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Iatrogenic Illness in Elderly Inpatients from a Department of Internal Medicine in Cameroon: a Prospective Study

Pathologies iatrogènes chez les sujets âgés hospitalisés dans les services de médecine interne au Cameroun : Une étude prospective

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ABSTRACT

Background. In-hospital mortality in elderly patients reaches 32% in some departments of Internal Medicine in Yaoundé and the causes are largely unknown. The study aimed at identifying some factors associated with this high mortality in our environment. **Methods.** The study was carried out from June to August 2017, in the Internal Medicine departments of the Yaoundé Teaching Hospital and the Yaoundé Central Hospital. We included all patients aged of 60 and over hospitalized in the Internal Medicine departments during the study period and looked for iatrogeneic events in the rcords. Iatrogenic events were defined as any adverse clinical and / or biological manifestations occurring during hospitalization and which cannot be explained by the current disease. The data were analyzed using the SPSS 23.0 software. The Chi-square and the exact Fischer test were used to study associations between variables with a significance threshold of less than 0.05. We obtained the approval of the Institutional Ethical Review Board of the Faculty of Medicine and Biomedical Sciences. **Results.** We included 81 patients with a mean age at 71.5 ± 8.1 years. We found an incidence of 5.3 iatrogenic events per 100 person-days of hospitalization. Risk factors for iatrogenic event were poor general status at admission (RR 4.35 95% CI 1.04-17.5 p= 0.044), antihypertensive drugs (RR 5.3 95 %CI p= 0.015) and polymedication (RR 6.1 95% CI 1.8-20.5 p <0.001).The occurrence of an iatrogenic event significantly increased the risk of death in elderly patients (RR 1.6 95%CI 1.1-2.2).**Conclusion.** The identification of patients at risk of iatrogenic events will help reduce the in-hospital mortality of elderly patients.

RÉSUMÉ

Contexte. La mortalité hospitalière des patients âgés atteint 32% dans certains services de Médecine Interne à Yaoundé. Les facteurs associés à cette mortalité élevée sont peu documentés dans notre environnement d'où cette étude. **Méthodologie.**: Cette étude a été réalisée de juin à août 2017 dans les services de médecine interne de Centre Hospitalier et Universitaire et de l'Hôpital Central de Yaoundé. Nous avons inclus tous les patients âgés de 60 ans et plus hospitalisés dans les services de Médecine Interne pendant la période d'étude. Les données ont été analysées à l'aide du logiciel SPSS 23.0. Le test du chi carré et le test exact de Fischer ont été utilisés pour étudier les associations entre les variables avec un seuil de significativité inférieur à 0,05. Nous avons obtenu l'approbation du comité d'éthique de la Faculté de Médecine et des Sciences Biomédicales de Yaoundé. Les événements iatrogènes ont été définis comme toute manifestation clinique et / ou biologique défavorable survenant pendant l'hospitalisation et ne pouvant être expliquée par la maladie actuelle. **Résultats.** Nous avons inclus 81 patients dont l'âge moyen de 71,5 ± 8,1 ans. L'incidence de la iatrogénie était de 5,3 événements iatrogènes par 100 jours-personnes d'hospitalisation. Les facteurs de risque d'événement de survenue d'évènements iatrogéniques étaient un mauvais état général à l'admission (RR 4,35, IC 95%: 1,05-17,5 p = 0,044), la prise au long cours d'antihypertenseurs (RR 5,3 95%, IC p = 0,015) et la polymédication (RR 6,1 95%, IC 1,8-20,5 p < 0,001). La survenue d'un événement iatrogène augmentait significativement le risque de décès chez les patients âgés (RR 1,6 IC 95% 1,1-2,2). **Conclusion.** L'identification des patients présentant un risque d'événements iatrogéniques contribuera à réduire la mortalité hospitalière des patients âgés.

BACKGROUND

According to the World Health Organization (WHO), elderly people were 900 million in 2015 compared to 600 million in 2000. They will be two billions by 2050, of whom 80% in developing countries [1]. Older patients account for almost 50% of hospitalizations and the hospital mortality rate in this age group is around 33% in some countries [2,3]. Several factors explain this high mortality, including age-related functional and organic dysfunction, but also multiple comorbidities and iatrogenic conditions [4-6]. In the United States, iatrogenicity is responsible for nearly 180,000 deaths per year in people over 65 years. It is the third leading cause of death after heart disease and cancer [6,7]. In other developed countries, its hospital incidence in the elderly reaches 65% in some studies (6,8). It increases the cost of management but also the length of hospitalization of elderly patients [6,8-10]. Iatrogenic events in elderly patients are associated with high morbidity and mortality, due to many factors intrinsic to the patient but also to the medical and nursing staff [6,11,12].

