UNIVERSIDADE DE SÃO PAULO ESCOLA DE ENFERMAGEM DE RIBEIRÃO PRETO

RHONDA NICOLA HENRY-NICHOLAS

Technique for non-invasive blood pressure measurement followed by the nursing staff working in a hospital in Guyana.

Ribeirão Preto

(2020)

(RHONDA NICOLA HENRY-NICHOLAS)

Technique for non-invasive blood pressure measurement followed by the nursing staff working in a hospital in Guyana.

Thesis presented to the Research Program Post-Graduation in Fundamental Nursing at Ribeirão Preto College of Nursing University of São Paulo to obtain the title of Master of Science Concentration area: Ciencias da Saúde? Advisor: Prof.^a Dr^a. Eugenia Velludo Veiga

Ribeirão Preto

(2020)

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Advisor: Prof. Dra.		_
Institution:	Signature:	
Prof. Dr	Institution:	
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DEDICATION

First and foremost I would like to dedicate this dissertation to the Almighty God because he has been my source of strength throughout my life and during this period nothing has changed.

Secondly i would dedicate it to my son Kareem Montbatten Nicholas who I was blessed with after fifteen years and who endured the loss of his mother's bond and embrace (but never her love) in his earliest stage of life for fifty six (56)days.

Then I would also like to dedicate this dissertation the rest of my family: my Husband Kurk Nicholas and daughters Shanaya and Johanna for supporting me all through the way and stood strong while I was away in Brazil studying.

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ABSTRACT

HENRY-NICHOLAS, R N. Technique for non-invasive blood pressure measurement followed by the nursing staff working in a hospital in Guyana. Thesis (Master) - Escola de Enfermagem, Universidade de Sao Paulo de Ribeirao Preto; Sao Paulo Brazil. 2020.

Background: Blood pressure is the force of blood pushing against a blood vessels traditionally measured non-invasively by auscultation using an aneroid gauge or mercury device. The objective of this study was to determine whether the nursing staff of a Public hospital in Guyana follow international guidelines for the measurement of blood pressure. Since the detection and subsequent management of patients with high blood require that the technique followed by nursing staff who measure patients' blood pressure produces accurate readings.

Methods: This was a quantitative, cross sectional study, conducted in the national referral hospital GPHC in Guyana assessing a sample of 137 of the 781 nursing staff working in the five departments of this hospital. Data was collected through the use of a questionnaire developed following the guidelines for non-invasive blood pressure measurement published by Nerengberg 2018, by the researcher and validated by experts in blood pressure measurement technique and research methodology.

Results: 5% of the participants was ward managers, 12% was RNM, 35% of the participants was registered nurses, 7% was qualified midwives, 18% of the participants was nursing assistants and 23% of the participants was patient care assistants. Most of the participants i.e. 39.4% had 4-6, years of experience 31.4% had more than 6 years of experience and 29.2% had 0-3ears of experience in their area off work which means that they all had education and experience in blood pressure measurement. When compared to the steps of the blood pressure measurement technique 72% allow the patient to rest for at least five minutes, 82% provided a calm and quiet environment, 37% explain to the patient not to talk during the procedure, 13% ask the patient to keep the legs uncrossed, 10% ask the patient to keep the feet flat on the floor and 31% of the participants ask the patient to keep the back against the chair.

Conclusion: None of the nursing staff of GPHC Guyana followed all of the steps in the guidelines for the measurement of non-invasive blood pressure. While 15 of the 26 steps in guideline measured resulted in more than 75% adherence there were 9 of the 26 steps that had a less than 25% adherence by nursing staff. This means that the steps in the blood pressure guidelines are taken without a standardized guideline and so nursing staff

Key words: Technique, Nursing staff, Blood Pressure measurement, Non-invasive,

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LIST OF ABBREVIATIONS

- 1. ACDC Ambulatory Care and Diagnostic Centre
- 2. AF -Atrial Fibrillation
- 3. AHA- American Heart Association
- 4. BP Blood Pressure
- 5. CTFPHC -Canadian Task Force on Preventative Health Care
- 6. DBP -Diastolic Blood Pressure
- 7. ESC-ESH European Society of Cardiology-European Society of HTN
- 8. GAPFON -Global Advisory Panel for The Future of Nursing
- 9. GPHC -Georgetown Public Hospital Corporation.
- 10. HBPM Home Blood Pressure Monitoring.
- 11. KAPB Knowledge, Attitude, Practices and Beliefs.
- 12. LRS- Low Resource Setting
- 13. MMHG -Millimeters of Mercury
- 14. NA -Nursing Assistant
- 15. PCA -Patient Care Assistant
- 16. QM -Qualified Midwife
- 17. RH -Resistant HTN
- 18. RN -Registered Nurse
- 19. RNM -Registered Nurse/Midwife
- 20. SBP -Systolic Blood Pressure
- 21. SMBP -Self-Monitoring Blood Pressure

- 22. SPSS Statistical Package for the Social Sciences
- 23. UNSDGs -United Nations Sustainable Development Goals
- 24. US- United States
- 25. USPTF United Preventive Task Force
- 26. WHL- World HTN League
- 27. WHO -World Health Organization
- 28. WM -Ward Manager

INTRODUCTION

1. INTRODUCTION

1.1 SEARCH PROBLEM

1.2 SIGNIFICANCE

Blood pressure (BP) is the measure of the force of blood pushing against the blood vessel walls (STEINBAUN, 2019). BP is usually expressed in terms of the systolic pressure (maximum pressure during one heartbeat) over the diastolic pressure (the minimum pressure between two heartbeats) in the cardiac cycle and it is measured in millimeters of mercury (mmHg) above the surrounding atmospheric pressure. It is one of the vital signs health care professionals use when evaluating a patient's health (BLOOD PRESSURE, 2020), and when the pressure gets too high its dangerous because it makes the heart works harder and results in a condition called HTN (HTN) which causes other disease conditions (STEINBAUN, 2019). Traditionally blood pressure is measured non- invasively using auscultation which is still generally considered the gold standard of accuracy for non-invasive BP readings, with either an aneroid gauge or a mercury sphygmomanometer (BLOOD PRESSURE, 2020).

High BP is estimated to be the leading risk factors for death in the world and second leading risk for disability with close to one billion people worldwide have high BP (CAMPBELL et al., 2010). It is estimated that between the years 2000 and 2025 the prevalence will increase by 60% which makes it a major public health challenge since it has a high association with cardiovascular disease and premature death (MILLS et al., 2018). According to the health in the Americas Statistics Pan American Health Organization, 2012 published report concluded that over the years high BP has been in the top three category of morbidity causes in Guyana. And according to World Health Organization (2015) high BP affects more that 1.13 million people internationally. Of this figure 23.5% of the Brazilian population was affected and 23.1% of the Guyanese population was affected. The statistics also represented that high BP affected 26.7% of Guyanese males and 21.5% of the Guyanese female population. The 2018 report from World Health Organization

(WHO) posited that in 2015 1-4men and 1-5 women had HTN and 1-5 of those affected with HTN had it under control (WHO , 2018). In a study "HTN Canada's 2018 Guidelines for Diagnosis, Risk Assessment, Prevention, and Treatment of HTN in Adults and Children" asserts that high BP is one of the most common chronic diseases affecting Canadians across their lifespan-from approximately 2% of children and adolescents, 1 to 7% of pregnant women and 2 to 25% of the adult population (NERENBERG et al., 2018). In the United States 29% of all adults have HTN, and it is present in 64.9% of people >60 years and 7.3% of those aged 19–39.4. (POPPAS; NADLER, 2019).

High BP is one of the most important risk factors for cardiovascular disease and requires a global response and so one of the nine United Nations targets to reduce non-communicable diseases (NCDs) by 2025 is to reducing uncontrolled BP by 25% (MANGAT et al., 2015). It cannot be ever emphasized that high BP is an important and modifiable risk factor for cardiovascular disease and mortality, and systolic blood pressure (SBP) of at least 110 mm Hg has been related to multiple outcomes (FOROUZANFAR et al., 2017). Most medical examinations include BP measurement as it is the best indicator of cardiovascular health (KAUR et al 2018).

In the Canadian 2018 guidelines for Diagnosis, Risk Assessment, Prevention, and Treatment of HTN in Adults and Children, emphasis is placed on the use of standardized measurement techniques and validated equipment for all methods of BP monitoring (automated office BP [AOBP], non-AOBP, home BP monitoring, and ambulatory BP monitoring) (NERENBERG et al., 2018). In order for HTN to be diagnosed and managed effectively the Is need for accurate measurement of blood pressure is essential regardless of the method used for measurement therefore ongoing training of health care professionals and validated and calibrated device are needed (MUNTNER et.al 2019).

In a study conducted by Veiga and collaborators (2003) which assessed the techniques for blood pressure measurement by health professionals of a public hospital in São Paulo State, in Brazil, the conclusion was that permanent educational activities aiming at standardizing blood pressure measurement should be implemented among the different categories of health professional (VEIGA et al., 2003).

In another study on average, in practice assessment, 65% of the steps were followed. The authors concluded that knowledge was poor and there was disparities between theory and practice.

