

Decadal Change in Mortality Pattern of Surgical Patients – A Study in Government Tertiary Care Hospital in Vindhya Region

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Abstract

Introduction: The aim of the study was to study the change in mortality pattern of surgical patients in government tertiary care hospital over a decade.

Background: By analyzing the mortality pattern, we can identify the major reason for death in surgical wards. That will help to install our preventive strategies and allocate appropriate resources in terms of manpower and equipment where they are most critically needed.

Materials and Methods: For our retrospective study, necessary data were obtained from the registration department due to permission from hospital authority. Out of all the admissions, data of the expired patients during the year 2008 and 2018 in detail using the proforma sheet have extracted. Then, a retrospective and descriptive observational study was done on all patients who have died in the surgery department during the year 2008 and 2018 of Sanjay Gandhi Memorial Hospital (S.G.M.H), associated with Shyam Shah Medical College, Rewa (Madhya Pradesh), during the year 2008 and 2018.

Results: In 2008, there were 6286 admissions, of which 453 deaths were occurred, in contrast to 2018 there were 10,887 admissions, of which 702 deaths were noted and observed mortality rate (7.20%) in 2008 and (6.44%) in 2018. During our study, we observed that burn (26.04%) was the leading cause of the death in 2008 and (26.64%) in 2018, next was the road traffic accidents (RTA) specific to head injury (13%) in 2008 and (23.38%) in 2018 and, at third position, viscus perforation (16.78%) was the cause of death in 2008 and (16.39%) in 2018. The case fatality rate is overall decreased over a decade in all diseases.

Conclusion: In our institute (S.G.M.H), surgical mortality has reduced from 7.20% (2008) to 6.44% (2018) almost by 1% over a decade. Burn and RTA were the leading causes of the deaths to reduce the incidence in this both groups, we need to work in both directions as one side we need to improve in our infrastructure and services, and on the other side, we need to focus in preventive strategy as these causes can be preventable by educating the preventive strategies to the people at ground level.

Key words: Cause of death, In-hospital surgical mortality, Retrospective study, Tertiary care

INTRODUCTION

All living organisms are born on the earth to have to die as a part of the life cycle. Death is not completely preventable but the doctors can control to some extent

over unnecessary deaths and have a special responsibility to increase the life expectancy with good quality of life of the populations. In an ancient era due to lack of undeveloped medical science, there were thousands of deaths used to occur, nowadays in modern advanced medical era we are achieving a wonderful control over those preventable deaths. In high-income countries, the death rate is low due to easy accessibility, availability, and affordability of health care as compared to low-income countries.

Developing country like our India where most of the population live in the non-urban area, where the health-care

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facilities at rural primary level are constrained. Our institute (Sanjay Gandhi Memorial hospital [S.G.M.H]) which is situated in Vindhya region and is a government tertiary care hospital which is taking care of all patients seeking health care from nine districts such as Sidhi, Satna, Singroli, Chhatarpur, Damoh, Panna, Shahdol, Umaria, and Tikamgudh, our hospital has high numbers of OPD (Outdoor patients) and admissions in Surgery Department. By analyzing the mortality pattern, we can identify the major reasons for death in surgical wards. That will help to plan strategies to prevent the events leading to the death of a patient. The audit of mortality also helps in allocating appropriate resources in terms of manpower and equipment where they are most critically needed. We can compare our mortality results with other centers and also with our own previous records to see if we have improved ourselves or not?

The basic aim of any surgical procedure is the reduction in morbidity and mortality rates. By comparing the influence on adverse outcomes; assessment of the efficiency of surgical procedure and the quality of care provided can be done. The results of the present study will help to improve the quality of care by educating the health-care professionals about preventable deaths and to suggest the infrastructure required. There are many reports of similar work in the west^[1] and even from African nations^[2,3] reports from India are few.^[4,5]

MATERIALS AND METHODS

For our retrospective study, necessary data were obtained from the registration department due to permission from hospital authority. Out of all the admissions, data of the expired patients during the year 2008 and 2018 in detail using the proforma sheet have extracted. Extracted data included name, age, sex, and date of admission, date of expiry, hospital stay, comorbidity, investigation, mode of injury, cause of death, and surgical procedure performed. All records were submitted back to the registration after extracting proforma sheets. Then, a retrospective descriptive observational study was done on all patients who have died in the surgery department during the year 2008 and 2018 of S.G.M.H, associated with Shyam Shah Medical College, Rewa (Madhya Pradesh), during the year 2008 and 2018.

