

CONTAINMENT OF CASE-FILE CONTAMINATION--INFECTION CONTROL

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ABSTRACT: Medical charts could be potential vehicle for the spread of nosocomial infections (NI) as these come into direct contact with health care professionals whose hands may be contaminated. A prospective study was undertaken to determine the extent of contamination on this media of infection-transfer, which comprised of sampling of 60 randomly selected case files from Intensive care units and wards of a tertiary neurocare centre. The samples were collected from the exposed outer surface of the patients' files with sterile swabs moistened with sterile normal saline. The swabs were inoculated into trypticase soy broth and incubated at 37°C for 48 hours and plated on to blood agar and Macconkey media. The microorganisms isolated were identified at the microbiology laboratory as per standard guidelines. The study showed that majority of the hospital charts were contaminated. Coagulase-negative staphylococci (CNS) was the peak contaminant isolated (44.46%). Major number of hospital personnel may not wash their hands after handling the file, potentially placing themselves at risk of acquiring or transferring NI. Hand washing(HW) being the principal method to forestall the spread of NI, we encourage the staff members to observe hand hygiene emphasizing on alcohol rub after reviewing the patients charts and before patient contact.

KEY WORDS: cross infection, hand contamination, patients' charts, intensive care units; medical records

INTRODUCTION: Nosocomial / Hospital Associated Infections, (NI) / (HAI), have become an increasingly recognized problem and are a significant hazard for hospitalized patients. These require identification and control of sources of infection and are largely preventable with proper infection control implementation and is based on breaking the chain of infection¹

The source of the infectious agent and the transmission route are important elements in transmission of infection in hospital setting. The transmission between staff and patients should

be kept to a minimum as patient management involves contact with the hands of healthcare workers/personnel (HCW/P).²

Commonly used items such as stethoscopes, latex gloves, and white coats and writing pens, have been noted to be contaminated with various bacterial species some of which are pathogenic.³

Patient hospital charts are usually handled by several healthcare workers whose hands could be contaminated by bacterial isolates, often taken into patients' rooms, even isolation rooms where patients are barrier nursed, and may be placed on patients' beds. Patients' notes may therefore act as a vehicle for cross-infection by contaminating the hands of HCW², hence work as most common fomites in spreading NIs. Physicians, nurses, and clerks are all routinely exposed to NI as they leaf through the clinical chart.⁴ However, most HCP do not wash their hands between the contact with the medical charts and the patients.¹

The Centers for Disease Control and Prevention (CDC), points out the well documented effective hand washing (HW) as the principal, important measure for preventing spread of pathogens.^{1,5}

A well-practiced infection control plan that encompasses hand hygiene, environmental decontamination, surveillance and contact isolation is effective for prevention of such nosocomial infections. Despite these measures, colonization of potentially pathogenic organisms on various objects, such as stethoscopes, bronchoscopes, pagers, ballpoint pens, patient hospital charts, computer keyboards and mobile phones, has been reported as a potential vehicle for transmission of nosocomial pathogens from HCWs and have all been found to harbour viable bacteria.^{6,7}

The extent to which bedside patients' files become contaminated and the range of bacterial flora attributable to contamination in high-risk areas of the hospital are not known with certainty.⁸ Their role in the transmission of potential pathogens has not been examined extensively.⁵

This study was undertaken to investigate the extent of contamination of patients' charts in different areas as a media of infection transfer; to analyze and characterize the isolates as environmental flora, potentially pathogenic and pathogenic bacteria, compare the spectrum of contaminant bacterial flora and the patients' isolates in different areas of the hospital in terms of antibiotic resistance patterns.

MATERIAL AND METHODS: The present study was conducted at a tertiary care Neurocentre. A random selection of clinical charts- 60 case files from different wards and ICU's was made: 5 each from 3 ICUs, 3 surgery wards and 6 other wards. Samples were collected from the exposed outer surface of the patients' files-along the spine of the case file and the right front lower corner where most hand contact occurs while reading notes, with sterile swabs moistened with sterile normal saline.

