Original Research Article

Determinants of the flowchart use by registered nurses and associates in the Kasa-Vubu Health Zone in Kinshasa, Democratic Republic of the Congo

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Abstract

Aims: The aims of this research was to identify the main determinants (factors) that contribute to the low flowchart use registered nurses in Kasa-Vubu Health Zone. And to verify the existence of a relationship between the studied factors and the socio-demographic characteristics of the respondents.
Study design: This analytical study with a correlational estimate, ai,s to explore the relationships between variables related to intention and seeks to determine whether the variables involved are associated with facts.
Place and Duration of the study: This survey was carried out in the health facilities of Kasa-vubu health zone between May and June 2017.
Method: A questionnaire was used to collect data thru a structured interview. A pre-test was conducted in Bandalungwa health zone in order to provide quality care while using the flowchart. The Likert-type scale with seven choices was used in the design of different items. The sample size was established based on the number of participants per predictor variable in order to meet the statistical power in a multiple regression analysis. XLSTAT 2015 software was used to calculate the sample size. After calculation, the sample size was 105 respondents. The target study population was Registered nurses (RNs), Assistant Registered Nurses (ARNs) and the executive nurses (ENs) who use the flowchart during clinical consultation within their respective health centre including all the health centres in the aforementioned health zone. Data analysis was performed using SPSS version 20 software and the p-value < 0.05 was considered to be significant whereby descriptive statistics and correlation of Pearson were used. For ethical reasons, the consent of the respondent was needed.
Results: The analysis showed that 60% of the respondents were under 40 years of age, 50.5% were married, 80% had more than 5 years of service and 89.5% had a graduate degree. However, 59.0% were executive nurses. In addition, there is a statistically significant association between the use of the flowchart and motivation (p=0.014), the importance given by registered nurses and executive nurses in the therapeutic management of patients (p=0.001). Moreover, there is a statistically significant association between the flowchart systematic use and the education level during patient management (p=0.000). Last, there is an association between the flowchart systematic use and the importance given to facilitating and/or detrimental factors (p=0.001).
Conclusion: The socio-demographic parameters, factors related to the importance given to facilitating and/or detrimental factors and motivational factors significantly influence the systematic use of the flowchart in the therapeutic management of patients in the Health zone of Kasa-vubu. Yet, key determinants, which favor the low use of the flowchart by nurses of Kasa-vubu health zone, were identified. Hence, this would draw the attention of decision-makers for a better improvement of the health system in order to have a better patient management in different health zones of Kinshasa in DRC.

Keywords: Flowchart, Health Zone, Nurses, Socio-Demography, Therapeutic management.

1. Introduction

The "flowchart" concept is a tool that governs the organization of curative care at the Health Centre (HC) level, including the following elements: reception, consultation, administration of care and laboratory [1]. The flowchart is defined as a tool for Registered Nurses (RNs) to provide quality care on time and, if necessary, to refer for the continuity of care as soon as possible.

The lack of use of the flowchart by RNs is responsible for the exacerbation of morbidity and mortality cases in different layers of the population, particularly pregnant women and children under five years of age. However, in the Democratic Republic of the Congo (DRC), the poor quality of care, particularly in clinical cases due to the lack of the flowchart exposes patients to serious organic or even fatal consequences. The shortage of nurses in different clinical services is part of a context where the development of the profession is expanding rapidly with the advent of specialized practitioner nurses (SPNs) and the reshaping of roles as conferred by the Law 90. Therefore, this requires the increasing in the quality and effectiveness of health care and services. Among the information and communication technologies applied to the health field, the electronic health record is considered as the cornerstone for the integration of a set of information useful for the patient follow-up, including emergency data, immunization, medication, imaging and laboratory tests [2-3]. A study conducted in Cameroon reported that the flowchart is a decision-making and vocational training tool. A good technique for handling flowcharts, observed in 10/16 nurses, is associated with their systematic initial use and with the standardization of care [4]. However, the inadequate reading skills of dichotomous trees hinder their application in the diagnostic decision-making. A retrospective analysis of 800 treatments recorded in the HC consultation registers shows an average rate of 75% of treatment standardization that varies from 52 to 98% depending on the HC. Three-quarters of non-standardized treatments are ineffective and/or inefficient [5].

Audibert and Roodenbeke [6] reported from a survey conducted in Mali that the flowchart use by health personnel in first-level health services in Africa remains very weak despite the significant efforts that have been made over the past decade to strengthen the supply of care. However, there has been a major debate on the factors behind this low use, some of which mainly incriminate pricing, others showing that the negative determinants go far beyond pricing alone. Despite a considerable increase in the number of dispensaries, attendance has not varied much and health indicators remain a major concern. The current trend will not make it possible to achieve the Millennium Goals. As long as the population does not make greater use of preventive and curative care services, it is highly likely that this trend will not change significantly. Trying to move towards the Millennium Development Goals requires measures to ensure positive changes in health service utilization rates Audibert et al. [7].

Currently, as part of the decentralized management of primary health care (PHC), they are acquiring renewed interest as tools for rationalizing and standardizing care. Thus, these two concepts are part of the new health policy in Sub-Saharan Africa: rationalization is a condition for the implementation of the Bamako initiative, contributing to the financing of health services, i.e. the payment of care (medicines by the population requires the provision of affordable quality care). Meanwhile, the standardization of care in all health districts in an integrated health district contributes to the equality of care and allows rational management of care and medicines throughout the district [5].