The hospital is a tertiary referral government teaching hospital. Retrospectively, all patients who have died in surgery wards during the year 2008 and 2018 were included in the study. Case definition of in-hospital surgical mortality which was included in the study was deaths occurring within 30 days of admission for surgical care which has been traditionally used in other studies.

OBSERVATION AND RESULTS

In the year of 2008, there were 6286 admissions to the surgical ward. Men were 3771 (59.72%) and women 2515 (40.00%), among them 453 deaths occurred. Of the 453 deaths, 256 (56.51%) were males and 197 (43.48%) were females in a ratio of 1.29:1. In the year of 2018, there were 10,887 admissions to the surgical ward. Men were 6286 (57.73%) and women 4686 (42.26%), among them 702 deaths occurred. Of the 702 deaths, 361 (51.42%) were males and 341 (48.57%) were females in a ratio of 1.05:1. In 2008, the mortality rate was 7.20% and, in 2018, the mortality rate is 6.44%; there is a decrement in the proportional mortality rate over a decade [Tables 1 and 2].

Table 3 shows the age distribution as well as the number of deaths in each gender. Age-wise proportional mortality was highest in the age group between 21 and 30 years, in 2008 which was 21.64%, and the same age group had the highest proportional mortality found in 2018 which is 22.08%.

Burn was the leading cause of death in 2008 (26.04%) and in 2018 (26.64%). Next was the road traffic accidents (RTA) specific to head injury in 2008 (13%) and in 2018 (23.38%)

Table 1: Incidence and mortality rate in the surgery ward in 2008 and 2018

Year	Total numbers of admissions	Total numbers of deaths	Mortality rate%
2008	6286	453	7.20%
2018	10887	702	6.44%

Table 2: Gender-specific mortality rate in 2008 and 2018

Sex	Admissions 2008	Deaths 2008	GSDR% 2008	Admissions 2018	Deaths 2018	GSDR% 2018
M	3771	256	6.79	6286	361	5.83
F	2515	197	7.83	4686	341	7.27

GSDR: Gender specific death rate

Table 3: Age-wise proportional mortality during 2008 and 2018

Age group years	Total number of death in 2008	Total number of deaths in 2018	In 2008, PMR%	In 2018, PMR%
0–10	45	12	9.79	1.71
11–20	67	86	14.79	12.25
21–30	98	155	21.64	22.08
31–40	61	113	13.34	16.10
41–50	54	110	11.92	15.67
51–60	44	77	9.71	10.96
61–70	45	90	9.93	12.82
71–80	24	44	5.29	6.26
81–90	1	18	0.22	2.56

PMR: Proportional mortality rate

and, at third position, viscus perforation was the cause of death in 2008 (16.78%) and 2018 (16.39%). Other diseases include deaths due to pancreatitis, obstructive uropathy, uremia, obstructive jaundice, and (hepatobiliary pathology), which is given in Table 4.

During our study, we noted that the case fatality rate of all diseases is reduced over a decade which reflects the improvement in providing good quality of care and facilities which are mentioned in Table 5.

Table 6 shows that most of the deaths in burn departments in 2008 and 2018 occurred in those patients whose body surface area involved more than 60% which is almost unpreventable deaths.

Table 4: Cause of death during 2008 and 2018

Diagnosis	Number of deaths 2008	Percentage	Number of deaths 2018	Percentage
Burn	118	26.04	187	26.64
RTA (head injury)	76	16	164	23.38
Viscus perforation	76	16.78	115	16.39
Soft-tissue infection and necrosis	52	11.49	87	12.40
Intestinal obstruction	43	9.49	65	9.3
Malignancy	21	4.63	25	3.58
Blunt trauma chest	9	1.98	25	3.57
Blunt trauma abdomen	13	2.87	12	1.71
GI bleeding	7	1.54	13	1.85
Others	38	8.39	9	1.28
Total	453	100	702	100

RTA: Road traffic accidents, GI: Gastrointestinal

DISCUSSION

Mortality rate is the proportion of a population who die from any cause during a specified period of time. The rate can be made specific for a particular cause or group of causes of death. The rate can also be calculated for each sex and for any age group, thus providing disease, sex, and age-specific rates.

The determination of the pattern of mortality in a surgical unit helps in planning and to provide quality surgical care,^[6] as well as to ensure the improvement in management techniques which might help to unravel the mysteries of death of unknown origin.^[6] It will also enable us to know the changing pattern of mortality in the surgical environment, and understanding of the severity of the diseases that present to surgical units.

