

Potentially Avoidable Hospitalizations at Grand Yoff General Hospital, Senegal

Abdoul Aziz Ndiaye^{1,2}, Alioune Badara Tall¹, Ndeye Fatou Ngom-Gueye¹, Ousseynou Ka¹, Birahim Thiam¹, Amadou Barro Mbodj², Cheikh Tacko Diop¹, Awa Diop-B¹, Lamine Gueye¹ & Anta Tal-Dia³

¹ Department of Community Health, Alioune Diop University, Bambey, Senegal

² Military Health service Senegal, Senegal

³ Public Health Department, Cheikh Anta Diop University, Dakar, Senegal

Correspondence: Abdoul Aziz Ndiaye, Department of Community Health, UFR Health and Sustainable Development, Alioune Diop University of Bambey, Box 30, Bambey, Senegal. E-mail: ndiaziz2000@yahoo.fr; abdoulaziz.ndiaye@uadb.edu.sn

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Abstract

Background: PAHs are necessary hospitalizations that could be prevented by appropriate primary care. They are mainly attributable to non-communicable diseases (NCDs), which are increasing, especially in developing countries. The objective of this research was to evaluate the epidemiological burden of the PAHs at Grand Yoff General Hospital.

Methodology: A cross-sectional study was carried out in 2015. The population consisted of all patients hospitalized from April to August 2015, except those who were admitted to surgery, maternity or neonatology departments. This was a comprehensive study; the cases were represented by patients admitted for diabetes, high blood pressure, pulmonary disease, chronic kidney disease or stroke.

Results: A total of 739 hospitalizations were recorded in the targeted services, including 110 cases of PAHs (14.88%). Pulmonary disease was slightly more frequent (4.74%), followed by diabetes (4.08%), stroke (3.65%), then chronic kidney disease (1.35%) and high blood pressure (1.08%). The average age of cases was 57 ± 17.49 years and 54.5% of patients were 60 years of age or older, the sex ratio was 0.96, the married 68.2%, and the widowed 20%. About 34% of the patients were uneducated and 24% had just a primary school level. Only 8.2% were employed, while 43% were housewives and 23% were retired. 70% got a monthly income less than 100 USD. The median length of stay was 5 days. The level of awareness of the severity of the disease had improved significantly, from 37.3% at entry to 71.8% at the end of the stay ($p < 0.01$). That was the same for the level of information about the means of preventing disease prevention, from 32.7% to 64.5% with a p value < 0.01 .

A similar frequency of PAHs was reported in another study carried out in a regional hospital in northern Senegal (15%) with a predominance of the elderly.

Conclusion: PAHs are a heavy burden at Grand Yoff General Hospital. Strengthening primary health care through promotion and prevention is an alternative, especially for poor populations.

Keywords: PAH, NCD, Grand Yoff General Hospital

1. Introduction

“Potentially avoidable hospitalizations” (PAHs) or sensitive hospitalizations to primary care (SHPC) are hospitalizations that are necessary at the time of hospital admission but could have been prevented by appropriate primary health care (Freund et al., 2012; Billings, 1990; Weissman et al., 1992).

The PAHs are mainly attributable to chronic non-communicable diseases, which are a global public health priority (Moodie et al., 2013; Cesare et al., 2013; Bonita et al., 2013). Worldwide, the burden of NCDs has increased rapidly (Atun et al., 2013; Murray et al., 2012). It accounted for 60% of the 56 million deaths and 47% of global morbidity in 2001 (WHO, 2011). NCDs are increasing, especially in low and middle-income countries (Cesare et al., 2013; WHO, 2011; Lozano et al., 2012).

In several countries of the Organization for Economic Cooperation and Development (OECD), potentially

avoidable hospitalizations are the subject of much research initiated in the 1990s in the USA. These studies emphasized on the multidimensional nature of PAHs, highlighting links between PAHs and characteristics of patients, health staff, health system and environment (Freund et al., 2012; Billings, 1990; Weissman et al., 1992; Pappas et al., 1997; Ricketts et al., 2001).

According to WHO global report in 2010, NCDs are the leading cause of death worldwide. Out of 36 million deaths, 48% are due to cardiovascular diseases, 21% to cancer, 12% to chronic respiratory diseases and 3% to diabetes (WHO, 2011; Kankeu et al., 2013). Approximately 80% of cases occurred in low and middle-income countries (WHO, 2011; Kankeu et al., 2013; Abegunde et al., 2007).

