The potential role of X ray technicians and mobile radiography equipment in the transmission of multi-resistant drug resistant bacteria in an intensive care unit at Hadassah Ein Kerem

Summary

A nosocomial infection is defined as an infection that is acquired during hospitalization, and is a major concern in hospitals worldwide. In addition to increased morbidity and mortality, nosocomial infections are associated with multi resistant bacteria and with high incidence rates in intensive care units. It is found in many researches that a major proportion of nosocomial infections are thought to have their origins in the transfer of bacteria from patient to patient, and the primary mechanism of this transfer is thought to be caregivers’ hands. In addition, an educational intervention to improve infection control measures can decrease this transfer of bacteria.

During hospitalization, and especially during hospitalization in ICU, patients are being treated by many different staff members. These staff members, including physicians, nurses, physiotherapists and more, pass routinely from patient to patient every day.

A routine part of ICU care for almost all patients is the performance of daily chest x-rays, often carried out sequentially on all patients. The procedure by which x-rays are performed requires close contact between the radiology technician and the patient (while lifting the patients and inserting the x-ray cassette behind the patient’s back), and the nature of the x-ray round may thus predispose to transfer of bacteria from patient to patient.

The goal of this study was to check if multi resistant bacteria are transferred to the portable X-ray machine during routine X-rays in the ICU, and if so, could an educational intervention reduce this transfer.
The study was designed as an observational study with educational intervention, and was performed in the medical and surgical ICU’s of the Hadassah Hebrew University Medical Center at Ein Kerem.

The study included 3 phases: observation, intervention and follow up.

Observation of the x-ray technicians were done in all 3 phases as follow: 14 infection control steps during one chest x-ray were defined, and divided to 4 subgroups: before touching the patient, after inserting the cassette but before touching the x-ray machine, after performing the X ray but prior to removing the cassette, and after removing the cassette but before moving on to the next patient. For each of the mentioned steps, a yes\no notation was recorded for each x-ray performed. In addition, microbiology cultures were taken in a sterile technique from the surface of the x-ray machine before and after the x-ray round in part of the days of all 3 phases.

Phase 1: observation.

During this phase, the observation of the x-ray technicians was performed without their knowledge. Microbiology cultures were taken in part of the occasions from the surface of the x-ray machine before and after the x-ray round.

Phase 2: intervention.

During this phase an educational intervention was done. It included a short explanation about the importance of infection control and the steps that should be taken in order to achieve it. The explanation was given to the x-ray technicians every morning before the x-ray round.

Observation and microbiology cultures in this phase were done similar to the observation phase.
Phase 3: follow up.

6 months after the intervention phase, a follow up phase took place. Observation and microbiology cultures in this phase were done similar to the observation phase, and the goal was to check weather a change in infection control could be preserved after the daily education intervention was stopped.

Results: Surveillance of 173, 113 and 120 chest X rays was performed during the observation, intervention and follow-up phases. Adequate infection control practice improved from 2/173 (1%) in the observation phase to 48/113 (42%) during the intervention phase (p<0.001), but deteriorated on long term follow up to 12/120 (10%) (p<0.001 for follow-up vs intervention and observation phases). Resistant Gram negative bacteria were cultured from the X ray machine on 11/30 (37%), 0/29, and 7/14 (47%) occasions during the observation, intervention and follow-up phases respectively. Pulsed field gel electrophoresis demonstrated genetic identity between some Acinetobacter baumannii isolates from X-ray machines and clinical cultures that were taken from patient hospitalized at the ICU in the same period of the study.

Conclusions:
Multi resistant bacteria were found in cultures taken from the x-ray machines in more than half the days in the first phase of the study, the observation phase. In the phase that included educational intervention, phase 2, an improvement in infection control practice was noted and at the same time no multi resistant bacteria were found in the microbiology cultures taken from the
x-ray machine surface. This important improvement was not preserved after the educational intervention was stopped, and a few months after this intervention, a decrease in the occurrence of adequate infection control was recorded in the observations in the follow up phase. In addition, cultures taken from the surface of the x-ray machine were positive for multi resistant bacteria during the last phase.

This data indicates that the routine x-ray round done every day in the ICU, and the x-ray technicians that perform the x-ray, can be an important part of the network of infection transfer in the ICU. Moreover, it was shown in this study that simple infection control steps, achieved by educational intervention, could break this dangerous chain of infection transfer.

Bibliography


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