Age-related causes of admissions and outcome of patients in a medical ward in sub-Saharan Africa: A cohort study from a tertiary referral hospital in Cameroon

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Abstract

Introduction: An accurate description of the pattern of diseases is important in planning public health policies. Hence, we aimed to determine the causes of admissions and outcome of patients admitted in the medical ward of a tertiary referral hospital in Cameroon.

Methods: A retrospective cohort study was conducted in the medical ward of the Douala General Hospital between 2015 and 2017. Data on sociodemographic characteristics, comorbidities, length of stay, outcome and diagnosis at admission were collected. Diagnoses were grouped in communicable diseases or non-communicable diseases (NCDs) and then classified according to the International Classification of Diseases (ICD-10). We defined communicable diseases as diseases presenting with fever and/or abnormal white blood cells count and due to an invasion by a pathogenic microorganism. A comparison was done according to age. A p-value less than 0.05 was considered statistically significant.

Results: A total of 4316 patients were included for analyses. The mean age of participants was 52.9 ± 17.2 years, 51.3% (2212/4316) were young and 55.3% (2288/4316) were male. NCDs constituted two thirds of admissions. According to the ICD-10, infectious diseases were the leading causes of admissions accounting for 20.5% (886/4316) of all admissions, followed by cancer and cardiovascular diseases with 19.9% (862/4316) and 19.0% (820/4316) of admissions respectively. Young patients were more likely to be admitted for infectious diseases ($p < 0.001$) while elderly patients were more frequently admitted for cardiovascular diseases ($p < 0.001$). The median length of stay was 7.0 (4.0-11.0) days and the in-hospital mortality was 17.4%.

Conclusion: Infectious, cancer and cardiovascular diseases were the leading causes of medical admissions. The double burden of diseases in developing countries may explain this pattern of admissions.

Key words: Medical admissions, Causes, Outcome, Douala, Cameroon.

Introduction

Over the past seven decades, the world has experienced significant demographic changes [1]. According to the 2019 population estimates, life expectancy increased from 47 years in 1950 to 71 years in 2015 [2]. As populations aged, a long-term shift occurred in the burden of diseases from communicable to non-communicable diseases (NCDs) [1]. Of the 55 million deaths recorded worldwide in 2016, 40 million (72.3%) were due to NCDs, principally cardiovascular diseases, cancer, chronic obstructive pulmonary disease (COPD) and diabetes mellitus [3]. Nearly 80% of these deaths occurred in developing countries [4]. While the annual number of deaths due to communicable diseases is projected to decline, those due to NCDs deaths is projected to increase to 61 million by 2040 [3].

As this epidemiological transition occurs, it is important to understand variations in the pattern of disease. An accurate description of the causes of morbidity and mortality is crucial to establish public health policies [5,6]. Although data on hospital admissions are not helpful to estimate the true incidence of diseases, it provides relevant information on the burden of disease, the use of healthcare facilities and the quality of hospital care [7,8]. In a population-based worldwide cohort study in 2019, 23.6% of participants were admitted to hospitals and the leading causes of medical admissions were cardiovascular diseases followed by gastrointestinal, cancer and respiratory diseases [5]. At country level, the same pattern of diseases was observed in developed countries where NCDs are predominant [9]. This has been supported by a report from France in 2020 where the leading causes of medical admissions were gastrointestinal, cardiovascular and cancer diseases [10]. Conversely, developing countries, are facing a double burden of communicable diseases and NCDs [9]. Various studies from African countries showed that communicable diseases are leading causes of medical admissions, closely followed by NCDs such as cardiovascular, respiratory, and gastrointestinal diseases [11-15].

