Why Copper Matters to a Hospital CEO?

Because it matters to my board;
It matters to my physicians;
It matters to my CFO;
and most importantly it matters to my patients!

We’re here for you when you need us.
The Goal: The Triple Aim

- Population Health
- Experience of Care
- Per Capita Cost
Grinnell Regional Medical Center

→ EMERGENCY
→ Hospital Entrance
→ Medical Arts Building
→ Parking
“Go West Young Man, Go West”

Home to Grinnell College

First Prepaid Health Plan 1921

We’re here for you when you need us.
We Are a Tweener!
Top Hospitals for Safety

America's Safest Hospitals
Is Yours on the List?

Exclusive Report

Luxury Spas You Can Afford

Decades after his Parkinson's diagnosis, the actor is grateful for his close-knit family and a new TV series!

New Ways to Fight Arthritis

Michael J. Fox

Slash Your Costs 101

Dr. Oz's Healthy-Life Handbook: Bad Habits to Break, Facts You Must Know, Tests You Need Most

Real Possibilities

Condoms Reports Get a FREE 30-Day Trial!
First, Do No Harm

To Err Is Human
Building a Safer Health System

Institute of Medicine

Crossing the Quality Chasm
A New Health System for the 21st Century

Institute of Medicine
We need to fix this!
U.S. HEALTHCARE IS ONLY EXPENSIVE WHEN YOU USE IT!

Healthcare Costs by Age


US is spending much more for older ages
First Curve to Second Curve Markets

**Volume-Based First Curve**
- Fee-for-service reimbursement
- High quality not rewarded
- No shared financial risk
- Acute inpatient hospital focus
- IT investment incentives not seen by hospital
- Stand-alone care systems can thrive
- Regulatory actions impede hospital-physician collaboration

**Value-Based Second Curve**
- Payment rewards population value: quality and efficiency
- Quality impacts reimbursement
- Partnerships with shared risk
- Increased patient severity
- IT utilization essential for population health management
- Scale increases in importance
- Realigned incentives, encouraged coordination
How medicine is killing us all: Antibiotics, superbugs and the next global pandemic

The Guardian reported:

Antibiotic-resistant bacteria with the potential to cause untreatable infections pose "a catastrophic threat" to the population, the chief medical officer for Britain warns in a report calling for urgent action worldwide.
Antibiotic Resistant Bacteria

- Shiga toxin-producing Escherichia coli
- Drug-resistant Gonorrhea
- Extensively Drug Resistant Tuberculosis
- Clostridium difficile
- Methicillin-resistant Staphylococcus aureus
- Klebsiella pneumoniae
According to the CDC, this particular class of superbug, called carbapenem-resistant Enterobacteriaceae, or CRE, has been found only in hospitals or nursing homes, rather than in the community.
Nearly All Antibiotics Are Now Obsolete

In the last 34 years, Big Pharma has only come up with two new classes of antibiotics. Both are now obsolete.
Antibiotic sales for livestock rose 16 percent between 2009 and 2012. More sub-therapeutic antibiotic is used in Iowa for livestock production, than used to treat humans in the entire USA.
Between 5% and 10% of patients admitted to hospitals in developed countries contract at least one hospital-acquired infection during their stay.*

Hospital Associated Infections (HAIs)

The cost of HAIs

- **2 Million** infections/year
- **100,000** deaths/year
- **$45 Billion** – annual cost to treat infections

- **Antibiotics** becoming less effective and new ones not being developed fast enough.

*Direct cost* of HAIs for **typical hospital** is **$8 million per year** to treat infections. *†


Hospital Associated Infections (HAIs)

HAIs add on average $43,000 to hospital charges*

<table>
<thead>
<tr>
<th>NO HAI:</th>
<th>WITH HAI:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$9,377</td>
<td>$52,096</td>
</tr>
</tbody>
</table>

Hospital Associated Infections (HAIs)

Readmissions due to HAIs won’t be reimbursed

Patients that developed clinical cultures for MRSA, VRE or C. difficile during hospital stay were 60 percent more likely to be readmitted within 30 days than patients with negative or no clinical cultures.*

Readmission Penalties

Medicare readmission penalties:
- Max Penalty, 278 Hospitals (8.3%)
- No Penalty, 1,156 Hospitals (34.3%)
- Other Penalty, 1,933 Hospitals (57.4%)

