

# CLINICAL STUDIES IN SUPPORT OF DISPOSABLE BLOOD PRESSURE CUFFS

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## LONGITUDINAL EVALUATION OF NEONATAL NOSOCOMIAL INFECTIONS: ASSOCIATION OF INFECTION WITH BLOOD PRESSURE CUFF.

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**Objective:** The purpose of this study as documented by the author and a pediatric resident was to determine the cause of nosocomial infection in a special care nursery. Guidelines for determining the presence and classification of infection were adopted from those suggested by the CDC. In this study an infection was considered to be nosocomial if the onset occurred at least 48 hours after admission.

**Setting:** A special-care nursery, which consisted of two intermediate-care nurseries, seven Isolette intensive care rooms and three isolation rooms.

**Results:** During 21 weeks of surveillance, 46 of 248 infants who were at risk (18.5%) acquired 52 infections in the special-care nursery area with a nosocomial infection rate of 21.0%. Of these 248 infants, 54 died while in the special-care nursery. Eight of the deaths were related to nosocomial infection. One in seven causes of death for these infants was attributed to nosocomial infection. It was observed during the 16th week of surveillance that the Doppler blood pressure monitor was used on all infants in the special-care nursery. A portion of the blood pressure cuff was excised and cultured. It was found to contain *Klebsiella pneumoniae*, *E. cloacae*, *Staphylococcus aureus* and several other Gram-negative bacilli.

**Finding:** With the introduction of single-patient blood pressure cuffs there was an associated decrease in nosocomial infection rates. *Klebsiella pneumoniae* and *E. cloacae* disappeared.

**Conclusions:** Therefore, blood pressure cuffs can be attributed to nosocomial (hospital) acquired infection. This study has caused increased awareness by the physician of the magnitude of nosocomial infection in the hospital setting.

(Pediatrics 1978; Vol. 61 42-45).

# METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) AND VANCOMYCIN-RESISTANT ENTEROCOCCI (VRE) IDENTIFIED ON ENVIRONMENTAL SURFACES

Authors: J. M. Boyce, M. M. Jackson, G. Pugliese, D. B. Murray, et al.

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**Introduction:** Drug-resistant organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE) are a major public health problem. Diseases that are caused by drug-resistant organisms have prolonged patients' diseases, extending their hospital stay. This also causes a greater risk for the spread of the disease to other individuals. An increase in morbidity may also result because there is no single treatment for antibiotic resistance. "MRSA strains have been identified as a major source of nosocomial infections and outbreaks in the United States. MRSA accounts for 12% of all nosocomial infections in the US; resistance to methicillin increased from 2.4% in 1975 to 29% in 1991 (Dept. of Health, 1999)."

**Discussion:** MRSA is transmitted primarily by contact with a person who either has a purulent site of infection, a clinical infection of the respiratory tract or urinary tract, or is colonized with the organism. Hands of personnel appear to be the most likely mode of transmission of MRSA from patient to patient. Studies have demonstrated that MRSA can be present on the hands of personnel after performing such activities as wound debridement, dressing changes, tracheal suctioning, and catheter care.

MRSA has also been identified from environmental surfaces including but not limited to the following examples: work areas, sinks, medical devices, tourniquets used for blood drawing, and blood pressure cuffs. Although these environmental surfaces are not the most likely source of the spread of MRSA, these surfaces must be disinfected on a routine basis to reduce overall bacteria in the environment.

**Conclusion:** Once a patient has been identified with a multiple-antibiotic-resistant organism, any surfaces which may have had contact with the patient (e.g., blood pressure cuffs, examination table, and stethoscopes) should be cleaned with an EPA-registered disinfectant as soon as the patient is released. Also ensure that the follow-up visit to the office/clinic is managed in order to prevent the spread of the disease.

Healthcare workers must address this problem by ensuring additional infection control measures are in place. A multidisciplinary approach to drug-resistant organisms should be immediately implemented to stop the spread of the disease.

## Reference:

Guidelines for Control of Antibiotic Resistant Organisms. 1999. Infection control in the management of antibiotic resistant organisms: (December). Florida Department of Health.

# AN OUTBREAK OF MUPIROCIN-RESISTANT STAPHYLOCOCCUS AUREUS ON A DERMATOLOGY WARD ASSOCIATED WITH AN ENVIRONMENTAL RESERVOIR.

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**Objective:** To investigate a cluster of mupirocin-resistant *Staphylococcus aureus* on a dermatology ward in an 850-bed university hospital.