In Cameroon, communicable diseases and NCDs represented 40.7% and 14.2% of the burden of disease respectively; with HIV-related diseases, malaria, lower respiratory infections, diarrheal and cardiovascular diseases being more prevalent [16]. There is paucity of data on medical admissions in Cameroon; most of the available studies reported admissions on only few groups of diseases or patients [17-19]. Nevertheless, Pancha et al. reported in a study in 2015 that malaria, diarrheal and HIV-related diseases were the main causes of medical admissions in a secondary hospital in the northern part of Cameroon [20]. However, this study lacked use of a universally accepted classification of diseases and it did not report the causes of admissions according to age. Hence, the aim of our study was to determine the age-related causes of admissions and outcome of patients in the medical ward of a tertiary referral hospital in Cameroon.

Methods

Study design and setting: We carried out a retrospective cohort study over a three-year period (January 1, 2015 to December 31, 2017) in the medical ward of the Douala General Hospital (DGH), a tertiary referral hospital situated in the Littoral region of Cameroon. This hospital, with a capacity of 320 beds, has several wards including medical, surgical, obstetrics, gynecology and pediatric wards. At the time of the study, there were 29 physicians in the medical ward, distributed as follows: 4 general practitioners, oncologists, and neurologists; 3 cardiologists, rheumatologists and gastroenterologists; 2 nephrologists and endocrinologists and one hematologist, dermatologist, chest physician and infectious disease specialist. All patients are admitted through either the emergency department or the outpatient unit. During the course of their admission, patients clinical and paraclinical data are reported in open medical files upon admission. At discharge, these files are recorded and stored in the archives.

Patients and data collection: This study was based on the medical files of all patients admitted in the medical ward of the DGH during the study period. We excluded all medical files with missing relevant data on the diagnosis and outcome of patients. Data collected were sociodemographic characteristics (age, sex, residence, marital status, employment status, health insurance), comorbidities, length of stay, outcome (discharge, death, left against medical advice, referral) and diagnosis at admission. Diagnoses were grouped in communicable diseases or NCDs and then classified according to the International Classification of Diseases, 10th edition (ICD-10) [21].

Definition of operational terms: Communicable diseases were defined as diseases presenting with fever and/or abnormal white blood cells count ($> 12000/mm^3$ or $< 4000/mm^3$) and due to a clinically suspected and/or biologically proven invasion by a pathogenic microorganism. Non-communicable diseases were defined as diseases of long duration, generally of slow progression and not directly associated to the pathogenic effects of a microorganisms. Young patients were those aged less than 55 years and elderly patients were those aged 55 years or above.

Data analysis: We used SPSS version 23.0 for Windows (IBM Corp., Armonk, New York) software for statistical analysis. A comparison was done according to age of patients. Qualitative data were described as frequencies and percentages and compared with Chi-square test (χ^2) or Fisher's exact test. Quantitative variables were reported as medians and interquartile ranges (IQR) and their comparisons were done with Mann Whitney's test. In-hospital mortality was calculated by dividing the number of deceased patients by the number of total admissions. A difference was considered statistically significant when p-value was less than 0.05.

Ethical consideration: This study received the administrative authorization of the DGH and the ethical clearance of the Institutional Ethics Committee of the University of Douala, with reference number 1222CEI-Udo/01/2018/T. The study used clinical files, and therefore no opportunity of consenting participants individually.

Results

Baseline characteristics: During the study period, 4591 patients were admitted in the medical ward of the DGH among which 94.0% (4316/4591) were included for analysis. Their baseline characteristics are summarized in Table 1. Age ranged from 15 to 101 years with a mean age of 52.9 ± 17.2 years and 51.3% (2212/4316) were young. Overall, 55.3% (2288/4316) of patients were male, 91.5% (3948/4316) lived in urban areas, 62.8% (2706/4316) were married, 50.6% (2186/4316) were employed and 76.9% (3320/4316) were insured. Young patients were significantly more employed ($p < 0.001$) while elderly patients were significantly more married ($p < 0.001$), insured ($p < 0.001$), unemployed or retired ($p < 0.001$). Hypertension, cancer and diabetes were the main comorbidities with 41.2% (1778/4316), 22.2% (956/4316), 18.8% (813/4316) of all admissions respectively. Hypertension and diabetes were more prevalent in elderly patients ($p < 0.001$ each).

