

**Title:       SPHYGMOMANOMETERS AS A RESERVOIR OF PATHOGENIC BACTERIA**

**Authors:    M.A. Beard, A. McIntyre, P.M. Roundtree**

**OBJECTIVE:** The purpose of this study was to identify the type and level of the bacterial contamination of sphygmomanometers in use in a hospital.

**SUMMARY:** The bacterial strains were compared by clinical unit with those strains from isolated patients during a six week period before and after the sampling period. Sources of patient samples included skin lesions, blood, wounds and sputum. Sixty percent of the cuff isolates were identical to strains that had caused infection in the clinical units in which two were found. Two strains were cross infecting organisms across four clinical units during the time of the survey. Since no attempt was made to determine the length of time these cuffs had been use prior to sampling, another study was initiated.

**SETTING & PATIENTS:** Forty-eight clinical units in a hospital were tested during a three week period. Samples were taken from the part of the cuff that comes in contact with the patient's arm. The sphygmomanometers tested were those that where in common use on those clinical units

**RESULTS:** *Staphylococcus aureus* was found on 92% of the sphygmomanometers and *Psuedomonas aeruginosa* was isolated from only one cuff (2%) on a surgical unit. A range in number of colonies (1-500+) and multiple strains of *S. aureus* were isolated.

Over a five week period, the sphygmomanometers were changed twice a week and sampled at 0, 24 and 48 hours after introduction. Three sites on the cuff were sampled each designated as high, medium, and low level of contact with the patient's skin. Results indicated that the number of bacterial colonies increased from time 0 hours to 48 hours. Not unexpectedly, the site with greatest contact with the patient's skin yielded the greatest number of bacterial counts.

Swabs were taken from the patient's arm before and after application of the blood pressure cuff. Staphylococci of the same type were identified from the patient only after usage. Results were similar when the staff's hands were tested. The same bacteria type was identified after, but not prior to, handling of the contaminated blood pressure cuff by the health care worker.

**CONCLUSIONS:** While no attempt was made to link bacterial contamination to the direct cause of infection, the implication of direct transfer of microorganisms from cuff to patient and staff is clear. No other piece of equipment was in more common use without adequate disinfection than the blood pressure cuff. Strategies subsequently suggested by the authors that were aimed at risk reduction such as daily washing of the cuff, sterilizing the entire blood pressure set up, or cleansing the patient arm after cuff usage, were unacceptable by clinicians. (*The Medical Journal of Australia*. October 11, 1969;2: 758-60).

**Title:** NEW THREATS TO THE CONTROL OF METHICILLIAN-RESISTANT  
*Staphylococcus Aureus*

**Author:** M.W. Casewell

**INTRODUCTION:** New threats to the control of methicillin-resistant *Staphylococcus aureus* (MRSA) can be recognized, some due to the evolution of the organism and others arising from changing hospital populations and organization. This paper attempts to identify these threats and encourage infection control personnel to focus on minimizing the morbidity and mortality from staphylococcal infection on those issues that remain within our control.

**SUMMARY:** Several countries have achieved considerable success in the control of MRSA. However, in several hospitals in the UK, MRSA strains of enhanced epidemicity\*, notably EMRSA-16, are becoming endemic\*\*.

Factors in 'market-led' health care delivery that hinder control of MRSA include a shortage of inpatient beds which results in patients being moved more often from unit to unit, and more mixed-specialty units, both known to be factors that encourage the spread of MRSA. Increasing use of day treatments leaves an inpatient hospital population with more risk factors for infection. Early discharge of infected patients to convalescent homes or to homes for the elderly, has created a new reservoir of infected and colonized patients.

The transfer of vancomycin-resistance from *Enterococcus faecium* to a laboratory strain of *S. aureus* suggests that, especially in hospitals with both vancomycin-resistant enterococci and

MRSA, there is the opportunity for the emergence of vancomycin-resistant MRSA. There may be no effective antimicrobial prophylaxis or treatment for vancomycin-resistant MRSA.

**RECOMMENDATIONS:** It is increasingly important to persuade hospital managers that even partial control of MRSA, while expensive, is still cost-effective and is a quality issue for individual hospitals. The control of EMRSA-16 in one hospital has recently been estimated to have saved more than £629,000 or \$997,594 (1995 values) in extra costs. MRSA continues to be at the forefront of those organisms that seriously challenge modern technological medicine and surgery. (*J Hosp Infect* 1995 Jun;30 Suppl:465-471).