Source: Kaiser Health News analysis of CMS data

Average Hospital Readmission Penalty:
- > 0.40%
- 0.39 - 0.30%
- 0.29 - 0.20%
- 0.19 - 0.10%
- < 0.10%

3367 hospitals were evaluated, of which 71% were penalized. The average penalty was 0.28%.
Data reported by Kaiser Health News.
Hospital-Acquired Conditions

Beginning in FY 2015, adds a 1 percent penalty to hospitals in the top quartile of rates of Hospital-Acquired Conditions, resulting in reductions in payment of $1.5 billion over 10 years.
“Since both in importance and time, health precedes disease, so we ought to consider first how health may best be preserved, and then how one may best cure disease”
- Galen of Pergamon

C.170 AD
Transmission of Infectious Bacteria

Contaminated Surfaces

Infected Patients

Susceptible Patients

Hands of Healthcare workers, Family, Visitors

Goal: Break Chain of Infection
Use All Available Options

Wash Hands

Clean

Protect

Alcohol gels

Disinfect
Proposed Solutions for Clean Hospital Environments

BUSINESS CASE

• Hand Hygiene
• Chemical cleaners & disinfectants
• Extended Cleaning with Robots
  • Ultraviolet
  • Hydrogen Peroxide
• Inherently bactericidal surfaces.
Transmission of Infectious Bacteria

[CDC logo]

CLEAN HANDS SAVE LIVES
Protect patients, protect yourself

Influenza
Staphylococcus
Candida
RSV
Klebsiella
Pseudomonas
Enterococcus

Alcohol-rub or wash before and after EVERY contact.

© CDC.gov

www.cdc.gov/handhygiene
Putting Cleaning in Perspective

• Why we clean
• When we clean
• How well we clean
• What is a “safe” level of risk?
Why We Clean

Eliminate Bacteria

Lower RISK of transmission

Fewer infections

Better outcomes & lower costs
Evaluating Patient Zone Environmental Hygiene in view of evidence that transmission of many healthcare acquired pathogens is related to contamination of near patient surfaces and equipment....

...hospitals should develop programs to optimize the thoroughness of high touch surface cleaning as part of terminal room cleaning at the time of patient discharge or transfer.
Daily Cleaning

When We Clean
Terminal Cleaning

When We Clean
Even though healthcare equipment and furnishings are designed to be easily cleaned...
Bacterial Contamination

...cleaning does not kill all bacteria.

(Electron microscope photo shows live bacteria in a scratch on recently sanitized stainless steel surface)
How Well We Clean

Mean = 32%

>110,000 Objects

Dr. Carling  IL Dept. of Public Health
<table>
<thead>
<tr>
<th>Type of HRO</th>
<th>Mean % of HROs cleaned (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sink</td>
<td>79 (38–97)</td>
</tr>
<tr>
<td>Tray table</td>
<td>74 (35–90)</td>
</tr>
<tr>
<td>Toilet seat</td>
<td>71</td>
</tr>
<tr>
<td>Flush handle</td>
<td>53 (11–100)</td>
</tr>
<tr>
<td>Side rail</td>
<td>49 (12–86)</td>
</tr>
<tr>
<td>Bedside table</td>
<td></td>
</tr>
<tr>
<td>Call box</td>
<td></td>
</tr>
<tr>
<td>Chair</td>
<td>29 (0–82)</td>
</tr>
<tr>
<td>Chair handhold</td>
<td>28 (0–90)</td>
</tr>
<tr>
<td>Room light switch</td>
<td>25 (0–84)</td>
</tr>
<tr>
<td>Room door knobs</td>
<td>22 (0–73)</td>
</tr>
<tr>
<td>Bedpan cleaner</td>
<td>22 (0–79)</td>
</tr>
</tbody>
</table>

**Note.** All *P* values are <.001; CI, confidence interval.
## How Long Pathogens Survive in Hospital Environment

<table>
<thead>
<tr>
<th>Type of bacterium</th>
<th>Duration of persistence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acinetobacter</td>
<td>3 days - 5 months</td>
</tr>
<tr>
<td>Clostridium difficile (spores)</td>
<td>5 months</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>1.5 hours - 16 months</td>
</tr>
<tr>
<td>Enterococcus spp. incl VRE and VSE</td>
<td>5 days - 4 months</td>
</tr>
<tr>
<td>Norovirus</td>
<td>3 weeks</td>
</tr>
<tr>
<td>Rotovirus</td>
<td>3 months</td>
</tr>
<tr>
<td>Listeria spp.</td>
<td>1 day - months</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>6 hours - 16 months</td>
</tr>
<tr>
<td>Salmonella typhi</td>
<td>6 hours - 4 weeks</td>
</tr>
<tr>
<td>Staphylococcus aureus, incl. MRSA</td>
<td>7 days - 7 months</td>
</tr>
</tbody>
</table>

