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Research Article

Factors associated with complications in anaesthesia of the elderly in a low-income country: the case of MONKOLE Hospital Centre

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Abstract

Objective: Anaesthesia of the elderly is at risk of complications. No study has been devoted to this in our country. This study investigated anaesthetic morbidity and mortality in this type of patient.

Methods: This was a cross-sectional study conducted at Monkole Hospital from January, 1st2011 to December, 31st2020. It included all patients aged at least 65 years undergoing anaesthesia for any surgery. Peri-anaesthetic data were collected and analysed with SPSS 22.0 for p<5%.

Results: Of 404 patients, representing 4.8% of all patients, 284 were men (70.2%) and 120 were women (29.7%), with a predominance of patients aged 65 to 74 years (70.5%). Co-morbidities were present in 77% of patients, including hypertension in 52.2%. General and visceral surgery (48%) and urology (29.5%) predominated. Surgical procedures were major in 45.8% of patients. The majority of patients were ASA II (61.38%) and 3% were ASA IV. Locoregional anaesthesia was used in 51.7% of cases and general anaesthesia with intubation in 30.9%. The complication and death rates were 12.9% and 5.9% respectively. The factors associated with postoperative complications were: under nutrition, coma and ASA IV class, and those associated with mortality were: thromboembolic risk, ASA IV class, major surgical procedure and duration of anaesthesia and surgery ≥2 hours.

Conclusion: Anaesthesia for the elderly represented 5% of surgical procedures. Mortality was influenced by major surgical procedures, ASA IV class and duration of anaesthesia ≥2 hours and not by age itself.

Key words: Morbidity, mortality, associated factors, anaesthesia, elderly, low income

INTRODUCTION

Anaesthesia in the elderly subject is accompanied by a high risk of complications [1]. The World Health Organisation (WHO) defines the elderly as people aged 60 and over [2]. In the United States, the National Institute of Aging divides the elderly population into three categories: the "young old" (aged 65-74), the "old old" (aged 75-84) and the "very old" (aged 85 and over) [3].The surgical pathologies of the elderly that expose them to anaesthesia concern all specialities: urology, orthopaedics, visceral surgery, etc. Elderly patients often suffer from co-morbidities, with a high risk of perioperative complications [1]. This requires special anaesthetic management to avoid these complications.

In Africa, although the proportion of elderly people is evolving slowly, the absolute numbers are increasing by around 2.6% per year; the number of people aged over 60 rose from around 12 million in 1950 to 53 million in 2005 and, according to United Nations estimates (2006), will reach 200 million in 2050 [4, 5]. In the Democratic Republic of Congo, for example, life expectancy rose from 55.09 years in 2007 to 59.62 in 2016 and 60.03 in 2017 [6].

At the same time, the development and improvement of surgical techniques has led to an increase in the number of surgical procedures performed on the elderly and, consequently, an increase in the number of anaesthetic procedures. In 2003, Etzioni found that elderly patients in the United States underwent surgery four times more frequently than younger patients [1].The incidence of morbid manifestations and the rate of postoperative mortality increase with age. This is explained by the various physiological, anatomical and pharmacological changes that human beings undergo as they age, as well as the co-morbidities associated with

advanced age [7]. It has been found that the patient's clinical history and background, particularly cardiovascular, are more predictive of morbidity and mortality than age. However, some authors have found that age is an independent factor in postoperative morbidity and mortality, with a four-fold increase in risk after the age of 75 [8].

Publications on anaesthesia for the elderly in Africa appear to be rare. However, Chaibou found that 1.68% of 119 elderly patients operated on in Niamey died [9]. In our country, there are no published studies on anaesthesia in the elderly. This study was therefore conducted to determine the complications of anaesthesia in this type of patient and the factors associated with them.

METHODS

Type, setting and period of the study: This is a cross-sectional study conducted at the Monkole Hospital Centre (MHC) from 1st January to 31st December 2020.

Study population: The population consisted of all patients aged at least 65 years undergoing anaesthesia for any surgical procedure. Patients were recruited exhaustively and consecutively with their consent and followed from the day of the operation until discharge from hospital. Patients anaesthetised for digestive or bronchial endoscopy were not included because this activity had begun less than 5 years previously, and those operated on under local anaesthesia performed by the surgeon were also excluded.