Causes of admissions: As presented in Figure 1, NCDs accounted for 68.6% (2960/4316) of all admissions compared to 31.4% (1356/4316) for communicable diseases. Although NCDs predominated in both ages, there was a higher proportion of patients with NCDs in elderly patients ($p < 0.001$).

Table 2 shows the causes of admissions according to the ICD-10. Overall, infectious diseases including pneumonia, tuberculosis and HIV-related diseases were first, accounting for 20.5% (886/4316) of all admissions; followed by cancer and cardiovascular (such as stroke and heart failure) diseases with 19.9% (862/4316) and 19.0% (820/4316) of admissions respectively. Young patients were more likely to be admitted for infectious diseases ($p < 0.001$) while elderly patients were more frequently admitted for cardiovascular diseases ($p < 0.001$).

Outcome of patients: The median length of stay was 7.0 (4.0-11.0) days and 38.5% (1662/4316) patients were admitted for 1 to 6 days with no difference according to age ($p = 0.812$). A total of 77.2% (3331/4316) patients were discharged, 17.4% (749/4316) died during admission and 4.4% (188/4316) left against medical advice. There was no difference in term of discharge ($p = 0.603$) or in-hospital mortality ($p = 0.427$) while those who left against medical advice were more young patients ($p = 0.029$) (Table 3).

Discussion

To the limits of our knowledge, this study describes for the first time the age-related causes of admissions and outcome of patients in a medical ward of the main tertiary referral hospital in Cameroon. The results show that patients were mainly young and male. Hypertension, cancer and diabetes were the main comorbidities with hypertension and diabetes being more prevalent in elderly patients. NCDs predominated in both ages and were significantly more frequent in elderly patients. According to the ICD-10, the leading causes of admissions were infectious, cancer and cardiovascular diseases. Young patients were more likely to be admitted for infectious diseases while cardiovascular diseases were more frequents in elderly patients. The median length of stay was 7.0 (4.0-11.0) days and the in-hospital mortality was 17.4% with no difference according to age.

Our study population was predominantly young and male; this is in agreement with the demographic data of the Littoral region [22]. However, we noticed a higher proportion of elderly patients in our series compared to the general population. Similar observations have been reported by other authors [15,23-25]. Hypertension, cancer and diabetes mellitus were the main comorbidities with hypertension and diabetes being more prevalent in elderly patients. This highlights the role of ageing in cardiovascular diseases and diabetes [26].

In our study, NCDs were predominant and accounted for two thirds of admissions. This finding is in consonance with previous studies in other tertiary referral hospitals in Africa such as Uganda (62.0%) [27], Nigeria (64.6%) [24] and Sudan (71.8%) [15]. In contrast, Allain et al. found a lower proportion of NCDs (29.9%) in Malawi [28]. When presented according to the ICD-10, infectious came up top, followed by cancer and cardiovascular diseases. Young patients were more likely to be admitted for infectious diseases while elderly patients were more frequently admitted for cardiovascular diseases. This finding is in agreement with similar studies on hospital admissions. A systematic review from Africa found that the leading causes of medical admissions were infectious, respiratory and cardiovascular diseases, with a 16% increase in admissions for cardiovascular diseases in 60 years [11]. This is indicative of the double burden of communicable diseases and NCDs in developing countries [29,30]. According to the WHO estimates, there are more deaths from communicable diseases than NCDs. However, the prevalence of NCDs is rising rapidly and is projected to overtake communicable diseases and cause almost three quarters of deaths [4,31]. The most cited determinants of this epidemiological transition are populations ageing, growing urbanization, and changes in behavioral and dietary habits [26,32-34].

The median length of stay was 7 (4.0-11.0) days, in accordance with previous observations [14,24,35-37]. The in-hospital mortality of 17.4% is similar to most rates reported in other developing countries [14,24,35], but higher than those reported in developed countries [38,39]. This high figure could be attributed to the late presentation of patients as reported by studies in that tertiary referral hospital that is at the top of the health pyramid of Cameroon [40-43].

