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# Study of Factors Affecting Deaths in Medicine Ward Patients Including MICU at a Teaching and Tertiary Care Hospital Located in Central India during Period 2013 to 2016

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**Abstract**
**Introduction:** *ICU related rates are robustly governed by factors related to and type of patients and sternness of disease that are analyzed. Even though massive chunk of these deaths are preordained, identifying risk factors associated increased mortality and targeting avoidable ones should be the mainstay of critical care health strategies.*
**Aims and Objectives:** *To study factors affecting death rates in Medicine wards especially in Medicine ICU (MICU).*
**Material and Methods:** *The present study is record based retrospective study on deceased patients admitted to Medicine ward and MICU from 2013 to 2016.*
**Results:** *Total 908 deaths were registered during the study period. On analyzing age groups, it was found that maximum deaths occurred in age group 51-70 years. Maximum deaths occurred in patients whose hospital stay was >48 hours (54.7%), followed by 269 deaths in patients whose hospital stay was between 24-48 hours and least deaths were encountered in patients whose hospital stay was <24 hours. Most common diagnosis in hepato-biliary system was cirrhosis, while stroke was most common in CNS, pneumonia in respiratory system and myocardial infarction, angina were most common in cardiovascular system.*
**Conclusion:** *Present study is one of the few studies to highlight critical care status in rural India. Effective strategies need to be chalked out in pursuit of improving standard of healthcare.*
**Keywords:** *death, factors, ICU, Medicine.*

## Introduction

Intensive care unit (ICU) witnesses precariously ill patients who are treated with multifaceted therapy regimens. ICU related rates are robustly governed by factors related to, and type of patient and sternness of disease that are analyzed.[1]

Various studies report that ICU related deaths (around 50-60% of total deaths) are the major contributors of in-hospital deaths.[2,3] Even though massive chunk of these deaths are preordained, identifying risk factors associated increased mortality and targeting avoidable ones should be the mainstay of critical care health strategies.[4,5] Deferral in identification of critically ill patients and delayed initiation of treatment have concomitant augmented number of deaths.[6,7,8] The trend of analyzing death rates in health care setup started when few researchers studied death summaries of patients in Medicine wards. They found mortality rates of around 7% and listed pneumonia, cerebrovascular diseases and malignancy as the major culprits.[9]Thereafter many such studies have done.[10,11,12]Most of these studies utilized retrospective study design. Few of the studies conducted in Western countries were of prospective design, wherein factors like length of hospital stay, side effects of medication, and polypharmacy were analyzed in relation to death rates.[13,14] Globally, in addition to administrative and clinical aspects, now focus has been increased on factors associated with execution of quality of healthcare. Particularly in developing countries where scarcity of assets for healthcare is a major issue, findings of such studies prove to be beneficial for optimal healthcare.[15] Forecasting of probable consequences can also help in triage management to segregate patients who need aggressive treatment and palliative treatment for those who have poor prognosis. This can be done by clinical and analytical scoring systems. Most common clinical scoring system used for predicting mortality in ICU settings is APACHE II (Acute Physiology And Chronic Health Evaluation) and MEWS (Modified Early Warning System Score) for outside the ICU.[16] Apart from these, it has been found in various studies that some laboratory parameters like hyponatremia, non-infectious leukocytosis, decreased blood sugar level (BSL) have been allied with mortality.[17,18,19,20] Despite extensive research being done on clinical and laboratory factors associated with mortality, there is paucity of data on exact causes of death in ICU patients, outcome indicators in mortality and morbidity in these patients, especially in rural population of India, whose clinical and epidemiological data is scarce. Also it needs to be stressed that critical care is the most expensive component (depending on intervention/s and duration of hospital stay).[21] Given the scarcity of ICU beds in India, availability of such data may prove as a boon for chalking out effective strategies for effective healthcare.[22] In the pursuit of obtaining this data we conducted the present study with the aim to analyze certain factors like timings of death, demographic variables, etc. and the possible interaction of these factors with mortality, so as to prospectively use them as outcome predictors.