Data collection: An Excel file was prepared and pre- and post-anaesthetic data were recorded progressively. The variables studied were preoperative: age grouped into three according to American terminology [3]: (65 to 74 years, 75 to 84 years and 85 years and over); sex; body mass index (lean, normal, overweight and obese); indications for surgery according to speciality; ASA class (American Society of Anesthesiologists classification); comorbidities; thromboembolic risk; haemoglobin (Hb) level grouped into two : (normal: 11g/dl and above, anaemia: <11g/dl); prothrombin level (normal: 70% and above, pathological <70%. Intraoperative variables: anaesthetic drugs and type of anaesthesia; operative procedures grouped into two (major and minor according to surgical risk); intraoperative complications: grouped into two (surgical and anaesthetic, i.e. related solely to the technique and/or anaesthetic drugs); intraoperative transfusion, qualification of anaesthetist and surgeon (senior or junior), duration of operation and anaesthesia: <2 hours and ≥2 hours. Perioperative complications and patient outcomes were tracked up to hospital discharge.

Statistical analysis: The data were entered into Excel, checked, coded and transferred to SPSS 22.0 for analysis. Results were expressed as a percentage or mean. The Chi-square test or Fischer's exact test was used to compare proportions. Factors associated with complications and death were investigated using logistic regression, and the strength of association between a factor and the dependent variable was estimated by calculating the Odds Ratio with 95% confidence intervals. The significance level was set at $p<0.05$.

Ethical considerations: The protocol was approved by the Ethics Committee of the School of Public Health under number ESP/CE/59/2021. The hospital management had given its agreement. The principles of the Helsinki Convention on Biomedical Research were respected and informed consent obtained. We have no conflict of interest in this work.

RESULTS

Patient flow diagram

We enrolled 8,698 patients, of whom 8,239 were under 65 years of age and 459 at least 65 years of age. Fifty-five patients were excluded because they had undergone digestive or pulmonary endoscopy, and therefore 404 (4.8%) were included in the study.

Preoperative patient characteristics

Table 1 shows the preoperative characteristics of the patients.

The mean age was 71.79 (range: 65-94 years). Patients aged 65 to 74 accounted for 70.5%, those aged 75 to 84 for 26% and the very old 3.5%. Males accounted for 70.2%, females 29.7%, with a M/F sex ratio of 2.48. Comorbidities were present in 77% of patients, the most common being: hypertension (52.2%), diabetes (19.9%), obesity (15.3%), heart disease (9.9%), stroke sequelae (6.18%) and lung disease (5.4%). The ASA classes were: I (14.8%), II (61.38%), III: 20.8% and IV (3%). By specialty, the indications for surgery were: digestive and general surgery: 48%, urology: 29.5%, orthopaedics: 15.8%, gynaecology: 4.5% and neurosurgery: 2.2%. The risk of venous thromboembolism (VTE) was present in 61.1% of patients. Coma was present in 4.7%, anaemia was present in 30.2% and the prothrombin level was pathological in 11.6%.

Table 1: Preoperative characteristics of patients

Variables	Frequency (n=404)	%
Age (year)		
65 to 74 (youngold)	285	70.5
75 to 84 (oldold)	105	26
84 and over (very-old)	14	3.5
Sexe		
Male	284	70.3
Female	12	29.7
BMI (Kg/mm²)		
Under 18.5 (lean)	32	7.9
18.5 to 24.99 (normal)	207	51.2
25 to 29.99 (overweight)	103	25.5
30 and over (obesity)	62	15.3
Comorbidities		
HTA	211	52.2
Heart disease	40	9.9
Alcohol consommation	163	40.3
Diabetes mellitus	77	19.1
Stroke and other neurologic disease	25	6.18
Pulmonary disease	22	5.4
Liver and digestive pathology	14	3.4
No comorbidity	93	23
ASA class		
I	60	14.8
II	248	61.38
III	84	20.8
IV	12	3
Indications/surgical speciality		

General and digestive surgery	194	48
Urology	119	29.5
Orthopaedics	64	15.8
Gynaecology	18	4.5
Neurosurgery	9	2.2
The risk of VTE		
Absent	157	38.9
Present	247	61.1
Conscience		
Lucid	385	95.3
Coma	19	4.7
Haemoglobin (g/dl)		
Anemia: <11	122	30.2
Normal : ≥11	268	66.3
Prothrombinlevel		
Normal : ≥70%	242	59.9
Pathological : <70%	47	11.6
Qualification of the surgeon		
Senior	331	81.9
Junior	73	18.1
Qualification of the anaesthetist		
Senior	375	92.8
Junior	29	7.2
Duration of anaesthesia		
Under 2 hours	262	64.9
Two hours and over	142	35.1
Duration of surgery		
Under 2 hours	312	77.3
Two hours and over	92	22.7

Legend: BMI= body mass index,HTA = high blood pressure, ASA= American Society of Anesthesiologists, VTE= venous thromboembolism. LRA: locoregional anaesthesia, AG: general anaesthesia.

