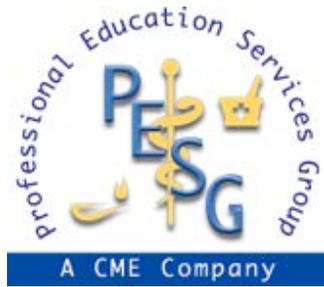


# **Controlling Transmission of Bacteria on Healthcare Identification Badges for HCWs, Visitor and Patients**

Lisa Marie Holmes

Patent Holder



# Disclosures

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# Disclosures

Lisa Holmes

Patent Holder, U.S. Patent No. 7,851,517

# Learning Objectives

At the conclusion of this activity, the participant will be able to:

1. Identify transmission of diseases via contaminated devices worn by Healthcare Workers (HCWs)
2. Discuss implications of wearing contaminated devices worn by Healthcare Workers (HCWs)
3. Educate on methods of eliminating bacteria and pathogens on contaminated devices
4. Recognize hidden forms of HAIs in the healthcare environment

# Abstract

## **Controlling Transmission of Bacteria on *Healthcare* Identification Badges for HCWs, Visitor and Patients**

Healthcare-associated infections (HAIs) are one of the top ten leading causes of death in the United States.(1) The use of standard precautions and proper hand hygiene techniques should minimize the spread of infectious diseases in most cases.(2,3)

Potential transmission of diseases via contaminated devices are often overlooked, not considered in routine cleaning schedules, but should be. Healthcare Workers (HCWs), visitor and patients identification badges have been shown to carry bacteria which can cause disease, including MRSA.

Two studies to assess microbial contamination of identification badges have been conducted.(4,5) Identity badges worn by HCWs had a presence of pathogenic bacteria, which could be transmitted to patients.(5) Badges worn around the neck had similar contamination rates when compared with those clipped to clothing. Badges that had been cleaned in the preceding week were contaminated. Badges should be frequently cleaned (2-3 times a day) throughout shifts with alcohol swabs.(4)

# Abstract

In 2010, an inventor identified the employee badge as a means of cross-contamination while on a site visit to a Veterans Affairs hospital in 2006 and patented the process of manufacturing an antimicrobial badge to inhibit and discourage the growth of HAI's on HCW badges.(6) Antimicrobial agents are added to plastic during manufacture of the badge to inhibit bacteria regeneration such as E. Coli and Staph. The effect long-lasting with no adverse reactions to anyone interacting with antimicrobial surface.

# References

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1. Centers for Disease Control and Prevention. Healthcare-Associated Infections (HAIs). Available at <http://www.cdc.gov/ncidod/dhqp/healthDis.html>. Accessed October 13, 2008.
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# Identification and Cash Substitution Instruments = Fomites

According to Llewelyn Grant of the Centers for Disease Control, "Any surface could contribute to the passing of the virus, which typically will live up to six to eight hours after contact has been made."