**Aims and Objectives**

1. To study factors affecting death rates in Medicine wards especially in Medicine ICU (MICU).
2. To study demographic factors like age, sex, socio-economic status of patients, who died during the study period.
3. To study time of death (9 am to 4 pm, 4 pm to 10 pm, 10 pm to 9 am) and causes of death in these patients (system wise).
4. To study the associated co-morbidities contributing to cause of deaths.
5. To study duration of stay of deceased patient in hospital (<24 hours/ 24-48 hours/ >48 hours).

**Materials and Methods**

1. **Study design:** Retrospective, cross sectional record based study.
2. **Study period:** 2 years- from January 2014 to December 2016.
3. **Study site:** Medicine ward including Medicine ICU at NKP Salve Institute of Medical Sciences & Lata Mangeshkar hospital, Nagpur.
4. **Inclusion criteria:** All the case record files of deceased patients admitted in

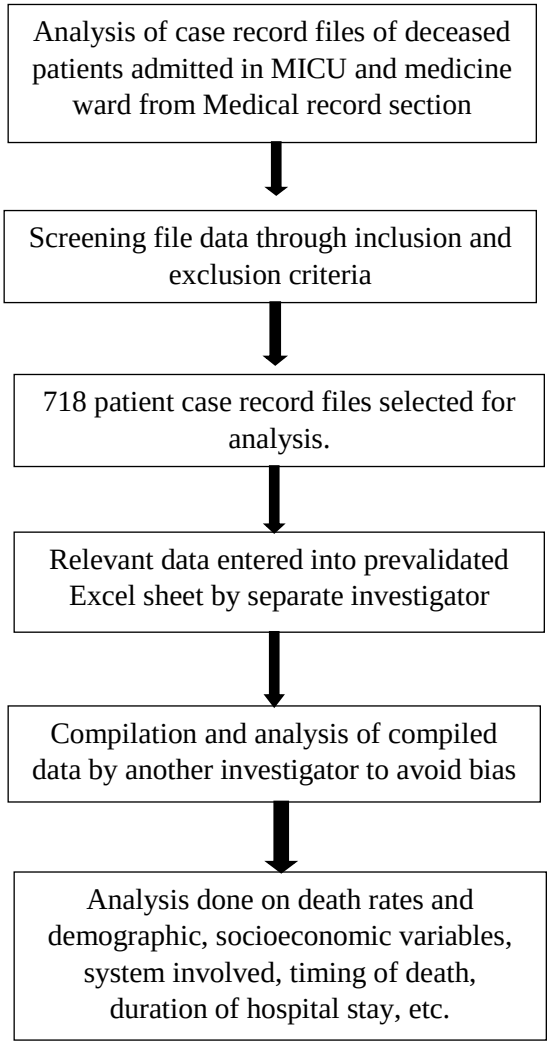
Medicine ward and MICU during period 2013 to 2016.

5. **Exclusion criteria:** Incompletely filled files were excluded from the study.
6. **Ethical approval:** taken from Institutional Ethics Committee (IEC) prior to the start of study.
7. **Statistical analysis:** All the data was analyzed by using Chi square test.
8. **Procedure outflow:** The basic flow of study is depicted in figure 1.