The cotton swab was immediately inoculated into trypticase soy broth and incubated at 37°C for 48 hours, then subcultured on to trypticase soy agar, 5% sheep blood agar and MacConkey's agar.

The isolates were subjected to Gram's stain, catalase and oxidase tests; tube coagulase test and cefoxitin disc diffusion method, were performed on Staphylococcus species and the organisms were identified using standard laboratory techniques at the Hospital Infection Surveillance System unit of the Department of Neuromicrobiology.

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Antibiotic susceptibility of the isolated bacteria was evaluated by the Kirby Bauer disk diffusion technique.

The presence in a ward, of a patient known to be currently colonized or infected with MRSA was considered but none of them stationed MRSA patients.

RESULTS: Of the 60 charts sampled, 56 (93.4%) were contaminated by potentially pathogenic, environmental or pathogenic bacteria. Coagulase- negative staphylococci (CNS) was the peak contaminant in both wards and ICU, isolated (44.46%) from the patients' files categorized as potentially pathogenic. Gram positive bacilli (*Corynebacterium* spp) was the next common isolate (38%) categorized as environmental contaminant hence were deemed to be environmental flora.

Among the pathogenic, *Klebsiella pneumoniae* and Non-fermenting gram-negative bacteria (NFGNB) (*Acinetobacter* spp) contributed to 4.76% each and *Providencia rettgeri*(*P. rettgeri*) 3.17% of the growths. The ratio of the other less common isolates (figure-1) and comparison of contamination of the patients' charts are depicted in table-1. More than one (two organisms each) were isolated from seven charts.

The kind of isolated microorganism from patients' samples correlated with the isolated ones from contaminated files. On comparison, the multidrug-resistant (MDR) *Klebsiella pneumoniae* and NFGNB and *P. rettgeri* isolated from the patient's files had same antibiotic resistance patterns as of these bacteria isolated from the patients in respective wards(EICU, PNSW).

DISCUSSION: The contamination varies in different hospitals and in different parts of the world which can be related to the infection control practices in different hospitals. Research in the contamination of the patients' charts in a large district general hospital in the UK found a 99.6% contamination rate) ² which matches the outcome of our study. In comparison, two studies in Saudi Arabia,^{5,8} also found 57% to 100% of the patients' charts contaminated with pathogenic or potentially pathogenic bacteria similar to our study (93.4%), which shows that majority of the hospital charts are contaminated by bacteria with most of the isolates being environmental organisms. These charts are probably contaminated by the hands of HCWs as some of the organisms are known to be part of normal skin flora.

A study documents isolation of CNS from all patient charts (100%)³ importantly revealing a very high ratio of charts positive for CNS, a potentially significant source of nosocomial infection in susceptible healthcare workers and their patients; in comparison, our study revealed 44.46% of CNS from the charts. It is found throughout hospitals, especially in patients with indwelling catheters commonly seen in our hospital set-up.

In our study, we observed that the pathogenic bacteria were not found as contaminants on the charts in the neurosurgical and neuromedical intensive care units (ICU), which caters to elective cases where the awareness and implementation of the infection control practices is optimal in these areas due to continuous monitoring and supervision of activities of the health care personnel by the infection control team. Whereas the emergency ICU being a busy and clustered area of the hospital appeared to harbour most of the pathogenic organisms explaining the probable breach or not so strict adherence to control practices despite conscious efforts due to emergency and high demand of patient care and management. The female and male surgical wards did not record the isolation of pathogenic bacteria indicating the compliance and adherence to infection prevention measures in these sections of our Institute (table-2).

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The results of this study showed the isolates from the patients' charts had the same antibiogram of the corresponding bacteria isolated from the patients, which certainly has an impact on nosocomial infections.

There are many potential sources of microbiological contamination in hospitals and can infect whole hospital unless stringent controls are observed.

