

https://dspace.org/

Thyroidectomy at Chris Hani Baragwanath Academic Hospital: is routine admission to intensive care unit justified?

Elgahani, Ahmed A M

2021
https://hdl.handle.net/10539/33571

Downloaded from a DSpace repository. https://dspace.org/

Thyroidectomy at Chris Hani Baragwanath Academic Hospital: Is routine admission to intensive care unit justified?

Dr. Ahmed A M Elgahani

MBCHB (Benghazi University, Libya)

FCS (SA)

Student Number **1322823**

Supervisors:

- **Ifongo Bombil**

  MD, MMED (Wits), FCS (SA), FACS

  Department of surgery, Chris Hani Baragwanath Academic Hospital and the University of the Witwatersrand

- **R A Muganza**

  MD, FRCS (I), FCS (SA), FACS

  Department of surgery, Chris Hani Baragwanath Academic Hospital and the University of the Witwatersrand.

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Medicine

12 August 2021

Declaration by the candidate

I, Ahmed A M Elgahani, herewith declare that this report is the product of my own research. It is being submitted for the Degree of Master of Medicine in Surgery at the University of Witwatersrand, Johannesburg, South Africa. It has not been submitted before for any other degree or examination either at the University of the Witwatersrand or at any other university.

Ahmed A M Elgahani

Signature: 

Date: 12 August 2021

Johannesburg, South Africa

Dedication

To my Mother and to the soul of my Father, To my wife and my children.

Abstract

Introduction

Thyroidectomy is the most common endocrine operation performed often in healthy patient in an elective setting. Patients are discharged early and the post-operative course is mainly uneventful. The need for intensive care is not essential in most cases. This study reviews the thyroidectomy cases routinely sent to intensive care at Chris Hani Baragwanath Academic Hospital, to assess the relevance of this practice.

Objectives

To establish the profile and outcome of thyroidectomy patients admitted to intensive care, and the incidence of an uneventful ICU stay.

Method

A review of all thyroidectomy cases admitted to intensive care from January 2013 to July 2017 at Chris Hani Baragwanath Academic Hospital.

Results

In 88.42% of cases intensive care admission was not justified. Of the 11.57% that needed ICU, 90.90% was predicted pre-operatively by an underlying comorbidity and the surgical approach. Altogether only 1.06% of cases had unpredicted ICU admission.

Conclusion

Routine intensive care admission was unnecessary in most cases.

Acknowledgement

On completion of this study, I would like to thank my supervisors, Dr.I.Bombil, Professor R.A Muganza, I highly appreciate their support and guidance during my research.

My appreciation also goes to Professor S. Omer for his input, his assistance in use of intensive care registry.

I would like also to thank the four PhD scientists from the Department of Surgery, University of the Witwatersrand research team, for their guidance and advice, with special thanks to Dr. Marietha Nel for her invaluable assistance.

CONTENTS **PAGE**

DECLARATION BY THE CANDIDATE..... 2

DEDICATION..... 3

ABSTRACT..... 4

ACKNOWLEDGEMENTS..... 5

CONTENTS..... 6

LIST OF TABLES.....7

LIST OF FIGURES 8

ABBREVIATIONS 9

INTRODUCTION.....10

STUDY OBJECTIVES…….....13

METHOD…….....13

RESULTS.....14

DISCUSSION.....19

Limitation……21

CONCLUSION……22

RECOMMENDATION……22

REFERENCES.....23

APPENDICES.....26

List of tables

- Table 1. Characteristics of patients who developed post thyroidectomy hematoma.
- Table 2. Comparison between justified and unjustified groups.
- Table 3. Indications that Justified ICU admission.

List of Figures

Figure 1(a). Length of ICU stay

Figure 1(b). Length of overall hospital stay.

Figure 2. Justified vs non justified ICU admissions.

Figure3. Predicted vs unpredicted justified ICU admissions.

Abbreviations

ICU ……Intensive care Unit

CHBAH ……..……Chris Hani Baragwanath Academic Hospital

NHLS…… National Health Laboratory Service

RLN……Recurrent laryngeal nerve

CCF……Congestive cardiac failure

HREC…… Human Research Ethics Committee

LOS……...Length of stay

Introduction

Thyroidectomy is usually an elective procedure, therefore sufficient time is available for adequate preoperative preparation (1). The main concern around thyroidectomy remains the risk of post-operative complications such as bleeding, recurrent laryngeal nerve (RLN) damage, tracheomalacia and hypoparathyroidism (2).

