

Four-year overall surgical mortality rate at Princess Marina Hospital, a tertiary hospital in Botswana

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Abstract

Background. Improving surgical mortality rates is a global priority, as they measure the success of surgical care systems. There is no data on Botswana's overall surgical mortality rate. Therefore, this study set out to evaluate the overall mortality rate in a surgical department at Princess Marina Hospital, a tertiary hospital in Botswana.

Method. This study is a single-center quantitative and retrospective study conducted in the surgical department at Princess Marina Hospital from August 2016 to December 2019. The Department of Surgery at Princess Marina Hospital keeps a prospectively updated database for quality assurance, which start-

ed in August 2016. The study received ethical approval. We included all patients older than 12 years admitted to the surgical department. Our adults surgical wards admit patients who are older than 12 years. This study collected all mortality data and determined the overall mortality rate as a percentage of surgical admissions.

Results. We retrieved 4660 admissions. The mean age was 56 (standard deviation=20.1). 66% (3083/4660) were operated. Out of the 4660 admissions, 267 deaths were registered, giving an overall mortality rate of 6%. The overall postoperative mortality rate was 3.63%(112/3083), and the non-operatively managed patient mortality rate was 9.83% (155/1577). Overall, malignancies were the leading cause of death, at 49.1%(131/267), followed by trauma at 22.1% (59/267).

Conclusions. The 4-year overall surgical mortality rate at Princess Marina Hospital was 6%. The mortality rate of the non-operatively managed patients was more than twice as high as the postoperative mortality rate. Overall, malignancies were the leading cause of death, followed by trauma

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Introduction

Postoperative mortality is used universally to measure the quality of surgical care. However, it represents a small proportion of the overall mortality rate within a surgical department as some patients are managed non-operatively.¹ Evaluating the overall surgical mortality rate provides an overall picture of the department's performance.¹ Improving surgical mortality rates is a global priority, as they measure the success of surgical care systems. However, little is known about the global quality of surgical care due to some countries lacking robust reports of their mortality rates.² There is no data on Botswana's overall surgical mortality rate. Therefore, this study set out to evaluate the overall mortality rate in a surgical department at Princess Marina Hospital (PMH), a tertiary hospital in Botswana.

Low- and middle-income countries, especially in Sub-Saharan Africa, have fewer surgical sub-specialties.³ In Botswana, there is an apparent predominance of general surgeons. This is contrary to the paradigm shift of worsening deficiency of general surgeons in some middle- and high-income countries.⁴ The availability of surgical sub-specialty training programs partly explains the paradigm shift observed in some middle- and high-income countries.⁴ When writing this paper, all surgical practitioners in Botswana trained abroad. Botswana started its first general surgery training program in 2020. Arguably, the additional cost of subspecializing abroad has favored not subspecializing. Therefore, the surgery department consists mainly of general surgeons and fewer surgical sub-specialists. The Department of Surgery at PMH consists of the following teams: Neurosurgery, Urology and Cardiothoracic, Surgical Oncology, and General Surgery.

Materials and Methods

This study is a single-center quantitative and retrospective study conducted in the surgical department at Princess Marina Hospital from August 2016 to December 2019. The study received ethical approval from the Ministry of Health (HPDME 13/18/1), Princess Marina Hospital (PMH 2/2A(7)/34), and the University of Botswana (UBR/RES/IRB/BIO/GRAD/252). We included all patients older than 12 years admitted to the surgical department for operative or non-operative management. Our adults surgical wards admit patients who are older than 12 years. We currently do not have a Paediatric Surgeon at PMH, and pediatric surgical patients are primarily referred to private hospitals. In this study, we collected all mortality data from the date of routine mortality and morbidity conferences (M&MC), and the quality assurance database was started, from August 2016 to December 2019. We determined the total number of admissions, deaths, diagnoses, operative status (operated vs non-operated patients), and causes of death. Finally, we determined the overall mortality rate as a percentage of all surgical admissions.

PMH is a tertiary hospital located in Gaborone, the capital city of Botswana. PMH has a bed capacity of 592 and offers a wide range of specialist services. It serves patients from Greater Gaborone and its surrounding areas in Southern Botswana, a population averaging 30,000. In addition, PMH is currently serving as the main teaching hospital for the residents in the Faculty of Medicine, University of Botswana. The Department of Surgery at PMH keeps a prospectively updated database for quality assurance, which started in August 2016.

Results

We retrieved 4660 admissions to the surgical department. Of these, 58% (2703/4660) were males, and 42% (1957/4660) were females. The mean age was 56 (standard deviation=20.1). 66% (3083/4660) of all admissions were operated. Out of the 4660 admissions, 267 deaths were registered from August 2016 to December 2019, giving an overall mortality rate of 6%. Of the 267 death, 41.9% (112/267) were operated on.

The overall postoperative mortality rate was 3.63% (112/3083), and the non-operatively managed patient mortality rate was 9.83% (155/1577). Over the four years covered in the study, there was an observed decrease in the yearly mortality rates, which was not statistically significant. The yearly mortality rates from 2016 through 2019 were 7, 6, 6, and 4%, respectively.

The top 5 leading causes of death were severe head injury (37, 13.9%), esophageal cancer (30, 11.2%), colon cancer (19, 7.1%), pancreatic cancer (18, 6.7%), and brain malignancy (13, 4.9%). Overall, malignancies were the leading cause of death, at 49.1% (131/267), followed by trauma at 22.1% (59/267).

Discussion

This study evaluated the overall mortality rate in a surgical department at a tertiary hospital in Botswana from prospectively collected data. The overall mortality rate was 6%. The overall mortality rate of 6% was comparable to a study conducted in Ethiopia under a similar setting,⁵ which reported an overall mortality rate of 6.9% among surgical admissions at Tikur Anbessa Specialized Teaching Hospital. Our postoperative mortality rate was lower (3.63%) but comparable to their findings (4.5%). Unfortunately,

fewer studies report on the overall surgical mortality rate but instead on mortality rates for specific procedures or surgical subspecialties. Therefore, it would appear inappropriate to compare our findings with such studies. On the other hand, studies in middle- and high-income countries have reported postoperative mortality rates as low as 0.71%.¹ This may be a reflection of readily available and accessible surgical services.

The mortality rate of the non-operatively managed patients was relatively higher (9.83%). However, on close examination, it became apparent that 67.7% (105/155) were non-preventable deaths such as stage IV malignancies who died from the disease progression. This explains the high mortality rate of the non-operatively managed patients in this study. The criteria and definition of non-preventability were adapted from the World Health Organization guidelines for trauma quality improvement programs.⁶ According to these criteria, mortality is considered non-preventable if: the pathology and sequelae were deemed non-survivable even with optimal management; the patient died in the face of appropriate evaluation and management according to accepted standards, or the patient had co-morbid factors that were major contributors to death.

The apparent decrease in yearly mortality rates over 4 years from 7 to 4% in 2019 is notable despite lacking statistical significance. Further analysis of mortality rates may lead to an explanation. The researchers are currently working on another project to explain this observation.

Study shortcomings include the possibility of under-reporting of cases for discussion during morbidity and mortality meetings. In addition, the extensive heterogeneity inherent in an overall mortality rate of a department makes identifying drivers of the mortality rate difficult. The spectrum of pathologies is too broad. However, this information is critical as baseline information for continued assessment of the department's performance. It also provides a reference point for similar settings elsewhere.

Conclusions

The 4-year overall surgical mortality rate at a PMH was 6%. The mortality rate of the non-operatively managed patients was more than twice as high as the postoperative mortality rate. Overall, malignancies were the leading cause of death, followed by trauma.

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