



UNIVERSITY *of*
RWANDA

COLLEGE OF MEDICINE & HEALTH
SCIENCES
SCHOOL OF MEDICINE & PHARMACY

**THE EPIDEMIOLOGY OF SELF-EXTUBATION IN PATIENTS ADMITTED AT
UNIVERSITY TEACHING HOSPITAL KIGALI EMERGENCY DEPARTMENT**

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**A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of
Master of Medicine in Emergency Medicine and Critical Care, School of Medicine
and Pharmacy , College of medicine and health Sciences**

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DECLARATION

I, Dr. MUGEMANGANGO Pascal, declare that this **dissertation** entitled “**Incidence and risk factors of self-extubation in patients admitted at University Teaching Hospital-Kigali, Emergency department**” is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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ABSTRACT

Background: Critically ill patients often require intubation for airway patency and mechanical ventilation in order to save their lives. Even though intubation is life-saving, it is also associated with many complications, such as self-extubation (SE). Currently, there is limited data on patients who have self-extubated in the emergency department in low- and middle-income countries. This study evaluated the risk factors of SE at the Centre Hospitalier Universitaire de Kigali (CHUK) in Kigali, Rwanda.

Methods: This cross-sectional study enrolled intubated patients at CHUK emergency department (ED) from 1st June 2020 to 28th February 2021. Trained study personnel collected data on demographics, clinical information, intubation characteristics, and medications. Cases consisted of all patients with occurrences of SE and were matched based on age, gender, and reason for admission and compared to intubated control patients who did not self-extubate. Patient characteristics of cases and controls were compared, and statistical differences were assessed using χ^2 or Fisher's exact tests. Finally, a univariate logistic regression was employed to calculate odds ratios (ORs) with associated 95% confidence intervals (CIs).

Results: Over the study period, there was a total of 140 intubated patients, of which 34 (24%) self-extubated. The median age of all intubated patients was 37.5 years, with a male predominance (75.9%). The majority of SEs occurred during the night (58.82%). Self-extubation was associated with complications of hypoxia (50.00 %), aspiration (11.76%), and airway trauma (8.82%). Of those who SE, 15 (44.12%) were on a weaning process. Patients who were not sedated had higher odds of an occurrence SE compared to those who were sedated (OR=20.4, 95% CI 2.49 to 167.9, p=0.005). In addition, those in respiratory failure had higher odds of an event of SE compared to those who were not (OR=2.7, 95% CI 0.99-7.33, p=0.05). There was no statistical difference in final ED disposition between the cases and controls.

Conclusion: In the population studied, there was high level of SE among intubated patients in emergency department which was associated with complications. These data may inform clinical guidelines for the prevention of SE and monitoring intubated patients in Rwanda and other similar ED settings

Key words : Self-extubation , Kigali , emergency

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LIST OF SYMBOLS AND ACRONYMS

CHUK: University Teaching Hospital of Kigali

CMHS: College of Medicine and Health Sciences

CPAP: continuous positive airway pressure

ED: Emergency department

EM: Emergency Medicine

ETT: Endotracheal tube

GBS: Guillain-Barre syndrome

GCS: Glasgow Coma Scale

GP: General practitioner

HDU: High dependency unit

ICU: Intensive care unit

IRB: Institutional Review Board

LMIC: Low- and middle-income countries

LOS: Length of Stay

MV: Mechanical ventilation

PEEP: positive end expiratory pressure

PSV: pressure support ventilation

RASS: Richmond agitation and sedation scale

RSS: Ramsay sedation scale

SBT: spontaneous breathing trial

SE : Self-extubation

UE: Unplanned extubation

UR: University of Rwanda

VAP: ventilator associated pneumonia

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I would like to thank the staff of the CHUK, for having taught me a lot during my training in Emergency Medicine and Critical Care.

May God bless you all.

DEDICATION

To God the Almighty for His love and blessings,

To my Beloved Parents, Brother and Sisters,

To my Friends and Relatives,

To my Supervisors,

To my Patients

This piece of work is dedicated with great pleasure.

CHAPTER ONE: INTRODUCTION

1.1 Background

Critically ill patients often require intubation to assure airway patency and facilitate mechanical ventilation in order to save their lives.(1) While intubation is life-saving, it is also associated with many complications such ventilator associated pneumonia (VAP) and lung injuries.(2) Others complications are associated with self-extubation mostly when the patient is not ready for planned extubation and many of them end up with immediate reintubation.(3)

Self-extubation is common in ventilated patients admitted in an ICU and the emergency room all over the world. Many factors are thought to lead to self-extubation, such as types of ventilator used, tracheal tubes, tracheal tubes fixations, ventilator support modes, level of sedation, and hyperactive delirium.(4) The majority of patients in different hospitals experienced self-extubation while liberation from the ventilator is in process. (5) A retrospective study done in Korea in 2017 showed that many patients with self-extubation were on CPAP and PSV, which may be explained by the weaning process. (6) Neonatal ICU are associated with other factors of self-extubation such as secretions, using uncuffed ETT, and methods of ETT fixation. Dantin J. et al.(7) showed that self-extubation is common in patients with lower severity of illness.(8)

The endotracheal tube can be an irritant and can make patients who are intubated very uncomfortable. Some protocols and guidelines, including analgesia, sedation, and physical restraints, have decreased the rate of self-extubation.(4) Patients who self-extubate often need to be reintubated, which may lead to increased time in the hospital and increased mortality.(1) A study done by Troy E. et al. in the UK showed that Self-extubation followed by reintubation is associated with increased mortality, increased length of stay (LOS), and even larger hospital costs. (9) Self-extubation in ED is associated with higher mortality than self-extubation in the ICU(10), also it is higher during night shift than day shift .(11) Self- extubation may be prevented by adequate patient education, patient monitoring and agitation prevention by giving anxiolytics.