In a multicentre study involving 14 934 patients, Rosat *et al.,* (2004) reported the following rate of major complications following thyroidectomy: bleeding 1.2%, permanent RLN palsy 1%, transient palsy 2%, superior laryngeal nerve injury 3.7% and persistent hypoparathyroidism in 1.7% (3).

There is a correlation between the volume of thyroid surgery performed per centre and the rate of complications (4). A high-volume centre is defined as one performing more than 25 thyroidectomies per year (5). Both high volume centres and high volume thyroid surgeons are associated with a reduction in postoperative complications (6).

Hypocalcaemia due to hypoparathyroidism is the most common post thyroidectomy complication, but is transient in the majority of cases (7). The risk of hypoparathyroidism is reduced by meticulous surgical procedure, identification and preservation of the parathyroid glands (7).

Postoperative hematoma is a rare but potentially fatal complication (1.2%) (3). A meta-analysis of 455 242 patients conducted by Liu *et al.,* (2017) reported a 1.44% (6573/455 242) incidence of post thyroidectomy hematoma (7). The following groups were identified as risk factors for the development of post thyroidectomy hematoma: age above 45 years, male gender, thyroidectomy for graves' disease, patients on

anticoagulant or antiplatelet medications, bilateral surgery, neck dissection and reoperation (8, 9). Lang *et al.,* (2012) recognized that a thyroid nodule size of more than 3 centimetres as another risk factor for post thyroidectomy hematoma (10).

Thyroidectomy for malignancy and drain insertion do not affect the post-operative hematoma formation (P = 0.46, P = 0.4 respectively)(8, 9). Meticulous haemostasis is still the most important factor in avoiding post thyroidectomy hematoma formation (11).

Unilateral RLN injury leads to ipsilateral vocal cord palsy with swallowing difficulties and increased risk of aspiration. Bilateral RLN injury is associated with complete loss of airway post extubation and requires immediate reintubation and either immediate or delayed tracheostomy. Adequate surgical skills and good knowledge of RLN anatomy and its variations are important factors to minimize injury (12). Other complications such as tracheomalacia, Horner's syndrome and thoracic duct injury occur in 1.8% to 8.3% of thyroidectomies, most commonly when performing lateral neck dissection (13).

With the advances in surgical techniques and skills, outpatient thyroidectomy has become possible for unilateral exploration. When life threatening post thyroidectomy hematoma occurs, it almost invariably happens acutely in the immediate postoperative period, while the patient is still being observed in the recovery room (14).

It is therefore not a major concern sending a patient who has survived the recovery room period to the ward. In a retrospective study done by Kolawole *et al*., (2009) in Nigeria, 11.8 % of 169 post thyroidectomy patients needed Intensive Care Unit (ICU)

care for different reasons (15). Similarly, a study done in the Chinese University of Hong Kong which included 268 elective major head and neck procedures, showed that it is safe and cost effective to send low risk patients back to the ward post-operatively (16).

Recently, the rate of outpatient thyroidectomy has increased dramatically. High volume thyroid surgeons feel comfortable to perform lobectomies as day cases and to discharge total thyroidectomy patients after 24 hours(4). The Endocrine Surgery Unit at Chris Hani Baragwanath Academic Hospital (CHBAH) is a high volume thyroid unit that perform approximately 50 thyroidectomies per year. Strict preoperative assessment is practised to identify patients who might be at risk. Postoperatively, laryngoscopy is done to assess the vocal cords. Patients are kept in the recovery room in theatre so that early complications like stridor or immediate postoperative haematoma can be detected early. In the general ward there are a few beds with a higher level of care, dedicated for sick patients including all postoperative patients. Such patients are red flagged, indicating closer observation by nurses and doctors on call. For years, it has been a routine to send all thyroidectomy patients to the ICU for close monitoring as a precautionary measure in anticipation of potential complications. Interestingly, the practice of requesting ICU facility is not routine in other academic hospitals attached to the University of the Witwatersrand where patients are sent back to the general ward post thyroidectomy. In case of complications, are they of such magnitude to warrant ICU or high care management? Our problem statement is to answer the question whether routine ICU or high care admission of all patients following thyroidectomy as practised at CHBAH is justified.

Objectives

1. To evaluate the profile and outcome of post thyroidectomy patients that justified admission to the ICU.
2. To determine the incidence of uneventful ICU stay.