**Results**

Total 908 deaths were registered during the study period. Out of these 675 were male and 233 were females. Thus male to female ratio was 2.9:1. Amongst socioeconomic class, maximum patients were found in low socioeconomic group i.e. 496 patients (54.6%), followed by 334 (36.7%) patients in middle socioeconomic class and 78 patients (8.5%) in high class. 231 (25%) patients gave a positive history of alcoholism, while 169 (18.6%) of patients gave a positive history of tobacco use (table 1). Majority of the patients attending OPD/IPD of this hospital are from relatively low socioeconomic group. To substantiate this finding, number of patients registered in year 2013 to 2016, under BPL & MPJAY scheme is depicted in Table 2. This table also shows the extent of concession given to BPL patients in this hospital, to be more than 50% of total bill. On analyzing age groups, it was found that maximum deaths occurred in age group 51-70 years i.e. 354 deaths (40%), followed by 272 deaths (30%) in 31-50 age group, 149 deaths (16.4%) in >71 years age group, 99 deaths (11%) in 18-30 years age group and least in age group <18 years, which was statistically significant with $p<0.05$ (figure 2).When duration of hospital stay was studied in death files it was found that maximum deaths occurred in patients whose hospital stay was > 48 hours (54.7%), followed by 269 deaths in patients whose hospital stay was between 24-48 hours and least deaths were encountered in patients whose hospital stay was <24 hours (figure 3).Thus number of deaths increased progressively with increase in duration of hospital stay, which was highly statistically significant ($p<0.001$). Maximum patients died in time period 10 pm to 9 am i.e. 516 patients (57%) followed by 281(31%) patients in time slot 9 am to 4 pm and 111 (11%) deaths during time slot 4 pm to 10 pm (figure 4). Increased number of deaths in night time was statistically significant ($p<0.05$). On system wise analysis, most common system involved was hepato-biliary i.e. 209 patients, followed by 161 patients in central nervous system, infections category, 144 patients with respiratory system involvement, 113 patients with cardiovascular system involvement and least involved system was gastrointestinal (figure 5). Most common diagnosis in hepato-biliary system was cirrhosis, while stroke was most common in CNS, pneumonia in respiratory system and myocardial infarction, angina were most common in cardiovascular system. Diabetes mellitus was most common co-morbidity which was encountered in 254 deceased patients (28%, $p<0.05$), followed by hypertension in 199 patients (22.1%) and chronic obstructive pulmonary disease (COPD) in 66 patients (7.2%) (figure 6).Alcohol addiction was observed in 306 deceased patients, which was statistically significant ($p<0.05$) and tobacco in 389 patients ($p<0.05$). The number of deceased patients taking alcohol increased progressively from 2013 to 2016.

