A Pilot Study to Determine the Effectiveness of Copper in Reducing the Microbial Burden (MB) of Objects in Rooms of Intensive Care Unit (ICU) Patients

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Abstract

Objective
We conducted a pilot study to assess the ability of copper to reduce the MB associated with objects in the patient care environment.

Methods
Copperized (Cu) objects (bed rails (99.99% Cu alloy), tray tables (90% Cu alloy), monitors (95% Cu alloy), and IV poles (75-90% Cu alloy)) were placed into three randomly selected ICU rooms. These objects were sampled by the sterile wipe technique weekly for 8 weeks from 7/27/09-9/28/09 and the MB for each object and each room (sum of MB of all objects) determined as colony forming units (cfu)/100cm². The mean (m) MB was calculated for all room objects and each Cu object was compared to the mMB measured by sampling the same non-copperized (non-Cu) objects in three randomly selected control ICU rooms. The efficacy of copper was calculated as the difference in MB between the Cu and non-Cu objects and rooms.

Environmental cleaning regimens did not change over the study period. The Kruskall-Wallis Test was used to compare means.

Results

- Copper was effective in significantly reducing the total MB of all ICU rooms by 87.4% (mMB 26,927 cfu/100cm² in non-Cu rooms vs. 3,391cfu/100cm² in Cu rooms, p=0.003) [Figure 1].
- Copper was also effective in reducing the MB on 4 of the 6 objects: bed rails by 99%, mean MB 18,417 cfu/cm² vs. 240 cfu/cm², p=0.0003.
- Chair arms by 38%, mean MB 3,164 cfu/cm² vs. 1,362 cfu/cm², p=0.11.
- IV poles by 57% by 676 cfu/cm² vs. 150 cfu/cm², p=0.11.
- Copper showed no reduction in the MB on tray tables (mMB 323 cfu/cm² vs. 509 cfu/cm²) or monitors (mMB 57 cfu/cm² vs. 78 cfu/cm²) [Figure 2].
- Pharyngeal was the predominant organism isolated from each individual object whether it was Cu or non-Cu and comprised 78.7% of the mean MB of copper objects and 78.7% of non-copper objects.

Conclusions

- Patient acquisition of organisms that we recovered from ICU rooms may lead to healthcare-acquired infections resulting in substantial morbidity and mortality.
- Further study regarding the effectiveness of placing Cu objects, particularly Cu bed rails and call buttons, into patient care environments in reducing the MB as well as acquisition of epidemiologically important organisms and healthcare acquired infections is needed.

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