Journal of Rawalpindi Medical College (JRMC); 2016;20(2):96-99

Original Article

Intensive Care Unit- Comparative Audit

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Abstract

Background: To compare mortality audit of an intensive care unit , before and after implementation of different management and academic improvement measures.

Methods: In this retrospective study , mortality audit of intensive care unit (ICU) for two consecutive years was done. Total mortality and specialty wise mortality for respective year were recorded and then this total morality rate and specialty wise mortality rate of each year was compared with respective mortality rate of the other year . Number of ICU trained nurses was increased from initial one staff nurse for eight beds to three staff nurses for same number of beds. Steps were taken for local training of these nurses.Full time intensivist was made available for ICU which was previously being managed by a part time physician. Similarly changes were made in physician staffing pattern and with the help of different specialty heads registrars and trainees were made accountable for their patients in ICU. Changes in organizational characteristics of ICU were also made. Written specific instructions (SOPs) for attending the patients in specific situations were made and implemented. Specific Job descriptions and standing operating procedures for different situations and for use of different equipments were made and implemented. Different record systems for recording patient's data were introduced.Different ICU bundles were introduced and implemented. At the end of year 2012 a retrospective mortality audit of our ICU for year 2011 and year 2012 and compared the results to know what difference has been made before the complete implementation of our efforts and after that.

Results: Total number of admissions in ICU in year 2011were 582 out of which 152 died giving overall mortality rate of 26.11%. Highest mortality rate was observed in medical patients(33.0%. Surgical patient's mortality was 21%. A total of 91 patients were placed on ventilatory support in 2011 of which 31 died giving mortality of 34.06% and contributing 15.63% to total bed occupancy and 20.39% to total mortality. Total number of admissions in ICU in year 2012 were 486 out of which 90 died giving overall mortality rate of 18.50%.Total of 102 patients were placed on ventilatory support in 2012 of which 28 died giving mortality of 27.45%,contributing 20.98% to total bed occupancy and 31.11% to total mortality. Mortality rate dropped significantly from 26.11% in 2011 to 18.50% in 2012. Mortality rates of individual group of patients has also dropped significantly. Surgical patients' mortality dropped from 21% to 13.5% in respective years. Medical patient's mortality has dropped from 33% to 22.50%, Gyane/Obs from 13.79% to 08.33% and ventilator support patients from 26.11% to 18.50% in respective years.

Conclusion: Better intensive care management at administrative and academic levels can result in significant reduction in overall mortality of ICU as well specific patient groups mortality .

Key words: Intensive Care Units, Mortality, Audit.

Introduction

Intensive care unit is a very specialized area of a hospital where level of care for a critically ill patient is much more sophisticated and facilities are concentrated to provide much better care to these patients as compared to wards and high dependency units. Number of studies has demonstrated a direct relation between numbers of nurses in ICU and ICU mortality rates.[1,2] Similarly there is growing evidence that there is significant reduction in ICU mortality rates if ICUs are managed by full time intensivists.[3-5] How ICU is being managed and who is managing it has a great impact on mortality of ICU especially an open ICU. [6- 8] Similarly organizational characteristics of ICU has also shown to affect the mortality rates. [9,10]

Presence of a full time intensivisit can make the difference in mortality. Personal expertise of the intensivist and coordination with other specialties in a timely manner plays important role. [11,12] Physician staffing pattern and organizational characteristics of ICU has also shown to affect the mortality rates.[13-19] Over all good hospital management in general and

ICU management in particular has great impact on mortality.[20].

Studies have shown that changes in ICU management patterns reduce the mortality rate, substantially. Number of doctors and paramedics per bed, training of the staff for ICU management , availability of whole time intensivist , following the standard operative procedures and proper documentation are mentionable steps in this regard .Introduction of different ICU bundles is also important. [15,16]

Patients and Methods

This study is retrospective mortality audit of our ICU for two separate but consecutive years i.e. for year 2011 starting from January 2011 till December 2011 and for year 2012 starting from January 2012 till December 2012. Data from ICU registers including demographic data, age sex, diagnosis, date of admission, discharge or death, specialty responsible for care of patient, number of days patient stayed in ICU and outcome, whether patient was shifted to ward or died , was collected. To improve the ICU services different steps were taken. Number of ICU trained nurses was increased from initial one staff nurse for eight beds to three staff nurses for same number of beds. Steps were taken for local training of these nurse.Full time intensivist was made available for ICU which was previously being managed by a part time physician. Similarly changes were made in physician staffing pattern and with the help of different specialty heads registrars and trainees were made accountable for their patients in ICU.Changes in organizational characteristics of ICU were also made. Written specific instructions (SOPs) for attending the patients in specific situations were made and implemented. Specific Job descriptions and standing operating procedures for different situations and for use of different equipments were made and implemented. Initially there was no proper system of records. We introduced many different record systems for recording patient's data .Different ICU bundles were introduced and implemented. All this was completed till end of year 2011. At the end of year 2012 we conducted a retrospective mortality audit of our ICU for year 2011 and year 2012 and then compared the results to know what difference has been made before the complete implementations of our efforts and after that. All the data was first shifted on excel sheet .Specialty wise mortality was calculated for each year separately. Only patients who died in ICU were taken for mortality and not anyone who was shifted to ward and never returned to ICU. Total mortality for the respective year and specialty wise mortality for respective year were recorded and then this total morality rate and specialty wise mortality rate of each year was compared with respective mortality rate of the other year using SPSS 22.