In Africa, NCDs are increasing (Dalal et al., 2011; Conner et al., 2007) and coexist with infectious diseases in several regions (Atun et al., 2013; Dalal et al., 2011; Mathers et al., 2006; Lopez et al., 2006). In Senegal, fragmented studies have shown the high frequency of NCDs in some groups (Seck et al., 2013; Ndiaye et al., 2016; Mbaye et al., 2011; Sow et al., 2014).

NCDs are a heavy financial burden for affected households, and the poorest are most affected when they seek care. The cost of care discourages many people with NCDs from seeking the care they need (Kankeu et al., 2013; Abegunde et al., 2007; Strong et al., 2005). Health insurance coverage is still limited and medical expenses are borne largely by families (Kankeu et al., 2013; Bloom et al., 2011; WHO, 2012). WHO estimates that the impact of NCD-related deaths could be reduced through interventions focused on the improvement of provision of health services, screening and adequate treatment (Moodie et al., 2013; WHO, 2012; Murray et al., 2014).

In this context, this study aimed to evaluate potentially avoidable hospitalizations at Grand Yoff General Hospital. More specifically, it was to estimate the extent of PAHs in Grand Yoff General Hospital, to determine the geographical accessibility of the hospital according to hospitalized patients and to analyze the average medical expenses for PAHs management at Grand Yoff General Hospital.

2. Methodology

This was a cross-sectional descriptive study of the potentially avoidable hospitalizations noted at Grand Yoff General Hospital.

2.1 Population and Inclusion Criteria

The study population consisted of all the patients hospitalized at Grand Yoff General Hospital during the period from April 01 to August 31, 2015. Targeted diseases met following characteristics:

- Diabetes: The diagnosis of diabetes is based on fasting blood glucose greater than or equal to 1.26 g / l twice or random blood glucose greater than or equal to 2.00 g / l in case of evocative symptoms or on anti-diabetic treatment (Oladapo et al., 2010).
- High blood pressure was defined as a systolic pressure greater than or equal to 140 mm of mercury or diastolic pressure greater than or equal to 90 mm of mercury or on antihypertensive therapy (Oladapo et al., 2010).
- Chronic pulmonary disease was defined as chronic broncho-pulmonary disorder.
- Chronic kidney disease was defined independently of its cause by the presence of renal disorder markers or a drop in glomerular filtration rate (GFR) below 60 ml/min/1.73 m² for more than 3 months (National Kidney Foundation, 2002).
- Cerebral vascular accident (or stroke) is a condition that occurs as a result of a problem in the arteries of the brain. Two types of stroke are distinguished:
 - o ischemic stroke, marked by a motor deficit
 - o Hemorrhagic stroke, characterized rather by an alteration of consciousness

Was included in the study any patient aged more than one year, hospitalized at Grand Yoff General Hospital for a period at least equal to 4 hours.

Non-inclusion referred to patients who met the inclusion criteria but hospitalized at surgery (general surgery, ENT, ophthalmology), maternity or neonatology, or those who refused to participate in the study or were unable to answer the questions.

This was a comprehensive sampling that included all inpatients who met the selection criteria.

Following the development of the data collection tool, several individual interviews were held with the staff of the Human Resources Directorate and the Head of Nursing to put in place administrative arrangements that could guarantee a legal framework and ensure a proper conduct of information gathering.

The introduction of the person responsible for the survey to the senior nurses of the various visited departments facilitated collaboration with the staff of the structure for better access to eligible patients for the survey. Nursing staff had helped to identify patients who met the eligibility criteria of the survey. Some information was collected from accompanying persons whenever the condition of the patient eligible for the survey did not enable him / her to continue to answer the questions correctly.

A questionnaire developed from SPHINX software was used as a collection tool. It included:

- A first part dealing with the identification of the patient, his socio-demographic characteristics,
- A second part related to hospitalization: reasons, length of stay, outcome, hospitalization expenses,
- A third part concerning the information on the disease: including before the hospitalization (Knowledge of the signs of severity, Knowledge of the means of prevention) and during the hospitalization (knowledge of the signs of severity, the means of prevention and the behavior to be adopted).

2.2 Data Collection

The direct administration of the questionnaire to each eligible patient was adopted as the main approach. This method has helped to clarify and involve the respondent in the study project, but also to reduce the risks of information bias.