\* epidemicity – the quality of being widely diffused and rapidly spreading throughout a community

\*\* endemic – present in a community at all times

**Title:** NORWEGIAN SCABIES – DISSEMINATION OF MITES BY MEDICAL INSTRUMENTS

**Author:** K.W. Kim, Y.J. Oh, B.K. Cho, W. Houh, J.A. Kim, Y.S. Lee

**INTRODUCTION:** Norwegian scabies is a clinical variant of human infestation with *Sarcoptes scabiei* and is characterized by extensive, heavily crusted skin lesions. Persons most frequently affected are the elderly, debilitated of all ages, and the immunosuppressed. They have a high rate of infectivity with transmission by close personal contact. The authors feel that the use of medical instruments on more than one patient is an important factor in spreading the disease throughout hospitals.

**CASE REPORT:** In March 1989, several members of the nursing team and medical staff complained of itching papules and were felt to have scabies. A source was sought among the patients on the ward. A 77 year old patient was examined and showed the presence of numerous itch mites.

One hospitalized patient who had had their blood pressure recorded with the same monitoring cuff previously used on the patient with Norwegian scabies complained of similar symptoms. Another patient who had shared a clinical thermometer with the Norwegian scabies patient also complained of pruritic papules in the axilla.

All the 26 medical personnel and 43 hospitalized patients received treatment and showed improvement within a week. All the bed linens and clothes were thoroughly cleaned and the contaminated medical instruments were sterilized.

**DISCUSSION:** The occurrence of scabies infestation in these two hospitalized patients was traced to contaminated medical instruments. Norwegian scabies may be difficult to diagnose clinically because it may resemble chronic eczema, psoriasis or drug eruptions.<sup>1</sup>

The correct diagnosis is often not made until biopsy is done or an epidemic of secondary scabies breaks out among contacts of the patient. Delayed diagnosis or unrecognized cases of crusted scabies frequently contributes to secondary transmission especially in hospitals and institutions. Because of current wide spread use of immunosuppressive medication, it is anticipated that the number of Norwegian scabies cases will increase.<sup>1</sup> (*Annals of Dermatology, Vol.2, No.1, January 1990*).

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**Title:** TWO MILLION ARE INFECTED IN HOSPITALS EACH YEAR

**Author:** A. Manning

**INTRODUCTION:** The rate of infections picked up by patients while they're in the hospital has increased 36% since the last count made in a 1975-80 study reported at an international conference on emerging infectious diseases.

**SUMMARY:** About 2 million people a year acquire such infections, and nearly 90,000 die of them, according to a survey of 265 hospitals nationwide, as reported by the Centers for Disease Control and Prevention (CDC).

Without hospital infection-control programs, required for hospital accreditation since 1976, there would have been a 50% to 70% increase in such infections because the proportion of severely ill patients has increased. Hospitals have become ICUs, treating very sick patients vulnerable to infections because of their depressed immune systems or requiring the use of invasive equipment such as intravenous lines that provide and entry route for infection.

Another concern is the increasing rate of antibiotic-resistant organisms found in hospitals. At least 70% of the bacteria that cause nosocomial infections are resistant to at least one antibiotic.

**RECOMMENDATIONS:** Nosocomial infections add about \$4.5 billion a year to health care costs. About a third of them could be prevented with simple procedures such as frequent hand washing by health care workers, but many are unavoidable, caused by microbes carried in the patient's own body.

Health care workers washing their hands before touching patients and making sure antibiotics are taken according to prescription, can reduce the risk of infection. (*USA TODAY [US] Wednesday March 11, 1998*).

**Title:** NONDISPOSABLE SPHYGMOMANOMETER CUFFS HARBOR FREQUENT BACTERIAL COLONIZATION AND SIGNIFICANT CONTAMINATION BY ORGANIC AND INORGANIC MATTER

**Authors:** V. Base-Smith

**OBJECTIVE:** The purpose of this study was to determine if significant bacterial colonization and organic or inorganic contamination occurred on presumed “clean” blood pressure cuffs in critical care areas.

**SETTING & PATIENTS:** Blood pressure cuff samples were selected from the OR, medical intensive care unit (MICU), surgical intensive care (SICU), burn special intensive care unit (BSICU), cardiac intensive care unit (CICU), ER, PACU and the neurosurgical intensive care unit (NSICU) from a 707-bed tertiary care, level-one trauma center.

