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Original Article

Control of hospital acquired infections in the ICU: A service perspective

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ABSTRACT

Background: The service setting has some unique strengths and weaknesses that must be kept in mind when organizing Hospital acquired infections (HAI) prevention interventions.
Methods: Following an initial study to gather data regarding HAI in the Surgical intensive care unit (ICU) we put into place various infection control interventions. The present study was carried out to analyse the effect of these interventions on the incidence of HAI in the ICU.
Results: The total admissions to the ICU were 253 patients. Eighty eight patients (34.78%) were admitted for more than 48 hr, 165 patients stayed for less than 48 h. The frequency of HAI was 7.95% (95% CI 3.54, 15). Hospital acquired pneumonia was observed in 2 of the 88 patients (2.27%) (95% CI 0.38, 7.30) which amounted to 9.70 infections per 1000 ventilator days. Bloodstream infection was detected in 3 out of 88 patients (3.4%) (95% CI 0.87, 8.99) amounting to 6.54 fresh infections per 1000 Central Venous Catheter days. Urinary tract infection was observed in 2 (2.27%) (95% CI 0.38, 7.30) at 2.86 fresh infections per 1000 catheter days. As compared to the previous study we found that there was a decline of HAI ranging from 60 to 70%.
Conclusion: Our study demonstrated that by meticulously following infection control protocols especially tailored to the service setting the incidence of HAI's can be reduced. However, the challenge is in maintaining the gains achieved since there is a rapid turnover of manpower in the ICU and a lack of a structured ICU design model.

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Introduction

Hospital acquired infections (HAI) have assumed worrisome proportions in healthcare scenarios all over the world, be it the developed or developing world, the civil or service setting.

The service health care setting, however, has its own aspects which must be kept in mind while organizing infection control interventions. With the advent of systematic central procurement of equipment, decentralization of drug procurement with local purchase funds available at the hospital level, the non availability of state of the art equipment and quality drugs is now passé. The area of concern, however, is the paucity of trained manpower to achieve the basic nurse to patient ratio for nursing care.

With the above background, after a preliminary study to confirm the incidence of HAI in the surgical ICU, we instituted interventions towards control of HAI.[1] Thereafter, we observed the incidence again to see the effects of the interventions.

Interventions: Regular interactive discussion with nursing staff highlighting the important aspects of infection control, designating one nursing officer as infection control nurse in rotation, demonstration of hand washing, installation of flexiboards demonstrating the technique of hand washing, installation of bedside white boards for each patient and noting "FASTHUG".[2] (A mnemonic to enumerate all the daily actions required in the management of critical patients. Developed by Jean Louis Vincent in Belgium it is a short mnemonic that highlights seven evidenced based best practises for critical care. It is a tool used to ensure that the seven essential evidence based aspects of patient care are not forgotten by the ICU team. These stand for F = early enteral Feeding A = assessment of Analgesia S = assessment of Sedation T = Thromboembolic prophylaxis H = Head of bed elevation U = stress Ulcer prophylaxis G = Glycaemic control).

In addition the dates of insertion of catheters and lines, institution of ventilator-associated pneumonia bundle (VAP), catheter related blood stream infection (CRBSI) bundle, catheter associated urinary tract infection (CAUTI) bundle, use of subglottic suction, use of closed suction, attention to isolation of infected cases within the ICU. Introduction of shoe covers for all entrants to the ICU as mopping of the floor every 2 h wasn't possible.

Material and methods

The aim of the study was to analyse the effects of structured interventions, tailored to the service setting on the incidence of HAI in our hospital ICU. The results would be compared with the results of a prior study.[1]

The objectives of the study were to answer the following questions.

1. To assess the feasibility of implementing the interventions in the service setting.
2. To analyse the effect of the various interventions on the incidence of HAI as compared to the earlier data?
3. To sensitise the staff to the problem of HAI and to keep the issue of HAI in the forefront.

Patients and methods: This hospital-based observational study was conducted from June to December 2012 at a 10 – bedded surgical intensive care unit (ICU) of a tertiary service hospital. Patients who were shifted out of the ICU within 48 h of admission were excluded from the study. All patients who were above 16 years of age, admitted in the surgical ICU with different complaints and presentations and developed clinical evidence of infection that did not originate from patient's original admitting diagnosis, were included in the study. A proforma was designed and used for data collection. All data items were collected for all patients in the ICU, irrespective of their length of stay. Data for all patients who developed an infection was collected, irrespective of when the infection occurred. Infections studied were CRBSI, CAUTI, and VAP. This did not influence any aspect of clinical diagnosis and clinical decision-making.

HAI definitions: In this survey an HAI was an infection which arose 48 h or more after admission to hospital and which was not present or incubating on admission. A prevalent HAI was considered present when the patient had signs and symptoms which met one of the centers for disease control (CDC) definitions as had been used in the previous study.[3] The assessment, diagnosis and management of the patients was done as in the previous study.[1]

Results

Statistical analysis to calculate 95% confidence intervals for incidence of infections was done using Epi-Table and chi square test for linear trend applied to length of stay and incidence of infection along with calculation of odds ratio was done using EPI Info software.

The total admissions to the ICU were 253 patients. While 88 patients (34.78%) were admitted for more than 48 h, 165 patients stayed in the ICU for less than 48 h. There were a total of 28 deaths. There were 161 (63.64%) males and 92 (36.36%) females. Only seven 7.95% (95% CI 3.54, 15) out of the eighty eight (88) patients were identified to acquire infection during their stay in the ICU. 128 patients of the 253 had central lines placed for a total of 459 days thus the average duration of indwelling CVCs was 459/128 that is 3.59 days per patient. Similarly for urinary catheters it was 699/218 that is 3.21 days per patient.

Details of patients who acquired nosocomial infection are summarized in Table 1. Hospital acquired pneumonia was observed in 2 of the 88 patients (2.27%) (95% CI 0.38, 7.30) all of these had undergone or were on mechanical ventilatory support. The total number of days that all patients were ventilated amounted to 206 days. Thus it amounted to 9.70 infections per 1000 ventilator days. They developed signs of consolidation after 3–5 days and we categorized them as ventilator-associated pneumonia (VAP). The identified pathogens on broncho-alveolar lavage (BAL) in such patients were Acinetobacter sensitive only to imipenem and polymixin in both the patients.