Mortality

The present study shows that the mortality rate of admitted patients was 7.20% in 2008 and 6.44% in 2018 in surgical wards. This observation in present study compares reasonably with studies by various authors in developing countries, such as Krishnamurthy *et al.*,^[6] Chukuezi and Nwosu,^[2] Ihegihu *et al.*,^[7] and Ayoade *et al.*,^[1] 6.5%, 9.14%, 8.3%, and 5.09%, respectively. Our mortality rate is almost similar. It is just because of availability of same level of health-care facility and same circumstances. In contrast, in developed countries where McDonald *et al.*^[8] and Semel *et al.*^[9] reported surgical mortality as 2.3% and 1.32%, respectively. This significant difference in surgical mortality rates between resource-poor and developed countries may be due to their better health system at each level, but more

Table 5: Case fatality rate of various causes in the year 2008 and 2018

Diagnosis	Total admissions in 2008	Total deaths in 2008	Case fatality rate in 2008 (%)	Total admissions in 2018	Total deaths in 2018	Case fatality rate in 2018 (%)
Burn	315	118	37.46	546	187	34.24
RTA (head injury)	752	76	10.10	1675	164	9.77
Viscus perforation	210	76	31.19	396	115	28.78
Soft-tissue infection and necrosis	1452	52	3.67	2560	87	3.39
Intestinal obstruction	222	43	19.37	354	65	18.36
Blunt trauma chest	158	9	5.69	470	25	5.32
Blunt trauma abdomen	164	15	9.14	284	12	4.22

RTA: Road traffic accidents

Table 6: Deaths according to BSA% and CFR according to BSA% in the year 2008 and 2018

BSA%	Admission in 2008	Deaths in 2008	CFR according to BSA%	Admission in 2018	Deaths in 2018	CFR according to BSA%
1–20	71	1	1.40	118	2	1.69
21–40	86	8	9.30	164	13	7.92
41–60	38	12	31.57	81	23	28.39
61–80	46	34	73.91	71	49	69.10
81–100	74	63	85.13	112	100	89.28
TOTAL	315	118	37.46	546	187	34.24

BSA: Body surface area of burn, CFR: Case fatality rate

than that. Their general surgery unit does not include head injury, burn, and chest trauma patients because these patients are admitted in respective specialty unit with well-equipped infrastructures, like all the head injury patients are admitted in neurosurgical department, burn patients are admitted in burn and plastic department, in contrast, our institute, and many other places are deficient of such facilities where all RTA and burn patients are admitted in general surgical ward. In our study, the majority of deaths nearly 50% of are due to head injury and burn. If we exclude mortality due to burn and head injury, then almost we are able to achieve a mortality rate of 3% like other developed nations.

Crude death rate, in our study, has decreased from 72 to 64/1000 admitted patients; this shows that we have improved our health-care services but still, we need to improve it further to minimize the crude death rate more. In our analysis in 2008 and 2018, majority of deaths were noted in the 3rd, 4th, and 5th decades of life with the peak occurring at the 3rd decade. This observation is similar to Ayoade *et al.*^[1] study. Death in this productive age group adds to the burden of the family and society. Deaths among women occur more frequently in the 2nd and 3rd decades with the peak in 3rd-decade similar to men. It is mainly due to the involvement of RTA and burn group. As in 3rd-decade, proportional mortality rate was highest, as 21.64% in 2008 and 22.08% in 2018.

In our analysis, we observed that burn (26.04%) was the leading cause of death in 2008 and 26.64% in 2018, next was the RTA specific to head injury (13%) in 2008 and (23.38%) in 2018 and, at the third position, viscus perforation (16.78%) was the cause of death in 2008 and (16.78%) in 2018. In contrast Krishnamurthy *et al.* (2016),^[6] reported leading cause was RTA specific to head injury (27.86%) followed by burns (27.17%), this is not similar to our study.

Case Fatality Rate Due to Burn

In our study, almost half of the deaths (352 of 702=54%) were due to burn and RTA with a head injury. Burn was the predominant cause of death among women (154 [49.84%] of 309 female deaths in 2018). As the burn injuries are due to marital discord and domestic problems, they were more common among women at late 2nd, 3rd, and 4th decades, 70 presents of the burn victims are in most productive age group of 15–40 years and most of the patients belong to poor socioeconomic strata. In our study, there is no significant change in mortality due to burn over a decade. (In 2008, 26.04% deaths were due to burn and in 2018 it is 26.64%).