Kramer A. BMC Infectious Diseases 2006;6:130
Increased Risk from Prior Room Occupant

**Risk of Acquiring Antibiotic-Resistant Bacteria From Prior Room Occupants**

We found a **40% increased** odds of **transmission of MRSA and VRE** attributable to the carrier status of **prior room occupants**, strongly suggesting a role for environmental contamination, **despite room cleaning methods that exceeded national standards**.  

Susan S. Huang, MD, MPH; Rupak Datta, BS; Richard Platt, MD, MS  

**Environmental cleaning intervention and risk of acquiring multidrug-resistant organisms from prior room occupants.**


**Datta R1, Platt R, Yokoe DS, Huang SS**

**Admission to intensive care unit** rooms previously **occupied by carriers** of methicillin-resistant Staphylococcus aureus (**MRSA**) or vancomycin-resistant enterococci (**VRE**) had been found to confer a **40% increased risk of acquisition**
Looking Clean Isn’t Enough

Visibly Clean 82 - 91%
Microbiologically Clean 30 - 45%
Free from organic soil 10 - 24%


http://infection.thelancet.com Vol8 February 2008
“Hospitals must stop ignoring the hospital environment as the source of hospital acquired infections (HAIs)”

Edmond A. Hooker, MD, DrPH, of the department of health services administration at Xavier University, Cincinnati,

“The current research fits into the growing body of evidence that the hospital environment is dirty; is not being cleaned well enough; and that this failure to clean the environment is leading to hospital-acquired infections and deaths,”
Finding a benchmark for monitoring hospital cleanliness

D. Mulvey a, P. Redding b, C. Robertson c, C. Woodall a, P. Kingsmore d, D. Bedwell d, S.J. Dancer e,*

a Blutest Laboratories Limited, Robertson Building, University of Glasgow, Glasgow, UK
b Department of Microbiology, Southern General Hospital, Glasgow, UK
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ARTICLE INFO

Article history:
Received 3 August 2010
Accepted 19 August 2010
Available online 3 December 2010

SUMMARY

This study evaluated three methods for monitoring hospital cleanliness. The aim was to find a benchmark that could indicate risk to patients from a contaminated environment. We performed visual monitoring, ATP bioluminescence and microbiological screening of five clinical surfaces before and after detergent-based cleaning on two wards over a four-week period. Five additional sites that were not featured in the routine domestic specification were also sampled. Measurements from all three methods were integrated and compared in order to choose appropriate levels for routine monitoring. We found that visual assessment did not reflect ATP
What’s the Level of Risk?

Finding a benchmark for monitoring hospital cleanliness

D. Mulvey a, P. Redding b, C. Robertson c, C. Woodall a, P. Kingsmore d, D. Bedwell d, S.J. Dancer e,*

a BluTest Laboratories Limited, Robertson Building, University of Glasgow, Glasgow, UK
b Department of Microbiology, Southern General Hospital, Glasgow, UK
c Department of Statistics & Mathematics, University of Strathclyde, Glasgow, UK
d Health Facilities Services, Crosshouse Hospital, Kilmaurs, UK
e Department of Microbiology, Hairmyres Hospital, East Kilbride, Glasgow, UK

- Food industry
- <5 CFU/cm²
- Healthcare industry recommendations:
  - Dancer: Aerobic colony count <2.5 CFU/cm²
  - Ericksson: Aerobic colony count <1 CFU/cm²
  - Lewis: Aerobic colony count <2.5 CFU/cm²

SUMMARY

This study evaluated three methods for monitoring hospital cleanliness. The aim was to find a benchmark that could indicate risk to patients from a contaminated environment. We performed visual monitoring, ATP luminescence and microbiological screening of five clinical surfaces before and after detergent-based cleaning on two wards over a four-week period. Five additional areas that were not featured in the routine domestic specification were also sampled. Measurements from all three methods were integrated and compared in order to choose appropriate levels for routine monitoring. We found that visual assessment did not reflect ATP
What’s the Level of Risk?