Around half of self-extubated patients need reintubation, patients who did not experience reintubation presented shorter LOS. Some factors like pulmonary diseases, delirium and level of PEEP before self-extubation increases the risk of reintubation.(12) Patients who are on SBT before self-extubation are less likely to be reintubated, which is different for patients who still need high ventilator settings.(13)

1.2 Problem statement

Self-extubation is common among intubated patients and has been associated with many complications. However, there is currently little data on the incidence and risk factors for self-extubation in Rwanda hospitals.

1.3 Research Objectives

1.3.1. Aim

To better understand self-extubation events in CHUK in order to develop a way to prevent self-extubation from occurring.

1.3.2. Primary objective

- To identify modifiable factors associated with self-extubation events in CHUK/ED

1.3.3. Secondary objectives

- To document the epidemiology of self-extubation among all intubated patient in CHUK/ED
- To document difference in patients outcomes associated with self-extubation compared to patients who do not self-extubate.

1.4 Research question

What is the epidemiology and risk factors of SE among intubated patients in the ED at CHUK?

1.5 Rationale

Our study identified common risk factors of self-extubation so that appropriate measures and education be implemented to reduce the incidence of self-extubation in Rwandan hospitals. By identifying gaps in the management of intubated patients in ED and in ICU, this study will also help emergency medicine physicians to recognize areas of improving intubated patients care.

1.6 Hypothesis

Most cases of self-extubation happen on night shifts where there are few staffs compared to day time personnel.

, other self -extubation are associated with weaning process as there is hold of sedation which also may increase the risk of self extubation.

1.7 Structure of the study

Our study on epidemiology and risk factors of self-extubation in patients admitted at CHUK ED contains a title page, acknowledgements, dedications, abstract, table of content, followed by six chapters: Introduction, Literature review, Methodology, Results, Discussion, Conclusions and Recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Intubation is a rapid and safe lifesaving procedure in critically ill patients performed by emergency residents, consultants, and anesthesia and other people who are trained in advanced airway management.(14) Even though intubation is lifesaving, it is also accompanied by many complications in LMICs due to poor knowledge and or loss resources .(14)

Self-extubation is a common complication among intubated patients receiving mechanical ventilation. This extubation is associated with many minor to major effects on mortality and morbidity in LMICs.(17)

Hence, investigating risk factors of self-extubation is essential for better recognizing the problems and plan for preventives measures. This chapter reviews the literature around the world, particularly in LMICs and briefly explains the mechanism of action of mechanical ventilation.

2.2 Theoretical Literature

Intubation is a rapid and safe airway management procedure in the emergency department in patients who need respiratory support. It can be done by emergency physician, anesthesiologist, anesthetist and anyone who has trained in advanced airway management.

Indications of intubation and mechanical ventilation :

- Respiratory failure : type 1 (hypoxic) and type 2 (hypercapnic)
- Reduced level of consciousness (GCS <8)
- Airway injury or impending respiratory compromise
- High risk of aspiration
- Trauma to the airway to the airway cage either penetrating trauma to the neck or chest
- Neuromuscular diseases (GBS, MG, ..)

Intubation equipment's:

- Metal blade with direct laryngoscopy to improve the rate of success , video laryngoscopy also can be used when there is a failure of airway visualization with direct laryngoscope.
- Subglottic device and surgical back up should be used for oxygenation when there is failure of intubation.
- Different size ETT, well-functioning suction machine , capnograph , good fixing tools , and medications .(15)

Drugs used in intubation work in different ways. There are hypnotics (ketamine, etomidate, Propofol,..) agents that are used in Rapid Sequence Intubation (RSI) and the choice will depend on patients’ medical condition . After intubation, adequate sedation and pain management are recommended in order to improve patients comfort , prevent agitation which can lead to self-extubation. Many studies were done on adequate level of sedation, deep sedation (RASS -3 to -5) were considered to decrease risk of agitation and risk of self extubation but also it is associated with many side effect like prolonged LOS , prolonged MV , and mortality . Light sedation (RASS -2 to 0) is associated with less complications .(16)

Richmond Agitation Sedation Scale (RASS)

Target RASS	RASS Description
+ 4	Combative, violent, danger to staff
+ 3	Pulls or removes tube(s) or catheters; aggressive
+ 2	Frequent nonpurposeful movement, fights ventilator
+ 1	Anxious, apprehensive , but not aggressive
0	Alert and calm
- 1	awakens to voice (eye opening/contact) >10 sec
- 2	light sedation, briefly awakens to voice (eye opening/contact) <10 sec
- 3	moderate sedation, movement or eye opening. No eye contact
- 4	deep sedation, no response to voice, but movement or eye opening to physical stimulation
- 5	Unarousable, no response to voice or physical stimulation

Figure 1.RASS scoring

2.3 Empirical Literature

In LMICs such as South Africa, and the Philippines, studies have been conducted on incidence, risk factors and outcome of unplanned extubation . A study in south Africa has found that medical patients have high rate of reintubation after self extubation compared to trauma patients.(10) The most common causes of reintubation were severe respiratory distress and low level of consciousness.(10) The rate of Unplanned Extubation is almost similar for ICU patients compared to non ICU patients , but the young age , male sex and night shift contribute a lot to UEs .(11)

Some definitions

Hypoxia :is Oxygen saturation below 92% i , and less than 88% in COPD patients .