There was evidence of steps taken without proper awareness and lack of consideration for important knowledge during implementation of BP measurement and suggested that educational and operational interventions should be applied systematically with institutional involvement to ensure safe care with reliable values (Machado et al., 2014). This supports Mills and associates when they suggests that there is a lack of adherence to clinical guidelines at the provider level therefore implementation strategies to overcome the barriers to BP control, such as home BP monitoring is necessary (MILLS et al., 2018) and Forouzanfar and friends however said that "There are some barriers to the control of HTN: the health care system, health care provider, and patient levels (FOROUZANFAR et al., 2017)."

When Carey and his associates, in 2018 conducted a study assessing standard triage BP measurements by clinic staff with an automated device obtaining up to 6 BP measurements 1 minute observing some steps of the guidelines, triage SBPs were a median of 17 mm Hg higher, and they unearthed that of the patients referred for resistant HTN (RH), inaccurate BP measurement was estimated at 33%CAREY, R. M. et al, 2018. The diagnosis and treatment of arterial HTN continue to rely primarily on non-invasive BP measurements. Although factors such as but not limited to, observer errors, digit preferences, lack of attention, too rapid cuff deflation, and hearing deficits may account for substantial inaccuracies. "Nevertheless, as there is no better alternative and so non-invasive BP measurement using the sphygmomanometric technique continues to be the gold-standard for BP measurement, both in clinical research and clinical practice" (DIETERLE 2012). HTN Canada's Canadian HTN Education Program Guidelines Task Force provides annually updated, evidence-based recommendations to guide the diagnosis, assessment, prevention, and treatment of hypertension. In 2016 they present 4 new recommendations one of which is automated office blood pressure, taken without patient-health provider interaction, is now recommended as the preferred method of measuring in-office blood pressure (HOWLETT et al., 2016)

The accurate measurement of BP is essential for the diagnosis and management of HTN. Regardless of the method used to measure BP, initial and ongoing training of technicians and healthcare providers and the use of validated and calibrated devices are critical for obtaining accurate BP measurements (VEIRA et al 2019). Looking at this study done by Levi and associates who also found few studies investigating the adherence to measurement guidelines focused their study on two important aspects of BP measurement: waiting time before measurement and number of readings taken. Of the one hundred and three patients who completed self-report questionnaires about office and home BP measurements, 77% reported that physician measurements were obtained without waiting and an even higher percentage -96% when measured by a nurse/technician. This team also reported that most patients received no measurement instructions prior to the procedure and concluded that Nonadherence to measurement guidelines is common, and may be affecting the validity of readings obtained in physicians' offices with significant and potentially harmful effects on treatment decisions. (LEVI et al 2016)

The non-invasive BP measurement supports a system placed on the surface of an underlying artery of a patient to collect the fluctuations in BP. While there are many different approaches to measure BP englobed under the two categories, invasive and noninvasive measurement the non-invasive BP measurement methods are widely used due to its non-intrusive nature and ease of use. BADRAN et.al 2019. The detection and subsequent management of HTN requires appropriate monitoring, and self-monitoring of BP (SMBP) is increasingly used for this purpose with endorsement by guidelines worldwide. (Hodgkinson et al. 2019). And when looking at the study done by Mancia et al (2016) it is shown that the stated relatively modest benefit from more than 3 days of readings or of any particular quantity or timing of readings within these 3 days suggests that more protracted schedules are only likely to be worthwhile around diagnostic or treatment thresholds. To attack this crisis in Brazil, on 9th August, 2019 the World HTN League (WHL) and partner organizations have developed the São Paulo call to action for prevention and control of high BP to help align health and scientific organizations and HTN experts with global best practices for HTN control ("HTN"). Clinical skills is the foundation for nursing practice and clinically competent students are a priority for nursing educators and so BP measurement with accuracy is one of the fundamental clinical skills performed by nurses regularly and nursing students Knowledge in this study is found to be high (GORDON; FROTJOLD; BLOOMFIELD, 2015) yet observations by patients, peers and other health professionals in another study indicate that measurement technique may not always be according to current best practice(FOKEN; FOKEN, 2017). Vital sign measurement (of which BP measurement is included) and assessment are important components of the review of systems in a physical therapy examination for individuals with and without documented cardiopulmonary disease. The measurement of blood pressure gives the health care provider insights regarding the patient's baseline cardiovascular status accurate measurement of blood pressure is critical for making appropriate clinical decisions (FRESE; FICK; SADOWSKY, 2011)

Search problem

Therefore, appropriate technique for noninvasive BP measurement is paramount for the diagnosing and treatment of high BP however evidence suggest that a large number of nursing staff is not adhering to all the steps of the BP measurement guidelines. If steps are omitted BP measurement values will be subjected to errors with significant practical consequences such as the patient being over medicated or under medicated or even diagnosed with Resistant HTN. Given the above, the research question is:

Are the techniques followed by the nursing staff of a public hospital in Guyana following recommended international guidelines for non-invasive BP measurement?

Significance of the study:

- This study is of great importance to support planning and implementation of actions and to promote improvements in practice of BP measurement as needed. In Guyana no study was found which supports quantification, specific educational or operational interventions for safety and guarantee of reliable values to guide interdisciplinary clinical management of high BP.
- To the nurses at the Georgetown Public Hospital Corporation (GPHC) since they would be participating in a study; demonstrating their technique as we aim to strengthen the Nursing and Midwifery competencies.
- The Ministry of Health and GPHC, since a detailed report of the findings would be presented to the authorities of these agencies, so that policy makers can refer to as they create and implement an evidence-based policies which ensures that appropriate techniques for measuring BP non-invasively are implemented and maintained as needed.
- The Nursing educators as we provide mechanisms to maintain or improve the basic nursing and midwifery curricula that is updated and applicable to the changing populations and service needs.

• It will add to the body of knowledge for subsequent studies assessing the technique followed for non-invasive BP measurement by nursing staff.

LITERATURE

Literature Reviews

In 2016 Jindal and associates conducted a study in Guyana to initiate a program for early detection of diabetes and HTN, the main causes of kidney failure in Guyana, South America. Seven local high school students were trained and taught to monitor the health of seven village with a population of 1000-1500 each, with the goal that these students would stay in the villages for longterm, become health advocates and shift the reliance away from physicians. The program lasted for three years and a total of approximately 10,000 people were screened which represented 1.3% population in Guyana. The data from the pilot study from the sample of 619 people showed; Prevalence of HTN was 29.4%, 63.2% were overweight and 17% were obese. About 9.9% patients were unaware about the existence of HTN. (JINDAL et al., 2016). In another literature: Policy Statement of the World HTN League on Noninvasive BP Measurement Devices and BP Measurement in the Clinical or Community Setting the authors purported that Increased BP is the leading risk factor for death and disability globally, with more than 40% of the adult population older than 25 years having HTN although much of its risk factors are preventable. The authors also attested to the fact that about half of patients with HTN remain undiagnosed hence, the World HTN League has made the increase in regular BP assessments and encouragement of widespread BP screening programs linked to diagnosis and clinical management of HTN to be among the highest of priorities. The policy statement is "Whether in low-, middle-or high-resource settings, recommendations for BP assessment are consistent and include a standardized approach to premeasurement preparation, patient positioning, appropriate cuff selection and placement, measurement technique, and use of accurate BP-measuring devices ``(CAMPBELL et al., 2014). A Scientific Statement from the American Heart Association on Resistant HTN: Detection, Evaluation, and Management reiterated that HTN is the world's leading risk factor for cardiovascular disease, stroke, disability and death. Although there was steady improvement of HTN awareness, treatment and control rates a large proportion of adults still fail to achieve their recommended BP. In 2017, American college of Cardiology /American Heart Association published clinical practice guidelines for prevention, detection and evaluation and management. The authors indicated that errors in BP measurement can account for the misdiagnosis of RH since the preparation of the patient, environmental conditions, cuff size, and technique of BP measurement can have a substantial influence on BP results. In particular, inherent BP variability dictates that diagnostic BP recordings include an average of at least 2 readings obtained on at least 2 separate occasions. Therefore, before the diagnosis of RH is made, it is critical to ensure accurate BP measurement. Similarly, out-of-office BP and self-monitored BP require proper technique. BP should be measured at any site according to current guidelines (CAREY et al., 2018). This systematic review and meta-analysis was done to assess the comparative effectiveness of 8 implementation strategies for BP control in adults with HTN. Systematic searches of MEDLINE and Embase Randomized controlled trials lasting at least 6 months, comparing implementation strategies versus usual care on BP reduction in adults with HTN. A total of 121 comparisons from 100 articles with 55,920 hypertensive patients were included in this study. Team-based care with and without a non-physician team member titrating medications and multilevel strategies without team-based care patient health coaching and home BP monitoring were the most effective implementation strategies for HTN control. The conclusion was, despite strong evidence that antihypertensive medications and lifestyle modifications reduce BP and subsequent cardiovascular disease morbidity and mortality, HTN control rates are low worldwide so the US Institute of Medicine and the National Heart Lung and Blood Institute have both called for research focusing on integrating evidence-based strategies into routine health care for HTN control. Their findings provide evidence that multilevel, multicomponent implementation strategies are most useful and should be recommended in clinical practice and public health policy for HTN control in communities (MILLS et al., 2018). (Mangat et al., 2015) in Policy Statement from the WHL BP screening programs are the first step in identifying a large number of people with HTN and both the US and Canadian task force on HTN have recommended screening for HTN in adults aged 18 years or older. In order to begin addressing this, a WHL committee was established on "BP Screening Programs in LRS" to create and disseminate comprehensive and easy to use resources to aid in the development and sustainability of HTN screening programs. To that end, the WHL has developed a standard set of resources titled "Train the Trainer" to guide the development of BP screening programs in LRS. So the module was rolled out and the target focus was to accurately measure BP which included use appropriate equipment, and providing accurate education. The fourth resource of the manual described recommended techniques for measuring BP using semi or fully automated device in the screening program while the fifth resource targeted the appropriate interpretation of the reading. Since 2002 the Working Group on BP Monitoring of the European Society of HTN International Protocol for validation of BP measuring devices in adults' states that is imperative to provide a protocol that is applicable to the majority of BP monitoring device on the market. Their validation process comprised a team of two observers a supervisor (nurse) and an expert (doctor). The process took on observer training and assessment, familiarization sessions, measurement validation and analysis and reporting. They described a measuring technique as follows: a must have certified functioning sphygmomanometer; specifically the Hawksley brand, BP should be measured with the arm supported at heart level; the level of the manometer does not affect the accuracy of measurement, but it should be at eye level and within one (1) m of the observer. The quality of the stethoscope is also crucial to performing the evaluation procedure. Stethoscopes with badly fitting earpieces and poor-quality diaphragms preclude precise auscultation of the Korotkoff sounds. A well-maintained quality stethoscope is recommended. The circumference of the arms should be measured to ensure that the bladder being used is adequate for the subject. During the procedure it was also recommended that the persons' rest for 10-15 minutes to minimize anxiety and any white-coat effect. (O'BRIEN et al., 2002). Researchers in Japan using a cross-sectional observational survey design method assessed the extent to which long term care facilities adhere to BP measurement guidelines. The results unearthed caused them to conclude that BP measurement guidelines were not necessarily followed by long-term care service facilities in Japan and that modifications for the guidelines may be needed. Appropriate upper-arm BP measurement devices were used at 302 facilities (68.2%), Pre-measurement resting time was appropriate (\geq 5 minutes) at 205 facilities (46.3%). Of the 302 facilities that used appropriate BP measurement devices, 4 (1.3%) measured BP on a bare arm while 266 (88.1%) measured BP over a thin sleeve and when the arms were covered with thick sleeves, BP was measured on a bare arm at 127 facilities (42.1%) and over a sleeve at 78 facilities (25.8%) (OZONE et al 2018) showing clearly that there was no standardized measurement technique for non-invasive BP. Even though there are no universally accepted guideline for measurement of BP there are areas of the technique that may be open for standardization. If not more results like the ones revealed when Holland and friends conducted a study for patients confined to bed with the aim of establishing areas of technique that might be open to standardization to improve measurement reliability. Their results of the observational study of one hundred patients in a variety of medical wards showed that BP was always taken initially with automated machines, 7% patients were lying flat, 32% semi-reclined, 24% had their back unsupported, 15% crossed legs, 9% arms unsupported, 65% arm below heart level, 4% above, 36% incorrect cuff size for arm circumference, 43% bladder not centered over brachial artery. They also found staff and patients were conversing during 41% measurements. This can lead to grave errors in BP readings, which presents an unreliable basis for clinical interpretation and decision making. Individual attention should be given to factors well known to affect BP measurement, such as correct cuff size and placement, arm position and absence of talking during measurement as well as only using validated machines (HOLLAND et al 2014). Those Authors outlines steps in the BP measurement technique that plays a vital role in ensuring accurate BP readings and presented findings to support that all the steps are not adhered to.

