

Effect of a Care Bundle for Hypertension Control on the Health Outcomes of Hypertensive Patients with Stroke Risk

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Abstract Background: Care bundles contain three to five evidence-informed practices, which need to be delivered collectively and consistently to improve health outcomes of patients. **Objectives:** this study aimed to assess the level of stroke risk among hypertensive patients, evaluate the effect of a care bundle regarding hypertension control on health outcomes of hypertensive patients with stroke risk and identify factors associated with the effect of care bundles on hypertensive patients. **Design:** a quasi-experimental research design was used in this study. Setting: this study was conducted in medical outpatient clinics of governmental and health insurance hospitals in Port-Said city. Sample: a purposive sample of 105 patients was included. **Instruments:** three tools were used for data collection, including a structured interview to assess the socio-demographic characteristics and medical histories of patients, a stroke risk assessment screening tool to determine stroke risk among hypertensive patients and clinical measures such as pulse, blood pressure, body mass index, serum cholesterol and fasting blood sugar. **Results:** the study results revealed obvious improvements in health outcomes of patients, which were reflected in the significant differences in clinical measures, such as systolic blood pressure, cholesterol level, body mass index and fasting blood sugar, with P-values of 0.000, 0.000, 0.000 and 0.002, respectively, between hypertensive patients pre- and three months post-patient education with the care bundle for hypertension control. However, nearly two-thirds of hypertensive patients in the study sample were at moderate risk for stroke, and the rest were at severe risk. Conclusion: the current study concluded that educating hypertensive patients at risk for stroke with the care bundle for hypertension control could significantly improve their clinical measures. However, further research on a larger sample that includes hypertensive patients with or without stroke risk is recommended.

Keywords: hypertensive, care bundle, cholesterol, control, patients, stroke, risk

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1. Introduction

Care bundles contain three to five evidence-informed practices that need to be delivered collectively and consistently to improve patient health outcomes [1]. It is believed that care bundles including a combination of several evidence-based practices that nurses are familiar with could greatly promote positive outcomes in patients. Logically, "the whole is greater than the sum of its parts" seems to be a logical clinical principle to follow [2]. Applying a care bundle is a way to overcome the gap between clinical practice and research.

Nearly one-third of adults in developed and developing countries have hypertension [3]. Hypertension is classified into two types: the first type is essential hypertension, which represents at least 95% of hypertensive adult

patients. The causes of primary or essential hypertension are unknown, although genetic and environmental factors play a role in blood pressure regulation. The common risk factors that could be controlled include increased sodium intake, overweight, smoking and alcohol consumption. However, other factors cannot be modified, such as age and genetic factors leading to inappropriately high renin-angiotensin in aldosterone system and sympathetic nervous system activity. The second type is secondary hypertension and represents only 5% of all patients with hypertension; this type of hypertension results from complications of other diseases, such as chronic kidney disease and/or renal artery stenosis [3].

Hypertension is classified as stage one hypertension when blood pressure is 140/90 mmHg or higher, with an average blood pressure of 135/85 mmHg or higher. Stage two blood pressure is 160/100 mmHg or higher, with an average blood pressure of 150/95 mmHg or higher. Severe

hypertension is when clinic systolic blood pressure is 180 mmHg or higher or clinic diastolic blood pressure is 110 mmHg or higher [4]. The National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure classified hypertension as follows: 120-139/80-89 mmHg as pre-hypertension, 140-159/90-99 mmHg as stage one and $\geq 160/\geq 100$ mmHg as stage two [5,6].

According to Canadian hypertension evidence-based practice guidelines [7], health behaviour management to control hypertension includes physical exercise for stage one hypertensive individuals, as use of resistance or weight training exercise (such as free weight lifting, fixed weight lifting, or handgrip exercise) does not adversely influence BP (grade D). Weight reduction, reflected as a decrease in body mass index, is a grade B strategy for reducing blood pressure. However, weight loss strategies should employ a multidisciplinary approach that includes dietary education and increased physical activity, which is a grade B strategy. Recommended dietary measures include fruits, vegetables and low-fat dairy products, dietary and soluble fibre, whole grains and protein from plant sources that are low in saturated fat and cholesterol and limiting sodium intake to 5 g of salt per day, which is a grade A strategy for reducing blood pressure.