The information was collected by the investigator. In order to carry out the collection, patients who were eligible for the survey and who were in the structure were interviewed by direct interview. Furthermore, in the emergency and cardiology departments, accompanying persons and relatives of the patient participated in the survey by helping their sick relative (inpatient) to answer the questions.

2.3 Data Entry and Analysis

The collected information was entered using Sphinx software and then processed with SPSS software. The qualitative variables were presented in percentages and the quantitative variables by using the mean with standard deviations or the median with the 25th and 75th quartiles. The frequency comparison was carried out using chi² test and the comparison of averages by the variance analysis.

2.4 Ethical Aspects

The investigation was authorized by the director of the hospital following the advice of the technical medical board. Participation was free and voluntary for patients meeting the selection criteria. All information regarding the patient's identity was confidential. An informed consent form was signed by each patient or his / her accompanying person at the beginning of the interview.

3. Results

At the end of data collection, 110 patients meeting the eligibility criteria were interviewed.

3.1 Characteristics of Participants

The average age of patients was 57±17.49 years with a median (IQR25-IQR75) of 60 years (49-71). Also 16.36% of patients interviewed were between the ages of 1 and 39 years; 29.09% between 40 and 59 years. More than half of the participants (54.55%) belonged to the age group of 60-87 years. (See Table 1)

The sex ratio was 0.96. The married accounted for 68.18% of the participants, widowed 21.82% and singles 10%. (See table I).

Regarding education, 36.36% of surveyed patients were uneducated and 23.64% reached primary school. Nearly 3 out of 10 participants reached high school and only 8.20% reached college. Regarding occupational activity, almost 43.64% of participants were housewives and 22.73% retired. Only 8.18% of the interviewees had a paid job (civil servants 6.40% and private employees 1.8%). At last, 5.45% of surveyed patients were students or pupils. (See Table 1)

Regarding monthly incomes, 86.36% earned less than 100 USD and only 3.64% earned 200 USD or more. (See Table 1)

Table 1. Socio-demographic and Economic Characteristics of Participants (n = 110)

Variables	Numbers	Percent
AGE		
- 1 - 39 years	18	16.36%
- 40 - 59 years	32	29.09%
- 60 - 87 years	60	54.55%
SEX		
- Female	56	50.91%
- Male	54	49.09%
MARITAL STATUS		
- Married	75	68.18%
- Widowed	24	21.82%
- Single	11	10.00%
LEVEL OF STUDY		
- Not enrolled	40	36.36%
- Primary	26	23.64%
- Middle	25	22.73%
- Secondary	10	9.09%
- College	9	8.18%
PROFESSION		
- Housewife	48	43.64%
- Retired	25	22.73%
- worker/Craftsman	15	13.64%
- Private employee or Civil servant	9	8.18%
- Traders	4	3.64%
- Students	6	5.45%
- Unemployed	3	2.73%
MONTHLY INCOME		
- < 100 USD	95	86.36%
- 100–199 USD	11	10.0%
- ≥200 USD	4	3.64%

3.2 According to the Reason for Hospitalization

During the study, 739 hospitalizations were recorded at the targeted services. Thus, the proportion of PAHs was estimated at 14.88% in this study (Table II).

Pulmonary disease was the leading cause of avoidable hospitalizations at Grand Yoff General Hospital at 4.74%, respectively followed by diabetes (4.06%) stroke (3.65%), chronic kidney disease (1.35%) and high blood pressure (1.08%) (Table 2).

Table 2. Distribution of potentially avoidable hospitalizations by pathology at Grand Yoff General Hospital

Reason hospitalization	Number	Percent
Chronic pulmonary disease	35	4.74
Diabetes	30	4.06
Stroke	27	3.65
Chronic kidney disease	10	1.35
High blood pressure	8	1.08
TOTAL	110	14.88

3.3 Depending on the Average Length of Stay

The average length of stay of PAHs was 8 days. Hospitalizations ranged from 1 to 45 days. The standard deviation was 7.88. The median was 5 days and the mode was equal to 3 days. (Table 3)

Approximately 4 out of 10 patients had a length of stay less than 5 days and almost 3 out of 10 patients had a length of stay between 5 and 9 days; 3 out of 10 patients had a length of stay greater than or equal to 10 days (Table 3).