**Figure 1:** showing workflow of the present study



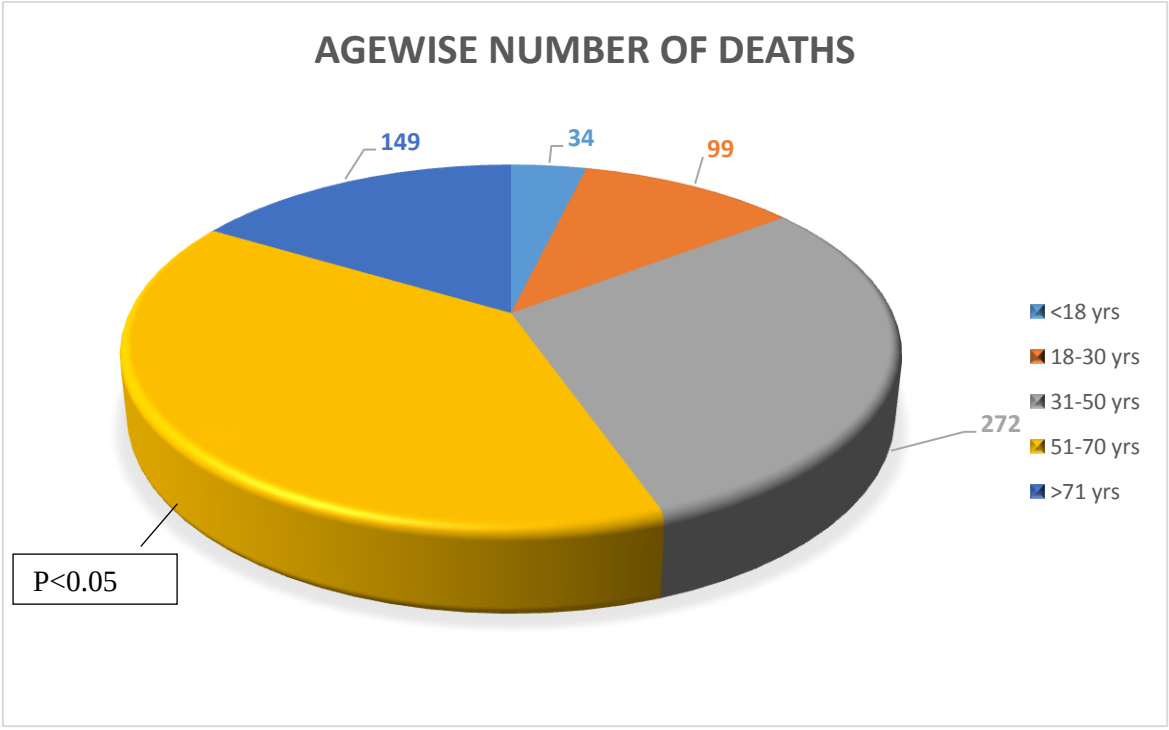




**Figure 2:** showing age-wise distribution of deaths in the present study

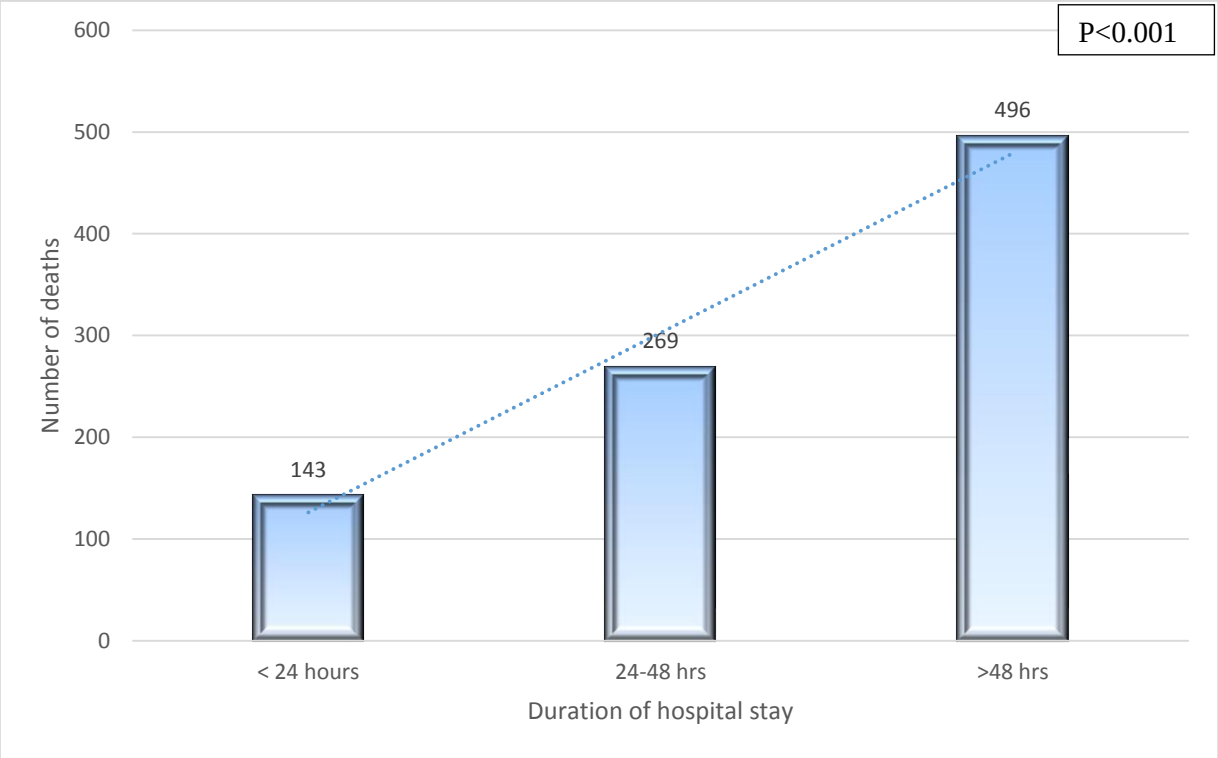



**Figure 3:** showing number of deaths according to duration of hospital stay. The figure shows progressive increase in number of deaths with increase in hospital stay (p<0.001)