In this literature search; limited to outcome clinical trials published in English, in PubMed, between January, 1990 and April, 2017 where selected thirty six (36) milestone trials, which all spoke to variables such as patient position, devices used, rest period prior to BP testing and arm and cuff size used etc. as critical for BP measurement as guiding HTN therapy and preventing cardiovascular events. The authors also concluded that office BP measurement has been used for therapeutic monitoring of HTN for more than a century but that future clinical trials should consider also the out of office BP monitoring to guide therapy which reduces the white coat HTN (defined in the glossary) (CHEN; LEI; WANG, 2018). To compliment this study LeBlanc et al examined the Knowledge and practice outcomes after home BP measurement education programs. Choosing a pretest/post-test design and randomly dividing 95 adults into three groups: individual training (group A), group training (group B), and self-learning (group C), for education regarding HBPM in accordance with the Canadian HTN Education Program, the authors of this study investigated the outcomes of three home BP measurement (HBPM) education programs on adult knowledge and practice. Participants involved in groups A and B received interactive education led by a nurse. Participants in group C learned by themselves using an instruction booklet and a HBPM device lent to them for 7 days. Knowledge was assessed pretest and post-test by questionnaire and their skills were evaluated post intervention by direct observation. Analysis of the 60 participants indicated significant knowledge improvement. Pretest scores of 38% (group A), 54% (group B), and 45% (group C) rose significantly to 97%, 99%, and 90%, respectively (pretest vs. post-test; P<0.0001). Individual and group training sessions were significantly more effective compared with the self-learning program, which was confirmed by differences between groups in post-test practice. Assessment scores: 74% (group A), 79% (group B), and 53% (group C; group A vs. group C; P=0.001, group B vs. group C; P=0.001). Their findings indicate that adults attending an individual or group training program for HBPM retained its theoretical and practical principles better than those engaged in self-learning. Their success may be attributed to interaction with the nurse (LEBLANC; CLOUTIER; VEIGA, 2011). The aim of the subsequent study was to examine whether there is any difference between BP readings with patients crossing a leg at the knee level and uncrossing during BP measurement. It was clear that numerous factors influence an individual's BP (BP) measurement they looked at guidelines for accurately measuring BP inconsistently specify that the patient should keep feet flat on the floor. So using a mercuryfilled column sphygmomanometer, BP was measured at uncrossed leg position, crossed leg position and again at uncrossed leg position in 283 unmedicated or medicated patients. Three experienced nurses specially trained for the study performed BP measurements. The results indicated that BP increased significantly with the crossed leg position. Systolic and diastolic BP significantly increased approximately 10 and 8 mmHg, respectively. Concluding that crossing the leg at knee results in a significant increase in BP (PINAR; ATAALKIN; WATSON, 2010)To determine theoretical and practical knowledge of nursing professionals in a coronary unit concerning the steps of indirect BP measurement since Indirect BP measurement by the auscultatory method is the most widely used method. While it is a simple and easy procedure to be conducted it can present errors related to the environment, observer, patient and device itself, and so HTN guidelines describing steps for BP measurement reinforces the importance of obtaining reliable values to support adequate diagnosis and treatment of HTN. Among health professionals there are evidence of failures on measuring BP such as cuff-type chosen, patient position, values rounding and inadequate pre-measurement rest. This cross-sectional and descriptive study highlighted the poor theoretical and practical knowledge of nursing professionals on steps of indirect BP measurement. Health care professionals who have been specifically trained to measure BP accurately should assess BP in all adult patients' at all appropriate visits to determine cardiovascular risk and monitor antihypertensive treatment (GELFNER et al., 2018). The aim of this study was to assist with HTN control programs and specifically develop training and education curricula on HTN for health care professionals the authors Assessed healthcare professional knowledge, attitudes, and practices on HTN management. The team developed resources to assess the knowledge attitude and practices (KAP) on HTN management. Among other things they also developed tools to assess the measurement of BP, screening and diagnosis of HTN since the quest is to reduce HTN (CAMPBELL et al., 2017).

The authors of Principles and techniques of BP measurement have explained that although monitors that measure at the wrist have become popular the standard location for the measurement of BP is the brachial artery since systolic and diastolic pressures vary substantially in different parts of the arterial tree. They also explained that even though the mercury sphygmomanometers are rapidly being replaces by the aneroid devices BP is taken in the same manner for both; by an observer using a stethoscope and listening for the Korotkoff sounds. Additionally, they describe the oscillometric method which records the mean intra-arterial pressure beginning with systolic pressures and ends with the diastolic pressures; and the ultra sound technique which is advantageous since it uses a transducer and receiver placed over the brachial artery that is less susceptible to external noise. The document also addresses technical issues which are potential sources of error with BP measurement from the arm. Those issues addressed are the effects of posture most (guidelines recommend the sitting position although supine position yield accurate measurements also), body position which states that measurements are influenced as the arm moves up and down and if the patient is sitting bolt upright the diastolic pressure may be up to 6.5 mm Hg higher than if sitting back and cuff size which is critical in avoiding overestimation of the accurate measurement of BP (OGEDEGBE; PICKERING, 2010). To assess the techniques for BP measurement by health professionals of a public hospital in São Paulo State, Brazil using semistructured interviews and performing direct observations with a verification list according to the criteria from a previous study. Of sample size of 105 health professionals who took part in the study the results revealed - nurses and nurse's aides abided by 40% of the recommended procedures for adequate Bp measurement and the other categories of health professionals (nursing and medicine teachers, physicians, residents, and nursing students) abided by approximately 70%. Veiga and associates concluded that permanent educational activities with the aim of standardizing BP measurement should be implemented among the different categories of health professional (VEIGA et al., 2003). The objective of another cross-sectional study; to determine and to analyze the theoretical and practical knowledge of nursing professionals on indirect BP measurement unearthed that for the theoretical knowledge of the stages of preparation of patient and environment; 12.9% mentioned 5-minute of rest, 48.4% checked calibration, and 29.0% chose adequate cuff width. A total of 64.5% of professionals avoided rounding values, and 22.6% mentioned the 6-month deadline period for the equipment calibration. On average, in practice assessment, 65% of the steps were followed. Another study whose population comprised of thirty one (31) professionals of a coronary care unit i.e.86% of the nursing staff in the unit, 38.7% of professionals nurses and 61.3% nurse technicians. A validated questionnaire was used for the theoretical evaluation and for practice assessment in a simulation environment, under a nonparticipant observation the auscultatory technique was applied. Those authors concluded that knowledge was poor and had disparities between theory and practice with evidence of steps taken without proper awareness and lack of consideration of important knowledge during implementation of BP measurement and suggested that educational and operational interventions should be applied systematically with institutional involvement to ensure safe care with reliable values (Machado et al., 2014). Earlier; in 2013 a descriptive and cross-sectional study intended to evaluate and self-evaluate the knowledge of nurses from adult Intensive Care Units three public and teaching hospitals in the interior of São Paulo, Brazil; about direct and indirect BP measurement. Fifty-four nurses from three Intensive Care Units were approached. They answered a self-administered questionnaire with 65 questions forty (40) of which was related to BP. surprisingly nurses had insufficient performance on the test that assessed knowledge (average score 4.6). Half of the sample felt dissatisfied with their knowledge about BP. And while reviewing the questionnaires, they realize that the subjects self-rated their knowledge as regular 48.2%, bad 27.8% and poor 9.3% indicating they are aware of the importance for the subject to practice. This results displayed the need of urgent implementation of continuing education for this sample, since they are professionals who work directly with critical patients (ALMEIDA et al., 2013).