The limitations of the present study are those inherent to retrospective studies, such as missing data. Also, data were collected from a single hospital, which could raise issues of its application to the entire country. However, the DGH is one of the two tertiary referral hospital in Cameroon and patients admitted there come from all over the country. This study has as major strength that it describes for the first time the age-related causes of medical admissions and outcome of patients in a tertiary referral hospital in Cameroon. This could help to establish public health policies to improve the care of this group of patients.

Conclusion

This study found a higher proportion of young patients among medical admissions in DGH. NCDs constituted two thirds of admissions, predominantly among the elderly patients. Infectious diseases were the leading causes of admissions, followed by cancer and cardiovascular diseases; with infectious diseases more frequent in young patients and cardiovascular diseases more frequent in elderly patients. This highlights the double burden of diseases in developing countries. With the growing ageing of the population, there is a need to establish more public health policies to prevent noncommunicable diseases.

What is already know on this topic

- Developing countries, are facing an ageing of populations and a double burden of communicable diseases and NCDs;
- In African countries, communicable diseases are leading causes of medical admissions, closely followed by NCDs such as cardiovascular, respiratory, and gastrointestinal diseases.

What this study adds

- NCDs constituted two thirds of admissions;
- According to the ICD-10, the leading cause of admissions were infectious, cancer, cardiovascular, genitourinary and respiratory diseases;
- Young patients were more likely to be admitted for infectious diseases while elderly patients were more frequently admitted for cardiovascular diseases;
- The in-hospital mortality was 17.4%.

Competing interests

The authors declare no competing interest.

Authors' contributions

Hamadou Rachidou: conception and design, acquisition of data, analysis and interpretation of data, drafting the article

Marie Patrice Halle: conception and design, analysis and interpretation of data, final approval of the version to be published

Yacouba Njankouo Mapoure: acquisition of data

Anne Marthe Maison: acquisition of data

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Anastase Dzudie: drafting the article

Simeon Pierre Choukem: draft review

Bertrand Hugo Mbatchou Ngahane: draft review

Henry Namme Luma: final approval of the version to be published

Acknowledgements

The authors are grateful to the nurses, medical doctors and medical students, who over the years have contributed to the follow-up, and therefore maintaining the medical files of patients used as the basis of data collection for the current study.

Tables and figures

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Table 2: Causes of admissions of patients according to the ICD-10

Table 3: Length of stay and outcome of admitted patients

Figure 1: Communicable diseases and non-communicable diseases amongst admitted patients

References

1. Santosa A, Wall S, Fottrell E, Högberg U, Byass P. The development and experience of epidemiological transition theory over four decades: a systematic review. Glob Health Action. 2014;7(1):23574-90.

2. United Nations. World population prospects, the 2019 revision - volume I: comprehensive tables. 26th ed. New York: United Nations; 2019. 374 p.

3. Foreman KJ, Marquez N, Dolgert A, Fukutaki K, Fullman N, McGaughey M, et al. Forecasting life expectancy, years of life lost, and all-cause and cause-specific mortality for 250 causes of death: reference and alternative scenarios for 2016-40 for 195 countries and territories. Lancet. 2018;392(10159):2052-90.

4. World Health Organization. The global burden of disease: 2004 update. Geneva: World Health Organization; 2008. 146 p.

5. Dagenais GR, Leong DP, Rangarajan S, Lanas F, Lopez-Jaramillo P, Gupta R, et al. Variations in common diseases, hospital admissions, and deaths in middle-aged adults in 21 countries from five continents (PURE): a prospective cohort study. Lancet. 2020;395(10226):785-94.

6. Etyang AO, Munge K, Bunyasi EW, Matata L, Ndila C, Kapesa S, et al. Burden of disease in adults admitted to hospital in a rural region of coastal Kenya: an analysis of data from linked clinical and demographic surveillance systems. Lancet Glob Health. 2014;2(4):e216-24.