The elderly population is constantly increasing in sub-Saharan Africa [1]. However, this region remains one of the least provided with geriatricians and geriatric departments in the world [13]. The majority of geriatric population studies have been conducted in Western countries. In a Nigerian study, intra-hospital mortality among elderly patients was 31% in 2008 [3]. About 5.4% of Cameroonians were 60 years and over in 2014 [14]. Between 2012 and 2015, they accounted for more than 24% of Internal Medicine admissions in Yaoundé and the in-hospital mortality rate was 22% [15]. Since the factors associated with this high mortality are not documented in our environment, the aim of our study was to fill this gap. In addition, the departments of Internal Medicine of Cameroon are devoid of specialists in geriatric care.

METHODS

Study setting

We conducted a prospective study in the Internal Medicine and Specialties departments of the Yaounde Teaching Hospital and of Central Hospital. The study ran from June to August 2017. The Yaoundé Teaching Hospital and the Yaoundé Central Hospital are reference health facilities located in the heart of the Cameroonian capital. They are also application hospitals attached to the Faculty of Medicine and Biomedical Sciences of the University of Yaounde I. It provides specialized health care in most medical disciplines. The elderly population represents about one-third of admissions, particularly in Internal Medicine and Specialties ward.We obtained the approval of the Institutional Ethical Review Board of the Faculty of Medicine and Biomedical Sciences (N° 272/UY1/FMSB/VDRC/CSD of the 24/05/2017) as well as the research authorizations of the directors of hospitals.

Data collection

We included all patients aged 60 and over hospitalized in Internal Medicine and Specialties ward during the study period and who consented to participate. Those whose hospital stay was less than 24 hours were excluded. Inpatient registers were consulted each morning to identify any new patients aged 60 and over admitted to the Internal Medicine ward during the study period. Eligible patients were identified in the hospitalization rooms where we gave them the information leaflet, taking care to explain to them in details, objectives, risks and benefits of our study. For patients who were unable to understand our explanations or read the information leaflet, we discuss with their family members. Patients who agreed to participate to our study gave us their written consent. For those patients who were unable to give their consent, we got it from the family member. After obtaining the informed consent of the participants, we conducted an interview with the patients and their family member in order to obtain the following informations: The age (that was calculated from the year of birth), the lifestyle (patient living with family or living alone), the existence of a remunerative activity, the level of education. We then reviewed each patient's medical file for the following informationS: comorbidities, daily treatment, state of consciousness on admission, vital parameters on admission, baseline serum creatinine values, prothrombin levels and transaminases. Diagnoses were discussed and retained in consultation with the medical team based on anamnestic, clinical and paraclinical data. Nursing records were consulted to record the different drugs received (pharmacological classes, number of drugs received). For each participant, we performed a physical examination at inclusion: Consciousness using the Glasgow coma score, vital parameters: blood pressure (measured with an Omron® electronic cuff), pulse (measured at radial pulse), respiratory rate, temperature (taken with a mercury thermometer), and general physical examination. Participants were evaluated everyday for the purpose of collecting complaints, physical examination data and additional labtests available. We have identified the main iatrogenic events. For each event we specify the type, the time of appearance and the observed manifestation. The data collected were systematically confronted with those of the medical team. Patients were followed until they discharge, indicating whether they had survived or died. Subsequently, we performed a comparison between patients with iatrogenic events and those who were not affected in order to highlight the risk factors for their occurrence.

Definitions

Iatrogenic event: adverse clinical and / or biological manifestations, not related to the current pathology and possibly induced by medical or nurse intervention.
Drug related iatrogenic events: adverse drug reactions, drug interactions, dosage errors, wrong indication or route of administration.
Non-drug related iatrogenic events: pressure sores, nosocomial infections, falls, events related to a therapeutic or diagnostic procedure.

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Iatrogenic events related to a therapeutic procedure: superficial phlebitis, post-transfusion reactions, complications of urethral or nasogastric tube, complications of dialysis, complications of serous punctures (peritoneum, pleura or pericardium)

Iatrogenic events related to a diagnostic procedure: contrast induced nephropathy, biopsy complications (lymph node, pleural, renal, hepatic)

Alteration of consciousness: Glasgow coma score less than 15.

Impairment of general status: decrease in functional capacities evaluated according to the WHO Performance Status.