Again HTN is one of the main risk factors for cardiovascular diseases and nursing carries a large responsibility in care delivery to hypertensive individuals thus; the authors' goal was to assess a nursing team's knowledge on HTN and its treatment using before and after educational interventions. A questionnaire was used, addressing theoretical aspects of HTN knowledge among nurses (5), technicians (2), auxiliaries (11) and community agents (37); at two Basic Health Units in São Paulo City, Brazil. Nursing team members need tools that enable them to perform this care and retaining the knowledge permeating the problem is a fundamental starting point in the process. The study revealed the benefits for nurses, nursing technicians and auxiliaries and community health agents' knowledge, indicating that a systematic educative process can improve these professionals' knowledge, which can contribute to a change in the care panorama state (SILVA et al., 2010). In this 2018 ESC/ESH Guidelines for the management of arterial HTN/The Task Force for the management of arterial HTN of the European Society of Cardiology (ESC) and the European Society of HTN (ESH), Williams et al., 2018 published guidelines which included principles that should be maintained that while measuring BP in order to make an accurate diagnosis of HTN. Those principles are: patients should be seated comfortably in a quiet environment for 5 min before beginning BP measurements. Three BP measurements should be recorded, 1-2 min apart, and additional measurements only if the first two readings differ by >10 BP is recorded of mmHg. as the average the last two BP readings. Additional measurements may have to be performed in patients with unstable BP values due to arrhythmias, such as in patents with AF, in whom manual auscultatory methods should be used as most automated devices have not been validated for BP measurement in patients with AF. Use a standard bladder cuff (12–13 cm wide and 35 cm long) for most patients, but have larger and smaller cuffs available for larger (arm circumference >32 cm) and thinner arms, respectively. The cuff should be positioned at the level of the heart, with the back and arm supported to avoid muscle contraction and isometric exercise-dependent increases in BP. When using auscultatory methods, use phase I and V (sudden reduction/disappearance) SBP Korotkoff sounds identify to and DBP, respectively. Measure BP in both arms at the first visit to detect possible between-arm differences. Use the arm with the higher value as the reference. Measure BP 1 min and 3 min after standing from a seated position in all patients at the first measurement to exclude orthostatic hypotension. Lying and standing BP measurements should also be considered in subsequent visits in older people, people with diabetes, and people with other conditions in which orthostatic hypotension may frequently occur. Record heart rate and use pulse palpation to exclude arrhythmia. (WILLIAMS; MANICA, 2018).

Purpose of this next review was to indicate the key elements of current Canadian programs to treat and control HTN. These authors reminded us that in the early 1990s Canada had a HTN treatment and control rate of 13% so A Canadian strategy based on annually updated management recommendations knowledge translation and outcome assessment programs, to prevent and

control HTN was developed and a coalition of national organizations and volunteers formed to develop increasingly extensive programs. With this yearly review commencing in 1999 improvement was evident. However with more recent initiatives developed which included a more rigorous education program for the public and people with HTN the treatment and control rate increased to 66% when last assessed (2007–2009). The study describes important aspects of the Canadian HTN management programs to aid those countries wishing to develop similar programs and they say that many of the programs could be fully or partially implemented by other countries (CAMPBELL; SHELDON, 2010). Many experienced clinicians as well as medical and dental students do not measure BP accurately, because they either take shortcuts or lack knowledge regarding the appropriate technique. This article provides guidelines for proper BP measurement. (WEINBERG et al 2019)

The objective was to assess the effects of an educational intervention speaking to BP measurement, targeting the theoretical and practical knowledge of nurses from a cardiac unit. This quasi-experimental, before-and-after, study was conducted in a large tertiary hospital in Brazil and included all nurses working in that unit (31 nurses, 86.1%). Data were collected through two types of assessments: practical and theoretical knowledge of the technique, before-and-after the educational intervention that involved simulation as a teaching strategy. A validated checklist was used for both assessments. The results indicated that of the mostly female participants (64.5%), with an average age of 33.1 years old considerable improvement in theoretical and practical knowledge of nurses, which may contribute to safer healthcare delivery and error-free BP measurements (MACHADO et al., 2017).

STUDY OBJECTIVE:

To determine whether the nursing staff of a public hospital in Guyana follows international guidelines for noninvasive BP measurement.

METHODS

Methods

Study design

This dissertation makes use of a quantitative observational and cross- sectional study and part interview research strategies. This is so because the data gathered must be quantifiable using statistical and numeric value after analysis; and cross sectional because the data collection is at a single point in time. This quantitative observation technique is conducted on a sample which best represents the diversities that exist in the population within which the sample derived from hence the results will be generalizable. ("Quantitative Observation: Definition, Characteristics and Examples | QuestionPro",), 2020)

Setting

The study was conducted at Georgetown Public Hospital Corporation; The National Referral Hospital also known as the Specialty of Guyana. It is located in the heart of Georgetown, Guyana's capital and serves the Georgetown populace as well as persons from neighboring region, and those referred from out-station or the hinterland regions of Guyana. Its capacity is five hundred (500) beds divided in five (5) sub areas. Those areas are: The Maternity unit, The Pediatric unit, The Medical unit, The Medical- Surgical unit and The Ambulatory care and Diagnostic Centre (ACDC) which includes Accident and Emergency, Intensive Care and Cardiac Intensive Care Unit, Burns Care Unit, Operating Theatres and most of the specialist clinics. The hospital also houses specialist department like physiotherapy and psychiatry department.

The seven hundred and eighty one (781) nursing staff working at GPHC ranged in category from Director of Nursing Services (the highest category) to the Patient Care Assistant (PCA) (the lowest category). In between these two categories the hospital is staffed with nursing supervisors, ward managers (WM), registered nurse midwives (RNM), registered nurses (RN) qualified midwives

(QM), and nursing assistants (NA). These nurses are distributed throughout the various departments of this hospital. In the maternity unit there was 179 nursing staff, in the medical surgical unit there was 179 nursing staff, in ACDC there was 280 nursing staff, in the medical block there was 78 nursing staff and in the pediatric unit there was 78 nursing staff. (See Table 1). The departments were given acronyms which will be used in the rest of this report. Those are maternity unit (MU), medical surgical unit (MSU) Ambulatory care and Diagnostic Centre (ACDC) Medical Block (MB) and Pediatric Unit (PU). See Table 2).

Table 1- Distribution of nurses per department at GPHC. Georgetown, Guyana's - 2020. N=781.

Departments	of Nursing professionals (n)	
Maternity Unit	179	
Medical Surgical Unit	179	
Ambulatory Care And Diagnostic Centre	280	
Paediatrics Unit	65	
Medical Block	78	
Total	781	

Source: Data from the author herself. 2020

Table 2 Distribution of number of nurses that should be sampled in all areas of the GPHC.

Area	Nurses (n)	Abbreviations	Area
MU	45	MU	Maternity Unit
MSU	52	PU	Pediatric Unit
MB	20	MSU	Medical-Surgical
PU	23	MB	Unit Medical Block
ACDC	39	ACDC	Ambulatory Care And Diagnostic
			Centre
Total	179		

Georgetown, Guyana's - 2020. N=179.

Source: Data from the author herself. 2020

Sampling Design

For this study a population of 137 nursing staff (this six categories were WM, RNM, RN, QM, NA AND PCA) was asked to participate voluntary and consented before the data was collected. The researcher arrived at this number of nursing staff based on a proportionate to probability size sampling methodology. The nursing staff was involved in BP measurement and because these nursing staff was accessible any time of the day the participants was then selected conveniently. Everyone was included (male and female, irrespective of their years of experience and was working in the five areas of GPHC. Exclusion criteria included those nineteen (19) nurses who refused to participate, who were not on shift; either because of vacation leave or maternity leave, non-nursing personnel and nursing students.