In a book published in DRC, it was pointed out that the rich are the largest users of consultation and hospitalization services in private hospitals, dispensaries and health centres, with a number of visits representing almost half of the total. Thus, the rich are also more likely than the poor to seek the care in mission-operated fee-based facilities, entering 35% of admitted patients and 25-29% of non-admitted patients in hospitals, health centres as well as clinics of these missions [8]. To reduce mortality and morbidity in DRC, the minimum quality services defined in the Minimum Package of Activities (MAP) should be provided to the population of the health area. However, among these services are the benefits services that facilitate the management of morbid phenomena that occur there. In this problem, Kinshasa's RNs operate under very specific conditions, neglecting what would facilitate their work in caring for patients, and this constitutes an unprecedented benchmark.

One of the main clinical reasons for studying compliance with the flowchart use is that no professional recommendation or prescribed treatment can be effective without the behavior and willingness of the RNs to use this tool. The use of this health tool and the management of patients fits very well with the orientations of health reform [1]. By identifying factors aimed at improving the care of patients in general and children in particular in order to reduce mortality and morbidity resulting from poor patient care. The identification of the most significant factors contributing to the low use of the flowchart would allow the

nurse to focus on the relationship between the patient and appropriate management, which will help him to develop strategies to facilitate the integration of WHO recommendations on the standardization of care and to promote the quality of care. Therefore, nurses must base their interventions on patients' behaviors and health beliefs if they are to be truly effective [9].

From all the analysis carried out above, two questions were arisen, namely: (1) What are the determinants of the flowchart use by RNs, ARNs and ENs of Kasa-vubu health zone? (2) Is there any relationship between these determinants and the socio-demographic characteristics of the study population? The hypotheses of the current research were: (1) Cognitive components, motivation, effectiveness and facilitating factors significantly predict the intention of registered nurses to use the flowchart in their department, and (2) Sociodemographic factors: seniority, level of education and professional activity, factors related to the importance given to facilitating and/or detrimental factors and motivational factors significantly influence the systematic use of the flowchart in the therapeutic management of patients.

The aim of this study was : (1) to identify the main determinants (factors) of the flowchart use by the RNs in the Kasa-vubu health zone, and (2) to verify whether there is a relationship between these factors and the socio-demographic characteristics of the respondents

2. MATERIALS AND METHODS

2.1 Study area

The survey was carried out in the health facilities of Kasa-vubu health zone which offer preventive, curative and promotional services. The HZ of Kasa-vubu is one of the 35 HZ of Kinshasa city. At the adventure of primary health care in DRC, the country was subdivided into 306 health zones and the health province of Kinshasa had 22 health zones. This distribution was based on the quantitative and temporal denominator, which is the population. This indicator is dynamic and not static, thus changing over time. Before the division, Kasa-Vubu health zone and the current Ngiri-Ngiri health zone constituted a single health zone and this health zone was called Mboka Sika health zone. This new distribution occurred while Mboka Sika health zone was under the responsibility of a Chief Medical Officer. And, it included 15 health areas and the central office was located within the boundaries of the Opala health centre, which has now become Maman Pamela after its rehabilitation. In 2000, after the Administrative division, Mboka Sika Health Zone was split in two and then, we have Ngiri Ngiri health zone with 8 health areas and Kasa Vubu health zone with 7 health areas namely: Anciens Combattants (Former fighters), Assosa, Katanga, Lodja, Lubumbashi, NPO and Salongo.

The health zone of Kasa-Vubu is the hinge health zone between the East and West blocks of Kinshasa city, it is located in the centre of Kinshasa city, in the Administrative municipality of Kasa-Vubu. It is limited by Kalamu health zone (East), Kokolo health zone (West), Kinshasa health zone (North) and Ngiri-Ngiri health zone (South).

2.2 Study design, sampling method, sample size and target population

This study is analytical, with a correlational estimate, aims to explore the relationships between variables related to intention and seeks to determine whether the variables involved are associated with the facts. Yet, the present research is correlational because several concepts, including those of cognitive components, motivation, effectiveness and the importance given to facilitating and/or detrimental factors, are measured at the same time as we have sought to identify the relationships between these variables.

For the current study, the sampling was non-probability for convenience. It should be remembered that this method involves including people who come to the appropriate (health centre for medical consultation) until the desired number of participants was reached [10-11]. However, this choice was made in order to access a sufficient number of participants to be representative of the population, within a very specific period of time and with limited resources within the framework of this study. The sample size was established on the basis of the number of participants per predictor variable in order to meet the statistical power in a multiple regression analysis. XLSTAT 2015 software was used to calculate the sample size. However, for the parameters entered (with α=0.05), an expected effect size of 0.13; four independent variables and a power of 0.90. Thus, the sample size required for this study was 105 RNs

and their assistants from Kasa-vubu health zone were interviewed according to the pre-established questionnaire. The target study population was Registered nurses (RNs), Assistant Registered Nurses (ARNs) and the executive nurses (ENs) who use the flowchart during clinical consultation within their respective health centre including all the health centres in the aforementioned health zone.

Four independent variables were used namely: the affective component, the motivation, the effectiveness and the importance given to facilitating and/or detrimental factors and the intention was considered as a dependent variable. Each variable was measured using the Likert scale at different levels. The affective component was related to the behavior and it was measured using the Likert scale having 10 questions with seven levels of responses. While the motivation was referring to the respondent's perception that individuals or groups of individuals important to the respondent who would prove or disapprove of the flowchart use, but also the internal factors that lead them to do something in order to achieve quality care behavior. In addition, a Likert scale with seven response levels and four sets of questions was measured. However, the effectiveness showed the ability of the flowchart to guide quality patient care by meeting standards of care for patients with a view to producing expected health promotion outcomes. And a seven level Likert scale was measured using a series of four questions.