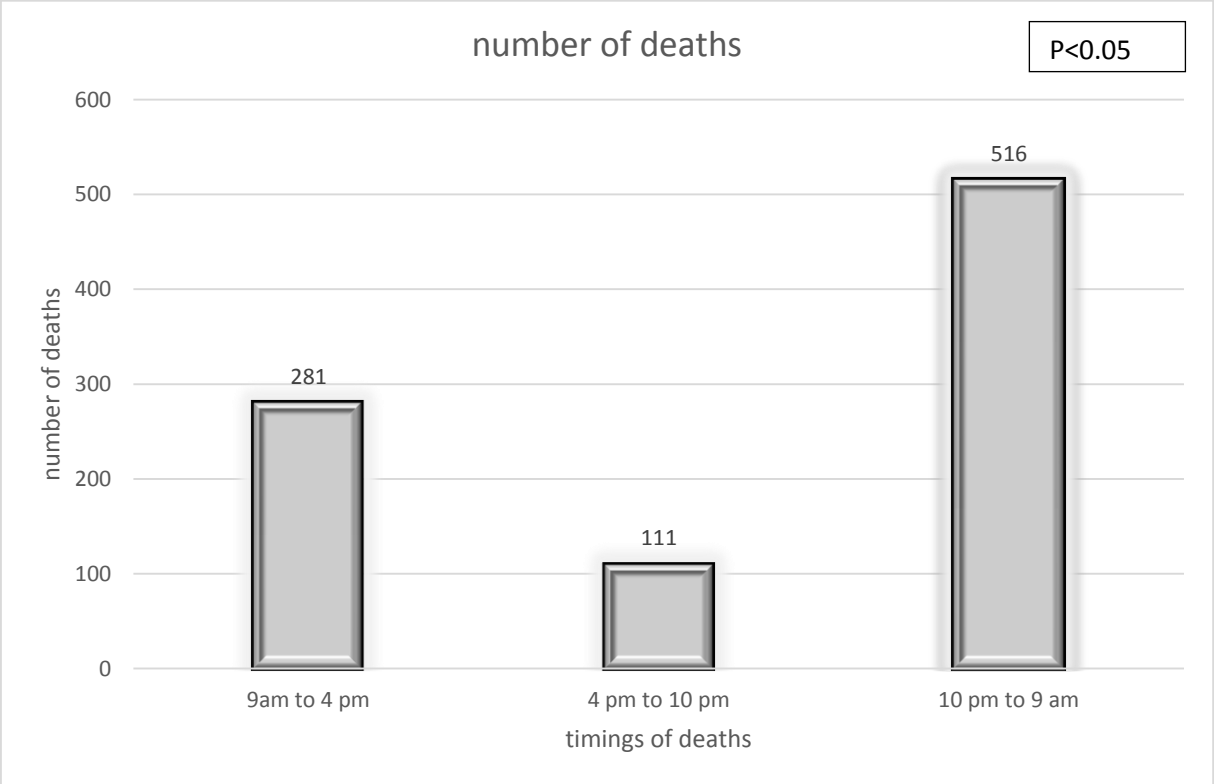



**Figure 4:** showing number of deaths according to timings of death

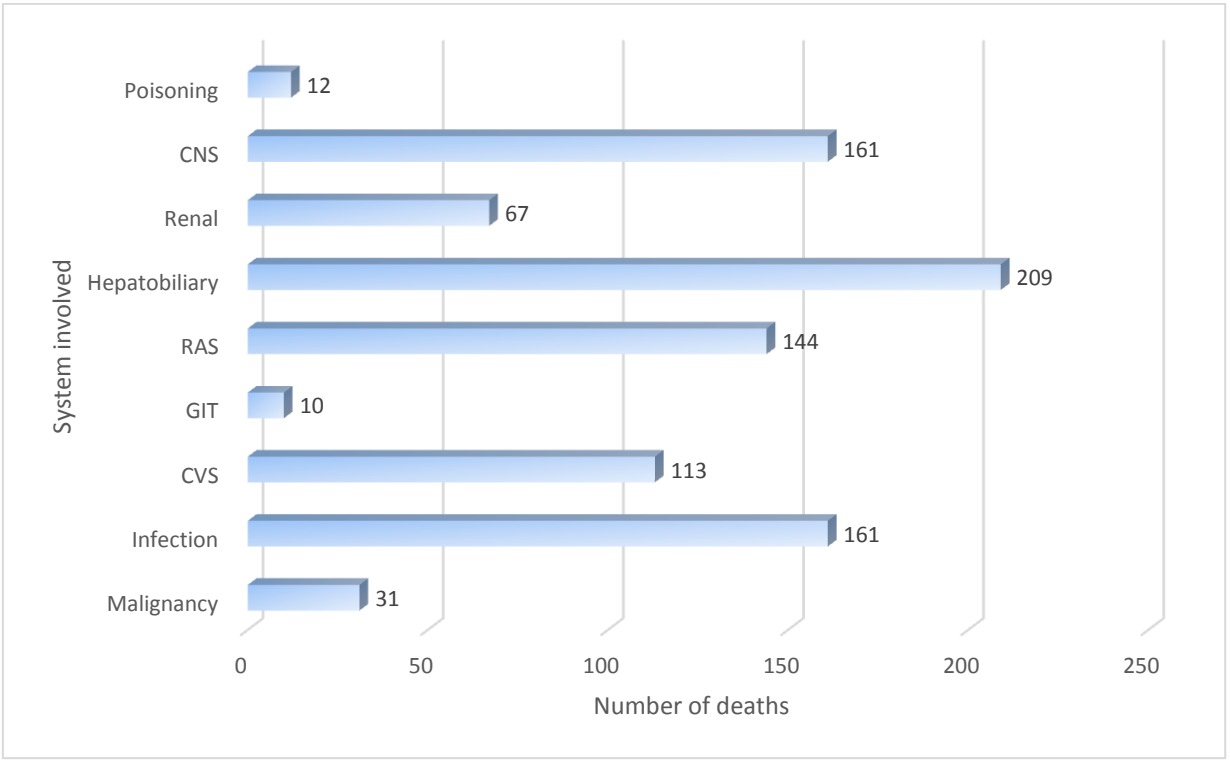



**Figure 5:** showing systems involved in deceased patients

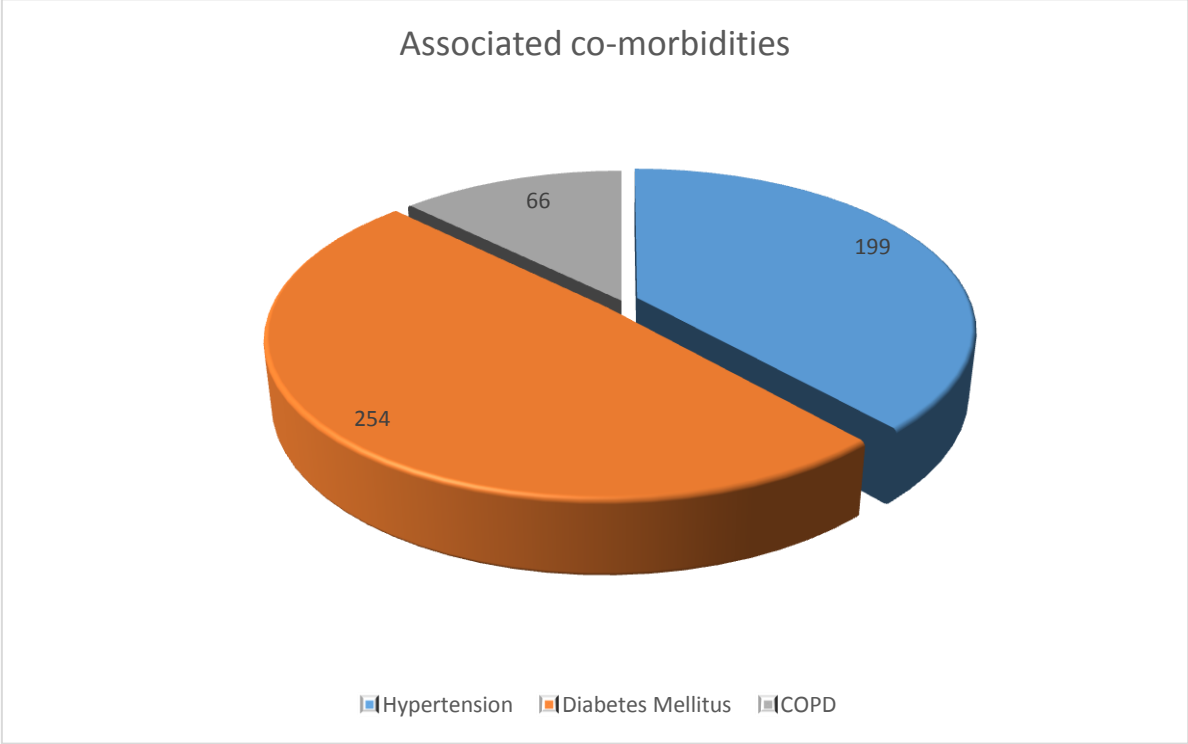



**Figure 6:** showing comorbidities in deceased patients in the present study

**Table 1:** showing socio-demographic details and addiction details in deceased patients

| Particulars of data collected from 2013 to 2016 | | | |
|---|---|---|---|