Sampling Methodology

To perform the sample calculation, the PPS (Proportionate to Probability Size) method was used. The study population consists of 781 nursing professionals working in the five (5) units of the Hospital. The formula for sample calculation by the simple random sampling method (AAS) is given by Results The prevalence of positive response on the adoption of the shared management model based on the sample calculation was assumed unknown. Bussab and Bolfarine (2005), in order to obtain a conservative estimate of sample size, suggest a prevalence value of 50% ($\hat{p}_{srs} = 0.50$), which results in a sample size that includes any value of \hat{p}_{srs} .

Assuming a significance level of 5% ($\alpha = 0.05$), an accuracy of 7.5% (d = 0.075), delineation effect (deff) of 1.25, expected loss of 10% and average Nursing Number per Area (m) =~ 13, reached the number of 5 Areas, whose total students is 150 Nursings.

Ethical consideration

- A letter of approval was be obtained from the Ministry of Public Health; Ethical Review Committee Georgetown Guyana. IRB Approval of New Protocol #588/2019 (Appendix 1)
- Permission was granted from the chief executive officer of GPHC.
- The objectives and conduct of the study was explained to individual participants and voluntary informed consent of the participants was obtained.
- Confidentiality of information was guaranteed using the consent form (**Appendix 2**). Each questionnaire had a consent form that will be made available for the participants to sign.

- It was explained to the participants that they were needed only once, then investigators will observe them individually as he/she performs the procedure, and at the same time using the questionnaire to observe their technique and scoring will be done simultaneously.
- Following collection of the data questionnaires was kept in a locked cupboard and only the researcher had access to this cupboard.
- Although I work in the same institution as the participants, I do not work in the areas with them and therefore will not cause fear for the participant.
- The researcher's contact information was on the consent form and it was explained to them that if they wish to withdraw it will be granted and respected.

Data Collection

Data collection was done using a two-part questionnaire (Appendix 3) with structured questions. The first part of the questionnaire gathers demographic information of the participants and contains six (6) questions, while the second part of the questionnaire gathers information pertaining to the steps in the BP measurement technique and contains twenty-six (26) questions. Two of the researcher's colleagues was asked consented and assisted in the data collection process. Nine hours within three days was spent educating my assistants about my research project and how to use the questionnaire. They were instructed to explain the consent form, the questionnaire, the purpose of the research, and to tell the each participants that there will be no implications in cost nor other liabilities them when they volunteer. Then they are to ask the participants if they understand. If the participants answered in the confirmative then my assistants would give the nursing staff the consent form to sign. Those assistants would then complete the demographics for the participants and note the characteristics of the device selected by the participants. Following that my assistants would then observe the participants demonstrating the techniques followed for the measurement of noninvasive BP.

Questionnaires was then distributed by researcher and my two assistants who along with the researcher then approach potential participants, gained consent and gather the data needed by observing the technique the nursing staff demonstrated and ticking the appropriate box. Following which the completed questionnaires were returned to me and locked my locker until I was ready to analyze the data gathered.

Data analysis:

The questionnaire responses were coded, that is numerical value was assigned to each response since the possible responses was already known. The category of staff was coded with numerals 1 for WM, 2 for RMN, 3 for RN, 4 for QM, 5 for NA, and 6 for PCA. The responses for the steps in the BP guidelines was YES, NO and NA so the numeral 1 was assigned to YES, the numeral 2 was to NO and the numeral three was assigned to NA. The coded data was then manually entered into an Excel spread sheet. To ensure that there was no inputter error data cleaning was done by scanning the spreadsheet for errors and adjusting same. This data was later extracted to the IBM SPSS V.25 software and a descriptive analysis was done. The SPSS Software volume 25, which is used for the processing and analyzing of survey data. SPSS is short for Statistical Package for the Social Sciences, and it's used by various kinds of researchers for complex statistical data (https://www.computertechreviews.com/definition/spss-statistics/, 2020; analysis (54. https://www.ibm.com/analytics/spss-statistics-software, 2020). The in the SPSS software the frequency of a response in each question and percentage of each response for each question was described. To present the findings the results was displayed in tables, charts and paintings since those are clear and very easy to follow. To look at the difference between the category of staff and some steps of the BP guidelines followed a cross tabulation was done in the same SPSS software and displayed in a table. And the Chi-square was done to determine the significance of the difference between the results (KIRKLEES, 2013)

RESULTS

Results

A total of 137 participants were taken from six different categories of nurses working at GPHC. The distribution was: 7 was WM, 16 was RMN, 48 was RN, 10 was QM, 24 was NA and 32 was PCA.

Nursing Staff	Frequency (n)	Valid Percent (%)	
WM	7	5,1	
RNM	16	11,7	
RN	48	35,0	
QM	10	7,3	
NA	24	17,5	
PCA	32	23,4	
Total	137	100,0	

Table 3-Distribution of the nursing staff at the GPHC. Georgetown Guyana - 2020. n = 137

Source: Data from the author herself, 2020

And the largest portion of nurses was taken from the MSU which was 48 nursing staff of the total sample. The second largest portion of response came from the MU that is 33 nurses. 14 of the response came from the PU, 26 responses came from ACDC and 23 of the responses came from the MB.

Table 4-Distribut	ion of th	e department	assigned, a	t GPHC.	Georgetown	Guyana,	2020.
n=137.							

Dept. Assigned	Frequency	Valid Percent (%)	
Maternity	33	24,1	
Med Surgical	41	29,9	
ACDC	26	19,0	

Medical Block	23	16,8
Pediatrics	14	10,2
Total	137	100,0

Source: Data from the author herself, 2020

The results also showed that the largest portion of samples were taken from nurses who had four to six years of experience on the job that is 54 responses; those with more than six years on the department was 43 responses and 40 had less than three years of experience.

Table 5- Distribution of the Time in department, at GPHC in Georgetown Guyana, 2020

Time in Dept.	Frequency (n)	Valid Percent (%)
0-3years	40	29.2
4-6years	54	39.4
More than 6years	43	31.4
Total	137	100,0

Source: Data from the author herself, 2020

And of the 122 respondent who used the aneroid device only 115 of those ensure that they were using a calibrated device and 121 respondents used a validated device. The other 11 persons used a device that was not calibrated while five respondents used device that was not validated (Table 6 and Table 7).

Table 6 Distribution of the type of Device Used, at GPHC, Georgetown Guyana. 2020

Device Used	Frequency (n)	Valid Percent (%)	
Aneroid	122	89,1	
Automatic	15	10,9	
Total	137	100,0	

Source: Data from the author herself, 2020

equency (n)	Valid Percent (%)
5	91,3
1	8,7
6	100,0
4	equency (n) 5 1 6

Table 7: Distribution of the Device Calibrated, GPHC. Georgetown Guyana, 2020. n= 126.

Source: Data from the author herself, 2020

|--|

Device Validated	Frequency (n)	Valid Percent (%)
1	121	96,0
2	5	4,0
Automatic Device	11	0
Total	126	100,0
Total	137	100,0

Source: Data from the author herself, 2020

As it relates to the characteristics of the patient the results revealed that 84 of the participants chose the sitting position for the procedure, 48 participants choose to have the patients in the supine position and 5 participants had the patients with standing. Figure 1.



Source: Data from the author herself. 2020

Figure 1-Describes the Patients Position, at GPHC in Georgetown Guyana, 2020

Also the results revealed that the left hand was the favored arm chosen for the measurement of BP by participants with 69 participants choosing same and 65 choosing the right hand but only 3 choose "other" to measure BP. Figure 2



Source: Data from the author herself.2020

Figure 2: Distribution of the Arm used, at GPHC in Georgetown Guyana, 2020

The table below display the findings in percentage i.e. (%n yes, %n no and %n Na) of the steps in the BP measurement techniques followed by the nursing staff who participated in the research. Table 9

Table: 9 Describe the percentage responses (%n) of in each steps in the BP technique,GPHC. Georgetown Guyana, 2020. n= 137.