Furthermore, the importance given to facilitating and/or detrimental factors is the magnitude to which the person assigns value to the health situation. For each of the emphasis placed on the facilitating/detrimental factors identified from the preliminary study, the respondent was asked to identify the reasons or contexts for which it would be more difficult or easy to use the flowchart in each patient consultation. A seven level Likert scale was measured using a series of six opposite questions.

2.3. Elaboration of the Likert scale

Multiple studies have shown the quintessence by which this scale has proven in the case of such research. However, Joshi *et al.* [12] reported that the majority of studies using the theory of interpersonal behavior use the Likert scale, which is widely used to measure cognitive components, motivation, effectiveness and the importance given to facilitating and/or detrimental factors and intention. Furthermore, Godin [13] and Heelis *et al.* [14] proposed an approach for developing the instrument using a socio-cognitive theory. There are two strategies for developing a scale: one that gives equal weight to each item from the outset (additive scale) and one that gives different importance to items depending on whether they reflect a higher or lower level of possession of the measured characteristic (Likert scale).

However, the qualities of the instrument (Likert scale) developed were evaluated using the test-retest method two weeks apart. This method made it possible to verify the temporal stability of their measurement as well as the internal consistency of the constructs. This pre-survey was conducted with 15 registered nurses from the Bandalungwa Health Zone who were not selected as the sampling frame for this study. It should be noted that this pre-experimentation also validated the understanding of the meaning of questions and response options as well as the level of language.

The results of the fidelity tests (CIC and Cronbach alpha) are presented in Table 1

Table 1. Fidelity tests

Used Questionnaire	Number of items	α	CIC	n
Intention to use the flowchart	4	,700	,700	15
Cognitive component	10	,711	,711	15
Motivation	4	,700	,700	15
Effectiveness	4	,722	,722	15
Importance given to facilitating/detrimental factors	5	,720	,720	15

With regards to the interpretation scales proposed by Koo and Mae [15], the theoretical constructs show a temporal stability (intra-class coefficient) ranging from mediocre to good (0.43 to 0.86). As shown in Table 1, the value obtained for the constructs was considered satisfactory, demonstrating some fidelity of the questionnaire. With respect to Cronbach's alpha coefficients of intent, cognitive components, motivation, effectiveness and importance given to facilitating/detrimental factors, the literature review shows that the majority of researchers using TCI accept a minimum value of 0.60 at Cronbach's alpha. Thus, the value of 0.70 was used to rate Cronbach's alpha coefficients as satisfactory, as suggested by Nunnally and Bernstein [16]. The values obtained are almost all greater than or equal to 0.70, which was considered satisfactory and shows a certain consistency between the items and the measured constructs.

2.4. Data collection

Before starting with the survey, there was a period of preliminary survey (pre-test) was condcuted. The preliminary survey was conducted with 15 RNs from the Bandalungwa Health Zone who used the flowchart during clinical consultations with patients in order to provide quality care. This step helped to highlight the salient beliefs of the participants who were used to make the final instrument for the study.
For the current research, data were collected using the structured interview method to collect information from respondents. It is a concern by which the researcher comes into a direct contact with the respondent in order to collect accurate information about a certain phenomenon. A Likert-type scale with seven answer choices was used in the design of the items.

The registered nurses and their assistants who participated in the study were interviewed in their offices on the day they were on duty. The main aim of the research was presented to the respondents, which was to identify the factors explaining the low use of the flowchart by registered nurses in the Kasa-vubu health zone, but also the explanations on the procedures for responding to our instrument (questionnaire). The contact with participants was performed after the service. The current research work was carried out between May and June 2017.

2.5. Data analysis

This study dealt with descriptive analyses (frequency and percentage) in order to describe the profile of the sample. The correlational analysis using the Chi-square and Pearson test, the confidence interval of the Odds-ratio was performed between different variables of the study. This helped to determine the factors that explain the use of the flowchart in diagnosis and treatment of patients. The data analysis was performed using SPSS version 20 software and the p-value (<0.05) was considered to be statistically significant.

3. RESULTS AND DISCUSSION

3.1. Socio-demographic characteristics

The socio-demographic characteristics of respondents of the current study are presented in the following table

Table 2. Socio-demographic characteristics of respondents

Caractéristiques	n=105	%
Age		
Less than 40 years	63	60
40 years and more	42	40
Total	**105**	**100**
Marital status		
Married	53	50,5
Single	52	49,5
Total	**105**	**100**
Seniority		
Less than 5 years	21	20
More than 5 years	84	80

Total	**105**	**100**
Level of education		
High school	11	10,5
University	94	89,5
Total	**105**	**100**
Professional activity		
Registered nurse	21	20
Assistant registered nurse	22	21
Executing nurse	62	59,0
Total	**105**	**100**

Legend: n : total number of respondents

It was observed from the table above that, 60% of the respondents were under 40 years old while more than 50.5% of respondents were married Meanwhile 80% of the respondents had more than 5 years of service. In addition, 89.5% of the respondents had a degree. Finally, 59.0% were executing nurses, 21% were assistant registered nurses (ARNs) and 21% were registered nurses (RNs).

3.2. Use of the flowchart related to the affective component

The use of the flowchart in relation to the affective component is presented in the figure below.