| **Sr. No.** | **Item/s** | | **Number (%)** |
| **1** | Total no. deaths | | 908 |
| **2** | Sex | Male | 675 (74) |
| | | Female | 233 (25.6) |
| **3** | Socioeconomic | Low | 496 (54.6) |
| | | Middle | 334 (36.7) |
| | | High | 78 (8.5) |
| **4** | Alcohol intake | | 231 (25) |
| **5** | Smoking | | 169 (18.6) |

**Table 2:** showing total number of patients admitted in Medicine wards and ICU, enrolled under various concession schemes of government (inclusive of live and deceased patients

| **Items** | **Year** | | | |
|---|---|---|---|---|
| | **2013** | **2014** | **2015** | **2016** |
| **BPL Scheme** | 1879 | 3016 | 2011 | 2206 |
| **RGJAY Scheme (now MJPJAY)** | 301 | 606 | 975 | 1137 |
| **Concession given to patients** | 53,64,950/- | 1,27,50,634/- | 84,79,394/- | 1,07,50,446/- |
| **Cash paid by patients** | 23,51,671/- | 86,27,299/- | 46,87,710/- | 72,20,547/- |
| **Total** | 77,16,621/- | 2,13,83,933/- | 1,31,66,104/- | 1,79,70,993/- |

Where: BPL- Below Poverty Line.
RGJAY- Rajiv Gandhi Jan Arogya Yojana.
MJPJAY- Mahatma Jyotiba Phule Jan Arogya Yojana.