Table 3. Average length of stay of patients study on PAHs at HOGGY (n = 110)

Length of stay	Number	Pourcent
Less than 5 days	45	40.90%
from 5 to 9 days	31	28.20%
from 10 to 14 days	19	17.30%
15 and higher	15	13.60%

3.4 Recrudescence of PAHs

Table IV shows that 2 out of 10 patients surveyed were at least at their second hospitalization in the last 12 months. This proportion was 42% among participants hospitalized for pulmonary disease and 23% among those hospitalized for diabetes. Regarding stroke, 4% were concerned.

Table 4. Recrudescence of PAHs at Grand Yoff General Hospital by cause over 12 months

Cause of hospitalization	Frequency of hospitalizations	
	1st time	2 times and more
Chronic pulmorary disease	58%	42%
Diabetes	77%	23%
Hypertension	73%	27%
Stroke	96%	4%
Chronic kidney disease	100%	0%
TOTAL	78%	22%

The comparison of the level of awareness of the disease severity before hospitalization and at the end of the stay (Table 5) shows a statistically significant improvement, from 37.3% to 71.8% ($p < 0.01$).

Also, the level of information about the means of disease prevention and its complications changed significantly with 32.7% before hospitalization and 64.5% at the end of the stay (Table 5).

Table 5. Evolution of the knowledge level of PAHs before and at the end of the stay

Knowledge	Before admission	End of stay
Awareness of disease severity	37.3%	71.8%
Information about disease prevention means and/or its complications	32.7%	64.5%

4. Discussion

This study demonstrated a relatively high frequency of potentially avoidable hospitalizations at Grand Yoff General Hospital (14.88%), with subjects over the age of 60 being more represented (54.5%), and the frequency of PAHs correlated to that reported in a hospital in northern Senegal (54%), but subjects aged 40-59 were as represented as those aged 60 or older (Ndiaye et al., 2017).

On the other hand, Giraud and collaborators (Giraud et al., 2016) observed a frequency of 6.4% in a study carried out in Poitou-Charentes, slightly higher for men, and three times higher in the aged group over 65 years compared to the aged group 20-64 years. In Ile de France, a frequency of PAHs of 5.7% was mentioned (Freund et al., 2012).

Another study shows that 60% of hospitalizations in Canada are due to chronic diseases; 2/3 of emergency hospitalizations are complications of chronic diseases; 80% of visits to the general practitioner are related to a chronic disease and in most cases, these pathologies are potentially preventable (Cesare et al., 2013). 60-80% of health spending is the result of chronic diseases (Atun et al., 2013).

This study shows that PAHs are concentrated in subjects aged 60 or older, with low or no education, men and women, housewives and retirees, with a monthly income of less than 100 USD. But Ndiaye et al had demonstrated that PAHs mainly affected the 40 or more years old, artisans or housewives, more women than men (Ndiaye et al., 2017). However, as in this study, married people and none or poorly educated subjects with a monthly income less than 100 USD were more represented.

Considering the reasons for hospitalization in this study, pulmonary disease was the leading cause of avoidable hospitalizations (4.74%), respectively followed by diabetes (4.06%), stroke (3.65%), chronic kidney disease (1.35 %) and high blood pressure (1.08%). But according to the study of PAHs in Saint Louis, diabetes was the leading cause of PAHs (22.1%) respectively followed by chronic kidney disease (12%), malignant high blood pressure (10.9%), stroke (6.4%) and pulmonary disease (2.6%). However, the average length of stay found in the studies were very close, 8 days at Grand Yoff General Hospital and 6.68 days at Saint-Louis Regional Hospital (Ndiaye et al., 2017). In France, an average length of stay of 8.7 days was observed in Poitou-Charentes (Giraud et al., 2016).

This study showed a double improvement of the level of awareness of disease severity and that of the information related to disease prevention means and/or its complications. A similar evolution was mentioned in Saint-Louis (Ndiaye et al., 2017).

5. Conclusion

The emergence of non-communicable diseases is a real threat to people, especially in developing countries. This study showed that diabetes, hypertension, pulmonary disease, stroke (ischemic, hemorrhagic) and chronic kidney disease are frequent reasons for hospitalization in Senegal. People aged 60 and over are the most affected. The economic cost of their medical care may likely constitute a major obstacle to the political will of an emerging Senegal. Fortunately, there are simple and effective solutions focusing on health promotion and primary prevention, with a better primary health care organization.

Authors' Contributions

NDIAYE Abdoul Aziz: design, data collection, statistical analysis and manuscript review. Other authors: design and manuscript review. All the authors have read and approved the final version of the manuscript.

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Competing Interests Statement

The authors declare no competing interests.

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