The vector of transmission may be as innocent as a medical chart, as it is conveyed from nurses' station to the bedside and back again⁴. The patient's chart is exposed daily to the bed-side clinical practice, may be casually placed on bed or in the bed clothes of an infectious patient. Physician and nurses are all routinely exposed to nosocomial infection as they handle the clinical chart. The personnel though would have washed hands after handling the first patient may not after handling that patients' chart.. During ward rounds transfer of the bacteria quickly occurs by these employee. They often cover number of wards in a single ward round and patient themselves may be transferred from one ward to another during the course of a single day.⁴

While bacteria on the patient clothing, bed linen continue to grow, as other healthcare professionals having failed to wash hands inadvertently transfer the bacteria to the patient's charts, on uniform, equipment in the ward as well as other patients. Thus spread to a number of wards and even beyond the hospital itself and also as visitors enter and leave the hospital. Additionally, staff may wear potentially infected uniform as they return home at the end of their shift. The potential for cross infection in the hospital still persists despite continuing extraordinary efforts to isolate hospital personnel by the use of glove, mask, gown etc.

Multiple methods like disposable covers, periodic wiping with antiseptic solutions, autoclaving and irradiation of sterilizing the charts have been described, but frequent HW before and after chart handling remains the cost-effective method of choice⁴. With HW, the healthcare personnel (HCP) is protected from patient cross-contamination, and conversely, the patient and coworkers are sheltered,⁴ but this behavioural change remains a formidable obstacle.

As cleaning and disinfecting the non-critical items is difficult HW remains the cornerstone of infection control. The maintenance of good hand hygiene by the HCWs after handling contaminated files should perhaps be the most prudent approach to prevent patient-patient transmission of infection in high-risk areas including ICU and surgical wards.

The outcome of this study delivers the message that development of effective preventive strategies is an essential need to contain nosocomial infections one among them being contaminated chart.⁷ The patient chart should not be allowed to be placed on bed, but remain on the chart rack after use⁹ and medical chart covers need to be cleaned by periodical wiping of the chart covers with appropriate detergents, antiseptic solution or alcohol rubs thus may decrease the risk of cross-contamination, or use of new chart covers may be cost effective.

It is also recommended that health care workers should wash their hands also after attending the patient and before entering the case notes in the patient's file.

Alcohol-based hand rub, a very cost effective means of NI control, also has repeatedly been shown to help improve compliance with hand hygiene and reduce transmission of pathogens after reviewing the patients' chart. Therefore, as an immediate consequence of this study, our staff members have been instructed and encouraged to observe hand hygiene with alcohol-rubs, before next patient contact and the surveillance on handling and random testing of the patients' charts at microbiology laboratory is ongoing.

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Orientation and education on HW after chart handling has become a conscious routine of hospital infection surveillance system, in our hospital.

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**Table-1- Comparison of contamination of patients'charts
(n=60)**

1)Charts with pathogenic isolates	n(%)
1 isolate/chart	04(06.66)
2 isolates/chart	07(11.66)
2)Charts with CNS alone	21(35.00)
3)Charts with environmental bacteria	24(40.00)
Total isolates	63
Charts without isolates	04(06.66)
Charts with contamination	56(93.33)

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Table-2-Bacteria isolated from patient's charts from different areas of the hospital

	ICUs (n=3)			Surgical wards (n=3)			Other wards (n=6)
	NSICU	NMICU	EICU	MSW	FSW	PNSW	
Kleb pneu						1	2
NFGNB							3
Prov rett			1				1
Esch coli			1				
Citro spp							1
CNS	3	1	3	3	-	3	15
MSSA							1
Coryne spp	1	3	2	2	5	1	10
Total	4	4	7	5	5	5	33

Neuro medical ICU(NMICU), Neuro surgical ICU (NSICU),Emergency ICU (EICU), Neuro male surgery ward (MSW), Neuro female surgery ward (FSW), Paedatric neuro surgical ward (PNSW);Stroke ward, Neuro male medical ward, Neuro female medical ward, Head injury ward, Recovery ward, and Neuro rehabilitation ward(Other wards).

Figure-1-Percent of bacterial isolates from patients' charts (n=60)