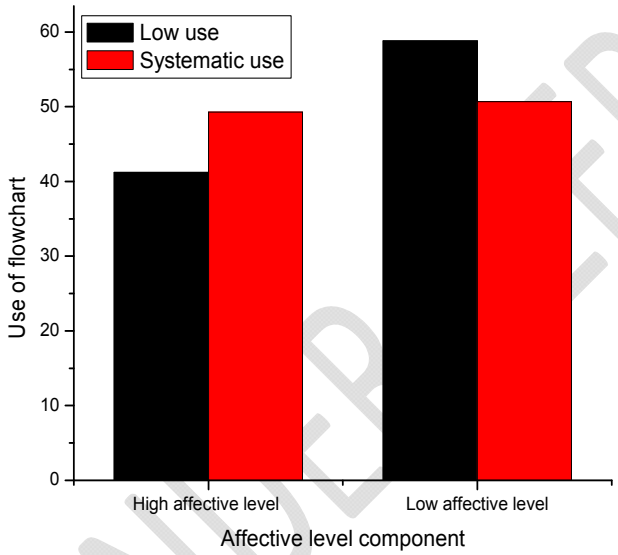

Figure 1. The use of flowchart related to the affective component

From the figure above, it was observed that 58.8% of RNs and executing nurses reported having a low affective level to use the flowchart during their clinical consultation for a better management of patients. Moreover, it was observed that 41.2% of RNs and executing nurses working in this health zone show a high affective level to the flowchart use during their clinical consultation for a better management of patients. However, the bivariate analysis between the affective component and the flowchart use showed that there is a statistically non-significant association (p=0.435), the affective component: OR= 0.72 [0.3-1.6]. Furthermore, there was no association between the use of the flowchart and the affective component (see appendix 1).

3.3. Use of the flowchart compared to the motivation

The use of flowchart in relation to the motivation is presented in the figure below.

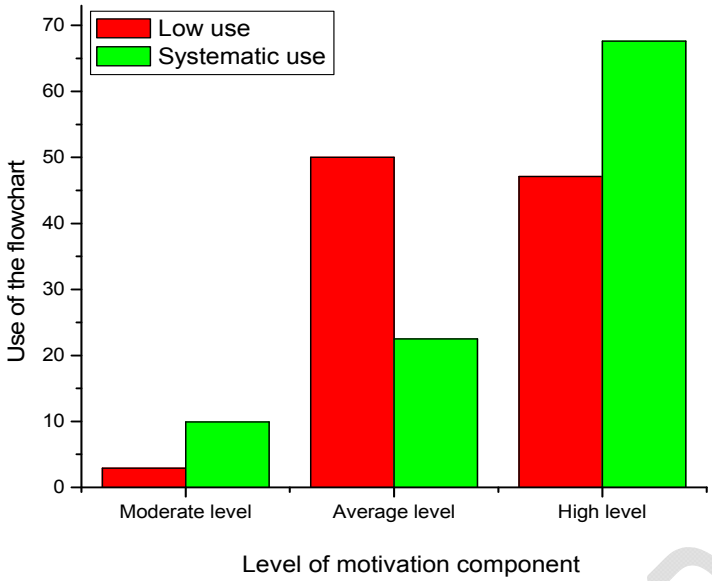

Figure 2. The use of the flowchart in relation to the motivation

The RNs and executing nurses groups surveyed in the health centres of the health zone was statistically different for a stratification following the motivation of therapeutic management. It was observed that 50% of the respondents had an average hesitant motivation on the use of the flowchart in the management of patients compared to only 47.1% who had a high level of motivation in the systematic use of the flowchart for patient management. However, the bivariate analysis between the use of the flowchart and motivation level showed that there is a statistically significant association between the flowchart use and motivation (p=0.014. Thus, there is an association between the use of the flowchart and motivation (see appendix 2).

3.4. Use of the flowchart in relation to the effectiveness of treatment

Figure 3 shows the use of the flowchart in relation to the effectiveness of treatment.

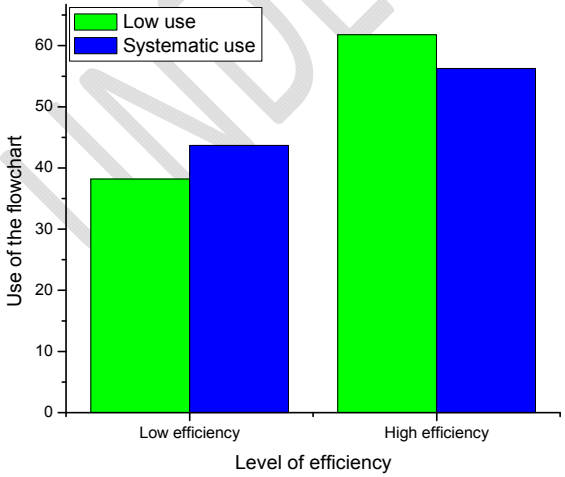

Figure 3. Use of the flowchart compared to the effectiveness of treatment

From the above figure, it was observed that 61.8% of RNs and executing nurses reported using the flowchart for reasons of effectiveness in the therapeutic management of patients. However, the bivariate analysis between the flowchart use and the effectiveness of the therapeutic management obtained showed that there is a statistically non-significant association (p=0.598), effectiveness: OR = 0.79 [0.3-1.8]. However, there was no association between the flowchart use and the effectiveness in patient management (see appendix 3).

3.5. Use of the flowchart compared to the importance given to facilitating and/or detrimental factors

The use of the flowchart compared to the importance given to facilitating or detrimental factors is presented in the figure below.