Weaning : is the process of reducing ventilator support to facilitate the patient spontaneous breathing and being extubated.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This study evaluated the epidemiology and risk factors of SE among intubated patients in the ED at CHUK. This chapter will give detailed clarification of research design, sampling, ethical consideration, data collection, analysis and final dissemination.

3.2 Study design

This single-center, cross-sectional study evaluated patient demographics, clinical information, intubation characteristics, and medications among cases of SE and intubated control patients admitted at CHUK ED between 1st June 2020 and 28th February 2021.

3.3 Research approach

During the study period data was prospectively collected on all intubated patients. After study enrollment patient were separated and matched based on cases and controls. The cases comprised of all patients with an event of SE. Patients who self extubated accidentally during their care; such as changing position, during transport or suction, were excluded. Cases were matched to intubated controls who did not experience an occurrence of SE. Cases were matched to controls based on age, gender, and reason for admission to a one-to-one ratio.

3.4 Research setting

This study was conducted at CHUK, the main public referral hospital in Rwanda. It has approximately 560 inpatient beds and 24 ED beds. CHUK receives a large number of patients daily, of which many require advanced airway management. Intubated patients are customarily admitted in Room Nine, commonly known as the resuscitation room. Resuscitation room is equipped with close monitoring and critical care management, including sedation, suction, and sometimes physical restraints to avoid any tube derangements. In total, there are four beds reserved for intubated patients. The ED is managed by nurses, GPs, Emergency and critical care residents, and consultants.

3.5 Population

The study population consisted of all intubated patients admitted to the ED from 1st June 2020 to 28thFeb. 2021.

3.5.1. Selection of study population

a) Inclusion criteria:

- All intubated patients admitted to CHUK/ED during the study period.

b) Exclusion criteria:

- Patients or caretakers who refused to sign the informed consent form.
- Patients who are extubated accidentally during their care such as changing position during transport or suction.
- Patients admitted in covid-19 isolation area as their monitoring setting was different from regular patients.

3.6 Sampling

Two nurses and one emergency medicine resident who were scheduled in the resuscitation room served as research assistants and were trained in data collection protocols. All intubated patients admitted at the CHUK- ED during the study period were screened for study inclusion. Those patients who met study eligibility were enrolled in the study after providing informed consent. Research personnel prospectively collected data through the patient intubation in the ED using a structured case reporting form.

3.6.1: Sample size calculation

As this was a prospective case-control study, no sample size calculation was needed. We included all intubated patients in CHUK/ED.

3.6.2: Sampling strategy

Study assistants were present 24 hours a day to enroll patients and gather data. All eligible patients who consented to participation were included in the study sample.

3.7 Validity and reliability of research instruments

A questionnaire was developed after reviewing different relevant literature. The form was assessed for content capacity to make sure it was acceptable and adequate.

3.8 Data Collection

All data were collected in CHUK ED using a data collection form. At the end of collection, all data were entered into database using excel sheet.

3.9 Data analysis

Data were entered into Excel and analyzed using STATA software. The epidemiologic profile of the population was characterized using descriptive statistics. Frequencies and percentages were found for categorical variables, and continuous variables were described using median values with associated interquartile ranges (IQR). Data were stratified by cases, those who self-extubated, and controls, those who did not self-extubated. Differences in characteristics were assessed using χ^2 or a Fishers exacts tests for categorical variables and independent t-tests for continuous variables. Finally, a univariate logistic regression was employed to calculate odds ratios (ORs) with associated 95% confidence intervals (CIs) to determine independent risk factors for the event of a self-extubation. A significance level of $p < 0.05$ was utilized for all analyses.

3.10 Ethical consideration

This study was approved by the CMHS Institutional Review Board (IRB) No 054/CMHS IRB/2020 and the CHUK ethics committee EC/CHUK/039/2020.

3.11 Data management

All hard copies of study data were secured in a locked area. Only research assistants had access to the data. For electronic data, a password was used to keep them secured.

3.12 Data Dissemination

The data will first presented as a thesis for the Master of Medicine in emergency and critical care program then later submitted to a peer reviewed journal for publication.

CHAPTER FOUR: RESULTS

4.1 Introduction

A total of 152 intubated patients were screened for study inclusion. Of these, 142 patients consented, enrolled and were included in the analysis. Of those enrolled, 34 patients (24.3%) experienced an occurrence of SE.

