Original Article

Acute renal failure in the ICU setting: A prospective observational study

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ABSTRACT

Background: Acute renal failure (ARF) is a common entity in the intensive care unit (ICU) setting. There is scanty data regarding acute kidney injury (AKI) in ICUs from our country and no data from the service setting.

Methods: All patients admitted to the ICU of a tertiary care teaching hospital for six months were included in the study. They were divided into two groups: surg gr (admitted in surgical ICU) and med gr (admitted in medical ICU). During the stay in ICU, patients were observed for the development of AKI depending on the creatinine values and hourly urine output. Staging was done based upon the Risk Injury Failure Loss and End stage kidney (RIFLE) criteria. Relevant data associated with development of AKI was collected for correlation.

Results: 17.15% patients developed AKI after admission to the ICU 40% patients admitted with sepsis developed AKI. An increased susceptibility to develop AKI was found on day 4 of admission in both the groups. Of the patients who developed AKI, the surg gr of patients had a higher sequential organ failure assessment (SOFA) score both on day of admission (7.85 vs 5.65) and on the day of development of AKI (9.47 vs 6.18) as compared to the medical group.

Conclusion: The incidence of ARF in our study was 17.2% with the patients of polytrauma/MODS being of major concern. The initial 3–4 days are the most critical and susceptible patients must be intensive monitored during this time for prevention of ARF. Medical ICU patients develop ARF at a low SOFA score in comparison to surgical ICU patients and thus need greater attention.

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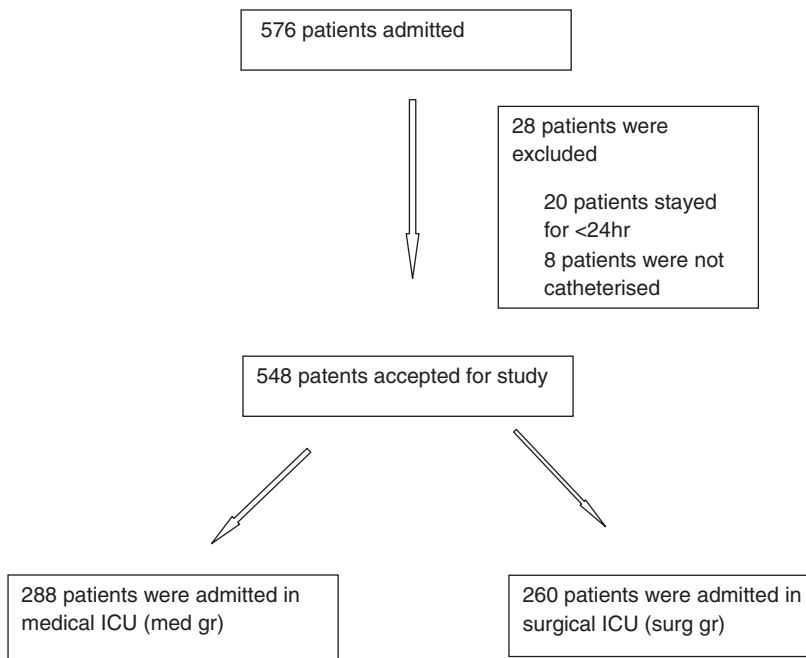 E-mail address: sshivinder@hotmail.com (S. Singh).

Introduction

Acute renal failure (ARF) has remained one of the major concerns in the intensive care unit (ICU) since time immemorial. In the recent past, it has been the subject of research in different parts of the world because of its impact on the morbidity and mortality of patients. The spectrum of ARF ranges from mild to severe and has various definitions. There are many studies directed at the incidence, probable risk factors, morbidity and treatment approaches of ARF; however, Indian studies are few and data from the service setting non-existent. We therefore carried out a prospective observational study to find out the incidence, risk factors and to measure the burden of ARF in our setup, which would help in identifying the possible areas of intervention.

Materials and methods

The study was carried out in the ICU of a tertiary care teaching hospital over a period of six months from March 2012 to August 2012. A total of 576 patients were admitted during the same period and all of them were screened. Patients who stayed in the ICU for less than 24 h or patients who were not catheterised were excluded from the study. Paediatric and cardiothoracic patients were managed in separate ICUs and were not included in our study.

The presence of comorbid diseases and organ system already compromised differ depending on the duration and severity of the comorbid disease and thus were considered separately. The presence of sepsis, whether they were on ventilator at admission and whether they had a past history of dialysis was also noted. Presence of sepsis was diagnosed as per the standard definitions.[1] Patients who were admitted with invasive airway in situ or who required mechanical ventilation on their initial evaluation were considered in the group of "on ventilatory support at admission". During the stay in ICU, patients were observed for hourly urine output and daily creatinine levels and staging of ARF was done as per Risk Injury Failure Loss and End stage kidney (RIFLE) criteria.[2] The progress of the patients was noted using the sequential organ failure assessment (SOFA) score.[3] All the patients were followed till their discharge from ICU; in case a patient developed ARF, he was followed till the 28th day following ARF development. The aim of the study was to find out the proportion of patients who develop ARF, potential risk factors and the outcome of such patients. Primary outcome of the study was the development of ARF.

Institutional ethics committee approval was obtained prior to starting the study. Data was collected and collated in excel sheet and was analysed using SPSS 20. Frequency, mean, chi square, independent t test and multiple regressions were used for measuring various outcomes and associations. On carrying out multiple regression analysis, the explained variation in the dependent variable based on our model, ranged from 24% to

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│  576 patients admitted   │
└──────────────────────────┘
             │          ┌──────────────────────────┐
             │          │ 28 patients were         │
             │          │ excluded                 │
             │          │                          │
             │          │   20 patients stayed     │
             ▼          │   for <24hr              │
                        │   8 patients were not    │
                        │   catheterised           │
                        └──────────────────────────┘
┌──────────────────────────────┐
│ 548 patents accepted for study│
└──────────────────────────────┘
         ╱                    ╲
┌─────────────────────────┐  ┌─────────────────────────┐
│ 288 patients were       │  │ 260 patients were       │
│ admitted in             │  │ admitted in             │
│ medical ICU (med gr)    │  │ surgical ICU (surg gr)  │
└─────────────────────────┘  └─────────────────────────┘
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The patients were divided into two groups: surg gr (patients admitted in surgical ICU) and med gr (patients admitted in medical ICU). The following data were collected with respect to every patient: age, sex, primary disease of admission, comorbidities, organ systems already compromised on admission and the morbidity scores. The patients were further divided into two groups: age less than or more than 60.

40%. This model predicted 97.1% of the ARF episodes correctly with a goodness-of-fit, as per the Hosmer and Lemeshow test with a p value of 0.14, which indicates that there was an agreement between the number of cases predicted and those actually observed.

Limitations of the study: Being a simple observational study, all the patients included in the study were those who fulfilled