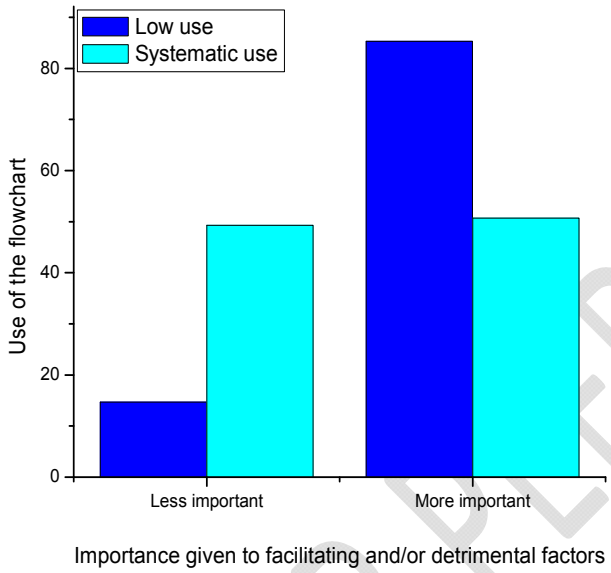

Figure 4: Use of the flowchart compared to the importance given to facilitating or detrimental factors

For factors concerning the importance derived from the flowchart use, this analysis revealed a statistically very significant association between the importance given to facilitating or detrimental factors and the flowchart use in the therapeutic management of patients. Nevertheless, 85% of respondents find the flowchart use much important in the medical management of patients compared to only 14.7% who find the use of the flowchart as a tool in patient management is less important.

Therefore, the bivariate analysis between the systematic use of the flowchart and the importance is given to facilitating and/or detrimental factors showed that there is a statistically very significant association (p=0.001), the importance given to facilitating and/or detrimental factors: OR=0.1 [0.06-0.5]. So, there is an association between the systematic use of the flowchart and the importance given by RNs and executive nurses in the therapeutic management of patients (see appendix 4).

3.6. Use of the flowchart in relation to socio-demographic characteristics

The flowchart use in relation to socio-demographic characteristics is presented in the table below.

Table 3. Distribution of respondents according to the flowchart use in relation to socio-demographic characteristics

Characteristics	Use of the flowchart		χ^2	p
	Low use	Systematic use		
	n (%)	n (%)		
Seniority				
Less than 5 years	11 (32.4)	10 (14.1)	4.795	0.029
More than 5 years	23 (67.6)	61 (85.9)		
Total	34 (100)	71 (100)		
Level of education				
High school	11 (32.4)	0 (0)	25.66	0.000
University	23 (67.6)	71 (100)		
Total	34 (100)	71 (100)		
Occupational activity				
RNs	3 (8.8)	18 (25.4)	18.18	0.000
ARNs	1 (2.9)	21 (29.6)		
ENs	30 (88.2)	32 (45.1)		
Total	34 (100)	71 (100)		

Legend: RN: Registered nurse, ARN: Assistant registered nurse, EN: Executing nurse

For factors related to the systematic use of the flowchart, this analysis revealed a statistically significant association of the systematic use of the flowchart with the majority of characteristics, namely: level of education, occupational activity and seniority. As for the factor such as the level of education in the systematic use of the flowchart, it was observed that the more a nurse has studied, the more he can use the flowchart in the management of patients (67.6%). This analysis revealed a statistically very significant association between the education level and the systematic use of the flowchart during patient management (p=0.000), the education level: OR= 4.0 [2.8-5.8].

Moreover, the determinants on the systematic use of the flowchart in relation to the occupational activity show that the executive nurses (88.2%) systematically use the flowchart during the therapeutic management of patients while 8.8% of the RNs who benefit from it during their consultation. However, the bivariate analysis between the systematic use of the flowchart and the exercise of one's professional activity showed that there is a statistically very significant association (p=029), seniority in the profession: OR = 0.1 [1.0-7.7]. Thus, there is an association between the systematic use of the flowchart and the professional activity exercised by nurses in the health zones during the therapeutic management of patients.

As to factors concerning the education level in the systematic use of the flowchart and seniority in the profession, it appears that nurses with 5 years or more in the profession find it more important to use the flowchart during therapeutic management (67.6%). However, the bivariate analysis between the systematic use of the flowchart and seniority in the profession showed that there is a statistically significant association (p=0.001), the importance given to facilitating and/or detrimental factors: OR = 2.9 [1.0-0.5]. Hence, there is an association between the systematic use of the flowchart and the importance given by RNs and ENs in the therapeutic management of patients.

3.7 Discussion

1. Socio-demographic characteristics of respondents

This study showed that 60% of respondents were under 40 years old while 40% was 40 years old and more.. This may be explained by the fact that the retirement in DRC is too difficult even impossible, but also the succession process is not effective. However, 50.5% of respondents were married and 80% had more than 5 years of service and 89.5% of the respondents had a degree compared to 10.5% who only had a secondary school diploma (A_2). Several studies have shown the effect of the education level on the provision of quality care because the more you have studied; the more you have knowledge and get expertise on patient care. The findings are not consistent with those found in Morocco by Aoufi [17]. In 2012, who reported that 87.5% of respondents were without professions, 60.3% were illiterate and 74.3%

were physically active, 15.4% were former smokers and three patients consumed alcohol. Moreover, 46.3% of patients had a history of diabetes in their family [17]. Furthermore, it was observed that 58% of respondents were ENs, 21% were ARNs and 21% were RNs. These findings are similar to those found by Kanika [18] who reported that 63.8% of respondents had A_1 level compared to 11.6% who had a bachelor's degree while 21.7% had A_2 level and 2.9% were A3. Concerning the professional experience and the seniority in the service, 30.4% of respondents had an experience between 5-10 years, 60.9% had an experience of 11 years or more. It should be noted that 69.6% had more professional experience and were senior in the service [18].