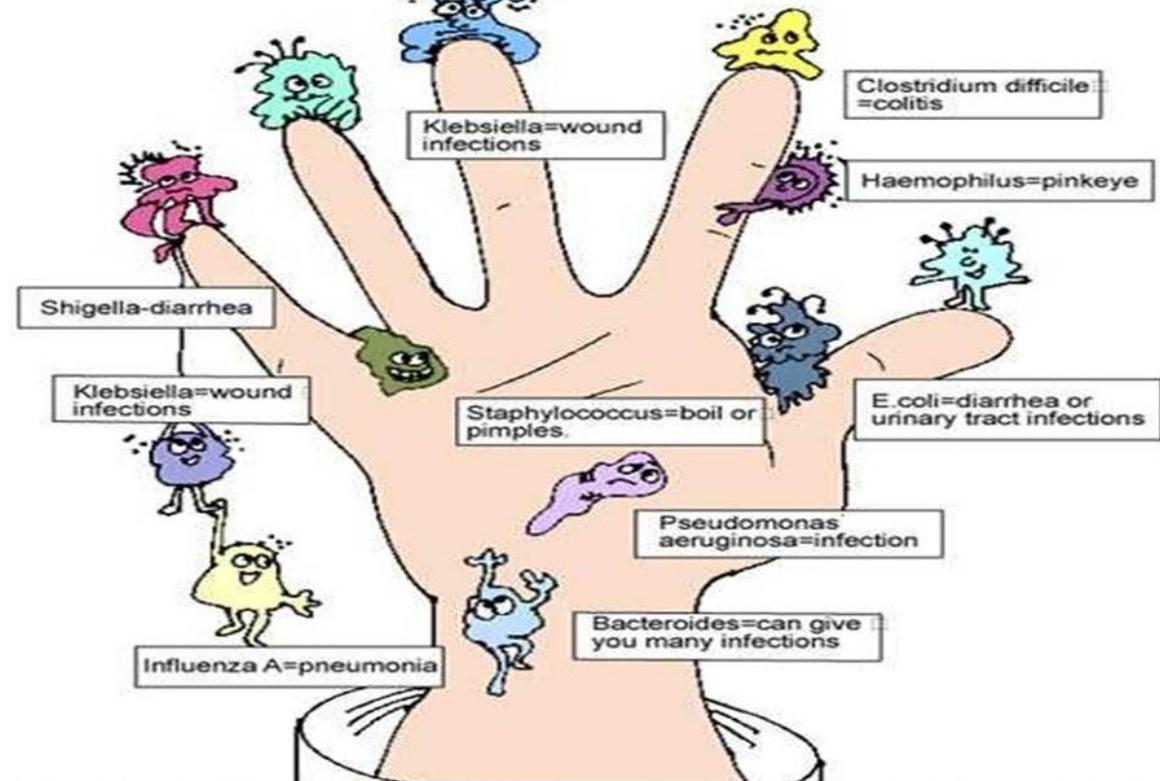
Some of the hardiest germs can successfully reproduce on **plastic** surfaces for weeks. Studies done in 2000 and 2001 showed that a few antibiotic-resistant germs could survive on plastic surfaces for three full months.

The badge holder cannot control behaviors of those they or their badges may interact with, and typically no control over the surfaces that the germ lands on. In our busy workday, there are times where we simply cannot wash our badge after we encounter viruses or the surfaces they land upon. Cleaning your badge and the surfaces it touches regularly with alcohol may not be something we remember to do, or have time to do.

# Hand Hygiene and HAIs

Healthcare-associated infections (HAIs) are one of the top ten leading causes of death in the United States.(1) The use of standard precautions and proper hand hygiene techniques should minimize the spread of infectious diseases in most cases.(2,3)

## What germs are on our hands ??



# Transmission of disease via contaminated devices

Potential transmission of diseases via contaminated devices are often overlooked, not considered in routine cleaning schedules, but should be. Healthcare Workers (HWCs), visitor and patients identification badges have been shown to carry bacteria which can cause disease, including MRSA.



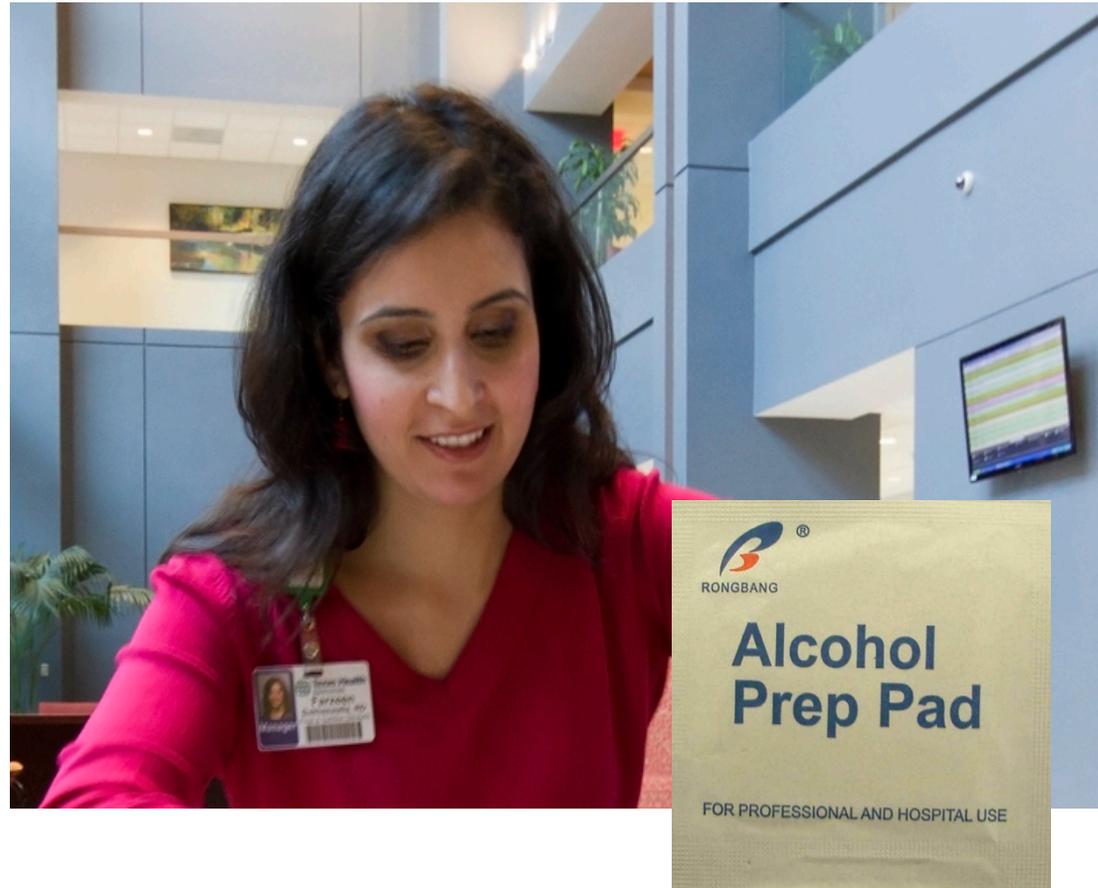
# Recognize hidden forms of HAIs in the healthcare environment