Moreover, for hypertensive patients in whom stress may contribute to blood pressure elevation, stress management should be considered as a grade D intervention. Individualized cognitive behavioural interventions are more likely to be effective when relaxation techniques are employed (grade B). Therefore, the current study aimed to evaluate the effect of care bundles that include a combination of three or more evidence-based guidelines for hypertensive patient management or control through the assessment of clinical measures or indicators such as pulse, blood pressure, glucose level, cholesterol and body mass index before and after applying care bundles regarding hypertension control.

2. Study Objectives

1. Assess level of stroke risk among hypertensive patients.
2. Evaluate the effect of the care bundle regarding hypertension control for hypertensive patients at risk for stroke.
3. Identify factors associated with the effect of the care bundle for hypertensive patients.

3. Research Hypothesis

The clinical measures of hypertensive patients with stroke risk will be improved after applying a care bundle regarding hypertension control.

4. Methodology

4.1. Study Design

A quasi-experimental research design will be used in this study, with pre- and post assessment of clinical measures of hypertensive patients at risk for stroke.

4.2. Setting of the Study

This study was conducted in medical outpatient clinics of governmental and health insurance hospitals in Port-Said city.

4.3. Sample

Purposive samples of 105 adult hypertensive patients with moderate and/or severe risk for stroke occurrence attending the study settings in a period of six months were included in the study.

4.4. Tools for Data Collection

Three tools were used for data collection. The first tool is a structured interview questionnaire that was developed by researchers after reviewing relevant, recent and related literature [8]; the questionnaire was used to assess the patients' socio-demographic characteristics, such as age, gender, educational level, occupation, and marital status. Additionally, the medical histories of patients, such as previous disease (e.g., cardiovascular) and previous stroke, were assessed. The second tool is a stroke risk assessment screening tool [9]. This tool aims to assess the level of stroke risk, which is classified into low, moderate and high risk. The screening tool comprises 18 questions about various risk factors, with yes/no responses. The scoring according to tool guidelines is based on the summation of "yes" responses to these questions.

The third tool involved clinical measures detected by the researcher based on reviewing relevant literature [10], including pulse, blood pressure, body weight and height, serum cholesterol and fasting blood sugar. These measures were assessed before and three months later after educating hypertensive patients with stroke risk regarding their hypertension control, e.g., dietary recommendation and physical activity, including exercise, medication adherence and stress management, to determine the effect of the care bundle on clinical measures.

4.5. Data Collection

Data were collected two times: first, before the application of a care bundle regarding hypertension control, and second, three months after educating hypertensive patients with stroke risk about the hypertension control needed to avoid related complications.

4.6. Ethical Considerations

An approval was taken from Research Ethics Committee (REC), Faculty of Nursing/ Port Said University. Approval was acquired from the directors of hospitals included in the study after a comprehensive explanation of study aim, benefits and processes. Additionally, before data collection, oral consent was acquired from each patient after explaining the study aim and process.

5. Results

The current study was conducted on 105 hypertensive patients, 57% of whom are female. Moreover, 66.7% of

patients were married, and 29.5% were widowed. On the other hand, (more than one-third) of the hypertensive patients were aged between 52 and 62 years old (41.9% of the study participants), followed by patients older than 62 years old (28.6%).

Furthermore, the percentage of illiterate patients was the same as the percentage of patients with secondary school education (22.9%). More than approximately 56.2% of patients worked a mean of 4.3 ± 4.06 hours daily, and 64.8% of patients did not have enough income (see Table 1).

Table 1. Socio-demographic characteristics of the study sample (n=105 patients)

Socio-demographic characteristics	N (%)
Education:	
Illiterate	24 (22.9%)
Ability to read and write	14 (13.4%)
Primary school	15 (14.3%)
Secondary school	24 (22.9%)
Institute	11 (10.5%)
University	17 (16.2%)
Working:	
Yes	59 (56.2%)
No	46 (43.8%)
Working hours daily (mean \pm SD)	4.3 \pm 4.06
Income:	
Enough	37 (35.2%)
Not enough	68 (64.8%)

In addition, 62.9% of patients were admitted to the hospital one time last year, 66.7% of patients stayed less than seven days in the hospital, and the highest percentage of patients were admitted because of hypertension, followed by heart disease, at 62.8% and 49.5%, respectively (see Table 2).

Additionally, the study results revealed that 55% of study patients had a family history of diabetes mellitus, and 49.7% had hypertension, while 32.4% of their family had cardiovascular disease, and 10.5% had previous stroke.