**RESULTS:** In 70 separate cultures collected over 6 weeks, bacterial colonization occurred on 57 (81%) of the blood pressure cuffs. Bacterial colonization was discovered on 100% of the cuffs sampled from the OR, PACU, BSICU, and ER. Of the cuffs from SICU and MICU, 90% and 80% were colonized respectively, while the NSICU and CICU demonstrated no growth. Thirty-two (45.7%) of the “clean” cuffs were contaminated with organic and/or inorganic substances that should not have been present. Additionally, the patient contact sides of cuffs were contaminated twice as often as the nonpatient sides.

The potential to produce opportunistic infection may be magnified when introduced to susceptible patients, such as those hospitalized in critical care units.

**CONCLUSIONS:** Results indicate that frequent bacterial colonization and significant contamination by organic and inorganic substances did occur on “clean” nondisposable blood pressure cuffs. The need for better sanitation and disinfection of the cuffs between patient use is evident. (*JANA, 1996 April 64(2): 141-145*).

**Title:** ENVIRONMENTAL CONTAMINATION DUE TO METHICILLIN-RESISTANT *Staphylococcus Aureus*: POSSIBLE INFECTION CONTROL IMPLICATIONS

**Authors:** J.M. Boyce, G. Potter-Bynoe, C. Chenevert, T. King

**OBJECTIVE:** To study the possible role of contaminated environmental surfaces as a reservoir of methicillin-resistant *Staphylococcus aureus* (MRSA) in hospitals.

**DESIGN:** A prospective culture survey of inanimate objects in the rooms of patients with MRSA.

**SETTING AND PATIENTS:** Thirty-eight consecutive patients colonized or infected with MRSA. Patients represented endemic MRSA cases.

**RESULTS:** Ninety-six (27%) of 350 surfaces sampled in the rooms of affected patients were contaminated with MRSA. When patients had MRSA in a wound or urine, 36% of surfaces were contaminated. In contrast, when MRSA was isolated from other body sites such as sputum, blood and conjunctivae, only 6% of surfaces were

contaminated. Environmental contamination occurred in the rooms of 73% of infected patients and 69% of colonized patients. Frequently contaminated objects included the floor, bed linens and blood pressure cuffs.

**CONCLUSIONS:** Inanimate surfaces near affected patients commonly become contaminated with MRSA and that the frequency of contamination is affected by the body site at which patients are colonized or infected. Personnel may contaminate their gloves (or possibly their hands) by touching such surfaces suggests that contaminated environmental surfaces may serve as a reservoir of MRSA in hospitals. (*Infection Control and Hospital Epidemiology*, 1997 Sep 18(9): 622-627).

**Title:** THE MICROBIAL FLORA OF IN-USE BLOOD PRESSURE CUFFS

**Authors:** M.G.M. Cormican, D.L. Lowe, P. Flynn, D. O'Toole

**OBJECTIVE:** This study was conducted to determine the extent of microbial contamination on blood pressure used in the operating and recovery rooms of a teaching hospital. The authors suggest that the blood pressure cuff is as yet an unrecognized source of bacterial contamination, which may play a part in the hospital's nosocomial infection rate.

**SETTING & PATIENTS:** As part of this study, new blood pressure cuffs were placed in six operating rooms, and one recovery room. A defined area of the cuff in contact with the patient was sampled before issue and at the end of the operating day for a period of five days. Swabs were plated, incubated and evaluated after 48 hours.

**RESULTS:** Results indicated that 68 different microorganisms were isolated from the forty-two samples. Seventy-one percent (n=61) were Staphylococci. One of the *Staphylococcus aureus* was found to be resistant to methicillin, gentamycin and erythromycin. The remaining twenty-five organisms were thought to be skin and environmental representatives although they may pose a risk to certain groups of patients.

**SUMMARY:** It was concluded that the majority of microorganisms isolates in this study posed little risk to healthy patients undergoing surgery. The one case where the gentamycin-methicillin resistant pathogen was identified caused concern since no patient known to have that pathogen had been in the operating room during the corresponding day of data collection. Therefore, the bacteria then would have had to survive for some time on the cuff implying therefore, that the cuff acts as a vehicle of infection.

The authors noted that enforcing policies that prohibit the transfer of cuffs outside a room where isolation precautions are in effect is very difficult. In addition, general use blood pressure cuffs are handled by many health care workers and patients. Because there is often no visible signs of contamination, no disinfecting procedures are employed on the cuff. The potential for cross contamination magnifies as often as patients, who are sources of antibiotic resistant pathogens, are unknown to the hospital staff. Blood pressure cuffs attached to resuscitation equipment were identified as another source of contamination.