Figure 1  Overall cfu/cm² ± SE from frequent-touch surfaces from clinical areas with cleaning policy.

How clean is clean? Proposed methods for hospital cleaning assessment

1. A. Al-Hamad, S. Maxwell

Journal of Hospital Infection
Volume 70, Issue 4, December 2008, Pages 328–334
Current Environment of Care (EOC)

- **Hand washing**: under 50% compliance
- **Daily Cleaning**: Not thorough enough with patient in room
- **Terminal Cleaning**:
  - Not often enough (avg. every 5 days)
  - Not thorough enough >50% of time
- **Supplemental Cleaning**:
  - Not often enough (Only after terminal cleaning)
  - Additional resources (Equipment, PTE, Training)
  - Rooms out of service for 2-6 hours
- **Pathogens survive** for weeks to months!

People shed > 1 million skin cells per day. (Patients, staff, visitors...)

- **Current protocols** are not working.
  - HAI are still a problem.
  - Bacteria levels exceed accepted levels of risk
Is Built Environment a Source for Infections?
Cleaner Hospitals with Copper Alloys
“although the evidence remains suboptimal, a number of high-quality investigations now support environmental disinfection as a control strategy. And based on these data, current guidelines for pathogens such as C difficile, MRSA, VRE, and norovirus emphasize the importance of environmental disinfection as a control measure.”
Bacterial Contamination

...cleaning does not kill all bacteria.

(Electron microscope photo shows live bacteria in a scratch on recently sanitized stainless steel surface)  
Bacterial Contamination

Growing evidence* is showing that...

...copper surfaces have the ability to continually kill bacteria between scheduled cleanings!

*Source: GRMC preliminary data.
How Copper Alloys Might Help Improve EOC

- Inherent ability to kill bacteria
- EPA Registered for public health claims
- Supplement regular cleaning
- Continuously active between cleanings...24 hours a day
- After installation
  - Do not rely on active human intervention
  - No additional PTEs
  - No special training
- Proven effectiveness
EPA-Required Efficacy Testing

EPA only allows companies to make public health claims for products approved and registered by EPA

EPA requires that Antimicrobials:

• Demonstrate efficacy
• Present no harm to human health
• Present no harm to environment
• Be registered and labeled according to EPA guidelines
EPA-Required Efficacy Testing

EPA Efficacy Test 1 – Kill bacteria within 2 hours

EPA-Required Efficacy Testing

EPA Efficacy Test 2 – Permanence

Efficacy Will Not Wear Away

(It’s solid metal!)
An Evidence Based Design Approach

EPA Efficacy Test 3 – Continuous reduction

Bacteria continue to grow on stainless, while virtually all bacteria on copper has been killed.

Efficacy of Copper Alloys in Clinical Environment

*Funded by the U.S. Department of Defense under the aegis of the Telemedicine and Advanced Technologies Research Center (TATRC), a section of the Army Medical Research and Materiel Command (USAMRMC)
Efficacy of Copper Alloys in Clinical Environment

Copper Alloy Surfaces placed in ICU's
Percent of Surfaces Sampled Positive for Bacteria

- **Bed**:
  - Total bacteria: 97%
  - Total staph: 90%
  - VRE: 9%
  - GramNeg: 6%
  - MRSA: 6%

- **Call**:
  - Total bacteria: 82%
  - Total staph: 71%
  - VRE: 5%
  - GramNeg: 3%
  - MRSA: 3%

- **Chair**:
  - Total bacteria: 82%
  - Total staph: 82%
  - VRE: 4%
  - GramNeg: 3%
  - MRSA: 3%

- **Tray**:
  - Total bacteria: 62%
  - Total staph: 46%
  - VRE: 1%
  - GramNeg: 2%
  - MRSA: 2%

- **Monitor**:
  - Total bacteria: 51%
  - Total staph: 38%
  - VRE: 2%
  - GramNeg: 1%
  - MRSA: 1%

- **IV Pole**:
  - Total bacteria: 68%
  - Total staph: 48%
  - VRE: 1%
  - GramNeg: 1%
  - MRSA: 2%
Comparison of Copper to Control Surfaces*  