Table 2. Past medical history of patients with hypertension (n=105 patients)

Medical history	N
Frequency of hospital admission in the last year:	
one time	66 (62.9%)
2 times	17 (16.2%)
3 times	11 (10.5%)
> 3 times	15 (14.3%)
Duration of hospital stay:	
<7 days	70 (66.7%)
7 to 14 days	30 (28.6%)
>14 days	5 (4.8%)
Causes of admission:	
Heart disease	52 (49.5%)
Hypertension	66 (62.8%)
Diabetes mellitus	36 (34.3%)

The study results revealed that 61% of hypertensive patients are at moderate risk for developing stroke.

However, more than one-third of study patients are at high risk for stroke (see Figure 1).

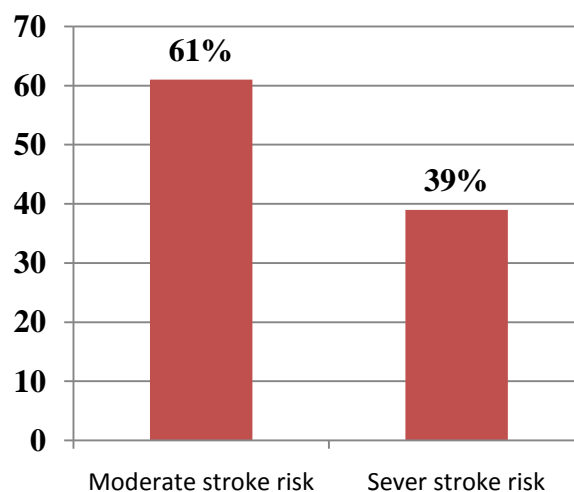


Figure 1. Levels of stroke risk among hypertensive patients

Additionally, the current study results revealed a significant difference between clinical measures, such as systolic blood pressure, cholesterol level, body mass index and fasting blood sugar, of hypertensive patients pre- and post-exposure to care bundles regarding hypertension control, with P-values of 0.000, 0.000, 0.000 and 0.002, respectively.

In addition, the current study revealed a significant relationship of systolic blood pressure with gender, education, presence of health insurance and employment using Kendall's tau-b test, with P-values of 0.021, 0.025, 0.036 and 0.048, respectively, three months after implementing a care bundle. Moreover, the marital status and cholesterol level of patients were significantly related to systolic blood pressure using the Pearson chi-square test, with P-values of 0.011 and 0.000, respectively. However, other factors, such as income, fasting glucose level, body mass index, age group and the presence of a lift in the living place, were not significantly related to systolic blood pressure three months after implementing the care bundle for hypertension (see Table 3).

Table 3. Comparison of clinical measures pre- and post-care bundle intervention in hypertensive patients with stroke risk

Clinical measures	Mean \pm SD	P-value
Pulse (pre-intervention)	81.68 \pm 7.263	0.088
Plus (post-intervention)	80.71 \pm 4.90	
Systole blood pressure (pre-intervention)	137.24 \pm 20.40	0.000
Systole blood pressure (post-intervention)	129.14 \pm 10.01	
Diastolic blood pressure (pre-intervention)	84.19 \pm 13.83	0.613
Diastolic blood pressure (post-intervention)	83.61 \pm 7.22	
Fasting blood sugar (pre-intervention)	176.14 \pm 76.26	0.002
Fasting blood sugar (post-intervention)	155.01 \pm 71.84	
Cholesterol level (pre-intervention)	186.21 \pm 34.40	0.000
Cholesterol level (post-intervention)	176.59 \pm 28.84	
Body mass index (BMI) (pre-intervention)	30.86 \pm 6.83	0.000
Body mass index (BMI) (post-intervention)	30.22 \pm 6.31	

Significance considered when p-value \leq 0.05.

6. Discussion

The current study was conducted to assess the effect of cholesterol control intervention on clinical measures of hypertensive patients at risk for stroke. A total of 105 patients at risk for stroke participated in the study, and more than half of these patients are female.

Additionally, most (more than one-third) of the patients were between 52 and 62 years old, followed by patients older than 62 years old. Inconsistent with these results, the report by the ¹¹ stated that more than two-thirds of patients with hypertension were over 65 years old.

This report showed the large difference in the occurrence of hypertension among different age groups, which could reflect an increase in life stressors or other risk factors, such as lifestyle changes that increase or cause hypertension in different age categories. Additionally, the current study results revealed that more than half of the study patients had a family history of diabetes mellitus, and nearly half of these patients had hypertension. Nearly one-third of the study patients had cardiovascular disease.