Results

Total number of admissions in ICU in year 2011were 582 out of which 152 died giving overall mortality rate of 26.11%. Highest mortality rate was observed in medical patients. Total of 204 medical patients were admitted in ICU during the year contributing 35.05% bed occupancy of which 67 died giving a mortality of 33.00% and contributing 44.00% to total mortality of this year. Surgical patient's mortality was 21% because 41 died out of total of 200 admissions in year 2011. Bed occupancy share of surgical patients was 34.36% and contributed 27.63% to total mortality of the year. Total of 87 patients of Gyne and Obs were admitted in year 2011 of which 12 died giving mortality of 13.79% and contribution to total mortality was 07.89%. Bed occupancy share of gyne/ obs patients was 14.96%.Total of 91 patients were placed on ventilatory support in 2011 of which 31 died giving mortality of 34.06% and contributing 15.63% to total bed occupancy and 20.39% to total mortality (Table 1).Total number of admissions in ICU in year 2012 were 486 out of which 90 died giving overall mortality rate of 18.50%.Total of 160 medical patients were admitted in ICU during the year contributing 32.92% bed occupancy of which 36 died giving a mortality of 22.50% and contributing 40.00% to total mortality of this year. Surgical patient's mortality in year 2012 was 13.50 % because 20 died out of total of 152 admissions. Bed occupancy share of surgical patients in year 2012 was 31.27 % and contributed 22.72% to total mortality of the year. Total of 72 patients of Gyne and Obs were admitted in year 2012 of which 06 died giving mortality of 08.33% and contribution to total mortality was 06.66%. Bed occupancy share of gyne/ obs patients was 14.81%.Total of 102 patients were placed on ventilatory support in 2012, of which 28 died giving mortality of 27.45%,contributing 20.98% to total bed occupancy and 31.11% to total mortality (Table 2).Mortality rate dropped significantly from 26.11% in 2011 to 18.50% in 2012.Mortalty rates of individual group of patients also dropped significantly (Table 3). Surgical patients' mortality has dropped from 21% to 13.5% in respective years. Medical patient's mortality dropped from 33% to 22.50%, Gyane/Obs from 13.79% to 08.33% and ventilator support patients from 26.11% to 18.50% in respective years.

Table 1:ICU admission and Mortality 2011

Patients stratification	Total No of admis-sions (No)	Share of the group to total bed occupa ncy (%)	Expired (No)	Mortal-ity of the group (%)	Share of the group to total morta-lity (%)
Surgical Patients	200	34.36	42	21.00	27.63
Medical patients	204	35.05	67	33.00	44.04
Gyne/Obs patints	87	14.94	12	13.79	7.89
Patients placed on Ventilatory Support	91	15.63	31	34.06	20.39
Grand Total	582	100	152	26.11	100

Table 2: ICU Admission Discharge 2012

Patients' stratification	Total number of admissi ons (No)	Share of the group to total bed occupa ncy (%)	Expired (No)	Morta lity of the group (%)	Share of the group to total mortality (%)
Surgical Patients	152	31.27	20	13.15	22.22
Medical patients	160	32.92	36	22.50	40.00
Gyne/Obs patients	72	14.81	06	8.33	6.66
Patients placed on Ventilatory Support	102	20.98	28	27.45	31.11
Grand Total	486	100	90	18.50	100

Table 3.Specialty vise comparison of Mortality 2011 and 2012

Type of patients	Mortality of the group year 2011 %	Mortality of the group year 2012 %
Surgical Patients	21.00	13.15
Medical patients	33.00	22.50
Gyne/Obs patients	13.79	8.33
Patients placed on Ventilatory Support	34.06	27.45
Total Mortality	26.11	18.50

Discussion:

Out of total admissions of 582 in year 2011 overall mortality in our ICU was 26.11% which is comparable to mortality of an ICU not being managed by a full time intensivist in a previous study of West E, Barron DN, Harrison D et al but it was reduced to 18.5% in 2012(total admissions 486) which is a significant change($p < 0.05$). [1] This is reduction of more than 7.8% is less than reduction in mortality in West E, Barron DN, Harrison D et all study who has shown a reduction of around 15% in mortality only because of ICU being managed by a full time intensivist.[1] Although we didn't achieve this great reduction but still reduction in our mortality rate is significant. Greatest reduction in mortality was noted in medical patients which dropped from 33.00% to 22.5% in respective years(reduction of 10.5%). This was followed by Surgical group in which mortality rate dropped from 21.00% to 13.5%(reduction of 7.5%). This great change in medical patient's mortality was probably due to greater changes brought in patient care on medical side, with introduction of more registrars, changes made in the delegation of responsibility and ICU round timings and introduction of ICU bundles for specific medical conditions. Reduction in mortality on surgical side was associated with reduction in total number of surgeries in year 2012 compared with 2011 (150 total surgeries in 2012 versus 200 in 2011). This reduction in number of surgeries was associated with better selection protocols adopted by surgical department. Mortality in ventilatory support group reduced from 34.06% in year 2011 to 27.45% in year 2012(reduction of 6.6%). This is probably attributable to all the measures as discussed earlier but specifically to increase in number of ICU trained nursing staff and efforts done to improve their training. Which measure has contributed how much in reduction of mortality cannot be ascertained in this study but its apparent from this study that better intensive care management at administrative and academic levels certainly can result in significant reduction in overall mortality of ICU as well as specific patient groups mortality.

Conclusion

Better intensive care management at administrative and academic levels certainly can result in significant reduction in overall mortality of ICU as well specific patient groups mortality.

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