## Discussion

Deaths in ICU from a major chunk in overall mortality rates of health care setup.[23] In our present study it was found that male to female ratio of deaths was 2.6:1. This finding is in corroboration with findings of other studies conducted in other parts of globe.[24,25] One of the reason in of this high ratio in our hospital might be attributed to rural population in our area. Being a rural healthcare setup major chunk of deceased patients belonged to low socioeconomic class. This finding is in conjunction with some international studies which found a positive correlation of low socioeconomic status and increased mortality.[26,27] This may be due to the fact in low socioeconomic group earning daily livelihood is major priority and due to poor literacy in this group, they are not much aware about health care. To curb the effect of this factor, in our hospital patients with low socioeconomic status are enrolled in Rajiv Gandhi Jan Arogya Yojana (now known as Mahatma Phule Jan Arogya Yojana) in pursuit of giving them optimal healthcare by providing concessions on hospital bills. The patients of low socioeconomic status, who could not be enrolled under this scheme were given concession, as per existing BPL (below poverty line) category rules. Moreover addictions like tobacco and alcohol are more prevalent in them, which may contribute to morbidity and mortality.[28] Also spending power is more in higher socioeconomic class, therefore bearing the expense of costly treatments of critical care is also more in this group and least in low socioeconomic group.[25] Similar finding was encountered in our present study when we found that majority of this class gave a positive history of alcoholism or smoking or both, in some cases. Maximum deaths occurred in age group 31-50 which differs from finding of other such studies.[24,29,30,25] These studies reported maximum deaths in age group 51-70 years. This finding in our study might be attributed to sedentary lifestyle and improper nutrition, lack of awareness of harmful effects of addictions, more incidence of infections in this rural part of country. It has been found in various studies that death rates are positively related to duration of ICU stay.[24,25,31] This may usually reflect suboptimal critical care. But in reality, major factor playing role here is delay in

admission to ICU. Our health care setup experiences this factor on a larger scale wherein patients rely on cheaper alternatives of treatment. Thus a patient is usually admitted to ICU when condition has already deteriorated to a larger extent.[32] This finding has been replicated in other studies conducted in other parts of globe.[33,34,35] Two factors play a major role here- one is delay in diagnosis and second is delay in transfer from emergency room to ICU. First factor usually is seen in cases of sepsis, wherein suspicion of sepsis is the key factor to early diagnosis.[36]Also it needs to be stressed that proper triaging play most vital role in outcomes of critically ill patients. One of the major reasons for worse outcomes in ICU setting is under- triaging, which may be due to limited availability of resources or undertrained healthcare staff.[37] One study found that nurses were lacking in basic knowledge of management of critical conditions. The authors of that study also recommended that bedside teaching should be maximum as compared to classroom lectures.[38]One study demonstrated the importance of producing emergency teams within the ICU setup.[23] These teams would respond quickly only if there is callout for an utmost emergency situation. But feasibility of team setup might pose a challenge in India where there is acute shortage of resources. On examining timings of deaths we found that maximum deaths occurred during night shift i.e. 10 pm to 9 am. This was corroborated in finding of other such study.[25] This may be due to the most logical reason that attending nurses and doctors might become sluggish during late night hours. Most common system involved was hepatobiliary system and liver cirrhosis was most commonly diagnosed disease in that category. Other studies reported sepsis as most common diagnosis in ICU related death,[29,39] which was second common diagnosis in our study. Increased incidence of cirrhosis in our study might be due to the fact that alcoholism was more in patients of our study. Some studies reported respiratory distress as most commonly diagnosed pathology in ICU deceased patients.[24] One important finding of present study was that significant number of deceased patients were transferred from other departments. This highlights the need for ICU setup for each major department separately, so that MICU is not overburdened with referred patients and at the same time better management of patients directly admitted to MICU from emergency rooms in light of availability of limited resources.

## Conclusion

Present study is one of the few studies to highlight critical care status in rural India. Effective strategies need to be chalked out in pursuit of improving standard of healthcare. There is urgent need of health education programme for rural population in the country to educate them about ill effects of alcohol and tobacco addiction on their health, importance of sanitation in health and disease and practices to improve sanitation in their surroundings, measures to prevent spread of communicable diseases, and vitality of their compliance in terms of completing the treatment, as prescribed by the physician. We hope findings of our study are corroborated by other studies in future so that results are generalized.

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**Conflicts of interest:** None declared by authors.
**Ethical approval:** Taken prior to start of study.

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