Two studies to assess microbial contamination of identification badges have been conducted.(4,5) Identity badges worn by HCWs had a presence of pathogenic bacteria, which could be transmitted to patients.(5) Badges worn around the neck had similar contamination rates when compared with those clipped to clothing. Badges that had been cleaned in the preceding week were contaminated.



# Eliminating bacteria and pathogens on badges

Today's Answer: Badges should be frequently cleaned (2-3 times a day) throughout shifts with alcohol swabs.(4)



# Eliminating bacteria and pathogens on badges

Promising Tomorrows...

In 2010, an inventor identified the employee badge as a means of cross-contamination while on a site visit to a Veterans Affairs hospital in 2006 and patented the process of manufacturing an antimicrobial badge to inhibit and discourage the growth of HAI's on HCW badges. (6)



# Eliminating bacteria and pathogens on badges

How it would work:

Antimicrobial agents are added to plastic during manufacture of the badge/card to inhibit bacteria regeneration such as E. Coli and Staph. The effect long-lasting with no adverse reactions to anyone interacting with antimicrobial surface.

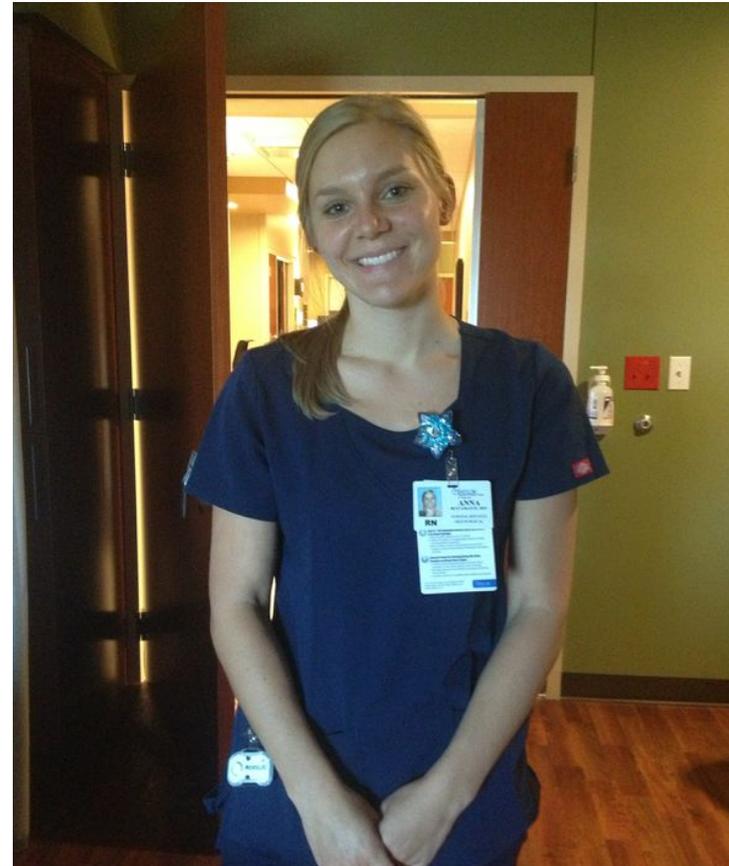


## Discussion & Footnotes

Let me guide you thru some of the footnotes, supporting studies and then we can have an open discussion.