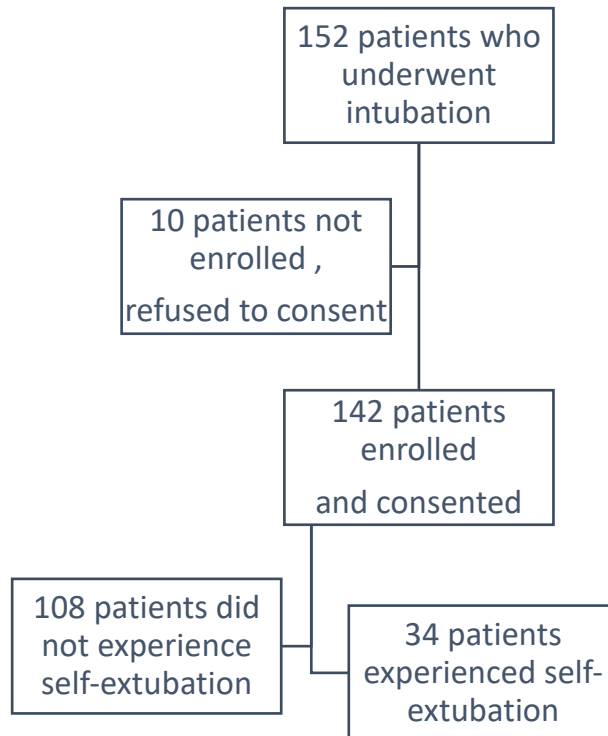


Figure 2 .Study Flow chart

4.2 Presentation of findings

Table 1 .Demographic information for all intubated patients at CHUK ED

		n	%
Sex	Male	108	76.0%
	Female	34	24.0%
Age	Mean	37.5	
	Pediatric (0-15yrs)	8	5.6%
	Adult (16-64yrs)	117	82.4%
	Elderly (>65yrs)	17	12%

In the study population, the mean age was 37.5 years, and 75.9% were men (Table 1). The majority of intubated patients were in the range of 16 to 64 years old (82.4%). The primary mode of arrival was Service d'Aide Medical d'Urgence (SAMU) (60.56%) (Table 2). More than half of intubated patients were classified as a trauma (56.34%), followed by medical patients (40%) (Figure 1). The most typical indication of intubation was a low GCS for airway protection (73.94%), subsequently respiratory failure (37.32%).

Table 2 .Characteristics of intubated patients at CHUK/ED

		n	%
Reason of admission	trauma	80	56.34
	medical	57	40.14
	burn	3	2.11
	unknown	2	1.41
Mode of arrival	SAMU	86	60.56
	District Hospital ambulance	45	31.69
	Private car	11	7.75
Place of departure	Health facility	88	61.97
	Home	10	7.04
	Street	44	30.99
Indication of intubation	Low GCS	105	73.94
	Respiratory failure	53	37.32
	Pre-operative	7	4.93
	Post-operative	1	0.70
GCS at time of intubation	3-8	103	72.54
	9-13	27	19.01
	13-15	12	8.45

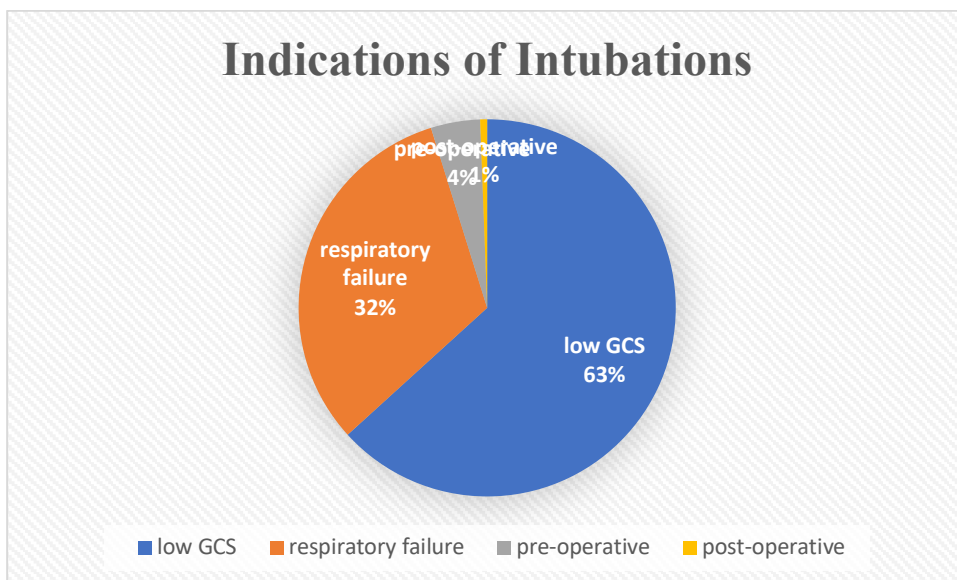


Figure 3 . Indications of intubation

In total, there were 34 patients (24.3%) who experienced an occurrence of SE during the study period. Among those who SE, the majority occurred at night 20 (58.82%). A total of 15 (44.12%) patients were on a weaning process when they SE. There were many complications associated with SE, such as hypoxia (50.00 %), aspiration (11.76%), airway trauma (8.82%), and others minor complications (38.24%) . After an episode of SE, almost three-fourths of patients (73.53%) required reintubation. Overall, 11 (32.35%) of SE patients died in the ED.

Table 3 .Self -extubation risk factor and final disposition of self-extubation cases (n=34)

		N=34	%
Time of self-extubation	Day	14	41.18
	Night	20	58.82
Complications of self-extubation*	Hypoxia	17	50.0
	Aspiration	4	11.76
	Airway trauma	3	8.82
	Others minor complications	13	38.24
Patients on weaning process	Yes	15	44.12
	No	19	55.88
Reintubation required	No	9	26.47
	Yes	25	73.53
Final ED disposition	Admitted ICU/ PICU	8	23.53
	Admitted ward	9	26.47
	Transfer/counter-ref	3	8.82
	Deceased	11	32.35
	Discharged	3	8.82

* The percentages for these variables do not add up to 100% because the categories within the variable are not mutually exclusive.