Method

This is an observational descriptive study done retrospectively. We reviewed all thyroidectomies performed at CHBAH from January 2013 to July 2017. Data were obtained from the theatre register, ICU register, National Health Laboratory Services (NHLS), and patient files from the records department.

We looked at patient demographics, comorbidities, indication for surgery, surgical approach (total thyroidectomy *vs* lobectomy, the need for sternotomy and neck dissection). We singled out those ICU patients who had an eventful ICU stay. Eventful ICU stay were defined as one of the following: pre-existing conditions that were expected to be exacerbated by surgery, surgical approach (sternotomy or neck dissection where high doses of analgesics are required and a higher rate of complications are anticipated), threatened airway from surgical complications (hematoma and RLN injury) and anaesthetic consideration (difficult intubation with a potential for laryngeal oedema). We excluded all patients who were directly sent to the ward after the operation, since the focus of the study was on the patients admitted in ICU.

Ethics approval was obtained from the Human Research Ethics Committee (HREC) (medical) of the University of the Witwatersrand and the research review board of CHBAH (HREC clearance certificate No: 170922)

All data were entered into an Excel spreadsheet. A software (Stata version 14.2) package was used to analyse the data. Means and standard deviations were used for continuous variables. Frequencies and percentages were used for categorical variables.

Results

Out of 216 thyroidectomies performed, we managed to send 26 patients directly to the ward since we did not always agree with the established policy of "no ICU/high care bed, no thyroidectomy". Although those 26 patients had an uneventful stay in the ward, they are not part of this study.

The remaining 190 patients were admitted to ICU. They were 171 females (90%) and 19 males (10%). 188 patients were black and only two were non-black. The mean age was 47.23 years ranging from 16 to 85 years. The standard deviation was 1.06. 122 patients had total thyroidectomy (64.21%) and 68 patients (35.79%) had lobectomies with isthmusectomies. Index surgery was performed in 178 cases and 12 cases accounted for redo-surgery. Neck dissection were done in seven patients, while five patients required sternotomy as an additional procedure for mediastinal goitre.

On the histopathological reports, 122 patients had benign disease (including 9 Grave's disease, 4 toxic multinodular goitre, 5 adenoma and one Hashimoto

thyroiditis). 66 patients had confirmed malignancies (40 papillary thyroid carcinoma, 15 follicular thyroid carcinoma, 6 medullary thyroid carcinoma, one poorly differentiated carcinoma, two anaplastic thyroid carcinoma, one parathyroid carcinoma and one spindle cell neoplasm). The histopathology of the remaining two patients were not found.

154 patients (80.53%) stayed in the ICU for one day. The length of ICU stay for the remaining 24 (13.62%), 8 (4.21%) and 4 (2.10%) patients was two, 3 to 5 and 6 to10 days respectively.

7 patients had neck dissections. 6 of them had central and ipsilateral dissections vs. one bilateral and central neck dissection. Out of the 190 patients, three (1.57%) developed hematoma, two (1.05%) had bilateral vocal cord palsy and no patient had tracheomalacia. The patients who developed hematoma were all females aged 55, 72 and 30 years, of which two had total thyroidectomy for malignancy without neck dissection and one had lobectomy for benign disease. One of the total thyroidectomy patients had previous parathyroid surgery.

Table 1: Characteristics of patients who developed post thyroidectomy hematoma.

	Total	**Hematoma**	**P-value**
	n (%)	**n (%)**	
Gender Male Female	 19(10%) 171(90%)	 0(0.0%) 3(100%)	0.561
Age 45 or less Age above 45	93(48.9%) 97(51.1%)	1(33.3%) 2(66.7%)	0.586
Types of thyroidectomy Total Thyroidectomy Lobectomy	 122(64.2%) 68(35.8%)	 2 (66.7%) 1(33.3%)	0.929
Surgery Index surgery Redo	 178(93.7%) 12(6.3%)	 2 (66.7%) 1(33.7%)	0.052
Histology Benign	 122(64.9%)	 2(66.7%)	0.948

Malignant	66(35.1%)	1(33.3%)	

Justified admissions were 22 (11.57%) cases vs. 88.4% (168/190) unjustified. Of the 22 ICU admissions, two were unexpected (9.09%) and were related to post-operative hematoma. The remaining 20 cases (90.90%) were anticipated. Altogether 1.05% (2/190) cases had unpredicted ICU admissions.

