

## Surgical Mortality at a Mission Hospital in Western Uganda.

G . Tumusiime

Department of Surgery, Mubende Regional Referral Hospital, P.O Box 4, Mubende, Uganda.  
E-mail: [tumurald@gmail.com](mailto:tumurald@gmail.com), [tumurald@yahoo.com](mailto:tumurald@yahoo.com).

**Background:** Audit of Surgical mortality seeks to focus on improvement in the process of surgical care and not on individual surgical ability. Audit of surgical mortality was conducted to establish the factors associated with the surgical deaths in Virika Hospital to propose ways of improvement.

**Methods:** The study was conducted in Virika Mission Hospital in Western Uganda, a 155 bed capacity hospital with a surgical bed capacity of 32 located in rural Uganda. Individual case file review of the forty three surgical deaths from 1<sup>st</sup> July 2008 to 31<sup>st</sup> June 2009 was conducted. Additional data was retrieved from hospital admission register, operation registers, and death certificate books.

**Results:** The operation death rate was 1.3%, all were emergencies, and 82.6% were done under general anaesthesia and 17.4% died on table. The laparotomy death rate was 12.5%, Herniorrhaphy 0.9%, drainage of pus 1.4% and wound suture 0.4%. Surgery was delayed due to lack of blood in only one case but there was no record of lack of any resource for delaying surgery. Surgical conditions were: Injuries 39.5%, Intestinal perforations 30.2%, Intestinal obstruction 20.9% and others 9.3%. The hospital had no high dependency unit and no intensive care unit. No postmortem was conducted in all cases.

**Conclusion:** Overall the Audit identified client, provider, administrative and community-related factors that need to be addressed collectively to reduce surgical mortality in Virika hospital. Audit of surgical mortality should be part of the health workers' general approach to making more information available in a meaningful way for continuous improvement of surgical services.

### Introduction

In recent years, audit has become an acquired concept in health care in both industrialized and developing countries. Audit can measure the resources and personnel available, processes that happen in practice and outcome that indicate the results of care. This is well appreciated that audit not fault finding, but it encourages thoughtful planning which leads to valid information collection and subsequently to informed decision making<sup>1,2</sup>. Mortality audit is important because it gives an understanding of what happened and why. This helps to go beyond rates and ratios to determine the inciting factors and to take measure of how they could be avoided<sup>3</sup>. Audit of Surgical mortality seeks to focus on improvement in the process of surgical care and not on individual surgical ability.

In countries like the United Kingdom where audit of surgical mortality has been institutionalized, there has been significant reduction in preventable death. The underlying principle of the audit is the recognition that surgical care is system based. Ultimately the findings of audit of surgical mortality may demonstrate deficiencies in surgical procedures, staffing in the hospitals, access to high dependence beds and other resource matters that will then need to be addressed by all stakeholders.

The core purpose of audit of surgical mortality is the feedback of information to inform, educate and facilitate change and improvement in service.

Audit of surgical mortality should be part of the health workers' general approach to making more information available in a meaningful way for continuous improvement of surgical services. The emphasis on problem-solving, not punishment, helps address issues and build staff capacity. This

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study was aimed at reviewing the cases of surgical deaths with a view of determining the factors associated with surgical mortality and consequently to propose ways of improvement surgical care.

### Material and Methods

The study was conducted in Virika hospital, a 155 bed capacity hospital with a surgical bed capacity of 32 located in rural Uganda. The hospital has neither an intensive care nor high dependency unit and no intensive care unit. Individual case file review of the forty three surgical deaths from 1<sup>st</sup> July 2008 to 31<sup>st</sup> June 2009 was conducted. Additional data was retrieved from hospital admission register, operation registers, and death certificate books. The American Society of Anaesthesiologists (ASA) classification was not documented on any anaesthesia sheet.

### Results

During the period 1<sup>st</sup> July 2008 to 31<sup>st</sup> June 2009, there were 1,678 admissions of which 1,818 underwent surgery. There were 43 deaths, giving a mortality rate of 2.6%. Thirty three (6.7%) of the deaths occurred in males. The patients' ages ranged from 3 days to 84 years with a mean age of 25 years and median of 22 years. 74.4% (32) were below the age of forty years.