## (1) Centers for Disease Control and Prevention. Healthcare-Associated Infections (HAIs).

In the United States, hospital patients get nearly 2 million infections each year. That's about 1 infection for every 20 patients. Infections that patients get in the hospital can be life-threatening and hard to treat. (99,000 deaths annually) The added financial burden attributable to HAIs is estimated to be between \$28 billion to \$33 billion each year.



Meet Anna, she works at Baylor Grapevine and was my mother's nurse in Sept 2013. Mom was in Room 1308 and came in with a leg fracture, but ended up with pneumonia after a week in the hospital.

## (2) Centers for Disease Control and Prevention. Healthcare-Associated Infections (HAIs).



MRSA is primarily spread through direct and indirect contact with infected or colonized patients. Poor adherence to standard infection control precautions (e.g. hand hygiene) can lead to transmission between patients and to clusters of infections. Adherence to infection control measures is critical to preventing MRSA outbreaks.

## (2) Centers for Disease Control and Prevention. Healthcare-Associated Infections (HAIs).

MRSA is primarily spread through direct and indirect contact with infected or colonized patients. Poor adherence to standard infection control precautions (e.g. hand hygiene) can lead to transmission between patients and to clusters of infections. Adherence to infection control measures is critical to preventing MRSA outbreaks.



## (4) Two studies to assess microbial contamination of identification badges

To determine whether identity badges and lanyards worn by health care workers (HCWs) are capable of harboring potentially pathogenic bacteria.

### DESIGN, SETTING AND PARTICIPANTS:

Cross-sectional study of 71 HCWs (59 clinical ward staff and 12 infection control staff) at Monash Medical Centre, a university teaching hospital. Samples from lanyards, identity badge surfaces and connections (eg, clips, keys, pens) were cultured. The study was conducted from July to August 2006.

### MAIN OUTCOME MEASURES:

Presence of pathogenic bacteria on identity badges and lanyards; differences in bacterial counts on items carried by nurses and doctors.

### RESULTS:

A total of 27 lanyards were identified with pathogenic bacteria, compared with 18 badges. Analyzing lanyards and badges as a combined group, seven had methicillin-resistant *Staphylococcus aureus*, 29 had methicillin-sensitive *S. aureus* (MSSA), four had *Enterococcus* spp and five had aerobic gram-negative bacilli. There were no significant differences between nurses and doctors in total median bacterial counts on items carried, but doctors had 4.41 times the risk of carrying MSSA on lanyards (95% CI, 1.14-13.75).

### CONCLUSION:

Identity badges and lanyards worn by HCWs may be contaminated with pathogenic bacteria, which could be transmitted to patients. In view of this finding we suggest appropriate infection control interventions.

**What's hanging around your neck? Pathogenic bacteria on identity badges and lanyards.**

**Source** Department of Infectious Diseases, Southern Health - Monash Medical Centre, Melbourne, VIC, Australia | [Kotsanas D](#), [Scott C](#), [Gillespie EE](#), [Korman TM](#), [Stuart RL](#).



**Monash Medical Centre**  
Melbourne, Victoria, Australia

# (5) Badges worn around the neck had similar contamination rates when compared with those clipped to clothing.

## Identification badges: a potential fomite?

[Ota K](#), [Profiti R](#), [Smaill F](#), [Matlow AG](#), [Smieja M](#).

Source Department of Pediatrics, McMaster University, Hamilton.

## Abstract

### BACKGROUND:

Staff identification badges are mandatory in all hospitals. The purpose of this study was to assess microbial contamination of identification badges at a Canadian tertiary centre. Risk factors for badge contamination were also investigated.

### METHODS:

Badges were cultured from 118 subjects including secretaries, physicians, nurses, and allied health workers. Subjects also completed a demographic questionnaire. Badge contamination was analyzed according to profession, workplace, duration of badge use, presence of a plastic cover, how the badge was worn, and cleaning frequency.