154 patients of the unjustified group stayed in the ICU for one day only, while 14 stayed for two days. All of them had uneventful hospital stays. All the 168 patients were eventually discharged safely from the ward.

Table 2: Comparison between justified and unjustified groups

	Total	**Justified**	**Unjustified**	**P-value**
	n (%)	**n (%)**	**n (%)**	
Gender				
Male	19(10%)	2(9.1%)	17(10.1%)	0.880
Female	171(90%)	20(90.9%)	151(89.9%)	
Age				
45 or less	93(48.9%)	9(40.9%)	84(50.0%)	0.423
Above 45	97(51.1%)	13(59.1%)	84(50.0%)	
Comorbidity				
With comorbidities	107(56.30%)	12(54.50%)	95(56.50%)	0.859
Without comorbidities	83(43.70%)	10(45.50%)	73(43.50%)	
Histology				
Benign	122(64.9%)	11(50.0%)	111(66.9%)	0.119
Malignant	66(35.1%)	11(50.0%)	55(33.10%)	
Types				
Thyroidectomy	122(64.2%)	17 (77.3%)	105 (62.5%)	0.174
Lobectomy	68(35.8%)	5(22.7%)	63(37.5%)	
Surgery				
Index surgery	178(93.7%)	19(86.4%)	159 (94.6%)	0.133
Redo surgery	12(6.3%)	3(13.6%)	9(5.4%)	
ICU stay				
One day	154(81.1%)	19 (86.4%)	135(80.4%)	
2 days	24(12.6%)	3(13.6%)	21(12.5%)	0.642
3-5 days	8(4.2%)	0(0.00%)	8(4.8%)	
6-10 days	4(2.1%)	0(0.00%	4(2.4%)	

Table 3. Indications that justified ICU admission

Indication	Number	Comment	Predicted need for ICU?
Exacerbation of underlying conditions	2	Well known cardiac patients with previous CCF	Yes Both with Significant comorbidity, one had sternotomy
Intraoperative bleed requiring transfusion	1	79-year-old lady, known with carotid body tumour, parotid tumour, Hypertension. She had total thyroidectomy.	Yes. Had sternotomy for retrosternal extension.
Evacuation of hematoma	3	Two had total thyroidectomy, one of them was redo who developed bilateral vocal cord palsy as well. One had left lobectomy developed small hematoma on day two with no airway compromise.	Two admissions were not predicted while the third one needed ICU because of bilateral vocal cord palsy.
Re-intubation for Stridor	4	Two had bilateral vocal cord palsy that required tracheostomy while the other two were extubated on the second day with no evidence of nerve injury.	Compromised airway.
Sternotomy / neck dissection	7 neck dissection 5 sternotomies	Extensive surgery	Yes.
Anaesthetic considerations	4	Difficult intubation	Yes.

Note: there were 22 cases of justified ICU admission with 26 indications because some patients had more than one reason to be in ICU.