**Average Bacteria Count**

- **Control Surfaces**
  - Bed Rails: 13,147
  - Call Button: 6,224
  - Chair Arms: 3,327
  - Tray Table: 2,610
  - Data Input: 527
  - IV Pole: 794

Control Surfaces = 1,092 - 1,126, Phase I-III  
Copper Surfaces = 473 - 526, Phase II-III

*Control Surfaces--Plastic, wood, stainless, chrome, coatings  
2008 - 2011

Level of Risk  
250 CFU/cm²
Comparison of Copper to Control Surfaces*

Average Bacteria Count

Control Surfaces

Control Surfaces = 1,092 - 1,126, Phase I-III
Copper Surfaces = 473 - 526, Phase II-III

Level of Risk
250 CFU/cm²

*Control Surfaces--Plastic, wood, stainless, chrome, coatings

2008 - 2011
Comparison of Copper to Control Surfaces*

**Maximum** Bacteria Count

<table>
<thead>
<tr>
<th>Surface</th>
<th>Bed Rails</th>
<th>Call Button</th>
<th>Chair Arms</th>
<th>Tray Table</th>
<th>Data Input</th>
<th>IV Pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Surfaces</td>
<td>17700</td>
<td>63513</td>
<td>31800</td>
<td>24000</td>
<td>87000</td>
<td>9714</td>
</tr>
<tr>
<td>Copper Surfaces</td>
<td>1290000</td>
<td>1096019</td>
<td>258000</td>
<td>1680000</td>
<td>237143</td>
<td>90000</td>
</tr>
</tbody>
</table>

Control Surfaces = 1,092 - 1,126, Phase I-III
Copper Surfaces = 473 - 526, Phase II-III
Comparison of Copper to Control Surfaces*

Cumulative Bacteria Count

Control Surfaces

Bed Rails: 184560
Call Button: 513248
Chair Arms: 364140
Tray Table: 343410
Data Input: 123390
IV Pole: 224809

Copper Surfaces

Bed Rails: 2512314
Call Button: 1365120
Chair Arms: 469637
Tray Table: 400000
Data Input: 167932
IV Pole: 63057

Control Surfaces = 1,092 - 1,126, Phase II-III
Copper Surfaces = 473 - 526, Phase II-III

2008 - 2011
Reduction in **Median Bioload: Copper vs. Control**

(Control Surfaces--Plastic, wood, stainless, chrome, coatings)

<table>
<thead>
<tr>
<th>Surface</th>
<th>CFU/100 cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bed Rail</td>
<td>97</td>
</tr>
<tr>
<td>Chair Arms</td>
<td>92</td>
</tr>
<tr>
<td>Data Input</td>
<td>100</td>
</tr>
<tr>
<td>Avg. All Surfaces</td>
<td>100</td>
</tr>
</tbody>
</table>

**ICU Touch Surface**

96% Reduction in Median Bioload: Copper vs. Control
Correlation Between Bacteria and HAIs*

Cumulative Bacteria on the 6 high-touch Objects in Room (CFU/100 cm²)

- <500 CFU: 7%
- 501 - 2000 CFU: 9%
- 2001 - 8000 CFU: 13%
- >8000 CFU: 21%
Copper’s Impact on Infection Rates

- HAI’s
  - Control Surfaces: 91.9%
  - Copper Surfaces: 96.6%

- Colonizations
  - Control Surfaces: 96.2%
  - Copper Surfaces: 98.6%

% Reduction with Copper

- HAI's: -64%
- Colonizations: -58%
GRMC Clinical Trials

Med/Surg Unit

Preliminary Findings

Research Conducted by:

Shannon Hinsa, Ph.D.
Associate Professor
Biology Department
Chair of Biological Chemistry Major
Grinnell College
Grinnell, IA

Michael G. Schmidt Ph.D.
Director Office of Special Programs
Professor and Vice Chair
Department of Microbiology and Immunology
Medical University of South Carolina
Charleston, SC
Collaborative Effort

- Grinnell Regional Medical Center
- GRMC Fitness Center
- Grinnell College
- Medical University of S. Carolina
- Olin Brass/CuVerro
- Fabricators*

- Administrative Staff
- Med/Surg Team
- Infection Prevention
- Nursing
- Facilities Management
- Environmental Services