Of the 43 deaths, 23 (53%) had undergone surgery. The overall death rate of the operated cases was 1.3%. All the 23 had emergency operations. Nineteen (82.6%) of the 23 operations complicated by death were done under general anaesthesia while four were performed under local anaesthesia. Twenty (87%) of the 23 operations were laparotomy; there were 160 laparotomies performed during the review period, giving a laparotomy death rate of 12.5%. The other three procedures performed among the deceased with their respective death rates were: Herniorrhaphy (MR = 0.9%), incision and drainage of pus (MR = 1.4%) and surgical toilet and suture of wounds (MR = 0.4%).

Five (21.7%) of those operated on had comorbid conditions that included diabetes mellitus in two and AIDS WHO stage four in three cases. The interval between admission and surgery ranged from 30 minutes to nine days. Twelve (52.2%) were operated on within 24 hours of admission while 6 (26.1%) had surgery three days after admission. Nineteen (82.6%) of the 23 were operated on once while four were operated on twice before death. The reasons for reoperation were burst abdomen in all the four cases. The interval between the first and second operations was 5 days, 10 days, 11 days and 12 days respectively.

Of the twenty patients who were not operated on, the reasons for not doing surgery were: condition not requiring surgery in 12 (60%), rapid death in 5 (25%) and in 3 (15%) an active decision was taken by the attending doctor and anaesthetist not to operate because patients were not fit for anaesthesia. None of the patients refused an operation. Twenty four (55%) of the 43 patients died within three days of admission while 10 (23%) died after one week of admission.

Four (17.4%) of the 23 patients died intraoperatively on the table, 10 (43.5%) died within three days after surgery and six (26.1%) died after seven days. The longest staying patient died on the 18<sup>th</sup> post operative day. Two of the patients who died on the table underwent laparotomy, one had herniorrhaphy, and one died before surgery was started. All the four were under general anaesthesia.

Twenty five (58%) of the 43 came direct from their homes and the rest came from various health institutions. Upon arrival in the hospital, only 7 (16.3%) were attended to first before admission. The majority was first reviewed and admitted by either nurses or by clinical officers. All the 43 patients who died were reviewed by a doctor at least once before death. Indications for admission among the forty three deaths were included traumatic injuries (39.5%), intestinal perforations (30.2%), intestinal obstruction (20.9%) and others (9.3%). Fifteen (88%) of the 17 traumatic injuries were unintentional while two were due to assault among tea plantation workers.

Causes of the 15 unintentional injuries included 7 (47%) road traffic crashes, 7 (47%) due to burns and one due to a collapsing wall. Eight of these cases were diagnosed as head injuries, seven of them being open head injuries. Five of the seven cases of burns were due to scalds among children at home while two were due to acid assault. Perforations were located in the ileum in 11 (84.6%) of the 13 cases of intestinal perforation and of the appendix in two cases. 76.9% (10) of these patients were first admitted on the medical ward for more than three days and the remaining three were first treated for malaria and gastroenteritis for more than three days by the referring hospitals.

Plain abdominal X-ray radiography was not done in any case of intestinal perforation. Of the eleven patients with perforations on the ileum, 54.5% (6) were done abdominal ultrasound scan before surgery and all suggested peritonitis. Full blood count was not done in any of the cases. Widal test was done in four (36.4%) of the cases and of these only one was positive. HIV serology was done in three (27.3%) of the cases and were all positive.

Seven (77.8%) of the nine patients with intestinal obstruction had large bowel obstruction five of which were due to sigmoid volvulus and two had anorectal malformation. The two small gut obstructions were due to strangulated hernia and intussusception.

No postmortem was conducted in all cases.

### **Discussion**

Surgical complications are a considerable cause of death and disability around the world<sup>4</sup>. They are devastating to patients, costly to healthcare systems, and often preventable, though their prevention typically requires a change in systems and individual behaviour.

The death rates and complications observed in this study are in agreement with the findings by Haynes et al<sup>5</sup> in a settings like Virika hospital where the World Health Organisation Surgical Safety checklist is not used. The risk of complications is poorly characterized in many parts of the world, but studies in industrialized countries have shown a perioperative rate of death from inpatient surgery of 0.4 to 0.8% and a rate of major complications of 3 to 17%<sup>6,7</sup>. These rates are likely to be much higher in developing countries<sup>8-11</sup>. Thus, every facility should design a system of establishing individual rates and contributing factors and institute appropriate measures to address them.