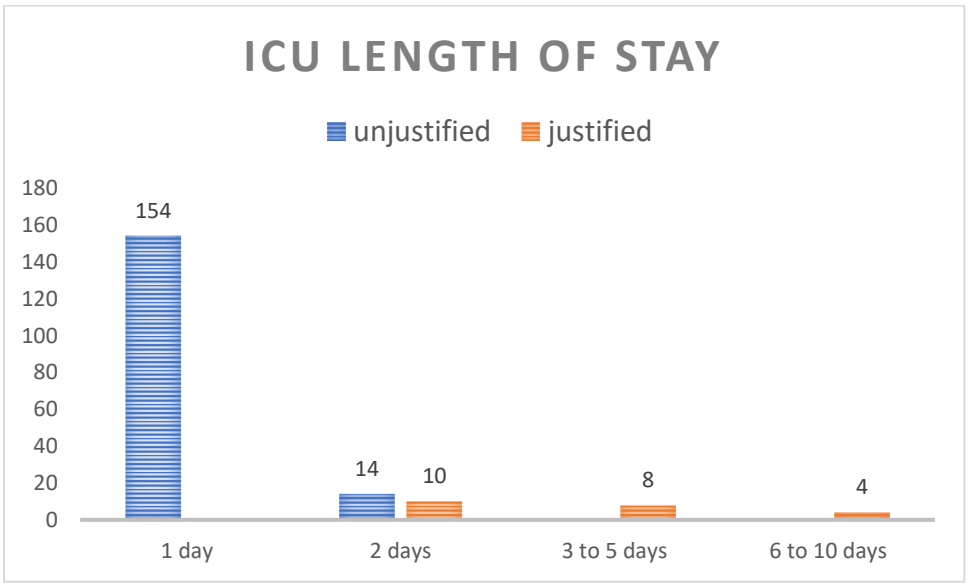

Figure 1(a): Length of ICU stay

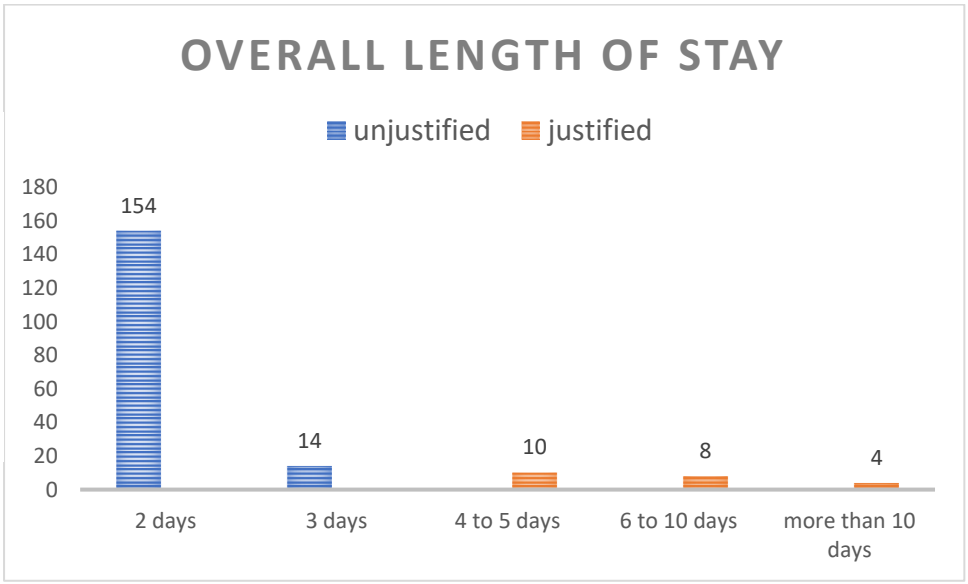

Figure 1(b): Length of overall hospital stay

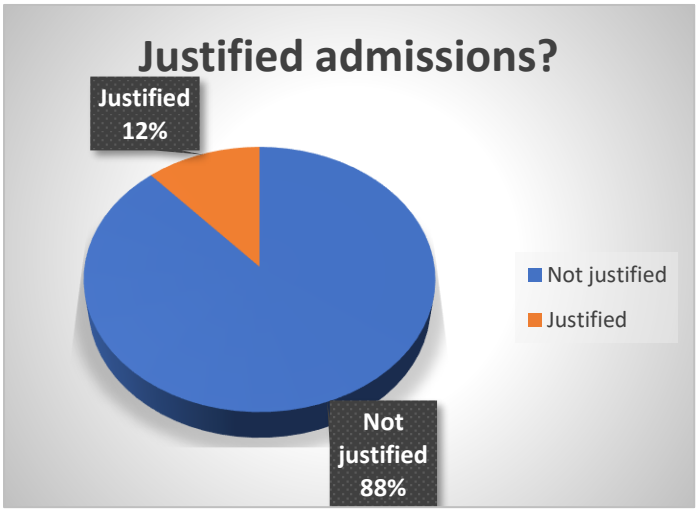

Figure 2

Justified vs non justified admissions.

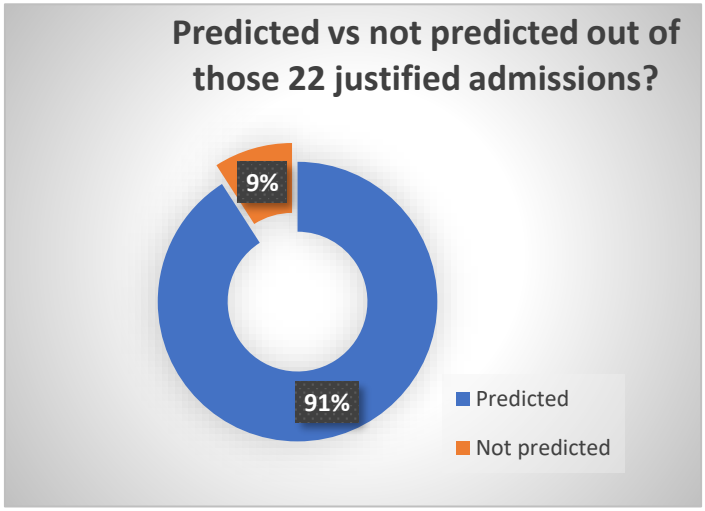

Figure 3

Predicted vs unpredicted justified admissions.