7. Carneiro I, Howard N. Introduction to epidemiology. 2nd ed. Maidenhead: Open University Press; 2011. 183 p.

8. English M, Mwaniki P, Julius T, Chepkirui M, Gathara D, Ouma PO, et al. Hospital mortality - a neglected but rich source of information supporting the transition to higher quality health systems in low and middle income countries. BMC Med. 2018;16(1):32-41.

9. Naghavi M, Abajobir AA, Abbafati C, Abbas KM, Abd-Allah F, Abera SF, et al. Global, regional, and national age-sex specific mortality for 264 causes of death, 1980-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017;390(10100):1151-210.

10. Direction de la Recherche des Etudes, de l'Evaluation et des Statistiques. Les établissements de santé : édition 2020. Paris: Direction de la Recherche des Etudes, de l'Evaluation et des Statistiques; 2020. 204 p.

11. Etyang AO, Gerard Scott JA. Medical causes of admissions to hospital among adults in Africa: a systematic review. Glob Health Action. 2013;6(1):19090-104.

12. Okoroiwu HU, Uchendu KI, Essien RA. Causes of morbidity and mortality among patients admitted in a tertiary hospital in southern Nigeria: a 6 year evaluation. PLoS One. 2020;15(8):e0237313-28.

13. Adebayo O, Freeman O, Osarenkhoe J, Omoruyi L, Imarhiagbe L. Pattern and outcome of medical admissions in a Nigerian rural teaching hospital (2009-2012). Ann Trop Med Public Health. 2014;7(3):171-6.

14. Ali E, Woldie M. Reasons and outcomes of admissions to the medical wards of Jimma University Specialized Hospital, Southwest Ethiopia. Ethiop J Health Sci. 2011;20(2):113-20.

15. Noor SK, Elmadhoun WM, Bushara SO, Ahmed MH. The changing pattern of hospital admission to medical wards: burden of non-communicable diseases at a hospital in a developing country. Sultan Qaboos Univ Med J. 2015;15(4):e517-22.

16. Ministère de Santé Publique. Profil sanitaire analytique 2016 Cameroun. Yaoundé: Ministère de Santé Publique; 2016. 121 p.

17. Nkoke C, Jingi AM, Makoge C, Teuwafeu D, Nkouonlack C, Dzudie A. Epidemiology of cardiovascular diseases related admissions in a referral hospital in the South West region of Cameroon: a cross-sectional study in sub-Saharan Africa. PLoS One. 2019;14(12):e0226644-52.

18. Mapoure YN, Kuate C, Tchaleu CB, Mbatchou Ngahane HB, Mounjouopou GN, Ba H, et al. Stroke epidemiology in douala: three years prospective study in a teaching hospital in Cameroon. World J Neurosci. 2014;4(5):406-14.

19. Luma HN, Doualla MS, Mbatchou Ngahane HB, Temfack E, Joko HA, Kuaban C. Extrapulmonary tuberculosis and HIV coinfection in patients treated for tuberculosis at the Douala General Hospital in Cameroon. Ann Trop Med Public Health. 2013;6(1):100-4.

20. Pancha Mbouemboue O, Ngoufack JO, Koona Koona A, Maha F, Kingue S. Place et profil évolutif des maladies cardiovasculaires en milieu hospitalier nord camerounais : le cas de l'Hôpital Régional de Ngaoundéré. Health Sci Dis. 2015;16(1):1-7.

21. World Health Organization. International statistical classification of diseases and related health problems. 10th ed. Geneva: World Health Organization; 2009. 1203 p.

22. 3è recensement général de la population et de l'habitat. http://www.bucrep.cm/index.php/fr/ressources-et-documentations/telechargement/category/46-resultats-du-3eme-rgph. Accessed on 28 December 2021.