**Setting:** A large university hospital with 12 inpatient dermatology beds. The majority of the patients have severe, exfoliating dermatologic medical disorders.

**Results:** Over a 14-month period MRSA (mupirocin-resistant *Staphylococcus aureus*) or BMSSA (borderline methicillin-susceptible *S. aureus*) was found on 13 patients. Eleven (84.6%) of the patients were mupirocin-resistant. Nine (81.8%) isolates were present upon admission. Eight patients had been previously in the hospital on the same ward within the past two months.

Hand and nasal cultures were obtained from 36 staff and were found to be negative for MRSA or BMSSA. Through very extensive environmental culturing it was determined that blood pressure cuffs and patients' showers were found positive for mupirocin-resistant BMSSA. PFGE (pulsed field gel electrophoresis) of all mupirocin-resistant isolates showed the DNA from nine patients matched the DNA patterns from the environmental sources.

**Conclusions:** The repeat cultures were negative when blood pressure cuffs were changed between patients and more effective cleaning practices were initiated.

(*Infection Control and Hospital Epidemiology*, 1993 Jul; 14(7):369-375).

# NONDISPOSABLE SPHYGMOMANOMETER CUFFS HARBOR FREQUENT BACTERIAL COLONIZATION AND SIGNIFICANT CONTAMINATION BY ORGANIC AND INORGANIC MATTER.

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**Objective:** Presumed “clean” blood pressure cuffs in critical care areas were evaluated to determine if they were contaminated with bacterial colonization of organic and inorganic materials.

Settings used to obtain the data: 707-bed, tertiary-care, level-one trauma centers. Blood pressure cuff samples were selected from OR, MICU (Medical Intensive Care Unit), SICU (Surgical Intensive Care Unit) CICU (Cardiac Intensive Care Unit), NSICU (Neurosurgical Intensive Care Unit), BSICU (Burn Special Intensive Care Unit), ER, and PACU (Post-anesthesia Care Unit).

**Results:** Bacterial colonization, in 70 separate cultures obtained over six weeks, occurred on 57 (81%) of the cuffs. Bacterial colonization was found on 100% of the cuffs obtained from OR, PACU, BSICU, and the ER. Ninety percent of cuffs obtained from SICU and 80% of cuffs from MICU were colonized. Cuffs from NSICU and CICU demonstrated no growth.

Organic and inorganic contamination was found on 32 (45.7%) of the presumed “clean” cuffs. Also determined from this study was that the patient contact side of the cuff was found to be twice as contaminated as the nonpatient side.

**Conclusions:** Frequent bacterial colonization and significant contamination of organic and inorganic materials do occur on presumed “clean” blood pressure cuffs.

Flora found on these cuffs may have the potential to produce opportunistic infection when introduced to critically ill patients who are susceptible to disease.

Education and infection control practices amongst healthcare providers may decrease morbidity, mortality and unnecessary healthcare costs.

(JAANA, 1996 April 64 (2):141-145).

# THE MICROBIAL FLORA OF IN-USE BLOOD PRESSURE CUFFS

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

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**Introduction:** Although not traditionally identified as a source for nosocomial infection, blood pressure cuffs can be an environmental source.

**Study:** A study was conducted to determine the microbial contamination on blood pressure cuffs that were used in both operating and recovery rooms.

**Results:** The results showed 68 different microorganisms were isolated from 42 samples and out of that sample, 71% were Staphylococci.

One microorganism of concern was *Staphylococcus aureus*, which is resistant to methicillin, gentamycin and erythromycin. There was no patient known to have that pathogen so it can be assumed that it had been in the operating room prior to the study. This indicates that *Staphylococcus aureus* survived over time on the cuff, making the blood pressure cuff a vehicle of infection. This study also identified blood pressure cuffs attached to resuscitation equipment as another source of contamination.

**Conclusion:** Patients and healthcare workers need to be aware of potential cross-contamination from environmental items used in hospitals, specifically blood pressure cuffs.

# INTERIM RECOMMENDATIONS FROM THE CDC ON INFECTION CONTROL IN HEALTHCARE FACILITIES CARING FOR PATIENTS WITH KNOWN OR SUSPECTED AVIAN INFLUENZA

Source: Center for Disease Control and Prevention, 2004

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**Introduction:** The Avian, or bird flu (type A) is caused by the influenza viruses that occur naturally among wild birds. The avian influenza (which includes H7 and H5) can be distinguished as either “low pathogenic” or “highly pathogenic” based on genetic features, and can be distinguished between the influenza virus that infects humans. The H5N1, a highly pathogenic virus, was recently identified in both Vietnam and Thailand. This variant is deadly to domestic fowl and can be transmitted from birds to humans. To date, there is no human immunity nor is there a vaccine available.