The study by [3] reported that almost all hypertensive patients are at risk for or have lipid abnormalities, glucose intolerance, or diabetes; have a family history of early cardiovascular disease; are overweight; and smoke tobacco.

The current study revealed a significant difference between clinical measures, such as systolic blood pressure and body mass index, of hypertensive patients pre- and three months post-patient education with the care bundle for hypertension control. These results are supported by a randomized controlled trial on lifestyle modification that included cholesterol control intervention in hypertensive patients conducted by [12], which found a significant difference between both study and control groups regarding body mass index in the follow-up phase after 6 months. Moreover, systolic and diastolic blood pressure was decreased in the study group. [13] Reported a significant decrease in systolic blood pressure after lifestyle modifications. The study by [14] on lifestyle modifications for hypertension prevention and management revealed that modification of lifestyle could decrease blood pressure in hypertensive patients. Moreover, another study reported that lifestyle modifications or interventions including weight loss controlled both diabetes and lipid levels. Simple exercise, such as walking, aerobics, bicycling and/or climbing stairs, plays a crucial role in controlling hypertension [15]. Hypertensive patients at risk for stroke, such as those in the current study, may acknowledge their health risks, increasing their attention and adherence to hypertension control and causing a significant reduction in blood pressure and body mass index, which is continued with the care bundle for hypertension control. Additionally, the combination of more than evidence-based guidelines in a care bundle could be effective in controlling hypertension. Inconsistent with these results, a systematic review revealed very-low-quality evidence from controlled before-after studies (downgraded due to the risk of bias, inconsistencies and potential indirectness of outcomes) suggesting that the implementation of care bundles may be an effective strategy to improve patient outcomes when compared with the usual care. In addition, low-quality evidence from five randomized trials (downgraded due to the risk of bias,

inconsistencies and potential indirectness of outcomes) was highly uncertain [16].

Furthermore, the current study results found significant differences between other clinical measures, such as cholesterol level and fasting blood sugar, of hypertensive patients pre- and three months post-patient education with the care bundle for hypertension control, which is inconsistent with the results of the study by [13] about the effects of premier lifestyle modification on patients with and without metabolic syndrome, stating that fasting blood glucose was, but not significantly, reduced and that the reduction in cholesterol level was unremarkable. The interpretation of these study results may show that nearly two-thirds of the study patients were previously admitted to hospitals. Additionally, approximately half of the study patients admitted to the hospital due to heart disease, while nearly two-thirds were admitted due to hypertension, which could be serious motivation to adhere to hypertension control, leading to a significant reduction in their cholesterol and fasting glucose levels.

On the other hand, the current study revealed a significant relationship of systolic blood pressure with gender, education, the presence of health insurance and employment. Additionally, the marital status and cholesterol level of patients have a strong, significant relationship with systolic blood pressure three months after implementation of the hypertension care bundle. However, there are many factors, such as income, fasting glucose level, body mass index, age groups and/or the presence of a lift in the living place, that are not significantly related to systolic blood pressure three months after implementation of the hypertension care bundle. These results may show that a combination of several factors can underlie improvements in blood pressure. However, the nature or characteristics of patients who participated in the current study are as follows: most patients were educated to different levels, more than half of these patients are still working, more than three-quarters of them have health insurance, their income ranged from enough to mostly enough, and nearly two-thirds are married; all of these factors are helpful in promoting adherence to care bundles for improving hypertension. In contrast, age, income, body mass index or availability of a lift in homes did not play an important role in improving blood pressure, which could be because most patients did not have a lift in their home, their mean age was over 55 years old, and nearly two-thirds of patients were between ideal and overweight, so all patients who participated in this study were similar in this regard, thereby explaining the non-significant differences among them.

7. Conclusion

The current study concluded that the care bundle for hypertension control could significantly improve clinical measures of hypertensive patients at moderate and/or severe risk for stroke. The care bundle involves a combination of interrelated evidence-based guidelines, including one guideline that affects another guideline, e.g., appropriate diets for hypertensive patients lead to weight reduction and facilitate physical activity. Moreover, the

study indicated that the marital status, cholesterol level, gender, education, presence of health insurance and employment status of patients are significantly related to systolic blood pressure three months after implementing a hypertension care bundle. Further research with a larger sample that includes hypertensive patients with or without stroke risk is recommended to obtain a more accurate overview of the study topic and further investigate factors associated with the effect of a care bundle on clinical measures of hypertensive patients.

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