23. Ogunmola OJ, Oladosu OY. Pattern and outcome of admissions in the medical wards of a tertiary health center in a rural community of Ekiti state, Nigeria. Ann Afr Med. 2014;13(4):195-203.

24. Olatayo Adeoti A, Adekunle Ajayi E, Oladimeji Ajayi A, Ayokunle Dada S, Olusesan Fadare J, Akolawole M, et al. Pattern and outcome of medical admissions in Ekiti State University Teaching Hospital, Ado-Ekiti- a 5 year review. Am J Med Med Sci. 2015;5(2):92-8.

25. Ogunmola OJ, Olamoyegun MA. Patterns and outcomes of medical admissions in the accident and emergency department of a tertiary health center in a rural community of Ekiti, Nigeria. J Emerg Trauma Shock. 2014;7(4):261-7.

26. Wang T, Zhao Z, Yu X, Zeng T, Xu M, Xu Y, et al. Age-specific modifiable risk factor profiles for cardiovascular disease and all-cause mortality: a nationwide, population-based, prospective cohort study. Lancet Reg Health West Pac. 2021;17:100277-86.

27. Kalyesubula R, Mutyaba I, Rabin T, Andia-Biraro I, Alupo P, Kimuli I, et al. Trends of admissions and case fatality rates among medical in-patients at a tertiary hospital in Uganda; A four-year retrospective study. PLoS One. 2019;14(5):e0216060-73.

28. Allain TJ, Aston S, Mapurisa G, Ganiza TN, Banda NP, Sakala S, et al. Age related patterns of disease and mortality in hospitalised adults in Malawi. PLoS One. 2017;12(1):e0168368-80.

29. Wong EB, Olivier S, Gunda R, Koole O, Surujdeen A, Gareta D, et al. Convergence of infectious and non-communicable disease epidemics in rural South Africa: a cross-sectional, population-based multimorbidity study. Lancet Glob Health. 2021;9(7):e967-76.

30. Boutayeb A. The double burden of communicable and non-communicable diseases in developing countries. Trans R Soc Trop Med Hyg. 2006;100(3):191-9.

31. World Health Organization. Global status report on noncommunicable diseases 2010. World Health Organization. Geneva: World Health Organization; 2011. 162 p.

32. Yusuf S, Reddy S, Ôunpuu S, Anand S. Global burden of cardiovascular diseases: Part I: general considerations, the epidemiologic transition, risk factors, and impact of urbanization. Circulation. 2001;104(22):2746-53.

33. Sobngwi E, Mbanya JC, Unwin NC, Porcher R, Kengne A-P, Fezeu L, et al. Exposure over the life course to an urban environment and its relation with obesity, diabetes, and hypertension in rural and urban Cameroon. Int J Epidemiol. 2004;33(4):769-76.

34. Ezzati M, Riboli E. Behavioral and dietary risk factors for noncommunicable diseases. N Engl J Med. 2013;369(10):954-64.

35. Bane A, Bayisa T, Adamu F, Guteta Abdissa S. Medical admissions and outcomes at Saint Paul's Hospital, Addis Ababa, Ethiopia: a retrospective study. Ethiop J Health Dev. 2016;30(1):50-6.

36. Baek H, Cho M, Kim S, Hwang H, Song M, Yoo S. Analysis of length of hospital stay using electronic health records: a statistical and data mining approach. PLoS One. 2018;13(4):e0195901-16.

37. McMullan R, Silke B, Bennett K, Callachand S. Resource utilisation, length of hospital stay, and pattern of investigation during acute medical hospital admission. Postgrad Med J. 2004;80(939):23-6.

38. Kellett J, Deane B. The diagnoses and co-morbidity encountered in the hospital practice of acute internal medicine. Eur J Intern Med. 2007;18(6):467-3.

39. Marco J, Barba R, Plaza S, Losa JE, Canora J, Zapatero A. Analysis of the mortality of patients admitted to internal medicine wards over the weekend. Am J Med Qual. 2010;25(4):312-8.