Steps in the BP Guidelines	% Yes	%No	%NA	Total (%)
Explain the procedure to the patient	83	17	0	100
Allow the patient to rest for at least five minutes	72	28	0	100
Provide a calm and quiet environment	82	17	1	100
Ensure the environment has a comfortable temperature.	85	12	3	100
Explain to the patient not to talk during the procedure	37	63	0	100
Test the stethoscope	66	8	6	100

Check the pressure gauge calibration	68	25	7	100
Assertain that the patient did not have a full bladder	12	86	2	100
Assertain that the patient did not exercise in the last 30 minutes	17	80	3	100
Ascertain that the patient did not consume alcohol in the last 30 minutes	13	80	7	100
Assertain that the patient had no food or coffee in the last 30 minutes	7	93	0	100
Ask the patient to keep the legs uncrossed	13	85	2	100
Ask the patient to keep the feet flat on the floor	10	63	27	
Ask the patient to keep the back against the chair	31	43	26	100
Ask the patient to keep the body relaxed	69	28	3	100
Remove any clothing from the patient arm	85	8	7	100
Position the patients arm at heart level	83	16	1	100
Keep the patients arm supported	73	6	1	100
Keep the patients Palm up	61	37	2	100
Keep the patients elbow slightly bent	60	38	2	100
Measure the patients arm circumference	3	90	7	100
Select the appropriate size cuff	87	13	0	100
Place the cuff so that the lover edge is 3cm above the antecubital fossa	82	16	2	100
Attach the cuff snugly to the patient arm	91	7	2	100
Palpate the radial pulse	74	20	6	100
Increase the pressure gauge rapidly	80	12	8	100
Place the bell or diaphragm of the stethoscope over the brachial artery	88	4	8	100
Deflate the cuff slowly	90	2	8	100
Determine the SBP	91	2	7	100
Determine the DBP	90	2	8	100

Proceed with rapid and complete deflation of the	85	8	7	100	
Pecord the RD clearly in the Datients notes	0/	6	0	100	
Record the Dr clearly in the rations notes	24	0	0	100	
Record the arm used	1	99	0	100	
Record the patients position during the procedure	3	97	0	100	

Source: Data from the author herself, 2020

The results were also described to show the number of nursing staff who scored Yes, No or NA to the steps in the BP measurement guidelines. The findings are of the 137 respondents of this study 114 respondents explained the procedure to the patient and 23 did not explain the procedure to the patient as they demonstrated the technique followed for the measurement of BP at GPHC; 98 respondents allowed the patient to rest for at least five minutes 38 respondents did not allow the patient to rest for at least five minutes and 1 respondent scored NA to allowing the patient to rest for at least five minutes; 112 provided an environment that was calm and quiet, 23 did not provide a calm and quiet environment and 2 scored not applicable as they demonstrated the technique followed for measurement of BP at GPHC,117 ensure that the environment chosen have a comfortable temperature, 16 did not ensure that the environment chosen have a comfortable temperature and 4 of the respondents scored NA demonstrated the technique followed for the measurement of BP; 51 respondents explain the patient not to talk during the procedure while 86 of the respondents did not explain to the patient not to talk during the procedure; 91 of the respondents tested the stethoscope, 38 respondents did not test the stethoscope and 8 of the respondents scored not applicable as they demonstrated the technique followed for measurement of BP.

In this study 93 of the respondents checked the pressure gauge calibration, 35 respondents did not check the pressure gauge calibration and 9 of the respondents scored NA checking the pressure gauge calibration as they demonstrated the technique followed for measurement of BP; 17 of the respondents ascertain that the patient did not have a full bladder, 118 respondents did not ascertain that the patient did not have a full bladder and 2 of the respondents scored not applicable to ascertaining that the patient did not have a full bladder; 23 of the respondents ascertain that the patient did not ascertain that the patient did not exercise in the last 30 minutes and 5 of the respondents scored not applicable to ascertaining that the patient did not consume

alcohol in the last 30 minutes, 110 respondents did not ascertain that the patient did not consume alcohol in the last 30 minutes and 9 of the respondents scored NA to ascertaining that the patient did not consume alcohol in the last 30 minutes as they demonstrated the technique followed for measurement of BP. Eighteen (18) ask the patient to keep the legs uncrossed, 116 of the respondents did not ask the patient to keep the legs uncrossed and 3 of the respondents did not ask the patient to keep the legs uncrossed during the procedure as they demonstrated the technique followed for the measurement of non-invasive BP;13 ask the patient to keep the feet flat on the floor, 87 of the respondents did not ask the patient to keep the feet flat on the floor and 37 of the respondents keeping the feet flat on the floor was NA; 42 ask the patient to keep the back against the chair, 59 of the respondents did not ask the patient to keep the back against the chair and for 36 of the respondents it was NA to ask the patient to keep the back against the chair during the procedure as they demonstrated the technique followed for the measurement of non-invasive BP. 95 of the respondents for this study ask the patient to keep the body relaxed, 39 of the respondents did not ask the patient to keep the body relaxed and 3 of the respondents scored NA to asking the patient to keep the body relaxed as they demonstrated the technique followed for measurement of noninvasive BP.

The results also showed that of the 137 respondents for this study 113 of the respondents position the patients arm at heart level, 22 of the respondents did not position the patients arm at heart level and 2 had NA to this step in the procedure; 100 respondents kept the arm supported, 35 of the respondents did not kept the arm supported and 2 of the respondents scored NA to keep the patients arm supported while demonstrating the technique followed for measurement of non-invasive BP; 83 respondents kept the patients palm up, 51 of the respondents did not keep the patients palm up and 3 of the respondents had a NA score to the step, 82 kept the patients elbow slightly bent, 52 did not keep the patient's arm slightly bent; 4 persons measured the patients arm circumference, 123 of the respondents did not measure the patients arm circumference and 10 of the respondents had a NA score this step; 119 respondents select the appropriate size cuff, 18 did not select the appropriate size cuff ; 112 placed the cuff so that the lover edge is 3 cms above the antecubital fossa and 3 had a NA score to the step place the cuff so that the lover edge is 3 cms above the antecubital fossa while demonstrating the technique followed for the step redge is 3 cms above the antecubital fossa while demonstrating the technique followed for the technique followed for the step redge is 3 cms above the antecubital fossa while demonstrating the technique followed for the technique followed for the step redge is 3 cms above the antecubital fossa while demonstrating the technique followed for the technique followed for the step redge is 3 cms above the antecubital fossa while demonstrating the technique followed for the technique followed for the step redge is 3 cms above the antecubital fossa while demonstrating the technique followed for the technique followed for the step redge is 3 cms above the antecubital fossa while demonstrating the technique followed for the technique followed for the step redge is 3 cms above the antecubital fossa whi

measurement of noninvasive BP; 125 attach the cuff snugly to the patients arm, 9 did not attach the cuff snugly to the patients arm and 3 of the respondents had a NA score to this step of the procedure as they demonstrated the technique followed for the measurement of non-invasive BP; 101 respondents palpate the radial pulse, 28 did not palpate the radial pulse and 8 had a NA score as the demonstrated the technique followed for the measurement of BP; 109 increased the pulse rapidly to 30mmhg above the level of which the radial pulse is extinguished. 17 did not increase the pressure rapidly to 30mmhg above the level of which the radial pulse is extinguished and 11 had a NA score to this step.

More results revealed that of the 137 respondents of this study 120 placed the bell or diaphragm of the stethoscope over the brachial artery, 5 did not place the bell or diaphragm of the stethoscope over the brachial artery and 12 of the respondents had a NA score to this step of the procedure as they demonstrated the technique followed for the measurement of non-invasive BP; 123 respondents of this study deflate the cuff slowly, 3 of the respondents did not deflate the cuff slowly and 1 of the respondents had a Na score to this step of the procedure as they demonstrated the technique followed for the measurement of non-invasive BP; 125 determine the SBP, 3 did not determine the SBP and 10 of the respondents had a NA score 123 determine the DBP,3 did not determine DBP and 11 scored NA; 129 respondents recorded the BP values clearly in the patients chart while 8 did not record the BP values in the patients' notes as they demonstrated the technique followed for measuring BP; 136 respondents did not record the arm used and 1 of the respondent recorded the arm used as they demonstrated the technique followed for BP measurement; 133 respondents did not record the patients position, 1 respondent recorded the patients position during the procedure.

Below are the results of Cross Tabulations represented as paintings.

Painting 1 - Table showing symmetric cross tabulation of between the categories of staff							
some step	os of the Bl	P measur	ement guideli	ines.			
Categor	Explain	Allow	Provide	Ensure	Explain	Stet the	Check the
y of staff	the	the	calm and	temperatur	to the	stethosco	pressure
	procedu	patient	quiet	e is	patient	pe	gauge
	re	to rest					calibration

			environme	comfortabl	not to		
			nt	e	talk		
WM	5	5	7	7	1	3	4
RMN	14	10	13	14	04	10	13
RN	44	36	40	40	20	34	32
QM	7	5	6	9	3	6	6
NA	21	17	19	20	9	15	15
PCA	23	25	27	27	14	23	23
Total	114	98	112	117	51	81	94
Source: D	ata from th	e author	herself, 2020				

Painting 2 – Table showing symmetric	cross	tabulation	of	between	the	Dept.	assigned
some steps of the BP measurement guide	elines	•					

Dept.	Explain	Allow	Provide	Ensure	Explain	Stet the	Check the
Assign	the	the	calm and	temperatur	to the	stethosco	pressure
ed	procedu	patient	quiet	e is	patient	pe	gauge
	re	to rest	environmen	comfortabl	not to		calibration
			t	e	talk		
MU	30	23	27	29	13	24	28
MSU	28	26	30	32	11	23	20
ACDC	24	19	23	22	9	12	10
MB	20	21	19	23	9	19	21
PU	12	9	13	11	9	13	14
Total	114	98	112	117	51	81	94
Source: I	Data from t	he author	herself, 2020		1		

Painting 3 – Table showing symmetric cross tabulation of between time in department
and some steps of the BP measurement guidelines.

Time in	Explain	Allow	Provide	Ensure	Explain	Stet the	Check the
departme	the	the	calm and	temperatur	to the	stethosco	pressure
nt	procedu	patien	quiet	e is	patient	pe	gauge
	re	t to	environme	comfortabl	not to		calibration
		rest	nt	e	talk		
0 - 3 years	33	30	27	31	17	30	27
4 - 6 years	45	41	41	50	18	36	34
More than	36	27	37	36	16	25	32
6 years							
Total	114	98	112	117	51	81	94
Source: Data from the author herself, 2020							

Painting 4 – Painting showing the percentage of the category of staff who allowed the patient to rest for five minutes before measuring the BP.