Case fatality rate due to burn has reduced to some extent (in 2008, it was 37.46% and, in 2018, it is 34.24%) this

explaining the improvement in providing better quality care and facility over a decade. In 2008, there was not a separate burn unit but in 2018, we have separate burn unit trained staff and manpower too, where we are providing a better care to the patient. During our study, we analyzed that more than 70% of death has occurred in those patients whose percentage of burn (bank secrecy act) was >60%. It is very difficult to save such patients even at better facility available health-care centers.

Case Fatality Rate Due to Head Injury

From our analysis, we have observed a decrement change in case fatality rate due to head injury from 10.10% to 9.77% over a decade. Which suggest that in spite of high incidence of RTA, we have achieved less case fatality rate, this suggest our improvement in neurosurgical services and emergencies department. A decade ago we did not have better neurosurgical facilities; we were less equipped with necessary machineries. Most of the head injuries patients were forced to send nearby other higher center such as Jabalpur, Nagpur, and Allahabad for better care of the patients. But gradually this trend is near to end at present in our institute. Over the years, we have improved our neurosurgical services, and our emergencies department. High tech computed tomography and magnetic resonance imaging machines with availability of neurosurgeons have totally changed the scenario. Nowadays, all RTA patients are being managed well with provision of required emergency care without delaying time. However, it is not enough to reduce mortality of head injury; we need to focus on incidence reduction strategy and preventive measures. Incidence of RTA has also increased in females (23.78%) over a decade; it is mainly due to increase female's mobility over roads.

Case Fatality Rate Due to Viscus Perforation

In our study, we analyzed that there is a decrement in case fatality rate due to viscus perforation from 31.19% to 28.78% over a decade. Still, it is third major cause of death in our institute, because in case of acute abdomen the early diagnoses and early intervention is the most important in the management, but in our institute most of the patients used to reach late with complication such as septicemia and irreversible shock. In those patients, even of our best efforts it becomes very difficult to save their lives. We have improved our casualty facilities so that required intervention should be performed timely to limit the mortality. Nearly 40% of deaths were due to pre-pyloric perforation among operated cases in 2008, which is decreased to 34% in 2018.

Case Fatality Rate Due to Soft Tissue Infection

The present study shows that there is a decrement in CFR due to soft-tissue infection over a decade from 3.67%

to 3.39% this explains that although there is doubling in incidence of soft-tissue infection over a decade, we have reduced the mortality by preventing the existence of septicemia and sepsis to some extent. It is mainly because of early intervention and better supportive care.

CONCLUSION

In our institute, overall surgical mortality has reduced from 7.20% to 6.44% almost by 1% over a decade. Burn was the most common cause of death. Inspire of our improved services in burn case management and better facility, we could not decrease mortality of burn. It is just because of unpreventable deaths in burns. Females were mostly involved it is due to marital harassment, emotional fragility, and less psychosocial support. To reduce mortality as well as incidence, we need to focus on incidence reduction strategy like we should educate the people about safety awareness at primary level. At primary level existing staff (such as auxiliary nurse midwives, nurses, and dressers) should be sensitized and trained on burn first aid. The main strategies for burn care would be to provide physical infrastructure and workforce for burn care at all three levels of health delivery system. Our institute is just going to open a separate wing for burn that may help in reduction of burn mortality in future.

Second cause of death was RTA specific to head injury. We have reduced mortality to some extent level by improving our neurosurgical services, for further reduction, we require full pledge trauma care unit and ATLS courses should be included in resident training. To reduce the incidence of trauma, we should educate the people at ground level regarding the road traffic safety and preventing measures for RTA. Strict implementation of traffic rules and stringent punishments alone will not solve the persisting crisis. Change in mind set of riders and drivers and road

users realizing their responsibilities alone will bring about a change. Soon we are going to open super specialty block for neurosurgery that may reduce the mortality due to head injury in future.

In our study, the major obstacles were heavy burden of RTA patients and burn patients. To reduce the incidence in this both groups, we need to work in both directions as one side we need to improve in our infrastructure and services and the other side we need to focus in preventive strategy.

Limitation of the Present Study

Could be its a short scale study? It should be done in large scale at each hospital to improve the health-care system at all three primary, secondary, and tertiary levels.

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