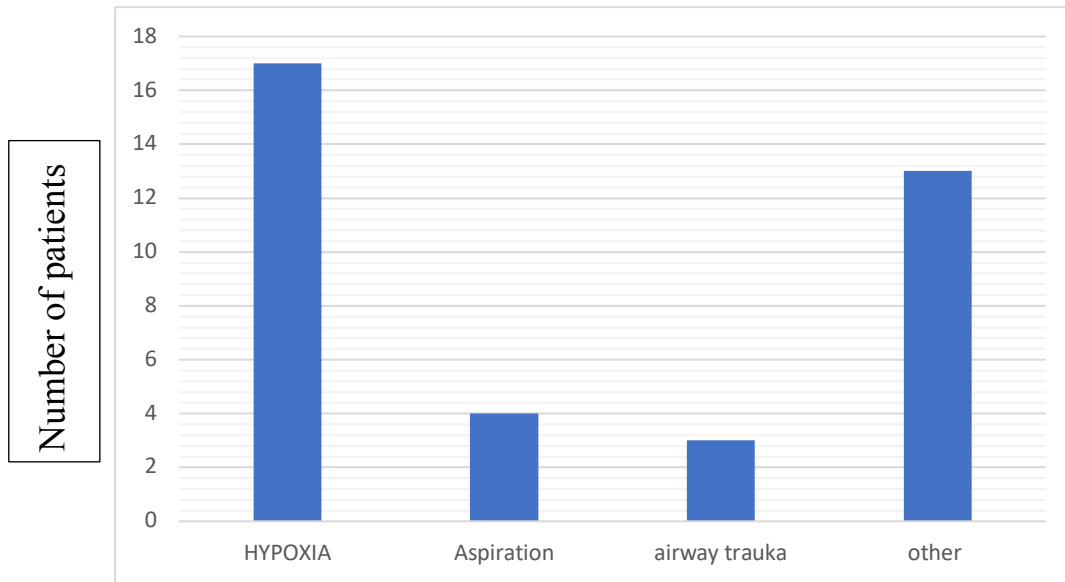


Figure 4 .Complications associated with self-extubation at CHUK ED

After matching cases, patients who had an occurrence of SE, to controls patients who did not, there were a total of 68 patients in the present analysis (Table 4). There was no statistical difference between cases and controls in gender, age, or GCS at the time of intubation. In a bivariate analysis stratified by cases and controls, patients who were not sedated had higher odds of SE than who were sedated (OR=20.4, 95% CI 2.49 to 167.9, p=0.005). Similarly, the type of medication for sedation lowered a patient’s odds of an occurrence of SE (OR=0.63, 95% CI 0.44-0.92, p=0.006). Those in respiratory failure also had higher odds of SE compared to those who were not (OR=2.7, 95% CI 0.99-7.33, p=0.05). There was no statistical difference found in final ED disposition between the cases and controls (p=0.29), however, there were more patients that were discharge from the ED who SE than those who did not SE (Figure 4).

Table 4 .Categorical variables according to emergency follow up with univariate analysis

Characteristics	Self-extubated (n=34)		No self-extubation (n=34)		Univariate		
	n	%	n	%	OR	(95%CI)	P Value
Gender							
Male (ref)	23	67.65	26	76.47	1.55	0.53- 4.52	0.41
Female	11	32.35	8	23.53			

Age (years)	32.5 (25-49)		31.5 (25-45)		1	0.97- 1.02	0.94
Indication of intubation*	22	64.71	28	82.35	0.39	0.12- 1.21	0.10
Low GCS	18	52.94	10	29.41	2.7	0.99- 7.33	0.05
Respiratory failure	0		0				
Pre-operative	0		0				
Post-operative	0		0				
GCS at time of intubation	23	67.65	27	79.41	1.62	0.76-3.45	
3-8	6	17.65	5	14.71			0.20
9-13	5	14.71	2	5.88			
13-15							
Patient sedated							
No	13	38.24	1	2.94	20.4	2.49 to 167.9	0.005
Yes (ref)	21	61.76	33	97.06			
Medication used							
none	12	35.29	1	2.94			
Ketamine	11	32.35	15	44.12	0.63	0.44-0.92	0.006
Midazolam	8	23.53	12	35.29			
Combination of medication	3	8.82	6	17.65			
Final ED disposition							
Admitted ICU/ PICU	8	23.53	7	20.59			
Admitted ward	9	26.47	5	14.71			
Transfer/counter-ref	3	8.82	2	5.88	0.82	0.58-1.17	0.29
Deceased	11	32.35	18	52.94			
Discharged	3	8.82	1	2.94			
Other/ED	0	0	1	2.94			

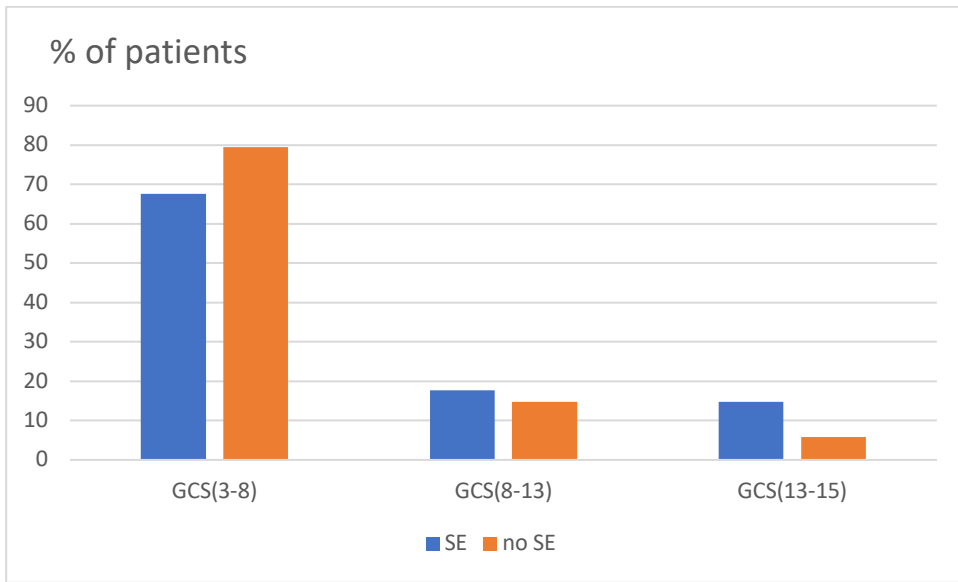


Figure 5 .comparison of rate of self -extubation based of GCS at time of intubation