**CONCLUSIONS:** This study emphasizes the need for increased awareness of the potential for cross contamination to patients and health care workers from seemingly innocuous items of general use hospital equipment, specifically blood pressure cuffs. (*Irish Journal of Medical Sciences 1994; 4:112-3*).

**Title:** AN OUTBREAK OF MUPIROCIN-RESISTANT *Staphylococcus Aureus* ON A DERMATOLOGY WARD ASSOCIATED WITH AN ENVIRONMENTAL RESERVOIR

**Authors:** M.C. Layton, M. Perez, P. Heald, J.E. Paterson

**OBJECTIVE:** To investigate a cluster of mupirocin-resistant *Staphylococcus aureus* on a dermatology ward.

**DESIGN:** An outbreak of mupirocin-resistant *S aureus* was noted on the dermatology ward during a prospective epidemiological study of methicillin-resistant *S aureus* (MRSA) and borderline methicillin-susceptible *S aureus* (BMSSA). Pulsed-field gel electrophoresis (PFGE) of whole cell DNA digested with *Sma* I was used as a marker of strain identity.

**SETTING AND PATIENTS:** An 850-bed university hospital with a 12-bed inpatient dermatology ward. Most patients have severe, exfoliating dermatologic disorders.

**RESULTS:** MRSA and BMSSA were isolated from 13 patients on the dermatology ward over a 14-month period. Eleven of these isolates (84.6%) were mupirocin-resistant. Nine isolates were present on admission (81.8%); 8 of these patients had been hospitalized on the same ward within the last two months.

Nasal and hand cultures from 36 personnel were negative for mupirocin-resistant MRSA or BMSSA. Extensive environmental culturing revealed that a blood pressure cuff and the patients' communal shower were positive for mupirocin-resistant BMSSA.

PFGE of all mupirocin-resistant isolates demonstrated that the nine patients and both environmental sources had identical DNA typing patterns.

**INTERVENTIONS:** Changing of blood pressure cuffs between patients and more stringent cleaning of communal areas was initiated. Repeat environmental cultures were negative.

**CONCLUSIONS:** *S aureus* is not usually associated with an environmental reservoir; however, these patients all had severe desquamation, which may have prolonged environmental contamination. (*Infection Control and Hospital Epidemiology*, 1993 Jul;14(7): 369-375).

**Title:** LONGITUDINAL EVALUATION OF NEONATAL NOSOCOMIAL INFECTIONS: ASSOCIATION OF INFECTION WITH A BLOOD PRESSURE CUFF

**Author:** M.G. Myers

**OBJECTIVE:** To determine the rate of nosocomial infection and to demonstrate the effect of specific infection control measures in a neonatal intensive care unit.

**SETTING & PATIENTS:** Longitudinal infection surveillance in a special care nursery was performed for a 21-week period. All infant charts were reviewed along with culture information; this information was recorded and infections were categorized as community- or hospital-acquired, and as new or recorded previously.

**SUMMARY:** During the 21-week surveillance period, 46 of the 248 infants at risk (18.5%) acquired 52 infections giving a nosocomial infection rate of 21.0%. Increased infection control measures were instituted with an apparent reduction in the nosocomial infection attack rate, but which returned to the same rate or higher by the tenth week of surveillance.

It was then observed that the Doppler blood pressure apparatus was used on all the children in the nursery area. A portion of the blood pressure cuff was cultured with several microorganisms recovered including *Klebsiella pneumoniae* and *Staphylococcus aureus*.

**RECOMMENDATIONS:** Nosocomial infection epidemiology is complex and dependent upon antimicrobial usage, and increasing population of susceptible patients, and varying hospital flora. Outbreaks of nosocomial infection have been related to arterial monitoring catheters<sup>1,2</sup> and material applied to the skin such as lotions<sup>3</sup> and stethoscopes.<sup>4</sup> It is not surprising that blood pressure cuffs may also be associated with hospital-acquired infection. While not

penetrating the dermis, blood pressure cuffs are made of fabrics on which organisms may persist for significant periods of time.<sup>5,6</sup> and may also be associated with hospital-acquired infection.

In this study, surveillance was conducted by peers of the ward physicians and was closely supervised, so that definitions and reporting of nosocomial infections remained constant during the surveillance. This method of surveillance has introduced a novel form of physician education, making them particularly aware of the magnitude of nosocomial infection. (*Pediatrics*, 1978 Jan;61(1): 42-45).

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