Category of	Allow the patient to rest for at least five minutes					
Staff	Yes	No	NA			
WM	4%	1%	0%			
RMN	4%	1%	0%			
RN	26%	8%	0%			
QM	4%	2%	1%			
NA	12%	5%	0%			
PCA	18%	5%	0%			
TOTAL	72%	23%	1%			

Chi-Square Tests

	Value	df	Asymp.
			Sig. (2-
			sided)
Pearson Chi-Square	15.445 ^a	10	.117
Likelihood Ratio	7.973	10	.632
Linear-by-Linear Association	.373	1	.541
N of Valid Cases	137		

a. 9 cells (50.0%) have expected count less than 5. The minimum expected count is .05.

Symmetric Weasures									
		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.				
Interval by Interval	Pearson's R	052	.080	609	.543°				
Ordinal by Ordinal	Spearman Correlation	055	.084	635	.526°				
N of Valid Cases		137							

Symmetric Measures

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

Painting 5 – Painting showing the percentage of the category of staff who ask the
patient to keep the legs uncrossed before measuring the BP.

Farmer 1. 1. 1. F 1. 1. 8. and 1. and 1								
Category of staff and the percentage		Ask the patient to keep the legs uncrossed			Total			
		1	2	3				
Categor y of	WM	Count	1	6	0	7		
Staff		% within Categor y of Staff	14.3%	85.7%	0.0%	100.0%		

		% within Ask the patient to keep the legs uncross ed	5.6%	5.2%	0.0%	5.1%
		% of Total	0.7%	4.4%	0.0%	5.1%
	RMN	Count	1	15	0	16
		% within Categor y of Staff	6.2%	93.8%	0.0%	100.0%
		% within Ask the patient to keep the legs uncross ed	5.6%	12.9%	0.0%	11.7%
		% of Total	0.7%	10.9%	0.0%	11.7%
	RN	Count	7	40	1	48
		% within Categor y of Staff	14.6%	83.3%	2.1%	100.0%
		% within Ask the patient to keep the legs uncross ed	38.9%	34.5%	33.3%	35.0%
		% of Total	5.1%	29.2%	0.7%	35.0%
	QM	Count	0	9	1	10

		% within Categor y of Staff	0.0%	90.0%	10.0%	100.0%
		% within Ask the patient to keep the legs uncross ed	0.0%	7.8%	33.3%	7.3%
		% of Total	0.0%	6.6%	0.7%	7.3%
	NA	Count	3	20	1	24
		% within Categor y of Staff	12.5%	83.3%	4.2%	100.0%
		% within Ask the patient to keep the legs uncross ed	16.7%	17.2%	33.3%	17.5%
		% of Total	2.2%	14.6%	0.7%	17.5%
	PCA	Count	6	26	0	32
		% within Categor y of Staff	18.8%	81.2%	0.0%	100.0%
		% within Ask the patient to keep the legs	33.3%	22.4%	0.0%	23.4%

		uncross ed % of Total	4.4%	19.0%	0.0%	23.4%
Total	1	Count	18	116	3	137
		% within Categor y of Staff	13.1%	84.7%	2.2%	100.0%
		% within Ask the patient to keep the legs uncross ed	100.0%	100.0%	100.0%	100.0%
		% of Total	13.1%	84.7%	2.2%	100.0%

Source: Data from the author herself.2020

Chi-Square Tests

CIII-Square resis			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.420 ^a	10	.685
Likelihood Ratio Linear-by-Linear	8.579	10	.572
Association	.422	1	.516
N of Valid Cases	137		

a. 11 cells (61.1%) have expected count less than 5. The minimum expected count is .15.

Symmetric Measures

		Value	Asymp. Std. Error ^a	Approx. T ^b	Approx. Sig.
Interval by Interval	Pearson's R	056	.083	648	.518°
Ordinal by Ordinal	Spearman Correlation	057	.083	663	.509°
N of Valid Cases		137			

- a. Not assuming the null hypothesis.
- b. Using the asymptotic standard error assuming the null hypothesis.
- c. Based on normal approximation.

DISCUSSION

Discussion

In analyzing the results of this research to determine whether the nursing staff of a public hospital in Guyana follow international guidelines for the measurement of noninvasive BP supports literature which suggests that nursing staff does not always follow the all the steps of an approved international guidelines during the measurement of non-invasive BP and the results supports this fact. This is evident in the results of this study discussed here. Over a period of five months from December, 2019 to April, 2020 data was collected using a two part questionnaire to examine the technique followed by nursing staff (WM, RMN, RN, QM, NA, PCA; six categories of nurses) of GPHC in Guyana and the evidence overwhelmingly supports this fact. So far a small amount of studies was found which assessed the techniques followed by nursing staff as they measure BP non-invasively and so the results of this study will contribute to building that body of knowledge. The questionnaire gathered demographics (that is category of staff, department assigned and the time in the department) for the participants, the position chosen for the procedure, the arm used for the procedure and the device chosen for the procedure while the second part of the questionnaire gathered data about the steps to be followed when measuring noninvasive BP.

Some results was chosen for discussion in order to answer the research question; Are the Nursing staff of a public hospital in Guyana follow international guidelines for the measurement of non-invasive BP? The position of the patient was considered for discussion since it was noted that majority of the 137 responses n-84 choose a sitting position for the procedure when n-48 nursing personnel choose to measure the BP while the patient was supine when compared this to the number of persons who ask the patient to keep the body relax n-95 persons and keep the back against the chair n-42 persons or keep the feet flat on the floor n-13 persons and ask the patient to keep the legs uncrossed almost supporting Machado and associatiates, 2014 quazi-experemental study results which indicated that some stages of the BP measurement technique are overvalued. Other important findings were the following 5% of the participants was ward managers, 12% was RNM, 35% of the participants was registered nurses, 7% was qualified midwives, 18% of the participants i.e. 39.4% had 4-6, years of experience 31.4% had more than 6 years of experience and 29.2% had 0-3ears of experience in their area off work which means that they all had education and experience in blood pressure measurement. When compared to the steps of the blood pressure

measurement technique 72% allow the patient to rest for at least five minutes, 82% provided a calm and quiet environment, 37% explain to the patient not to talk during the procedure, 13% ask the patient to keep the legs uncrossed, 10% ask the patient to keep the feet flat on the floor and 31% of the participants ask the patient to keep the back against the chair.

Based on the results a cross tabulation of was done to determine the number of each category of staff how follow the steps of the procedure to prepare the patient and device. The WM results was chosen for discussion since at GPHC one of their responsibility is to teach clinical skills and guidelines the other category of staff. Here it was revealed that of the 7 WM who participated in this research 5 WM explain the procedure to the patient and allow the patient to rest for five minutes, 7 WM ensure the environment chosen was calm, comfortable and had a comfortable temperature for the procedure 1 WM ask the patient not to talk during the procedure, 3 WM test the stethoscope before measuring the BP and 4 WM check the pressure gauge calibration for the device before measuring the patients BP. this means that at this level in there career they is no standardized technique that they follow.

Another cross tabulation was also done to determine the percentage of each category of nursing staff who allowed the patient to rest for five before measuring the BP. This showed that 4% of the WMs, 10% of the RNMs, 37% of the RNs, 5% of the QMs, 17% off the NAs and 26% of the PCAs who participated in this research allowed the patient to rest for five minute. A total of 72% of the total number of staff allowed the patient to rest for five minutes. Then the same cross tabulation was done to determine the percentage of each category of nursing staff who ask the patient to keep the legs uncrossed during the procedure. The result was 6% of the WMs,6% of the RNMs, 39% of the RNs, 0% of the QMs, 17% off the NAs and 33% of the PCAs who participated which represents only 13% of the total number of nursing staff who ask the patient to keep the legs uncrossed during the procedure. This also showed that all nursing staff does not follow all of the steps in the technique for BP measurement and that nurses at GPHC followed different steps of the technique. A number of other reasons could contribute to this fact such as when they were trained, their activities leading up to the procedure or even the fact that there is not a standardized guideline for nurses around the world to measure BP. This does not remove the fact that some steps in the technique more than others affects the BP value obtained and can contribute to

incorrect treatment or undiagnosed HTN. However causality was not one off the objective of this research.

In accordance with Carey et al 2018 my research showed that nursing staff omits the steps of the procedure which seeks to identify weather the patient had a full bladder, consumed food or alcohol within the last 30 minutes prior to the measurement of the BP, exercised within the last 30 minutes of the Prior to the measurement of the BP, somehow not rationalizing the importance of all of these steps and how they can affect the true value of the BP. And therefore presenting like treatment resistance and incurring longer hospital stay for the patients.

In fact, one hundred and thirty seven (137) nursing staff participated in this study and none of them followed all of the steps of the guidelines followed as they demonstrated the technique followed when they measure patients BP at GPHC in Guyana. At least three of the steps was omitted by nursing staff of GPHC in Guyana. On a few occasions the nursing staff omitted as much as nine (9) of the twenty six (26) steps in the measurement of BP.