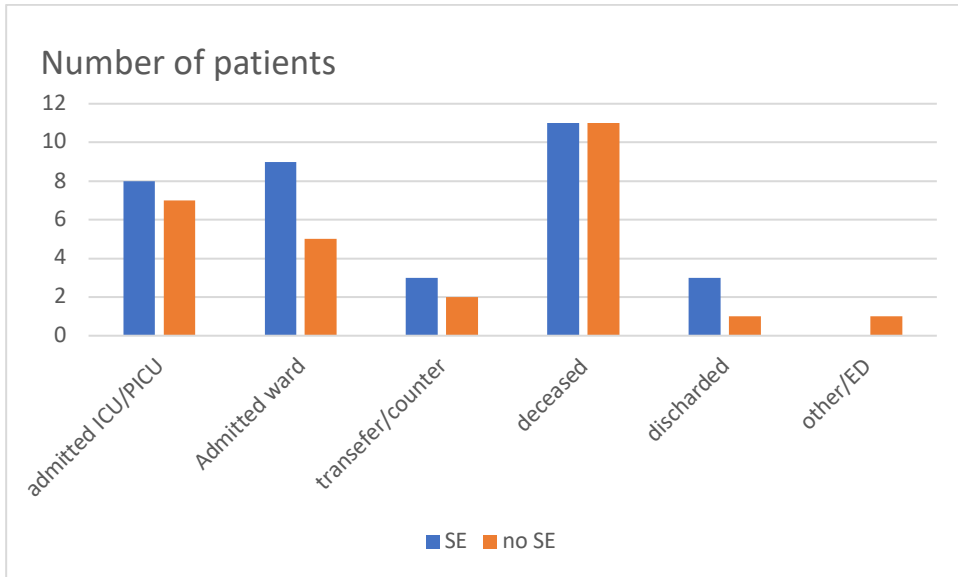


Figure 6 .Comparison of final ED disposition in patient with and without Self-extubation

CHAPTER FIVE: DISCUSSION

The study population consisted of a three to one male to female ratio with a mean age of 37.5 years. This finding may be because the majority of intubated patients were trauma admissions (56.34%), which is similar to the study done by Mbanjumuco et al. where they found the median age to be 30.(19) Of the 140 intubated patients, 117 (82.4%) were in the range of 16 to 64 years, correlating with the study of Jared R. et al. done in Malawi. (20)

Historically, there has been minimal research done on SE especially within the ED context. Our study demonstrated that around one-quarter (24%) of intubated patients over the enrollment time experienced an occurrence of self-extubation. We believe this to be a high rate of self-extubation. Some studies have been conducted on SE but within an ICU. A cohort study performed in an ICU in the Philippines showed that 19% of intubated patients experienced unplanned extubation. (17) The difference in rates may be explained by patient factors associated with the difference between non-ICU and ICU patients. Traditionally, non-ICU patients have low severity of illness, inadequate sedation, and monitoring plans compared to ICU patients.(17) There is no data found to compare in other settings, but the Ashleigh et al. (13) showed that the rate of self-extubation in non-ICU patients is higher than in ICU patients.

In our findings, more SE occurred during night shifts (58.82%) compared to day shifts. Although we were expecting this difference to be greater, we hypothesized that this might be due to night shifts typically having minimal personnel, and therefore, this may limit patient monitoring as shown by a study done in Iran by S.Razavi et al. (11.) In addition, over 25% of self-extubated patients did not require reintubation. This strongly suggests the need to closely evaluate the weaning criteria for these patients and put into effect clear monitoring plans for intubated patients. This plan needs to be communicated to both day and night shift personnel.

Our study showed no statistical difference between sex and age in rate of self-extubation before the matching of cases and controls occurred. This is contrary to another study conducted by T.Suratos et al which showed that males are associated with high rate of SE than female people.(17) A small sample size may explain this lack of difference in our findings. The current study findings suggest that sedation and the type of medication used increased the odds of SE. This finding is similar to S.Mahood et al. who showed SE was associated with

high GCS scores and low level of sedation. (18) This finding indicates the importance of patient sedation policies for the prevention of SE. Lastly, this study also found that patients in respiratory failure also had increase odds of SE. This finding warrants further investigation.

Although there was no statistical difference in final ED disposition between those who experience SE and those who did not, SE was associated with different complications, including aspiration, pneumonia, airway trauma, hypoxia, and seldom cardiac arrest. While there was no statistical difference in mortality in this study, these complications are still life-threatening, and enhanced policies should be made to prevent and limit SE.

The observations found in the current results point towards how the ED can benefit from further policies and monitoring plans to prevent patient SE. This is one of the few studies or the first study which investigated SE among intubated patients admitted in the Emergency department, which is different from ICU in settings. This study warrants further studies to be conducted about SE.