2. Determinants of the use of the flowchart in the health centre during medical consultation

The determinants fixed for the flowchart use depends on several components. As to the affective component, only 58.8% of RNs and ENs reported having a low emotional level to use the flowchart. Yet, 41.2% of RNs and ENs working in the above-mentioned health zone have a high emotional level to use the flowchart during their clinical consultation for a good management of patients. However, the bivariate analysis between the affective component and the flowchart use showed that there is a statistically non-significant association (p=0.435, the affective component: OR = 0.72 [0.3-1.6]). Moreover, there was no association between the flowchart use and the affective component. These findings are not consistent with those found in a study conducted in Morocco by Lamchahab *et al.* [19] on the factors influencing the knowledge of risks of the diabetic foot, whereby 40% of respondents were illiterate. This situation is partly explained by the poor compliance to hygienic-dietary rules. On the contrary, the current findings are going along with those found in the United States whereby there was no association between the education level and the diabetic foot though this study does not focus on Diabetes (p=0.1) [20].

The results mentioned above reveal that 50% of respondents have a moderately hesitant motivation to use the flowchart in patient management. This can be explained by the fact that several nurses do lack the knowledge about the importance of this tool in medical management of patients compared to only 47.1% who showed a high level of motivation in the systematic use of the flowchart during patient management. However, the bivariate analysis between the flowchart use and the motivation component showed a significant association between the flowchart use and the motivation (p=0.014). Luk et al. [21] conducted a study on the determinants of nurses' intention of the intensive care in applying physical restraints to patients mechanically ventilated whereby the author reported that in descending order, nurses consider restraints to an intervention to be prudent (6.52 ± 0.71), useful (6.25 ± 0.90), advantageous (6.17 ± 0.98), reassuring (6.17 ± 0.94), respectful (4.14 ± 1.25) and rewarding (3.81 ± 1.13). Furthermore, some increase in averages in the perception of control versus the motivation was related to the accumulation of years of experience [22].

As to the effectiveness of using the flowchart in a medical setting, 61.8% of RNs and ENs reported using the flowchart for reasons of the effectiveness of therapeutic management of patients compared to 38% who expressed the low effectiveness of therapeutic outcome by using the flowchart for the best management of patients. Haegeman [5] showed that out of the 11 nurses who left school have an average compliance score of 80% compared to an average score of 63% for the other five nurses. Moreover, the bivariate analysis between the flowchart use and the effectiveness component for a good therapeutic management obtained showed that there is a statistically non-significant association (p=0.598), effectiveness: OR = 0.79 [0.3-1.8]. However, there was no association between the use of the flowchart and the effectiveness of patient management. The same source suggests that there was a negative correlation between the number of previous professional years without a flowchart and the standardization of treatments. This is demonstrated with a linear regression coefficient r=0.61. In conclusion, this study suggests that nurses who have worked longer without a flowchart apply it quite well.

For factors concerning the importance derived from the use of the flowchart, this analysis revealed a statistically very significant association between the importance given to facilitating and/or detrimental factors and the flowchart use in the therapeutic management of patients. Nevertheless, 85% of respondents find the use of the flowchart too important in the medical management of patients compared to only 14.7% who find less important the use of the flowchart as a tool in patient management. To this end, the bivariate analysis between the systematic use of the flowchart and the importance given to

facilitating and/or detrimental factors showed that there is a statistically very significant association (p= 0.001), the importance given to facilitating and/or detrimental factors: OR = 0.1 [0.06-0.5]. Hence, there is an association between the systematic use of the flowchart and the importance given by RNs and ENs in the therapeutic management of patients.

These results corroborate with those found by Haegeman [5] who reported that a positive association observed between the standardization of treatments and the proper handling of flowcharts by nurses. The author showed that ten nurses who handle well the flowchart are able to administer proper treatments (84% on average) and the remaining nurses (six) can do the average at 60% (Kruskal-Wallis test with two groups; p-value <0.01). In fact, the same association was found with the systematic initial use of flowcharts: the eleven nurses who reported having used them initially for each patient prescribe on average 83% of compliant treatments and the other five on average 58% (Kruskal-Wallis test with two groups; p <0.01) [5]. Concerning factors related to the education level in the systematic use of the flowchart, it was observed that the more we have studied, the more we use the flowchart in the management of patients. This analysis revealed a statistically very significant association between the education level and systematic use of the flowchart during patient management (p-value = 0.000, study level: OR = 4.0 [2.8-5.8]. Moreover, these results contradict those found by Haegeman [5], whose eleven nurses leaving school have an average compliance score of 80% compared to an average score of 63% for the other five nurses (Kruskal-Wallis test; p<0.05). Thus, these nurses also handle flowcharts better (reading, interpretation) (X^2, Exact Fisher, p<0.01).

Moreover, the determinants of the systematic use of the flowchart in relation to the professional activity revealed that the ENs (88.2%) systematically use the flowchart during the therapeutic management of patients while the RNs (8.8%) use systematically the flowchart while performing their consultation. However, the bivariate analysis between the systematic use of the flowchart and the exercise of one's professional activity showed that there is a significant association (p=029), seniority in the profession: OR = 0.1 [1.0-7.7]. Thus, there is an association between the systematic use of the flowchart and the professional activity exercised by nurses in the health centres during the therapeutic management of patients. These findings can also be interpreted in the light of previous studies, despite the different objectives, Essex [23] finds, under optimal conditions, a concordance of more than 95% between the diagnostic and therapeutic conduct guided by the use of the flowchart.

