SYNOPSIS

KEY POINT SUMMARY

OBJECTIVES

The purpose of the study was to investigate how the conversion of an intensive care unit from open bays to single rooms impacted P. aeruginosa colonization and infection of burn patients at an army burn center.

DESIGN IMPLICATIONS

Physical separation between patients (i.e. single–bed rooms) with strict isolation measures should be implemented in care settings for high risk patients such as burn patients.

Control of Pseudomonas Aeruginosa Infections in Burned Patients

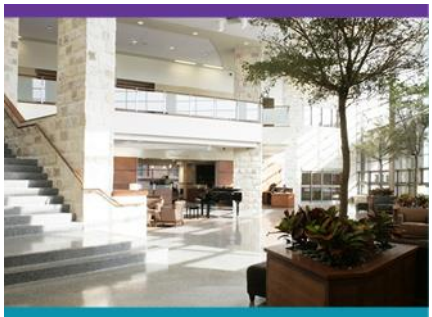
McManus, A.T., Mason, A.D.J., McManus, W.F., Pruitt, B.A.J.
1992 | Surgical Research Communications
Volume 12, Issue 1, Pages 61-67

Key Concepts/Context

Invasive burn wound sepsis with Pseudomonas aeruginosa is a major concern in burn patient care settings. It is difficult to treat and may cause high mortality among patients with extensive burn wounds. Therefore, one primary goal of burn care is to prevent colonization and infection of P. aeruginosa. Patient colonization refers to the isolation of the targeted pathogen (organism) from the patient (e.g., sputum, wound surface, urine, and stool). Colonization differs from infection in that colonization does not involve the adverse effects and symptoms presented in infection but colonization may lead to infection. It was hypothesized that burn patients were more susceptible to P. aeruginosa soon after injury and, over time, the probability of infection would decrease and the probability of patient survival in cases of infections would increase. Patient isolation using single bed room is one environmental measure in preventing P. aeruginosa colonization and infection.

Methods

This before-after study compared the rate of patient colonization and infection, time delay in colonization, and estimated mortality for a period of four years before the renovation of an ICU from open bays to single rooms and a period of seven years after the renovation. The data collection involved examination of microbiology and infection data stored in a computerized database. Over the years, routine microbial surveillance was conducted on burn patients including multiple weekly cultures of wound surface, sputum, urine, and stool. The rate of colonization and infection were calculated as the percentage of patients who were colonized or infected. The time delay in colonization was defined as the number of post-burn days before colonization. The increment of burn mortality due to infections was calculated as the difference in the actual mortality rate of infected patients and the mortality rate predicted for patient without infection based on patient



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characteristics (e.g. burn area, age). Statistical tests were conducted to compare the differences between the two patient groups—one before renovation and one after.

Findings

The demographics of the two patient groups (851 before and 1465 after renovation) were comparable except that the overall mortality was significant lower for the patients treated in single room unit. The rate of P. aeruginosa colonization was about the same in both groups. About 26% of patients were colonized in both groups. However, patients in single rooms were colonized much later (average 25 days vs. 15 days in open bays). The rates of infections (i.e. Pseudomonas bacteremia, pneumonia, and burn wound invasion) were much lower in single rooms (e.g. 2 infections of burn wound invasion in 1465 patients vs. 29 infections in 851 patients) and the infections happened much later in the hospitals stays (e.g. 36 days for Pseudomonas pneumonia vs. 15 days). In open bays, infections significantly increased mortality of patients, while, in single rooms, infected patients were not associated with a significantly mortality rate than non-infected patients.

Limitations

There were several limitations of this study:

- In this before-after study, the renovation of the intensive care unit was happened along with changes in isolation practice, medical technology, patient mix, and other factors therefore the decrease in infection and mortality could be partially attributed to factors other than the environment. The absence of a concurrent control group limited the ability of controlling these confounding factors.
- The formula used to predict patient mortality was based on both patient groups. Because the overall mortality rate was lower in the second group, the calculation based on the formula might overestimate the predicted mortality rate thus bias the result.
- The detailed mechanism behind single room's role in infection prevention was not clear from the study.