Discussion

Thyroid surgery in the hands of a skilled surgeon in a high volume centre is a relatively safe procedure (5, 10). It is usually performed in healthy patients with little or no comorbidities. The significance of a comorbidity on its own can be an indication for ICU admission (15). Although the role of comorbidities as predictors of ICU need is crucial, it is beyond the scope and objectives of this study. As an elective surgery, there is always enough time for proper preoperative assessment and optimisation. This policy is the standard of care in our unit. In retrospect, none of our patients had any comorbidities worsened postoperatively.

The need for additional surgery, namely, neck dissection and sternotomy were already planned pre-operatively. Such procedures require strong analgesia and sedation that justify ICU / high care admission. In our study, most of our patients who had these kinds of operations required at least a 24 hour ICU stay. Furthermore,

some patients desaturated and required re-intubation and therefore a longer ICU stay.

The incidence of hematoma was 1.57%, which is comparable to what was reported by Rosat *et al*., (2004) and Liu *et al.*, (2017) at 1.2% and 1.44% respectively. Although Liu *et al.*, (2017) and Weiss et al., (2014) had identified some groups e.g. age (above 45 years) and male gender as risk factors for hematoma, we could neither prove nor disprove that due to the smaller sample size. However, we believe that age and gender alone are unlikely to influence the incidence of bleeding since there are many confounding variables that can account for the bleeding. A huge goitre can leave an empty space that is filled with hematoma (10). Coagulopathy secondary to underlying conditions can account for abnormal bleeding. Surgical technique and energy devices can all affect the bleeding rate (8).

Vocal cord palsy in our study was 1.05% *vs* 1% which is similar as reported by Rosat *et al*., (2004). The manifestations of this condition can be detected early in the immediate postoperative period before the patient is sent to the ward, and appropriate management can be provided. In such a case, the need for ICU can be determined before leaving the theatre. It is possible that the incidence of vocal cord palsy is under-reported since not all nerve palsy are clinically detected and laryngoscopy are not done routinely post-operatively in our practice. We prefer to delay it until two weeks later to expect some cases of neurapraxia to resolve, although we recognize that temporary neurapraxia can take up to 6 months to resolve (17).

The justified need for ICU was 11.57% which is similar to the findings of Kolawole *et al.*, (2009), in Nigeria at 11.8% (15).

The need for ICU falls into 3 categories,

Category 1. Pre-operative prediction.

a. Patients with known significant comorbidities that can be exacerbated by surgery.

b. The planned surgical approach (sternotomy, neck dissection)

Category 2: Intra-operative prediction.

a. Difficult intubation
b. Significant Intraoperative bleeding.
c. Stridor after trial of extubation.

Category 3: Unpredicted cases

Two of the three patients who developed post-operative hematoma had none of the pre-operative or intra-operative predictors of ICU admission. When life threatening hematoma occurs, it is almost invariably an acute event in the immediate post-operative period while the patient is still in the recovery room. However, delayed hematoma is gradual and can be dealt with in the general ward.

Limitations

- This is a descriptive observational study with a sample size that is not big enough to identify the risk factors of different post thyroidectomy complications.

- Identifying the severity of comorbidities and determining which of them are considered justified indications for ICU admission were based on the clinical records of the pre-operative assessments by the surgeon, anaesthetist, and / or physician. Precise definition of significance of comorbidities may require application of different clinical criteria and scores. Such scores can be applied with more accuracy in the setting of a prospective study. However, as a retrospective study, lack of some clinical details made calculation of these scores difficult.
- Our observations were limited to the immediate post-operative complications that could justify ICU need. Long-term complications such as permanent hypocalcaemia were not recorded and analysed as they were not the focus of the study.

Conclusion

Routine ICU admissions post thyroidectomy were not justified in the majority of cases (88.42%). Although 11.57% of patients had justified ICU admission, unpredicted ICU admission was rare (1.06%)

Recommendation

The need for ICU beds should be individualised. A prospective study to correlate goitre characteristics and type of surgical approach with the rate of surgical complications is advised to better identify the ICU candidates.