In addition to the factors concerning the education level in the systematic use of the flowchart and the seniority in the profession, it appears that nurses with 5 years or more (67.2%) in the profession find it more important to use the flowchart during the therapeutic management compared to only 32.4% for nurses with less than 5 years' professional experience. However, the bivariate analysis between the systematic use of the flowchart and the seniority in the profession showed that there is a statistically significant association (p=0.001), the importance given to facilitating and/or detrimental factors: OR = 2.9 [1.0-0.5]. Thus, there is an association between the systematic use of the flowchart and the education level of nurse consultants. The findings of this study are consistent with those of Haegeman [5] revealed that the three graduate nurses in the population of his study are less adept at handling the flowcharts (X^2, Exact Fischer, p<0.03); the degree of compliance of their treatments is comparable to that of RNs. These findings seem contradictory to those found by Daveloose [24], who reported that nurses (80%) leaving schools have a good average compliance score compared to the other five nurses (63%) (Kruskal-Wallis test; p<0.05). In addition, these nurses handle the flowchart more efficiently: (reading and interpretation) (X^2, Exact Fisher, p<0.01).

3. Limitations of the study

In fact, several limitations to this study have been identified and allow us to qualify the interpretation of the results obtained. The fact that the sample is not proportionally stratified shows a certain limit to moving forward with multivariate analyses. In addition, the measuring instrument was not subjected to a pre-experimental step of the items due to time constraints. Indeed, this step would have made it possible to eliminate or reformulate certain items that could have been misunderstood by respondents. Similarly, the study did not take into account explaining the other socio-demographic characteristics using the regression model.

4. CONCLUSION

This research study was focused on the determinants of the flowchart use by registered nurses, assistant registered nurses and executing nurses in the health center of Kasa-vubu municipality. The main aim was to isolate the most determining factors that favour the flowchart use by this category of health personnel. in the Kasa-vubu health.

The findings show that socio-demographic factors: seniority, level of education and professional activity, as well as factors relating to the importance given to facilitating and/or detrimental factors, and motivational factors significantly influence the systematic use of the flowchart in the therapeutic management of patients. Following the bivariate analysis, the variables where the association with the systematic use of the flowchart while managing patients in the health center in the Kasa-vubu health zone was statistically significant for some and very significant for others as follows: the socio-demographic factors (the seniority, the level of education and the professional activity), the factors related to the importance given to facilitating and/or detrimental factors which allow the flowchart use as tool for the therapeutic management of patients(minor and major importance). And the motivational factors which lead to the systematic use of the flowchart for patient management (moderate, average and high) would allow the flowchart use as a tool for patient management during the medical consultation.

Some nurses did not experience the effectiveness of using the flowchart as a patient management tool, while other nurses reported that the affective component did not have the best impact on the systematic use of flowchart in the private and public sectors. Meanwhile, no association was observed between the proven effectiveness of using the flowchart for patient management, the affective component and the systematic use of the flowchart as a resort tool while performing the medical consultation in the health centre. This study is far to be exhaustive because it did not cover all aspects on the flowchart use at several health centres level. Yet, it has identified key determinants, which favor the low use of the flowchart by registered nurses of Kasa-vubu health zone, and this would draw the attention form decision-makers for a better improvement in order to have a better management of patients in different health zones of Kinshasa in DRC.

Ethical considerations and consent

For ethical reasons, the significance of the research was presented to the participants, which was to identify the factors explaining the low use of the flowchart by nurses in the Kasa-vubu health zone. It was crucial to seek the informed consent of participants and inform them about the guarantee of confidentiality of the responses provided; however, the participants' consent was obtained orally. However, the recruitment of potential participants was voluntary. In order to facilitate the participation, interviews were held in an appropriate room after the service. Before the interview, the consent was read out to the participant.

REFERENCES

[1]. Ministère de la santé congolais (2011). Ordinogramme des soins au Centre de santé. Direction de développement des soins de santé primaires. Instructions for the use of ordinogramme.

[2]. Fountain., D. (1992). Infirmier, comment traiter votre malade. harmattan: simani.

[3]. Kwete, D., Binanga, A., Mukaba, T., Nemuandjare, T., Mbadu, M. F., Kyungu, M. T., ... & Bertrand, J. T. (2018). Family planning in the Democratic Republic of the Congo: encouraging momentum, formidable challenges. *Global Health: Science and Practice*, *6*(1), 40-54.

[4]. Isono, H., Suzuki, S., Ogura, J., Haruta, J., & Maeno, T. (2017). Improving the workflow of nursing assistants at a general hospital in Japan. *BMJ Open Qual*, *6*(2), e000106.

[5]. Haegeman, F., Ledecq, L., Wyffels, A., Damak, K., (1994). Evaluation of the use of diagnostic / trachement equipment in the center of Nord-Cameroun. Service département de la santé publique du diamaré. Cameroun.

[6]. Audibert, M. et Roodenbeke, E. (2005). Application of services of santé de premier niveau au Mali: Analyze the situation et perspectives. Région Afrique. Département du développement humain. Région Afrique. Banque mondiale.