Limitations and strengths

Small sample size which is due to short time of study period.

Unknown patients (with no next of kin) were not screened.

Our motivating strength was that the study was done prospectively in order to try to capture all data.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

These data may allow us to develop clinical guidelines for the prevention of SE and monitoring intubated patients in Rwanda and other similar ED settings. Intubation in emergency departments is a lifesaving procedure but also it is associated with many mild to severe complications, some of them are related to high rate of self-extubation. Some factors that are contributing to self-extubation as shown by this study ,are types and level of sedation , night shift and intubation for respiratory distress .

6.2 Recommendations

Preventive measures should be taken in order to minimize the rate of self-extubation and associated complications:

- Establishing efficient sedation protocols in the ED
- Regular training of nurses on critical care
- Improve patients monitoring
- Availability of drugs used in sedation in the hospital pharmacy
- Further studies are recommended

REFERENCES

1. Kiekkas P, Aretha D, Panteli E, Baltopoulos GI, Filos KS. Unplanned extubation in critically ill adults: Clinical review. *Nurs Crit Care*. 2013;18(3):123–34.
2. Piriyaatsom A, Chittawatanarat K, Kongsayreepong S, Chaiwat O. Incidence and risk factors of unplanned extubation in critically ill surgical patients: The multi-center thai university-based surgical intensive care units study (THAI-SICU study). *J Med Assoc Thai*. 2016;99(9):S153–62.
3. De Lassence A, Alberti C, Azoulay É, Le Miere E, Cheval C, Vincent F, et al. Impact of unplanned extubation and reintubation after weaning on nosocomial pneumonia risk in the intensive care unit. *Anesthesiology*. 2002;97(1):148–56.
4. Konishia Y, Nakata Y, Nemotoa A, Masaru U, Matsuura M. The preoperative risk factors of postoperative self-extubation in elderly patients. *Int J Risk Saf Med*. 2018;30(1):9–18.
5. Chao C, Sung M, Cheng K, Lai C, Chan K, Cheng A, et al. Prognostic factors and outcomes of unplanned extubation. *Sci Rep* [Internet]. 2017;1–5. Available from: <http://dx.doi.org/10.1038/s41598-017-08867-1>
6. Kwon E, Ph D, Choi K, Ph D. Case-control Study on Risk Factors of Unplanned Extubation Based on Patient Safety Model in Critically Ill Patients with Mechanical Ventilation. *Asian Nurs Res (Korean Soc Nurs Sci)* [Internet]. 2017;11(1):74–8. Available from: <http://dx.doi.org/10.1016/j.anr.2017.03.004>
7. Fontáñez-Nieves TD, Frost M, Anday E, Davis D, Cooperberg D, Carey AJ. Prevention of unplanned extubations in neonates through process standardization. *J Perinatol*. 2016;36(6):469–73.
8. Roddy DJ, Spaeder MC, Pastor W, Stockwell DC, Klugman D. Unplanned extubations in children: Impact on hospital cost and length of stay. *Pediatr Crit Care Med*. 2015;16(6):572–5.
9. Dominguez TE, Thiruchelvam T. Unplanned extubations: Where is the harm? *Pediatr Crit Care Med*. 2015;16(6):595–6.
10. Afr S, Analg JA. Unplanned extubations in a level one trauma ICU. 2018;24(4):103–8.
11. Razavi SS, Nejad RA. Risk Factors of Unplanned Extubation in Pediatric Intensive Care Unit.

- 2013;12(3):11–6.
12. Groot D, Groot RI De, Dekkers OM, Herold IHF, Jonge E De, Arbous MS. Risk factors and outcomes after unplanned extubations on the ICU : a case-control study Risk factors and outcomes after unplanned extubations on the ICU : a case-control study. 2011;19(January):1–9.
 13. Fontenot AM, Malizia RA, Chopko MS, Flynn WJ, Lukan JK, Wiles CE, et al. Revisiting endotracheal self-extubation in the surgical and trauma intensive care unit: Are they all fine? *J Crit Care.* 2015;30(6):1222–6.
 14. Mbanjumucyo G, Aluisio A, Cattermole GN. Characteristics, physiology and mortality of intubated patients in an emergency care population in sub-Saharan Africa: A prospective cohort study from Kigali, Rwanda. *Emerg Med J.* 2021;38(3):178–83.
 15. Quintard H, l’Her E, Pottecher J, Adnet F, Constantin JM, De Jong A, et al. Experts’ guidelines of intubation and extubation of the ICU patient of French Society of Anaesthesia and Intensive Care Medicine (SFAR) and French-speaking Intensive Care Society (SRLF): In collaboration with the pediatric Association of French-speaking A. *Ann Intensive Care* [Internet]. 2019;9(1):1–7. Available from: <https://doi.org/10.1186/s13613-019-0483-1>
 16. Freeman CL, Evans CS, Barrett TW. Managing sedation in the mechanically ventilated emergency department patient: a clinical review. *J Am Coll Emerg Physicians Open.* 2020;1(3):263–9.
 17. Suratos TR, Miguel RTD. Incidence , risk factors , and outcomes of unplanned extubation in adult patients in a resource-limited teaching hospital in the Philippines : a cohort study. 2019;31(1):79–85.
 18. Mahmood SA, Mahmood OS, El-menyar AA, Asim MM, Abdelbari AA. Self-Extubation in Patients with Traumatic Head Injury : Determinants , Complications , and Outcomes. 2019;589–95.
 19. G. Mbanjumucyo *et al.*, “Épidémiologie des blessures et leurs résultats chez les patients souffrant de traumatismes bénéficiant d’une prise en charge préhospitalière dans un hôpital universitaire tertiaire à Kigali, Rwanda,” *African J. Emerg. Med.*, vol. 6, no. 4, pp. 191–197, 2016.
 20. J. R. Gallaher, B. E. Haac, A. J. Geyer, C. Mabedi, B. A. Cairns, and A. G. Charles, “Injury Characteristics and Outcomes in Elderly Trauma Patients in Sub-Saharan Africa,” *World J. Surg.*, vol. 40, no. 11, pp. 2650–2657, 2016.