### RESULTS:

13.6% of the badges were contaminated with significant pathogens. *S. aureus* was isolated in 6.8% of the badges, gram-negative bacilli in 5.9%. Contamination was highest in nurses (21.4% versus 9.4-14.3% in other professions) and in the ICU (22.6% versus 8.3%-14.3% at other locations). Neither association was statistically significant.

### **Covered and non-covered badges had similar contamination rates (12% and 17.1%) as did badges worn around the neck compared with those worn clipped to clothing**

(13.0% versus 14.6%). Contamination of recently cleaned badges was not statistically different from those that had not.

**CONCLUSION:** Identification badges do not appear to be a major reservoir for pathogenic organisms. **Badges can, however, harbour disease-causing organisms and should be cleaned regularly.**



**McMaster University**  
Hamilton, ON Canada

## Other studies of interest

**St. Petersburg College, Florida** (June 2012): 50% of all credit cards sampled at local malls, stores and hospitals tested positive for methicillin-resistant *Staphylococcus aureus*, better known as MRSA. Shannon McQuaig, Ph.D., Associate Professor, Department of Natural Sciences St. Petersburg College

**The London School of Hygiene & Tropical Medicine and Queen Mary, University of London** (Sept 2012): Study found that 78 per cent of credit cards had traces of bacteria like rhinovirus. Dr Ron Cutler, who led the research at Queen Mary, said: “Our analysis revealed that by handling cards and money each day we are coming into contact with some potential pathogens revealing faecal contamination including *E. coli* and *Staphylococci*. People may tell us they wash their hands but the research shows us different, and highlights just how easily transferable these pathogens - surviving on our money and cards.”



# New Study Freeman Hospital, United Kingdom (2012)



## **Freeman Hospital**

High Heaton, Newcastle upon Tyne,  
United Kingdom

Pathogenic Colonization of hospital  
badges and neck lanyards in the  
theatre environment Freeman New  
Study Hospital, Newcastle upon  
Tyne, UK (2012)



# Pathogenic Colonisation of hospital badges and neck lanyards in the theatre environment



## Background

- Healthcare associated infections (HCAI) cause considerable morbidity and mortality<sup>(3)</sup>
- Mandatory identification badges and neck lanyards (B&L) are handled numerous times a day and are rarely cleaned
- Contact between B&L, hands and patients poses a potential HCAI transmission risk<sup>(2,3)</sup>
- Two studies have examined colonisation of B&L in healthcare workers but none within the theatre environment.
- Pathogens were identified in 14-25% of badges and 14-38% lanyards<sup>(4,5)</sup>

### Evaluation aims:

- To quantify pathogenic colonisation of B&L within the theatre environment and determine whether B&L pose an infection risk to surgical patients<sup>(Box A)</sup>
- To evaluate the efficacy of a simple cleaning intervention using Clinell Universal Wipes™ on B&L colonisation

## Methods

- Point prevalence surveillance of B&L was performed on healthcare staff working in theatres, Freeman Hospital Newcastle upon Tyne NHS Trust, UK, May 2011.
- Ethical approval was not required as National Research Ethics Service (NRES) deemed the study a 'service evaluation'

### Phase 1:

- All samples were collected by the same operative
- Gloves were changed between each B&L
- The entire surface of the B&L was swabbed using a Polywipe (Medical Wire & Equipment) and placed immediately into a sterile bag labelled with the source of origin
- Each polywipe was then inoculated onto a standard set of media and any resultant growth identified by MALDI-TOF spectroscopy.

### Phase 2:

- Any B&L colonised with HCAI organisms were recalled and resampled
- Swabs were taken prior to cleaning intervention
- Each B&L was cleaned with a Clinell Universal Sanitising Wipe (Gama Healthcare) for 30-60 seconds<sup>(7)</sup>
- Swabs were then taken after the B&L had dried and re-analysed to assess decontamination efficacy

## Results

### Phase 1:

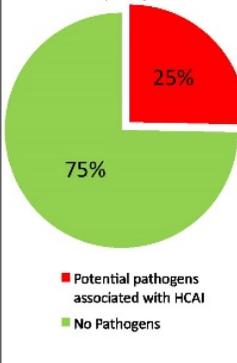
- 25.3% (21/83) B&L were colonised with pathogens associated with HCAI. (Figure 1/ Table 1)
- 93% of B&L grew normal skin flora, 8% were no growth
- 75% of control B&L contained normal flora. No pathogens were identified on controls. (Box B)
- Potential pathogens were identified from 25% B&L combined samples compared to 8.3% of badges sampled alone.