[7]. Audibert,M., Mathonnat,J., & Roodenbeke,E.,(2003). Le financement de la santé dans les pays d'Afrique et d'Asie à faible revenu, Ed. Karthala. Paris.
[8]. Wangata.,J. (2002). Les mutuelles de santé : une panacée pour les soins de santé primaires en RDC, Kinshasa DEP.
[9]. Achterberg TV, Getty G. J. Huisman-de Waal, Nicole A. B. M. Ketelaar, Rob A. Oostendorp, Johanna E. Jacobs, and Hub C. H. Wollersheim. How to promote healthy behaviours in patients? An overview of evidence for behaviour change techniques. Health Promotion International, 26(2):148-162. doi: 10.1093/heapro/daq050
[10]. Fortin, M.-F., & Gagnon, J. (2010). Fondements et étapes du processus de recherche : Méthodes quantitatives et qualitatives. Montréal, Qc : Chenelière Éducation. [UdeM : H61 F676 2010]
[11]. Fortin MFand Gagnon J 2016. Fondements et étapes du processus de recherche : méthodes quantitatives et qualitatives. 3ème édition, Chenelière éducation, Montréal, Canada, 518 pp.
[12]. Joshi A., Kale S., Chandel S. and Pal DK, 2015, Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology,* 7(4):396-403.
[13]. Godin G, Gagné C and Sheeran P **(2004)**. Does perceived behavioural control mediate the relationship between power beliefs and intention? *Br. J. Health Psychol*., **9:** 557-568.
[14]. Heelis R, Graham H and Jackson C (2015). A Preliminary Test of the Interpersonal Psychological Theory of Suicidal Behavior in Young People With a First Episode of Psychosis. Journal of Clinical Psychology, 72(1).
[15]. Koo TK and Mae YL (2016). A Guideline of selecting and reporting Intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine,* 15(2):155-163.
[16]. Nunnally J and Bernstein I **(1994)**. Psychometric Theory (3rd ed.). New York: McGraw-Hill.
[17]. Aoufi., H. (2012). Les facteurs de risque du pied diabétique à la province de Tétouan: Etude Cas-Témoin. Mémoire de fin d'études. Master in administration sanitaire et sante publique. Ministère de la Santé. Institut National d'Administration Sanitaire. Royaume du Maroc. En ligne. Consulter le 10/07/2017 à 20h sur le site: www.sante.gov.ma/departement/inas/index.asp
[18]. Kanika, M. (2015). Knowledge, attitudes and practices of health practitioners in the prevention of nosocomial infections in the health services of the General Hospital of Référence of N'djili. Unpublished BSc thesis, Section of Nursing Sciences, Option of Teaching and Administration in Nursing cares, Higher Institute of Medical Techniques, Kinshasa, Democratic Republic of the Congo,
[19]. Lamchahab FZ, El Kihal AN, Khoudri AI, Chraibi A, Hassam B, Ait Ourhroui M. (2011). Factors influencing the awareness of diabetic foot risks. Annals of Physical and Rehabilitation Medicine.
[20]. Denis.J., Contandriopoulos, A. (2001). Intégration des soins, dimensions et mise en œuvre, Revue transdisciplinaire en santé, ruptures vol.8.
[21]. Luk E, Burry L, Rezaie S, Mehta S and Rose L (2015). Critical care nurses' decisions regarding physical restraints in two Canadian ICUs: A prospective observational study. *The Canadian Journal of Critical Care Nursing*, 26(4):16-22.
[22]. Adovohekpe., P. (1991). The rationalisation des soins curatifs. Etude de quelques obstacles à l'utilization des ordinogrammes au bénin. Anvers. Institut de médecine tropicale.
[23]. Essix., B, (1976). Diagnostic pathways in clinical medicine.2nd ed. Edindurgh. Chirdill. Livingstone.
[24]. Daveloose, P. (1976). Etude méthodologique de la consultation de pédiatrie. Establishment and evaluation of the diagnostic strategy used by the axillaires. Thèse de doctorat. Anvers. Institut de Médecine Tropicale.

APPENDICES

Appendix 1.

Affective component	Use of flowchart		OR	$IC_{95\%}$ (OR)	χ^2	dl	p	Decision
	Low use	Systematic use						

	n(%)	n(%)		Lim<	Lim>				
High affective level	14 (41,2)	35 (49,3)	0,720	0,315	1,645	0,609	1	0,435	NS
Low effective level	20 (58,8)	36 (50,7)							
Total	**34 (100)**	**71(100)**							

582

583 **Appendix 2.**

Motivation	**Use of the flowchart**		**n=105**	**χ^2**	**dl**	**p**	**Decision**
	Low use	Systematic use					
	n(%)	n(%)	N(%)				
Moderate	1(2,9)	7(9,9)	8(7,6)	8,554	2	0,014	*
Average	17(50)	16 (22,5)	33(31,4)				
High	16(47,1)	48(67,6)	64(61)				
Total	**34(100)**	**71(100)**	**105(100)**				

584

585 **Appendix 3. Use of the flowchart compared to the effectiveness of treatment**
586

Effectiveness	**Use of the flowchart**		**OR**	**$IC_{95\%}$ (OR)**		**χ^2**	**df**	**p**	**Decision**
	Low use	Systematic use							
	n(%)	n(%)		Lim<	Lim>				
Low effectiveness	13(38)	31(43,7)	0,799	0,346	1,842	0,278	1	0,598	NS
High effectiveness	21(61,8)	40(56,3)							
Total	**34(100)**	**71(100)**							

587 Légende : (): number of Registered Nurses, Assistant Registered Nurses and/or Executive nurses who
588 have used the flowchart.
589
590 **Appendix 4. Use of the flowchart compared to the importance given to facilitating or detrimental**
591 **factors**
592

The importance is given to facilitating or detrimental factors	**Use of the flowchart**		**OR**	**$IC_{95\%}$ (OR)**		**χ^2**	**df**	**p**	**Decision**
	Low use	Systematic use							
	n(%)	n(%)		Lim<	Lim>				
Less important	5(14,7)	35(49,3)	0,177	0,062	0,510	11,66	1	0,001	***
More important	29(85,3)	36(50,7)							
Total	34(100)	71(100)							

593 **Legend** : ***Significant, ***highly significant**
594 **( ) :** number of registered and performing nurses who were motivated to use the flowchart
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