**Discussion:** Avian influenza can be transported into the States by travelers coming or returning to the United States from locations where avian influenza is active. Although the avian influenza virus does not usually infect humans, there have been many cases of avian influenza reported. The disease can be transmitted to humans from contact with infected poultry (even eggs) or contaminated surfaces. It can also be transmitted when the virus becomes aerosolized and it contacts the mouth, nose, eyes, or, if it is inhaled into the lungs, by respiratory droplets through coughing or sneezing. It is less likely that the spread of the virus is caused by human-to-human contact. However, it is important to note that the avian influenza can survive in water up to four days at a temperature of 72 degrees Fahrenheit and for 30 days at 32 degrees Fahrenheit. It can also remain alive in manure if in a cool temperature for a minimum of three months. This is a major concern for the agricultural industries as one gram of contaminated manure can contain enough viruses to infect one million birds. The symptoms of the avian flu include eye infections, respiratory system issues, and in severe cases, death.

**Recommendations:** Healthcare personnel who care for patients who have been diagnosed with avian influenza should follow the CDC recommendations related to proper interviewing procedures. These procedures include obtaining patients’ recent travel history, respiratory hygiene and cough regimens. Additionally, healthcare workers should implement isolation precautions for patients suspect or diagnosed with avian influenza. These precautions are as follows:

1. Standard Precautions—good hand washing before and after patient contact.
2. Contact Precautions—wear gloves and gown when in contact with the patient. Use dedicated medical equipment such as stethoscopes, disposable blood pressure cuffs, disposable thermometers, etc.
3. Eye Protection—wear whenever you are three feet or closer to patient.
4. Airborne Precautions—put patient in an airborne negative air pressure isolation room. The CDC also recommends a disposable particulate respirator.
5. If patient is required to go on transport, the patient must wear a surgical mask or other measures must be taken to prevent oral secretions from being expelled.

The precautions listed above should be continued for two weeks after the onset of symptoms or until a diagnostic test comes back negative for the avian influenza virus.

Health care workers should also consider being vaccinated with the most recent human influenza vaccine, as it will provide protection against the influenza strain as well as reduce the possibility of spreading the virus between patients where genetic rearrangement could lead to a pandemic strain.

## Reference:

Interim Recommendations for Infection Control in Health Care Facilities Caring for Patients with Known or Suspected Avian Influenza (2004). Department of Health and Human Services: Centers for Disease Control and Prevention. Obtained May 15 from website: [www.cdc.gov/flu](http://www.cdc.gov/flu)

## NORWEGIAN SCABIES— DISSEMINATION OF MITES BY MEDICAL INSTRUMENTS

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**Introduction:** The use of medical instruments used on more than one patient is an important factor in spreading disease (nosocomial infection) throughout a hospital.

Norwegian scabies is a clinical variant of human infestation with *Sarcoptes scabiei*, characterized by extensive, heavily crusted lesions on the skin.

The elderly, immunosuppressed, and debilitated are most frequently affected. These persons have a high rate of infectivity, and transmission is generally by close personal contact.

**Report of a Case:** In March 1989, nursing and medical personnel complained of itching papules on various areas of their bodies. Examination and lab work revealed that patients had numerous itch mites and scybala.

With further examination it was learned that these hospitalized patients shared the same blood pressure cuff. Another patient who shared a clinical thermometer with the Norwegian scabies patient also complained of pruritic papules in the axilla.

All 26 medical personnel and 43 hospitalized patients were provided treatment with Crotamiton lotion and showed improvement within one week. All of the patients' bed linens and cloths were thoroughly cleaned and the medical instruments sterilized.

**Discussion:** Contaminated medical instruments are considered the cause of these scabies infestations. Due to widespread use of immunosuppressant drugs, it is expected that the number of Norwegian scabies cases will increase.<sup>1</sup>

(Annals of Dermatology, Vol. 2. No. 1. January 1990).

**References:** 1. Bricklin AS, Musgnug RH: Norwegian Scabies: A new complication of immunosuppressive therapy. *Curtis* 22:81-84, 1978