Fabricators Using CuVerro*
- American Standard Brands
- AmFab
- Colonial Bronze
- Eaton/Arrow Hart Division
- Elkay
- Frigo Design
- Gojo
- Grace Premier Fitness
- Herman Miller/Nemschoff
- Just Manufacturing
- Larco
- Midbrook Medical
- MR Label
- Operator Interface Technology
- Pedigo
- Rocky Mountain Hardware
- Sloan Valve
- Trimco
- TSM
GRMC Med/Surg Unit
High-Touch Surfaces

- Alcohol dispenser
- Automatic door openers
- Bedside table
- Cabinet pulls
- Door levers
- Faucets
- Flush valves
- Free weight equipment

- Grab bars
- IV poles
- Keyboards and mice
- Light switches
- Over-bed tables
- Receptacles, wall plates
- Sinks
- Soap dispensers
Clinical Findings Show Consistency: ICU & Med/Surg

Average Bacteria Count--Control Surfaces, Before intervention

- Bed rails: 13,010 CFU/100 cm²
- Call button: 6,204 CFU/100 cm²
- Chair arms: 3,304 CFU/100 cm²
- Tray table: 2,592 CFU/100 cm²
- Data input device: 5,540 CFU/100 cm²
- IV Pole: 792 CFU/100 cm²

ICU’s

- Door levers
- Pass thru levers
- Pass thru pulls
- Bedside pulls
- Grab bars
- Toilet handle
- Cart pulls
- IV Pole
- GP Sink
- Faucet lever
- Light switch
- Auto door plate
- Alcohol dispenser
- Soap dispenser
- Keyboard
- Overbed table
- Bed rail

Med/Surg

Grinnell Regional Medical Center Trials
Schmidt, MUSC
Hinsa-Leisure, Grinnell College
Reduction in **Median** Bioload

<table>
<thead>
<tr>
<th>Item</th>
<th>Median Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door levers</td>
<td>100</td>
</tr>
<tr>
<td>Pass thru levers</td>
<td>100</td>
</tr>
<tr>
<td>Pass thru pulls</td>
<td>67</td>
</tr>
<tr>
<td>Bedside pulls</td>
<td>96</td>
</tr>
<tr>
<td>Grab bars</td>
<td>97</td>
</tr>
<tr>
<td>Toilet handle</td>
<td>100</td>
</tr>
<tr>
<td>Cart pulls</td>
<td>84</td>
</tr>
<tr>
<td>IV Pole</td>
<td>100</td>
</tr>
<tr>
<td>GP Sink</td>
<td>84</td>
</tr>
<tr>
<td>Faucet lever</td>
<td>91</td>
</tr>
<tr>
<td>Light switch</td>
<td>100</td>
</tr>
<tr>
<td>Auto door plate</td>
<td>92</td>
</tr>
<tr>
<td>Alcohol dispenser</td>
<td>100</td>
</tr>
<tr>
<td>Soap dispenser</td>
<td>94</td>
</tr>
<tr>
<td>Keyboard</td>
<td>97</td>
</tr>
<tr>
<td>Overbed table</td>
<td>95</td>
</tr>
</tbody>
</table>

Median Reduction in Bacteria after copper alloy intervention

GRMC Trials
Preliminary Data
Schmidt, Hinsa-Leisure
Percent Surfaces with Zero Bacteria

- Door levers: 0%
- Pass thru levers: 7%
- Grab bars: 0%
- Toilet handle: 0%
- Cart pulls: 0%
- IV Pole: 23%
- Patient Sink: 4%
- Faucet lever: 7%
- Light switch: 15%
- Auto door plate: 18%
- Alcohol dispenser: 42%
- Soap dispenser: 5%
- Overbed table: 4%

GRMC Trials
Preliminary Data
Schmidt, Hinsa-Leisure
Comparison of the Bioload in Active Hospital Environments

- Hospital 1: 90% Reduction
- Hospital 2: 91% Reduction
- Hospital 3: 96% Reduction
- Hospital 4: 96% Reduction
- Hospital 5: 93% Reduction

**Hospital Conformity:**

- Median Microbial Burden
- Control Objects

**Bioload Reduction--Hospital Conformity**
Brass Ring for Infection Reduction

Is Eliminating Bacteria
New Standard for Infection Risk?