Nosocomial infection: any infection occurring after at least 48 hours of admission, whether suspected or proven

Acute renal failure: a decrease of glomerular filtration rate of less than three months.

Liver failure: Prothrombin rate less than or equal to 50%.

Arterial hypotension: Blood pressure less than or equal to 120/80 mmHg.

Bradycardia: heart rate less than 60 beats / min.

Statistical analysis

The qualitative variables were presented by numbers and frequencies, the quantitative variables by the mean ± standard deviation and the extremes. The association between qualitative variables was sought by the Chi-square test or Fisher's exact test. The averages were compared using the Student's T-test and the medians by the Mann Withney U-test. Patient survival was represented by a Kaplan Meier curve. Multivariate analysis was done on the logistic regression model, including variables with p-values less than 0.05. The significance level used was $p < 0.05$.

RESULTS

Socio-demographic characteristics

We studied 81 patients, of whom 43 (53.1%) were female. The average age was 71.5 ± 8.1 years with extremes of 60 and 95 years. Seventy-nine patients (97.5%) lived with their families and 22 (27.2%) of them had a gainful activity. In terms of age distribution, we found that 29.6% of patients were under 65 years.

Clinical characteristics

Performance Status ≥ 3 was observed in 49.4% patients on admission. The most common comorbidities were high blood pressure (n = 60), osteoarticular disorders (n = 28) and type 2 diabetes (n = 22). The most common diagnosis were stroke (n = 23), decompensated heart failure (n = 22) and decompensated cirrhosis (n = 8). Thirty-one patients (46.3%) had acute renal failure on admission.

Therapeutic characteristics

On average, there were 5.62 ± 2.7 drugs per patient. More than half (58%) of the patients had polymedication during their hospitalization. The most commonly prescribed therapeutic classes were antihypertensives, proton pump inhibitors and anticoagulants (Table 1).

Table 1: Drugs prescriptions in elderly patients during hospitalization (N = 81)

Drugs	N	%
Antihypertensives	63	78
PPI	55	68
Anticoagulants*	47	58
Antibiotics	32	38
Analgesics	25	31
Antidepressants	10	12
Other drugs	17	21

PPI: proton pump inhibitors
Other drugs : anxiolytics, anticonvulsivants, antiarrythmics, corticosteroids, oral antidiabetics, insuline
*antiplatelet agents, vitamine K antagonists, new oral anticoagulants, low molecular weight heparin

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Epidemiology of iatrogenic events

Of the 81 patients included, 45 (55.6%) had at least one iatrogenic event during hospitalization. We found 62 iatrogenic events, giving an incidence of 5.28 cases per 100 person-days of hospitalization (95% CI: 3.9-7). We found that 30.6% of iatrogenic events were drug related. The majority of iatrogenic events occurred during the first 10 days of hospitalization. Nosocomial infections (n = 20), superficial phlebitis (n = 11) and pressure ulcers (n = 6) accounted for the majority of non-drug-related iatrogenic events.

The number of drugs received by patients with iatrogenic disease was significantly higher than that of other patients (p <0.001). As shown in Table 2, the risk factors for iatrogenic disease in elderly patients were: perfomance status ≥ 3 on admission, the presence of more than 3 comorbidities, antihypertensives and antiplatelet agents, polymedication during hospitalization.

Table 2: Univariate analysis of factors associated with iatrogenic events in elderly patients hospitalized in Internal Medicine

Variables	With iatrogenia	Without iatrogenia	RR (95% CI)	P value
Age ≤ 70	22 (59.5)	15 (40.5)	1.1 (0.8– .7)	0.517
Performance status ≥ 3	27 (67.5)	13 (32.5)	1.5 (1.01–2.3)	**0.033**
Nb of comorbidities > 3	9(90)	1(10)	1.8 (1.3- 2.4)	**0.037**
Polymedication	36 (76.6)	11 (23.4)	2.9 (1.6 –5.2)	**< 0.001**
Antihypertensives	40 (63.5)	23 (36.5)	2.3 (1.1 –4.9)	**0.007**
Proton pump inhibitors	36 (65.5)	19 (34.5)	1.9 (1.1 –3.3)	**0.009**
Anticoagulants	31 (66)	16 (34)	1.6 (1.02–2.5)	**0.027**
Antibiotics	23 (74.2)	8 (25.8)	1.7 (1.2 –2.5)	**0.008**

Nb: number . CI :confidence intervall ; RR :relative risk

In univariate analysis, performance status ≥3, polymedication, and antihypertensive were independent risk factors for occurrence of iatrogenic events. The length of stay of patients with iatrogenic events was

significantly longer (p = 0.002). A total of 21 deaths were recorded, of which 2 (9.5%) were attributed to iatrogenia. The occurrence of an iatrogenic event significantly increased the risk of death in elderly patients (Fig. 1).