Intraoperative data

Table 2 presents the intraoperative data.

The anaesthetic technique used was: locoregional anaesthesia (LRA): 209 cases (51.7%), LRA supplemented by GA (general anaesthesia): 10 (2.5%), GA with tracheal intubation: 125 (30.9%) and GA without intubation called narcosis: 60 (14.9%). Surgical procedures were major in 45.8% of cases (including 17.3% urological and 12.6% orthopaedic), with emergency procedures accounting for 8.9%. The surgeon was senior in 81.9% of cases, and junior in 18.1%. The anaesthetist was senior in 92.8% of cases and junior in 7.2%. Anaesthetic procedures lasting at least 2 hours accounted for 35.1% and those lasting less than 2 hours for 64.9%. Surgical procedures lasting at least 2 hours accounted for 77.2% and those lasting less than two hours for 22.7%.

Table 2: Intraoperative data

Variables	Frequency (n=404)	%
Anaesthetic technique		
LRA	209	51.7
GA with tracheal intubation	125	30.9
LRA supplemented by GA	10	2.5
Narcosis (GA without intubation)	60	14.9
Surgical procedure		
Minor	219	54.2
Major	185	45.8
Emergency degree		
Scheduled	368	91.1
Emergency	36	8.9

Intra- and post-operative complications

Table 3 presents the intraoperative and postoperative complications.

Intraoperative complications were present in 27% of cases and in 1.97% they were surgical. The most frequent complications were arterial hypotension (16.8%), insufficient block (2.77%) and discomfort (2.44%). Intraoperative transfusion was used in 19.3% of patients, with two units and over in 5.4%. Postoperative complications occurred in 51 patients (12.6%) (anaemia requiring transfusion: 9 cases, parietal infection: 7 cases, septic shock: 6 cases, Multiple organ failure: 5 cases, pulmonary embolism: 4 cases, haemorrhage: 2 cases, stercoral fistula: two cases, cardiogenic shock: one case, urine retention: one case, cough: one case, anuria: one case, strangulated hernia: one case, agitation: one case). There were 23 deaths (5.69%), one of which occurred intraoperatively as a result of septic shock. The causes of death were: septic shock (24%), multi-visceral failure (20.8%), pulmonary embolism (16.6%), metastasis (12.5%), haemorrhage (8.3%), unexpected (1 or 4.15%), brain trauma (4.1%) and cardiogenic shock (4.1%).

Table 3: Intra- and postoperative complications

Intraoperative complications	Frequency (n=404)	%
Present	109	27
Absent	295	73
Type of intraoperative complications		
Arterial hypotension	68	16.8
Insufficient blok	11	2.72
Discomfort	10	2.44
Haemorrhage with or without shock*	5	1.23
Gut injurys*	3	0.74
Septic shock**	4	0.99
Desaturation	4	0.99
Bradycardia	3	0.74
High blood pressure	1	0.24
Anemia requiring transfusion	78	19.3
Transfusion of one unit	56	13.9

Transfusion of two or more units	22	5.4
Postoperatives complications		
Present	51	12.6
Absent	353	87.4
Type of postoperative complications		
Minor	10	2.5
Major	18	4.5
Death	24	5.9
Moment of death		
Intraoperative	1	4.1
Fisrt postoperative day	4	16.6
Second to fifth postoperative day	13	54.1
Fifth to tenth postoperative day	3	12.5
More than ten days postoperative	3	12.5
Causes of death	**N = 23**	
Septic shock	6	24
Multiple organ failure	5	20.8
Pulmonary embolism	4	16.6
Metastasis	3	12.5
Haemorrhage	2	8.3
Unexpected	1	4.15
Brain trauma	1	4.15
Cardiogenicshock	1	4.15

*Surgical complications, **Not related to surgery or anaesthesia.