Introduction of the WHO Surgical safety checklist<sup>12</sup> into operating rooms in eight diverse hospitals was associated with marked improvements in surgical outcomes. Death rates and postoperative complication rates fell by 36% and the results suggested that the checklist program can improve the safety of surgical patients in diverse clinical and economic environments<sup>5</sup>. Its use would help the surgical team to prevent omission of important processes noted in this study like ASA classification of all surgical patients, adequate fluid resuscitation and recording on the daily fluid balance chart, timely administration of prophylactic antibiotics and availability of all essential laboratory and imaging results before surgery. This in turn would reduce on outcomes like intra-operative death and burst abdomen noted in this study.

Previous efforts to implement practices designed to reduce surgical site infections or anaesthesia-related mishaps have been shown to reduce complications significantly<sup>13-15</sup>. A growing body of evidence also links teamwork in surgery to improved outcomes, with high-functioning teams achieving significantly reduced rates of adverse events<sup>16, 17</sup>.

There is a high likelihood that surgical intervention in our series was delayed given the fact that majority of the deaths were among patients who came from to hospital direct from their homes. Those referred from health facilities and even those within the hospital were first treated as medical cases. Delays have been shown to cause adverse events and in a hospital setting delay in transferring to

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theatre is one of the most frequently reported causes for an area of concern or adverse event<sup>18</sup>. Delays may be resource related or clinical decision-making process. In a setting like Virika hospital where majority of the patients are first seen and admitted by nurses and clinical officers, delays in decision-making process can be reduced by regular refresher training of these cadres in timely recognition of emergencies and resuscitation so that the few doctors available can concentrate on more complex tasks in the care process.

Although physical access to health facilities in Uganda has improved with 82.5% of the population reporting to be living within 5 km of a health facility<sup>19</sup>, considerable disparities exist regarding the level and expertise of service delivery. This partly explains the observation that about 80% of the deceased came from districts which do not have hospitals. In addition, actual access and utilisation differs significantly between the poorer and richer segments of the population. Therefore, there is need for health workers in lower level health units to be trained in recognising cases that require surgical intervention and be able to make timely referrals to hospitals.

There is also need to educate communities especially those in remote areas on the danger signs of common surgical diseases so that they can make a decision to go to health facilities before complications set in. Timely surgical intervention is important especially in resource-limited facilities like high dependence units, intensive care units and expertise to handle complicated cases.

Although the main concern raised in surgical mortality audits in developed countries is mortality among the elderly<sup>20-25</sup>, the main concern of this audit was that the majority were young people below forty years of age. This age group contributes to scholars, income for many families and the country's workforce. However, this is not surprising since over seventy percent of the Uganda's population and the life expectancy is below sixty years<sup>19,26</sup>.

Injuries were associated with the majority of the surgical mortality. Globally, injuries have been recognised as one of the most life threatening public health problems. They represent 12% of global burden of diseases and the third most important cause of overall mortality<sup>27</sup>. According to WHO, an estimated 5.06 million people die each year as a result of some form of injuries, comprising almost 9% of all deaths. This equates to almost 14,000 injury deaths every single day<sup>28</sup>. Majority of the injuries (88%) were unintentional with a big proportion due to road traffic accidents in agreement with injury experience in Addis Ababa, Ethiopia<sup>29</sup> and in Kampala, Uganda<sup>30</sup>. However, the results were contrary to findings in North Gonder, Ethiopia<sup>31</sup> and the Jamaican injury profile<sup>32</sup> where more than half is violence related.

It is of great concern that none of the patients with head injury had their Glasgow coma scale recorded since it is an objective way of determining the severity of head injury in a resource limited setting, helps in monitoring the progress of a head injury patient and may be of importance in case of litigation to justify the likelihood of death.

Similarly, failure to assess and record the burn surface area points to inappropriate fluid resuscitation among the burns patients since the percentage burn surface area is used to estimate the fluid requirements especially in resource-limited situations. Although no postmortems were not done, autopsy has been shown to provide additional information while in some cases it has been rejected<sup>25</sup>.

### **Conclusion**

Overall the audit identified client, provider, administrative and community-related factors that need to be addressed collectively to reduce surgical mortality in Virika hospital. Audit of surgical mortality should be part of the health workers' general approach to making more information available in a meaningful way for continuous improvement of surgical services.

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It is hoped that all health workers will accept audit of surgical mortality as a peer review audit undertaken voluntarily by all participants, thereby ensuring that every surgical death is scrutinized independently and the collective results of that scrutiny are widely and freely disseminated resulting in improved care.

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