Table 3: Multivariate analysis of factors associated with iatrogenic events in elderly patients hospitalized in Internal Medicine

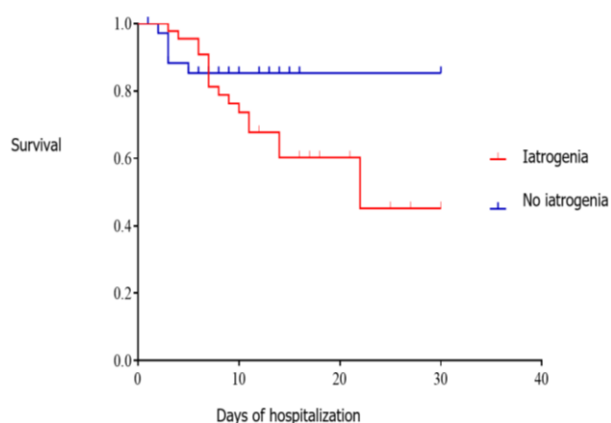| Variables	Ajusted RR (95 % CI)	ajusted P value
Performance status ≥ 3	4.3 (1.04 – 17.5)	0.044
Polymedication	6.1 (1.8 – 20.5)	0.004
Antihypertensives	5.3 (1.4 – 20.02)	0.015
CI :confidence intervall ; RR :relative risk		

Figure 1: Survival of elderly patients and occurrence of iatrogenic events

DISCUSSION

In our study, we found that about 56% of elderly patients hospitalized in Internal Medicine had at least one iatrogenic event. This value is greater than the 26% that Szlejt et al found in Brazil in 2012 [11]. The Szlejt team conducted a prospective study in a population of 121 patients for 20 months, in a geriatric ward with a multidisciplinary team. However, our incidence is lower than that of Madeira et al, who found 64% in a department of Internal Medicine in Brazil in 2007 [7]. This difference can be explained by the fact that our study population was younger than that of the Madeira team. In addition, the latter had also include the iatrogenic events that occurred before admission.

Nosocomial infections accounted for more than 32% of all iatrogenic events in our population. In Brazil, the Madeira and Szlejft teams found nosocomial infection in 24 and 1.6% of cases, respectively [7, 11]. According to a study conducted in Cameroon in 2015, the level of

knowledge on prevention of nosocomial infections of health care providers is low in our setting[16]. Superficial phlebitis secondary to peripheral venous access was present in 18% of cases. This is higher than the 11% found in a geriatric ward [11]. Hypodermoclysis is not practiced in our Internal Medicine departments.

Concerning drug-related iatrogenia, it was present in only 31% of cases. The Madeira team found 60% of drug-related events in an Internal Medicine department [7]. The median number of medications received in hospital by iatrogenic patients in our series was lower than that of this Brazilian study (6.6 ± 2.4 vs. 7.37 ± 2.26). Cardiovascular drugs were most often implicated, as in other studies [17].

The independent risk factors for the occurrence of iatrogenic events in elderly patients were: a performance status ≥ 3 on admission (RR 4.35 95% CI 1.04-14.5 p = 0.044), polymedication (RR 6.1 95% CI 1.8-20.5 p <0.001) and antihypertensives (RR 5.3 IC 95% 1.4-20.02 p = 0.015). This result is close to those of other studies [7,11,18], especially with regard to severe deterioration of the general state and polymedication. All tend to demonstrate that elderly bedridden patients are at high risk of iatrogenic disease. In addition, polymedication predisposes to drug interactions with increased risk of adverse events [11,7].

The length of hospital stay for iatrogenic patients was significantly longer (p = 0.002). This corroborates the findings of most studies [10,11]. The risk of death was increased in patients who had presented an iatrogenic event (RR 1.6 IC 95% 1.1-2.2 p = 0.027) and 9.5% of deaths were attributed to iatrogenic disease.These results are similar to those reported in other studies [7,11].

CONCLUSION

This study highlighted the profile of elderly patients in the Internal Medicine wards in Cameroon and the particularities related to their care. Morbidity and mortality associated with iatrogenic disease is high in this population and is dominated by non-drug-related iatrogenic events.

Competing interests

No conflict of interest.

Authors' contributions

All authors contributed to the writing of this paper.

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