Factors associated with complications

Factors associated with intraoperative complications

Table 4 presents the factors associated with intraoperative complications.

In multi-variate analysis, the presence of thromboembolic risk ORa: 2.64(1.63-4.25, p=0.031), spinal anaesthesia supplemented by general anaesthesia ORa: 5.97(2.45-17.95, p= 0.005), transfusion of two units of blood ORa: 2.41(1.90-6.46, p=0.008), major surgery ORa: 3.51(2.01-6.48, p<0.001) and duration of anaesthesia ≥2 hours ORa 1.71(1.49-3.43, p=0.013) were associated with intraoperative complications. Narcosis was protective ORa: 0.24(0.07-0.81, p=0.022).

Table 4: Factors associated with intraoperative complications

Variables	Univariate analysis		Multivariate analysis	
	P	OR (CI95%)	P	ORa (CI 95%)
Cardiac auscultation				
Normal		1		1
Pathological	0.009	2.38(1.25-4.55)	0.266	1.51(0.73-3.11)
VTE risk				
Absent				
Present	<0.001	3.34(1.98-5.62)	0.031	2.64(1.63-4.25)
Type of anaesthesia				
LRA		1		1
Narcosis	0.003	0.16(0.05-0.53)	0.022	0.24(0.07-0.81)
GA with intubation	0.031	1.70(1.05-2.75)	0.307	1.31(0.78-2.21)
SA plus GA	0.002	7.17(3.36-19.62)	0.005	5.97(2.45-17.95)
Number of units transfused				
None		1		1
One unit	0.009	2.20(1.22-3.99)	0.506	1.25(0.65-2.40)
Two units	<0.000	4.92(2.02-11.96)	0.008	2.41(1.90-6.46)
Surgical procedure				
Minor		1		1
Major	<0.001	3.31(2.09-5.27)	<0.001	3.51(2.01-6.48)
Duration of anaesthesia				
<2 hours		1		1
≥2 hours	<0.001	2.66(1.70-4.19)	0.013	1.71(1.49-3.43)
Duration of surgery				
<2 hours		1		1
≥2 hours	0.003	2.11(1.28-3.45)	0.416	1.36(0.65-2.86)

Legend: VTE= Thromboembolism, LRA= Locoregional Anaesthesia, GA= General Anaesthesia, SA= Spinal Anaesthesia.

Factors associated with postoperative complications

Table 5 presents the factors associated with postoperative complications.

In multivariate analysis, undernutrition ORa: 3.16(1.04-9.66, p=0.043), coma ORa: 3.42(1.77-5.21, p=0.010), ASA IV class ORa: 3.97(1.49-7.47, p=0.019), duration of surgery ≥2 hours ORa: 2.52(1.81-7.77 p=0.010) and urgency ORa: 2.95(1.06-8.23, p=0.039) were associated with postoperative complications.

Table 5: Factors associated with postoperative complications

Variables	Univariate analysis		Multivariate analysis	
	P	OR (CI95%)	p	ORa (CI95%)
Metabolic history				
None				
Diabetes mellitus	0.092	0.43(0.16-1.15)	0.663	0.77(0.24-2.47)

Obesity	0.559	0.74(0.28-2.01)	0.159	2.43(0.71-8.33)
Undernutrition	0.044	2.89(1.03-8.08)	**0.043**	3.16(1.04-9.66)
Conscience				
Lucid		1		1
Coma	0.018	3.40(1.23-9.39)	**0.010**	3.42(1.77-5.21)
Cardiac Auscultation				
Normal		1		1
Pathological	0.036	2.30(1.05-5.01)	0.938	1.04(0.36-3.05)
VTE risk				
Absent		1		1
Present	<0.001	4.77(2.09-10.88)	0.688	1.34(0.32-5.52)
ASA class				
I		1		1
II	0.326	1.73(0.58-5.14)	0.814	1.16(0.64-3.92)
III	0.089	2.75(0.86-8.83)	0.328	1.99(0.50-7.89)
IV	<0.001	9.25(4.16-19.09)	**0.019**	3.97(1.49-7.47)
Haemoglobin (g/dl)				
≥11 g/dl		1		1
<11g/dl	0.032	1.92(1.06-3.47)	0.212	1.61(0.76-3.42)
Number of units transfused				
None				1
One unit	0.052	2.09(0.99-4.44)	0.494	0.72(0.28-1.84)
Two units	0.005	4.01(1.53-10.52)	0.780	1.18(0.37-3.82)
Surgical procedure				
Minor		1		1
Major	0.003	2.51(1.37-4.62)	0.888	1.07(0.39-2.89)
Duration of anaesthesia				
<2 hours		1		1
≥2 hours	<0.001	2.88(1.59-5.22)	0.724	1.25(0.36-4.32)
Duration of surgery				
<2 hours		1		1
≥2 hours	<0.001	3.58(1.95-6.56)	**0.010**	2.52(1.81-7.77)
Degre of urgency				
Scheduled		1		1
Urgency	<0.001	5.53(2.61-11.69)	**0.039**	2.95(1.06-8.23)