- **Copper**
  - High Risk (≥250 CFU/100 cm²): 21%
  - Some Risk (1-250 CFU/100 cm²): 36%
  - No Risk (0 CFU/100 cm²): 43%

- **Control Surfaces**
  - High Risk (≥250 CFU/100 cm²): 61%
  - Some Risk (1-250 CFU/100 cm²): 25%
  - No Risk (0 CFU/100 cm²): 3%

Schmidt, MG, Medical University of SC

GRMC Trials
Preliminary Data
Schmidt, Hinsa-Leisure
One of the oldest alloys protects human kind....

Could be newest ally in fight against infections....

new eldest alloys

protecting humankind....
For Improved Hospital Hygiene...

...Consider Copper Alloy Surfaces

Products made with CuVerro
PAUL W. AHRENS
FITNESS CENTER
-A Service of Grinnell Regional Medical Center-
The Effects of Copper Alloy Gym Equipment on Bacterial Counts Compared to Traditional Gym Equipment

Annika Helverson, Francesca Varias, and Nathan Zaroban

Abstract

Gyms are notorious for being bacteria-breeding grounds. Copper alloy, which is known to have antimicrobial properties, could potentially provide a solution to this problem. Copper alloy has recently been implemented in some gyms in attempts to combat the spread of bacteria. This experiment compared the amount of bacteria found on surfaces of traditional gym equipment (those made of steel, lime, or rubber grip) to those made with solid copper alloy. In every instance tested, copper alloy surfaces had significantly lower bacterial counts than analogous traditional gym equipment.

Introduction

Background:
- The gym environment fosters the growth of bacteria. A lot of perspiration occurs in a gym and it is difficult to make sure members follow the proper cleaning protocol. One using an antimicrobial agent on copper alloy (Grass et al. 2011). Hospital equipment finished with copper alloy was shown to have reduced bacterial counts (Kaneshiro et al. 2013).

Our Experiment:
- We examined the difference in bacterial counts from copper alloy gym equipment and traditional gym equipment. The copper alloy samples were gathered at the Grinnell Regional Medical Center gym. The traditional equipment samples were gathered from the Charles Benson Field Athletic Facility.

Hypothesis:
- Solid copper alloy equipment will have significantly lower bacterial counts than traditional equipment due to copper alloy's antimicrobial properties.

Methods

In lab, PBS/0.1 solution is added to sterile swabbing cloths, which are then placed in sterile conical tubes.

In gym, using a sterile glove, the sterile cloths are swabbed over a specific area on the copper and traditional equipment. Swabs are then transferred to the conical tube.

Back in lab, six mL of PBS/0.1 is added to the swabs in the conical tubes. The tubes are vortexed for one minute each.

10^6 and 10^7 dilution sets of the bacterial solutions are prepared and plated on TSA-5% sheep's blood agar plates. The plates are incubated 48 hours, and the CFUs are counted.

Results

- Compared CFU/100 cm^2 of bacteria on copper surfaces to traditional surfaces.
- Equivalent equipment was compared (15 lb copper dumbbells to 15 lb traditional dumbbells).
- Tests show that the difference in CFU/100 cm^2 of copper alloy and traditional surfaces is statistically significant in each type of equipment.
- Average difference in bacterial numbers between traditional and copper alloy equipment was 95%.

Discussion and Conclusion

- While statistically significant data suggest that the antimicrobial properties of copper alloy are effective, the difference in usage at the two gyms is to be considered.
- It is estimated that the GRMC gym is used by 100–200 people daily while the Bear sees 400–500 people daily.

Future Directions

- Studying how copper alloy influences the bacteria that colonize on human skin (Matthes et al. 2013)
- Comparing gyms with equal daily usage
- The effects of copper alloy surfaces on copper resistant strains is and found that the copper alloy was still able to prevent the growth of the bacteria (Zhu et al. 2012)
- Testing copper alloy as a control against viruses (Tang et al. 2013)

Conclusions:
- Copper alloy is an effective way to significantly reduce the amount of bacteria found on surfaces.
- Implementing solid copper alloy surfaces could reduce outbreaks and illnesses.

Acknowledgements

We would like to thank Shannon Hinsa for her guidance and help throughout the whole project as well as Radkal Van Court and Ashley Millen for their assistance in the lab. We are grateful to Kathy Miller and her students in the stock room for all of the materials they prepared. We would also like to thank Jason Martinez and the staff of the Grinnell gym center for allowing us to take samples in their gyms.

References

The Goal: The Triple Aim

- Population Health
- Experience of Care
- Per Capita Cost