References

1. Kluijfhout WP, Van Beek DJ, Stuart AAV, Lodewijk L, Valk GD, Zee DCV Der, et al. Postoperative complications after prophylactic thyroidectomy for very young patients with multiple endocrine neoplasia type 2: Retrospective cohort analysis. Med (United States). 2015;94(29):1–6.

2. Rogers-Stevane J, Kauffman GL. A Historical Perspective on Surgery of the Thyroid and Parathyroid Glands. Otolaryngol Clin North Am [Internet]. 2008;41(6):1059–67. Available from: http://dx.doi.org/10.1016/j.otc.2008.08.003

3. Rosato L, Avenia N, Bernante P, De Palma M, Gulino G, Nasi PG, et al. Complications of Thyroid Surgery: Analysis of a Multicentric Study on 14,934 Patients Operated on in Italy over 5 Years. World J Surg. 2004;28(3):271–6.

4. Tuggle CT, Roman S, Udelsman R, Sosa JA. Same-day thyroidectomy: A review of practice patterns and outcomes for 1,168 procedures in New York State. Ann Surg Oncol. 2011;18(4):1035–40.

5. Adam MA, Thomas S, Youngwirth L, Hyslop T, Reed SD, Scheri RP, et al. Is there a minimum number of thyroidectomies a surgeon should perform to optimize patient outcomes? Ann Surg. 2017;265(2):402–7.

6. Loyo M, Tufano RP, Gourin CG. National trends in thyroid surgery and the effect of volume on short-term outcomes. Laryngoscope. 2013;123(8):2056–63.

7. Sabiston DC, Townsend CM editors. Sabiston textbook of surgery: the biological basis of modern surgical practice. 19th editi. philadelphia: Elsevier Saunders; 2012. 2124 p.

8. Liu J, Sun W, Dong W, Wang Z, Zhang P, Zhang T, et al. Risk factors for post-thyroidectomy haemorrhage: A meta-analysis. Eur J Endocrinol. 2017;176(5):591–602.

9. Weiss A, Lee KC, Brumund KT, Chang DC, Bouvet M. Risk factors for hematoma after thyroidectomy: Results from the nationwide inpatient sample. Surg (United States) [Internet]. 2014;156(2):399–404. Available from: http://dx.doi.org/10.1016/j.surg.2014.03.015

10. Lang BHH, Yih PCL, Lo CY. A review of risk factors and timing for postoperative hematoma after thyroidectomy: Is outpatient thyroidectomy really safe? World J Surg. 2012;36(10):2497–502.

11. Harding J, Sebag F, Sierra M, Palazzo FF, Henry JF. Thyroid surgery: Postoperative hematoma - Prevention and treatment. Langenbeck's Arch Surg. 2006;391(3):169–73.

12. Hartl DM, Travagli JP, Leboulleux S, Baudin E, Brasnu DF, Schlumberger M. Clinical review: Current concepts in the management of unilateral recurrent laryngeal nerve paralysis after thyroid surgery. J Clin Endocrinol Metab. 2005;90(5):3084–8.

13. Roh JL, Kim DH, Park CIL. Prospective identification of chyle leakage in patients undergoing lateral neck dissection for metastatic thyroid cancer. Ann Surg Oncol. 2008;15(2):424–9.

14. Dixon JL, Snyder SK, Lairmore TC, Jupiter D, Govednik C, Hendricks JC. A novel method for the management of post-thyroidectomy or parathyroidectomy hematoma: A single-institution experience after over 4,000 central neck operations. World J Surg. 2014;38(6):1262–7.

15. Kolawole IK OY. Complications and indications for intensive care unit admission after thyroidectomy in a University Teaching Hospital. Niger Postgr Med J. 2009;16(2):149–53.

16. To EWH, Tsang WM, Lai ECH, Chu MC. Retrospective study on the need of intensive care unit admission after major head and neck surgery. ANZ J Surg. 2002;72(1):11–4.

17. Mohil RS, Desai P, Narayan N, Sahoo M, Bhatnagar D, Venkatachalam VP. Recurrent laryngeal nerve and voice preservation: Routine identification and appropriate assessment - Two important steps in thyroid surgery. Ann R Coll Surg Engl. 2011;93(1):49–53.