Legend: VTE= venous thromboembolic disease. ASA= American society of anaesthesiologists.

Factors associated with mortality

Table 6 presents the factors associated with mortality.

In multivariate analysis. thromboembolic risk ORa: 2.25(1.59-8.49. p=0.023). ASA IV class ORa: 11.46(1.58-18.35. p=0.016). major surgery ORa: 3.84(1.05-5.98. p=0.042) duration of anaesthesia ≥2 hours ORa: 2.01(1.01-3.02. p=0.048) were associated with mortality.

Table 6: Factors associated with mortality

Variables	Univariate analysis		Multivariate analysis	
	p	OR (CI 95%)	p	ORa (CI 95%)
VTE risk				
No		1		1
Yes	0.029	3.37 (1.13-10.05)	0.023	2.25 (1.59-8.49)
ASA class				
I		1		
II	0.610	1.49 (0.32-68.3)	0.899	1.11 (0.22-5.55)
III	0.490	1.80 (0.34-9.63)	0.880	1.15 (0.19-6.94)
IV	0.001	20.36 (3.31-25.39)	0.016	11.46 (1.58-18.35)
Haemoglobin				
≥11 g/dl		1		1
< 11 g/dl	0.046	2.33 (1.01-5.34)	0.237	1.78 (0.68-4.62)
Surgical procedure				
Minor		1		1
Major	0.034	2.58 (1.04-5.42)	0.042	3.84 (1.05-5.98)
Duration of anaesthesia				
<2 hours		1		1
≥2 hours	0.010	3.42 (1.02-6.99)	0.048	2.01 (1.01-3.02)
Duration of surgery				
<2 hours		1		1
≥2 hours	0.027	2.60 (1.11-6.06)	0.873	1.14 (0.22-5.81)

Legend: VTE= venous thromboembolic disease. ASA= American society

of anaesthesiologists.