Furthermore, although all of the participants had the same training during their school years the results now means that in Guyana there is a need to upgrade and standardize the guidelines in the schools of nursing and ensure that there is continuous nursing education and to ensure that the nursing staff always follow approved guidelines for the measurement of non-invasive BP measurement with an aneroid device since this will provide the true BP value and thus prevents treatment errors or longer hospital stay of patients. This study supports Holland et al in their 2014 study which suggest there is need for standardization of the BP measurement technique. Having nursing staff follow appropriate recommended guidelines for the measurement of non-invasive BP will almost guaranteed that there will be a reduction of undiagnosed HTN and treatment errors.

Some of the limitations for this study would be Because of the timeline and the scope for this research it could not be ascertain whether the different time of the day, or the activities of the nurses prior to the time of the data collection affects the technique demonstrated by the nursing staff. However I believe that those factors did not affects the results of this study since the participants were all nursing staff and their daily activities at work on an eight hour shift involves them measuring patient BP at least five times. So I therefore believe that the results are a true picture of how the nurses always measure BP. Another limitation is that because GPHC Guyana at the time had seven hundred and seventy eight (781) nursing staff and therefore I could not gather data from each one of them and so the sample was taken out of that population and the results are now generalized. This results now reflects the picture of how the nursing staff of GPHC Guyana measure BP. Again I believe that this does not change the results of the research because thee sample was taken from all of the five departments at GPHC. Finally nineteen of the nursing staff approached refused to participate in the research however this still does not alter the results of the research.

Conclusion

None of the nursing staff at GPHC in Guyana followed all of the steps of an international guidelines in the technique demonstrated in the measurement of non-invasive BP which therefore produces BP values that do not necessarily reflect the true value of the patients' BP at the time of measurement. While 15 of the 26 steps in guideline measured resulted in more than 75% adherence there were 9 of the 26 steps that had a less than 25% adherence by nursing staff. This means that the steps in the blood pressure guidelines are taken without a standardized guidelines. There are some steps in the technique such as having the legs crossed, positioning of the hand above or below the heart level have shown to results in inaccurate BP value and the results of this study showed that those steps were not adhered to 100%.

Numerous but not enough studies have been published or referenced in this study on the guidelines for the measurement of BP that inform how to obtain an accurate BP measurement or supported that there are discrepancies in the technique followed by nursing staff when they measure BP. However the results of this study agree with those authors mentioned. And to answer the research question it was concluded that nursing staff at GPHC, Guyana do not follow recommended guidelines for the non-invasive measurement of BP.

Recommendations

The nursing education curriculum should be studied to determine its contents and guidelines modify as necessary to ensure that its standards meet internationally recognized guidelines like the Narengberg 2018 guidelines.

The nursing council the licensing body for nurses in Guyana should ensure that continuous nursing education is done which will seek to ensure that the nursing staff country wide abreast with current guidelines for the measurement of non-invasive BP.

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APPENDECES

Appendix 1

Scanned copy of the IRB approval letter

Appendix 2

CONSENT FORM

Dear participant, my name is Rhonda Nicola Henry-Nicholas and am currently pursuing Masters Science degree at the Escola de Enfermagem de Ribeirão Preto, University of São Paulo, Brazil.

My research is a requirement for successful completion of this program thus the title of my research is: Technique for non-invasive BP measurement followed by the nursing staff working in a hospital in Guyana.

My research question is: Are the techniques followed by the nursing staff of a hospital in Guyana following recommended international guidelines for noninvasive BP measurement? To achieve success in gathering data, I am kindly requesting your voluntary participation as we complete this questionnaire which is designed to guarantee no risk or expenses to you as a participant. The researcher has also made providence to ensure that confidentiality is maintained.

It is the hope that this research be beneficial to nursing staff, nursing educators and policy makers as we seek to ensure and improve patient safety (preventing inaccurate diagnosis and treatment) by guaranteeing appropriate BP measurement technique and accurate BP values. By extension with upgraded BP measurement guidelines nurses can contribute to improving BP management and control and therefore reduce the burden of cardiac disease in Guyana.

I have provided my contact information should you need more clarity or wish to withdraw from participating.

Name of Participant_____

Signature of Participant.

Thank you, Rhonda Henry-Nicholas

Email: rocola2c@yahoo.com, Tele: 6777835

Appendix 3

DATA COLLECTIO	ON INSTRUM	ENT- PRACTICAL ASSESSMENT OF N	NON- IN	VASIVE B	P	
MEASUREMENT W	VITH ANERO	D DEVICE			•	
Date	Document	Participant`s Initials				
	ID. Number					
Category of	WM ()	RMN ()	RN ()	QM ()	NA (PCA (
Nursing stall	Motomity ()	Mad Summingl ()	ACDC	Madiaal) Daada)
Assigned	Materinty ()	Med-Surgical ()	ACDC	Block (Paeus	
Assigned						
Time in	0-3years ()	4-6years ()	more th	an 6years	()	
Department	-			·		
Patient's Position	Standing (Sitting ()	Supine	()		
)					
Arm used	Right ()	Left ()	Other () Specify		
Type of Device	Aperoid()	Automatic (1	1	
Device Calibrated (Device Not C	alibrated (
)	Device Not C					
Device Validated)	Device Not V	alidated ()				
Steps in the non-invasive BP measurement Guidelines			Assessr	nent	•	
			YES	NO	NA	
1		Explain the procedure to the patient	YES	NO	NA	
2		Allow the patient to rest for at least	YES	NO	NA	
		five minutes				
3		Provide a calm and quiet environment	YES	NO	NA	
4		Ensure the environment chosen has a	YES	NO	NA	
		comfortable temperature				
5		Explain to the patient not to talk	YES	NO	NA	
	-	during the procedure				
6	-	Test the stethoscope	YES	NO	NA	
7	E	Check the pressure gauge calibration	YES	NO	NA	
8	atio	Ascertain that the patient does not	YES	NO	NA	
	bara	have a full bladder	T IE G		374	
9	rep	Ascertain that the patient did not	YES	NO	NA	
10	nt F	exercise in the last 30 minutes	VEC	NO	NT A	-
10	ttien	Ascertain that the patient did not	IES	INU	INA	
11	Pa	Ascertain that the nation had no food	VEC	NO	NA	
		or coffee in the last 30 minutes	115			
	1	or correct in the fast 50 minutes	1	1	1	1

12		Ask the patient to keep the legs uncrossed	YES	NO	NA	
13		Ask the patient to keep the feet flat on the floor	YES	NO	NA	
14		Ask the patient to keep back against the chair	YES	NO	NA	
15		Ask the patient to keep the body relaxed	YES	NO	NA	
16	tion	Remove any clothing from the arm to place the cuff	YES	NO	NA	
17	osi	Position the patient's arm at heart level	YES	NO	NA	
18	с _с	Keep the patient's arm supported	YES	NO	NA	
19	nt)	Keep the patient's palm up	YES	NO	NA	
20	atie	Keep the Patient's elbow slightly bent	YES	NO	NA	
21	C,	Measure the patients arm circumference	YES	NO	NA	
			1			
22		Select the appropriate size cuff	YES	NO	NA	
23		Place the cuff so with the lower edge 3cm antecubital fossa	YES	NO	NA	
24		Ensure that the bladder is centered over the brachial artery	YES	NO	NA	
25		Attach the cuff snugly to the patients arm	YES	NO	NA	
26		Palpate the radial pulse	YES	NO	NA	
27		Increase the pressure rapidly to 30mmHg able the level of which the radial pulse is extinguished	YES	NO	NA	
28		Place the bell or diaphragm of the stethoscope over the brachial artery	YES	NO	NA	
29	SC	Deflate the cuff slowly (mm/sec.)	YES	NO	NA	
30	nt Stej	Determine the SBP on auscultation of the first clear tapping sound	YES	NO	NA	
31	Iremei	Determine the DBP on auscultation at the point which the sound disappear.	YES	NO	NA	
32	Measu	Proceed with rapidly and complete deflation of the cuff	YES	NO	NA	
			1			
33	ntatio	Record the BP clearly in the patients notes	YES	NO	NA	
34	mei	Record the arm usedYESNO				
35	Docui	Record the patient's position during the procedure	YES	NO	NA	

CODES: Y-YES NOT APPLICABLE	N-NO	NA-
Comments or		
Suggestions		

SCHEDULE OF ACTIVITIES DEVELOPED

Time-line for Research

Activity	<u>2018</u>	<u>2019</u>			2020				<u>2021</u>	
	Sept	Jan	May-	Sept	Oct-	<u>Jan-</u>	<u>Apr</u>	<u>June</u>	<u>Sept</u>	<u>Jan</u>
	-	-	Aug		Dec	<u>Mar</u>	=		<u>-Dec</u>	=
	Dec	Mar					<u>May</u>			<u>mar</u>
Enrolled in	Х									
USP-RP										
Visit to	Х		Х	Х						
USP-RP										
Meetings	Х	Х	Х	Х	Х	Х	Х	Х	Х	Х
with										
Supervisor										
Proposal	Х	Х	Х	Х	Х	Х	Х	Х	Х	
development										
and										
literature										
IRB			Х							
submission										
Qualifying				Х						
exam										
Data					Х	Х				
Collection										
procedures										
Data							<u>X</u>			
Analysis										
Thesis								Х		
writing										
Attendance			Х				Х	Х	X	Х
at										

conferences,						
and other						
scientific						
events						
Final editing				Х		
of thesis and						
presentation						
of Report						
Defense of				Х	Х	Х
Thesis						