Appendices

Appendix I: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

R14/49 Dr A Elgahani

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M170922

NAME: (Principal Investigator)	Dr A Elgahani
DEPARTMENT:	School of Clinical Medicine Department of Surgery Chris Hani Baragwanath Academic Hospital
PROJECT TITLE:	Is high care admission mandatory post thyroidectomy?
DATE CONSIDERED:	29/09/2017
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Professor RA Muganza and Dr I Bombil
APPROVED BY:	Professor CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	14/03/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on 3rd floor, Phillip V Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.
I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially reviewed in **September** and will therefore be due in the month of **September** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Ahmed A M Elgahani — Principal Investigator Signature

02 / 02 / 2021 — Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix II: Turnitin report

Dr Elgahani - Turn it in Report Inbox ×

Josh Ndlangamandla <josh.ndlangamandla@wits.ac.za> Fri, 11 Jun, 12:56

to me, Ekene

Good day

Herewith your MMed plagiarism report attached.

Your overall similarity index is 13% with a maximum single match of 5%. Because you have published and the similarity index if from your paper, this is **acceptable** under these conditions.

Please look through and address individual similarities of 1% and more unless it is a phrase that cannot be changed e.g. the name of a hospital like Chris Hani Baragwanath Academic Hospital etc.

For your final submissions - Please only submit the Turn-it-in report PDF page in the attached report showing the similarity index (page), as well as this email stating that your plagiarism report is acceptable within the Department of Surgery.

Kind Regards

Mr Joshua Ndlangamandla
MMED Administrative Assistant
Department of Surgery, Room 9M07

Tel: +27(0)11 717 2801
Email: Josh.Ndlangamandla@wits.ac.za
Website: www.wits.ac.za



a0041843:Elgahani_MMed_Turn_it_in_Report.docx

ORIGINALITY REPORT

13%	11%	5%	2%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	paper.researchbib.com Internet Source	5%
2	archive.org Internet Source	1%
3	freidok.uni-freiburg.de Internet Source	1%
4	Edward W. H. To. "Retrospective study on the need of intensive care unit admission after major head and neck surgery", ANZ Journal of Surgery, 1/2002 Publication	1%

5	www.ourfactsyourfuture.org Internet Source	1 %
6	Submitted to Loughborough College Student Paper	1 %
7	doaj.org Internet Source	1 %
8	mobile.wiredspace.wits.ac.za Internet Source	<1 %

9	www.colorado.gov Internet Source	<1 %
10	Grubbs, E.G.. "Recent Advances in Thyroid Cancer", Current Problems in Surgery, 200803 Publication	<1 %
11	link.springer.com Internet Source	<1 %
12	Kerstin Lorenz, Marco Raffaeli, Marcin Barczyński, Leyre Lorente-Poch, Joan Sancho. "Volume, outcomes, and quality standards in thyroid surgery: an evidence-based analysis—European Society of Endocrine Surgeons (ESES) positional statement", Langenbeck's Archives of Surgery, 2020 Publication	<1 %
13	"Difficult Decisions in Endocrine Surgery", Springer Science and Business Media LLC, 2018 Publication	<1 %

14	"Management of Thyroid Nodules and Differentiated Thyroid Cancer", Springer Science and Business Media LLC, 2017 Publication	<1 %
15	Alan F. Utria, Paolo Goffredo, Mary Belding-Schmitt, Junlin Liao, Joel Shilyansky, Geeta Lal. "Practice Patterns and Outcomes of Pediatric	<1 %
	Thyroid Surgery: An NSQIP Analysis", Journal of Surgical Research, 2020 Publication	
16	Jennifer L. Hunt. "Molecular Alterations in Hereditary and Sporadic Thyroid and Parathyroid Diseases", Advances in Anatomic Pathology, 01/2009 Publication	<1 %
17	e-sciencecentral.org Internet Source	<1 %
18	etheses.whiterose.ac.uk Internet Source	<1 %
19	idoc.pub Internet Source	<1 %
20	journals.lww.com Internet Source	<1 %
21	scholarworks.gsu.edu Internet Source	<1 %
22	"Prophylactic Surgery", Springer Science and Business Media LLC, 2021 Publication	<1 %

23	"Medical and Surgical Treatment of Parathyroid Diseases", Springer Science and Business Media LLC, 2017 Publication	<1 %
24	bmcsurg.biomedcentral.com	
—	Internet Source	<1 %