APPENDICES

A .Data collection form

Patients Characteristics

1. Age

.....

2. Gender

- Female
- Male
- Other

3. Reason of admission

- trauma
- medical diseases
- burn
- unknown

4. Modes of arrival

- SAMU
- DH ambulance
- private car
- other

5. Transported from

- home
- health facility
- street
- other

Patients clinical characteristics in emergency department

6. Indication of intubation

- Low GCS (<8)
- Respiratory failure
- pre-operative
- Post-operative
- other

7. GCS at time of intubation

- 3-8
- 9-13
- 13-15

8. Were sedative prescribed ?

- No
- Yes

9. Was the patient sedated ?

- No
- Yes
- Unknown

10. Are sedatives available ?

- Yes
- No
- Unknown

11. If yes , medication used

- ketamine
- Propofol
- midazolam
- diazepam
- combination of medication
- other (specify).....

12. Did the patient have self-extubation ?

- yes
- No

13. If ye , Time of self-extubation

- day time
- Night shift

14. Complication of self-extubation

- Hypoxic
- Aspiration
- airway trauma
- cardiac arrest
- other

15. Was the patient on weaning process ?

- Yes
- No
- Unknown

16. was reintubation required ?

- yes
- No

17. If yes ,Time of reintubation

- <30 min
- 30min -24 hours
- >24 hours

18. What was the indication of re-intubation

- Low GCS (<8)

- Respiratory failure
- pre-operative
- Post-operative
- other

19. Current patient disposition

- Admitted ward
- Admitted ICU
- Diseased
- Discharged
- Transferred/counterreferred
- other

B. Informed Consent Form /English and Kinyarwanda

PI : Dr MUGEMANGANGO Pascal

Tel: 0788917402

Chair of ethics committess: Prof GAHUTU Jean Bosco

Study : **Incidence and risk factors of self-extubation at emergency department /CHUK**

CONSENT FORM

PI : Dr MUGEMANGANGO Pascal

Tel: 0788917402

Chair of ethics committess: Prof GAHUTU Jean Bosco

Study : **Incidence and risk factors of self-extubation at emergency department /CHUK**

Study ID No. _____

I, (or next of kin) _____

agree to participate in a study to be completed in the Emergency Department of the Centre Hospitalier Universitaire de Kigali (CHUK). This study is investigating the incidence and risk factors of self-extubation at emergency department in CHUK.

I understand the research team will be collecting potentially sensitive medical information and will do their best to protect my privacy; my individual information will not be identified when

reported for research purposes. I understand the major risk associated with this research is due to the private nature of the information that will be collected about my health.

It has been explained to me and I understand that during this course of research no intervention will be done on me to identify the risk factors of self-extubation.

- I understand the risks explained above.
- I understand that I may withdraw my participation in the study at any time, without the need to justify my decision. Participation in the study is completely voluntary and no payment is required to participate in this research.
- I understand that all information obtained will be treated with strict confidentiality and that the researchers will limit the use and disclosure of my personal information, including research study and medical records, to only people who have a need to review this information.
- I understand that the results of this research may be published. However, we will keep your name and all other identifying information confidential and I will not be identified as an individual.
- I understand that if I have more questions about the study, I may ask all of the questions I want before deciding to be in the study.

Signature _____

Date ____/____/____



CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 18th/March/2020

Dr MUGEMANGANGO PASCAL
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 054/CMHS IRB/2020

Your Project Title *"Incidence and Risk Factors of Self-Extubation at Emergency Department/CHUK"* has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
	Absent		Withdrawn from the proceeding	
Prof Kato J. Njunwa	UR-CMHS		X	
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS		X	
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 12th March 2020, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months.**

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 18th March 2020

Expiration date: The 18th March 2021


Professor GAHUTU Jean Bosco
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR



Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR



CENTRE HOSPITALIER UNIVERSITAIRE
UNIVERSITY TEACHING HOSPITAL

Ethics Committee / Comité d'éthique

04,Jun,2020

Ref.:EC/CHUK/039/2020

Review Approval Notice

Dear Pascal MUGEMANGANGO,

Your research project: "Incidence and risk factors of self extubation at emergency department/CHUK "

During the meeting of the Ethics Committee of University Teaching Hospital of Kigali (CHUK) that was held on 04,Jun,2020 to evaluate your request for ethical approval of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your research project.

You are required to present the results of your study to CHUK Ethics Committee before publication by using this link:www.chuk.rw/research/fullreport/?appid=104&&chuk.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

Dr Emmanuel Rusingiza Kamanzi
The Chairperson, Ethics Committee,
University Teaching Hospital of Kigali



Scan code to verify.

" University teaching hospital of Kigali Ethics committee operates according to standard operating procedures (Sops) which are updated on an annual basis and in compliance with GCP and Ethics guidelines and regulations "

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