



Supporting Documentation
On Bacteria and Blood Pressure Cuffs

**Significant Bacterial Colonization Occurs On The Surface Of Non-Disposable
Sphygmomanometer Cuffs And Re-Used Disposable Cuffs**

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Title: SIGNIFICANT BACTERIAL COLONIZATION OCCURS ON THE SURFACE OF NON-DISPOSABLE SPHYGMOMANOMETER CUFFS AND RE-USED DISPOSABLE CUFFS:

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Introduction. This study investigated the possibility that significant bacterial contamination of re-usable, non-disposable blood pressure cuffs might occur in the operating room, P.A.C.U., and I.C.U. settings. Such contamination might be of clinical significance were the BP cuff to be located in the region of the operative site during a surgical procedure, or near a wound in the post-operative period. Colonization might be of greater significance in the case of immunosuppressed, obstetric, and orthopaedic patients undergoing total joint replacement because of the increased need for sterility. Previous studies had pointed out that blood pressure cuffs could indeed be a vector for the transmission of bacterial infections in ward and ICU settings (1,3). A comparison of the relative colonization of re-used cuffs of both permanent and disposable types used with manometers and non-invasive automatic blood pressure monitors was made with clean, disposable cuffs.

Methods. Blood pressure cuffs for study were obtained from the operating rooms and ICU settings at three institutions; a university hospital, an orthopaedic hospital, and a cancer-center hospital. Cuffs were cultured within their utilization site and were all "clean" and ready for patient use. Cultures were taken at different times of the day, so as to avoid a possible bias of cuffs being cleaned at the end of the day. Cuff cultures were coded so that microbiologic technicians were unaware of their source. Actual cultures were obtained using Rodak trypticase soy agar plates, which were directly applied to the surface of the cuffs on inner and outer surfaces, since both are potentially contaminable and thereby potentially communicable. Plates were sealed, incubated at 37 degrees, and read out at 48 and 72 hours by a chief microbiologist technician at one institution. Results included both a colony count and identification of organisms cultured. Antibiotic sensitivities were obtained on pathogenic organisms.

Results. In a data collection group of 80 separate patient-related cultures, the colonization rate was 98.7% ($p < 0.001$). In order to assess the significance of the degree of colonization, six anesthesiologist's medial upper arms were cultured directly, and significance was thus defined as a colony count greater than the mean colonization rate of the samples thus obtained, i.e. > 20 colonies/16 cm². 85% of all patient-related cultures had 'significant' bacterial colonization.

30 % of all patient related cultures (N=80) had an organism other than a coagulase negative staph. growing. All organisms were susceptible to antibiotics and none were methicillin resistant. Of assays obtained from an orthopaedic hospital (N=17), 100 % of cuffs were colonized, with significant colonization of 71%. Samples obtained at the end of an operative day, after the O.R.'s were cleaned and closed, including a wiping of cuffs, produced lower colony counts in the orthopaedic hospital, with a significant colonization of 50% (N=6). Of assays obtained from a cancer-center hospital (N=23)

with a large percentage of immunosuppressed patients, 100 % of the cuffs were colonized, with significant colonization of 80%. The most common organism cultured overall was coagulase negative staphylococci (Staph. Epi.), growing off of 79 of 80 cuffs. Thirteen cultures obtained at the cancer hospital came from disposable cuffs which were being re-used until they appeared to be dirty, and twelve of these (92%) produced significant colonization.

Highest rates of colonization were generally obtained from cuffs used in P.A.C.U.-I.C.U. settings.

The only negative significant colonizations that were consistently observed were derived from cultures of new, non-used, disposable blood pressure cuffs (N=4).

Discussion. The study showed that 'significant' bacterial colonization of blood pressure cuffs utilized in the O.R., I.C.U. and P.A.C.U. settings does occur. Cuff types surveyed included automatic and manometric types of the permanent and disposable types. Cuff materials were either nylon or plastic. Previous studies have shown that blood pressure cuffs can actually be a clinically important vector in the transmission of infection on an in-patient floor (1), and in a neonatal I.C.U. (3).

Attitudes of staff employing the cuffs, including anesthesiologists and nursing professionals were also informally surveyed, and revealed that almost none routinely cleaned cuffs between patients, and few regarded the cuff as a possible source for infection.

It is thus recommended that efforts be made to reduce bacterial contamination of blood pressure cuffs. Cuffs should be located on the contralateral limb to the operative site when at all possible. Spraying cuffs with a topical disinfectant such as chlorhexidine can reduce their bacterial load by 75% (2,4). Repeated use of a disposable cuff on different patients produces significant colonization on the cuffs, and defeats their major advantage. Only clean, non-used disposable cuffs had insignificant colonization rates in this study. Ideally, it is recommended that where applicable, a cleansed cuff, or an unused disposable cuff be dedicated to a patient upon arrival to the hospital, and that it follow the patient to the O.R., to the P.A.C.U., and to the floor. This can also be adopted in I.C.U. settings. Such a procedure has been associated with a threefold reduction in nosocomial infection rate in a I.C.U. setting (3). Further studies are underway to quantify colonization rates on patient's skin directly, pre and post-operatively following application of a re-usable blood pressure cuff in the O.R.. It is hoped that these results and safeguards might further reduce the risks and improve the care of patients in the operating room, P.A.C.U., and I.C.U. settings.

References:

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