40. Halle MP, Kengne AP, Ashuntantang G. Referral of Patients with kidney impairment for specialist care in a developing country of sub-Saharan Africa. Ren Fail. 2009;31(5):341-8.

41. Halle MP, Tsinga L, Fottsoh Fokam A, Kaze Folefack F, Mouelle Sone A, Ashuntantang G. Does timing of nephrology referral influence outcome among patients on maintenance hemodialysis in Cameroon. Health Sci Dis. 2017;18(3):28-34.

42. Halle MP, Nyongbella J, Fouda H, Balepna JY, Kaze Folefack F, Ashuntantang Enow G. Factors associated with late presentation of patients with chronic kidney disease in nephrology consultation in Cameroon-a descriptive cross-sectional study. Ren Fail. 2019;41(1):384-92.

43. Luma HN, Jua P, Donfack OT, Kamdem F, Ngouadjeu E, Mbatchou HB, et al. Late presentation to HIV/AIDS care at the Douala General Hospital, Cameroon: its associated factors, and consequences. BMC Infect Dis. 2018;18(1):298-306.

List of tables

Table 1: Baseline characteristics of the study population				
Variables	**Overall**	**Age (years)**		**p-value**
		< 55	**≥ 55**	
N, n (%)	4316 (100)	2212 (51.3)	2104 (48.7)	-
Male, n (%)	2288 (53.0)	1201 (54.3)	1087 (51.7)	0.083
Urbanization, n (%)	3948 (91.5)	2030 (91.8)	1918 (91.2)	0.471
Married, n (%)	2709 (62.8)	1297 (58.6)	1412 (67.1)	< 0.001
Employment status, n (%)				
Employed	2186 (50.6)	1482 (67.0)	704 (33.5)	< 0.001
Unemployed or retired	1847 (42.8)	448 (20.3)	1399 (66.5)	< 0.001
Student	283 (6.6)	283 (12.8)	0 (0.0)	< 0.001
Insured	3320 (76.9)	1492 (64.5)	1828 (86.9)	< 0.001
Comorbidities[£], n (%)				
Hypertension	1778 (41.2)	537 (24.3)	1241 (59.0)	< 0.001
Cancer	956 (22.2)	469 (21.2)	487 (23.1)	0.124
Diabetes mellitus	813 (18.8)	208 (9.4)	605 (28.8)	< 0.001
HIV/AIDS	676 (15.7)	534 (24.1)	142 (6.7)	< 0.001
Stroke	582 (13.5)	150 (6.8)	432 (20.5)	< 0.001
Chronic kidney disease	531 (12.3)	255 (11.5)	276 (13.1)	0.112
Heart failure	314 (7.3)	83 (3.8)	231 (11.0)	< 0.001
Hepatitis B or C	312 (7.2)	128 (5.8)	187 (8.7)	< 0.001
Gastric and duodenal ulcers	192 (4.4)	82 (3.7)	110 (5.2)	0.015

Liver cirrhosis	167 (3.9)	58 (2.6)	109 (5.2)	< 0.001
Asthma	31 (0.7)	16 (0.7)	15 (0.7)	0.968
COPD	30 (0.7)	5 (0.2)	25 (1.2)	< 0.001
Other comorbidities*	637 (14.8)	250 (11.3)	387 (18.4)	< 0.001

AIDS: Acquired immunodeficiency syndrome; COPD: Chronic obstructive pulmonary disease; HIV: Human immunodeficiency virus; £Patients could have more than one comorbidity; *Other comorbidities were atrial fibrillation, cardiomyopathy, gout, chronic headaches, dementia, epilepsy, hyperplasia of prostate, lumbar disc disorders, Parkinson's disease, systemic lupus erythematosus.