DISCUSSION

This study was carried out to investigate the factors contributing to complications in anaesthesia in elderly patients in a low-income country. It showed that anaesthetic activity in elderly patients represents 4.8% with a predominance of men. This activity mainly concerned patients aged 65 to 74, often ASA II because of comorbidities, operated on for major digestive or urological surgery under GA or ALR. Intraoperative complications were dominated by arterial hypotension, while postoperative complications were mainly multi-organ failure, anaemia, septic shock and pulmonary embolism. The 5.6% mortality rate was due to the presence of a risk of VTE, ASA IV class, major surgery and anaesthesia lasting ≥2 hours. Undernutrition, coma, ASA IV class, emergency and duration of anaesthesia ≥2hours were associated with postoperative complications. The presence of thromboembolic risk, spinal anaesthesia supplemented with general anaesthesia, transfusion of two units of blood, major surgical procedure and duration of anaesthesia ≥2 hours were associated with the occurrence of intraoperative complications. In our series, anaesthetic activity in elderly subjects represented 4.8%. This frequency is lower than that (16.32%) reported by Chaibou [9]. There are variations according to the environment and the organised surgical activities. The male sex predominated with 70.2%, corroborating the data in the literature [9. 10. 11], probably because of the high prevalence of urological pathologies. Neither age nor sex was associated with mortality or complications in this series. The main comorbidities were cardiovascular (hypertension), neurological and pulmonary, and are cited in the literature [10, 11]. In this study [10], of non-cardiac surgery patients like ours, mortality was 4.6%, slightly lower than ours (5.6%), even though the study focused on patients aged ≥80 years. Postoperative complications in this study [10], were neurological in 15% and cardiovascular in 12%. These complications (12.6%) in our series were dominated by septic shock. multi-organ failure and pulmonary embolism, results found by other authors [11]. In Linda's study [10], the factors associated with postoperative complications were neurological comorbidities, congestive heart failure, presence of rhythm disorders and the use of vasopressors intraoperatively. In our study, it was coma (neurological impairment) similar to Linda's results, undernutrition, major surgery, duration of surgery ≥2 hours and ASA Class IV, which is also influenced by the comorbidities encountered in Linda's study. Digestive visceral surgery, urology and orthopaedics predominated, as other authors have found [11]. However, LRA (51.7%) was used more in our series because of urology and lower limb orthopaedic procedures, unlike the study cited above: 27.7% [11]. A review of the literature [12], showed the benefit of spinal anaesthesia compared with general anaesthesia in terms of morbidity and mortality, particularly for submesocolic surgery such as femur fractures. These data are contradicted by a recent review by Neuman [13], published in Anesthesiology in 2023 which showed no superiority of one technique over the other in hip fracture, hip and knee arthroplasty and vascular surgery. Arterial hypotension was the most frequent intraoperative complication in our series and in his [11]. In-hospital mortality (6.7%) was similar to ours, with the same sample size (404). Female gender was protective against the occurrence of postoperative respiratory complications, and general anaesthesia increased the risk of these complications unlike in our study. Neurological, cardiac and renal complications increased mortality in the Tawainian study [11], almost as in our series where multi-organ failure (cardiovascular, neurological, renal and respiratory) were the causes of death. It should be noted that in a study [14] of 50.000 elderly patients with hip fracture, LRA had fewer complications than GA, which could justify our more frequent recourse to LRA especially as orthopaedic procedures were numerous. However, some studies [15, 16] have shown no difference between LRA and GA in the elderly in terms of outcome, confirming that the anaesthetic technique did not influence either morbidity or mortality in our series.

A study [17], carried out in 23 New Zealand and Australian hospitals in 4158 patients aged at least 70 years showed that comorbidities were frequent in these patients as in our series, mortality was 5% close to ours; 20% had complications different from us (27% intraoperatively and 12% postoperatively). The factors associated with mortality in their study were: advanced age, which did not emerge in our study; class greater than 2, as in our study; urgency, which was associated with the occurrence of postoperative complications in our study; and hypo-albuminemia and the presence of complications. In another study [18], where morbidity was 28% with a mortality of 2.3%, advanced age was also associated with mortality and each increase in the duration of surgery by 30 minutes increased the risk of death by 17%. In our study, surgery duration and anaesthesia duration ≥2 hours were associated with postoperative complications and mortality respectively as found by other authors [19]. The Brazilian study [20] of 182 patients undergoing femoral fracture surgery also found a role for age, high ASA class and a history of pulmonary embolism, just as our study showed that the presence of thromboembolic risk increased the risk of death by a factor of 2.25. The high class of patient, the presence of comorbidities, the urgency and above all advanced age were found by many authors [21, 22]. The influence of advanced age, high ASA class and comorbidities on mortality has been reported in several studies [22, 23], but our data did not show the influence of age on mortality, probably because of the under-representation of patients over 84 years of age (14 patients or 3.5%).

CONCLUSION

Anaesthesia in the elderly represented 4.8% of procedures in this study, with major surgical procedures accounting for a third of cases, and half of the patients were operated on under locoregional anaesthesia. Preoperative anaemia is common, with its corollary, blood transfusion. Complications are present in 12.9% and mortality appears to be high at 5.9%. Mortality is influenced by major surgical procedures, ASA IV class and duration of anaesthesia ≥2 hours and not by age itself.

PERSPECTIVES

In the light of our results, we suggest the following:

- A multicentre prospective cohort study seems necessary to allow extrapolation of these conclusions.
- Preoperative anaemia is a factor that can be corrected, in particular by patient blood management (PBM), and a study of its implementation in our setting seems more than necessary.

Authors' contributions

Wilfrid Mbombo: study design, data collection and drafting of the manuscript.
Mos Chichi: conception of the study and drafting of the manuscript.
Alphonse Mosolo and Freddy Mbuyi: data collection and editing of the manuscript.
BienvenuNkoy: bibliographical research and correction of the manuscript.
All other authors: reading and correction of the manuscript.

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Conflict of Interest

All authors declare that they have no conflict of interest in this work.

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