Table 2: Causes of admissions of patients according to the ICD-10				
Variables	**Overall**	**Age (years)**		**p-value**
		< 55	**≥ 55**	
Category of diseases (ICD-10 code), n (%)				
Infectious diseases (A00-B99)	886 (20.5)	612 (27.7)	274 (13.0)	< 0.001
Cancer diseases (C00-D48)	862 (19.9)	439 (19.8)	423 (20.1)	0.832
Cardiovascular diseases (I00-I99)	820 (19.0)	252 (11.4)	568 (27.0)	< 0.001
Genitourinary diseases (N00-N99)	428 (9.9)	229 (10.4)	199 (9.5)	0.326
Respiratory diseases (J00-J99)	295 (6.8)	130 (5.9)	165 (7.8)	0.011
Digestive diseases (K00-K93)	294 (6.8)	135 (6.1)	159 (7.6)	0.058
Endocrine diseases (E00-E90)	246 (5.7)	92 (4.2)	154 (7.3)	< 0.001
Neurological diseases (G00-G99)	161 (3.7)	97 (4.4)	64 (3.0)	0.020
Hematological diseases (D50-D89)	108 (2.5)	90 (4.1)	18 (0.9)	< 0.001
Musculoskeletal diseases (M00-M99)	106 (2.5)	60 (2.7)	46 (2.2)	0.264
Mental diseases (F00-F99)	32 (0.7)	22 (1.0)	10 (0.5)	0.047
Skin diseases (L00-L99)	18 (0.4)	15 (0.7)	3 (0.1)	0.006
Other diseases[†]	60 (1.4)	39 (1.8)	21 (1.0)	0.032
Main diseases (**ICD-10 code**), n (%)				
• **Stroke (I60-I63)**	442 (10.2)	124 (5.6)	318 (15.1)	< 0.001
Chronic kidney disease (N18)	262 (6.1)	139 (6.3)	123 (5.8)	0.547

Pneumonia (J15)	255 (5.9)	110 (5.0)	145 (6.9)	0.008
Tuberculosis (A15-A19)	235 (5.4)	185 (8.4)	50 (2.4)	< 0.001
Diabetes mellitus (E10-E14)	227 (5.3)	82 (3.7)	145 (6.9)	< 0.001
Heart failure (I50)	219 (5.1)	58 (2.6)	161 (7.7)	< 0.001
HIV-related diseases (B20-B24)	211 (4.9)	179 (8.1)	32 (1.5)	< 0.001
Diarrheal diseases (A00-A09)	172 (4.0)	85 (3.8)	87 (4.1)	0.624
Malaria (B50)	124 (2.9)	87 (3.9)	37 (1.8)	< 0.001
Breast cancer (C50)	119 (2.8)	81 (3.7)	38 (1.8)	< 0.001

ICD-10: International classification of diseases; HIV: Human immunodeficiency virus; [†]Other diseases were diseases of the ear (H60-H95), puerperium diseases (O00-O99), symptoms and signs not elsewhere classified (R00-R99), injury and poisoning (S00-T98).

Table 3: Length of stay and outcome of admitted patients

Variables	**Overall**	**Age (years)**		**p-value**
		< 55	**≥ 55**	
Length of stay (days), median (IQR)	7.0 (4.0-11.0)	7.0 (4.0-11.0)	7.0 (4.0-11.0)	0.279
Length of stay (days), n (%)				
1-6	1662 (38.5)	848 (38.3)	814 (38.7)	0.812
6-11	1540 (35.7)	774 (35.0)	766 (36.4)	0.332
11-16	574 (13.3)	290 (13.1)	284 (13.5)	0.708
16-21	261 (6.0)	145 (6.6)	116 (5.5)	0.151
≥ 21	279 (6.5)	155 (7.0)	124 (5.9)	0.137
Outcome, n (%)				
Discharge	3331 (77.2)	1700 (76.9)	1631 (77.5)	0.603

Death	749 (17.4)	374 (16.9)	375 (17.8)	0.427
LAMA	188 (4.4)	111 (5.0)	77 (3.7)	0.029
Referral	48 (1.1)	27 (1.2)	21 (1.0)	0.486
LAMA: Left against medical advice				