**Table 1: Potential pathogens identified on B&L associated with HCAI**

Organism	No.
Methicillin Resistant Staphylococcus Aureus (MRSA)	1
Acinetobacter species	8
Non-lactose fermenting coliform	1
Pseudomonas species	5
Alpha-haemolytic streptococcus	1
Pseudomonas species & Non-lactose Fermenting-coliform	1
Pseudomonas species & Aspergillus fumigatus	1
Methicillin Sensitive Staphylococcus Aureus (MSSA)	1
Roseomonas species	1
Pantoea species	1
Total:	21

Other: Klebsiella was identified during phase 2

Figure 1: Bacterial colonisation of B&L in theatre environment (n=83)



### Phase 2:

- 11/21 B&L colonised with potential pathogens were followed up 1 month later. No B&L on pre-swab cultures contained the same organism as originally identified in phase 1. Three B&L grew different pathogens and 8 had no organisms
- All pathogens on B&L including control samples (MSSA, Acinetobacter, Klebsiella) were destroyed following Clinell intervention, with an average reduction of 72% in colony forming units (cfu)<sup>(Figure 2 and 3)</sup>

(Additional note: pseudomonas was destroyed by Clinell Universal wipes in a separate analysis of keyboards conducted by our team, not presented here).

### Box A: All micro-organisms have the potential to cause infection. To differentiate between microbes found in normal flora and potential pathogens associated with HCAI 'pathogens' defined as:

MSSA, MRSA, C.difficile, Acinetobacter, Klebsiella, Pseudomonas, E.coli, Proteus, Enterococcus and Candida

### Box B: Controls:

Phase 1: 2x unused Badges and 2x unused Lanyards swabbed for background contamination. Phase 2: 2x unused B&L were inoculated with S.aureus (NCTC 8530). B&L was swabbed and then cleaned with Clinell to assess effectiveness.

Dr Steven Lobaz<sup>1</sup>, Dr Raman Diddie<sup>2</sup>, Jennifer Collins<sup>3</sup>, Deborah White<sup>4</sup>  
ST5 Anaesthetist<sup>1</sup>, Consultant Anaesthetist<sup>2</sup>, Healthcare Scientist, Trainee Biomedical Scientist<sup>4</sup>  
Departments of Anaesthesia and Microbiology Freeman Hospital, Newcastle upon Tyne

Figure 2: Percentage reduction in pathogens (cfu) on B&L following Clinell intervention (n=3)

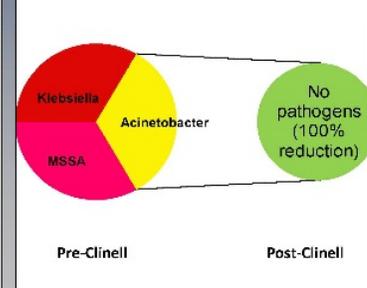
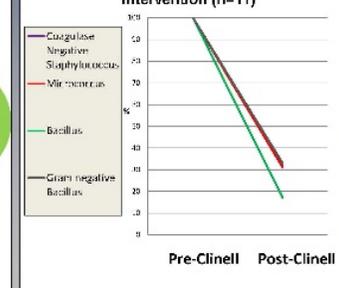


Figure 3: Percentage reduction in normal flora (cfu) on B&L following Clinell intervention (n=11)



With thanks to Gama Healthcare for sponsoring this poster

## Discussion

- 25% of B&L worn by staff in theatres were colonised with potentially pathogenic organisms
- Several species that can cause HCAI were identified: MRSA, Klebsiella Acinetobacter, Pseudomonas
- All pose a transmission risk to surgical patients
- B&L were found to contain 3x more pathogens than badges alone
- Like hands, B&L are a potential reservoir for pathogens and are an important 'touch site'.<sup>(6)</sup>
- Pathogens found on B&L can live on plastic and fabric for a number of months and remain a continuous source of transmission if no regular surface disinfection is undertaken<sup>(1,2,9)</sup>
- Plastic adherent organisms are more resistant to ethanol based cleaning methods<sup>(10)</sup>
- None of the B&L which had previously contained pathogens in phase one, contained the same organisms in phase 2
- B&L like hands, may be subject to a transient ever-changing colonisation dependent on contact
- Following Clinell use: all pathogens re-identified in phase 2 were destroyed with an average 72% reduction in CFU. Our findings support the data produced by GAMA healthcare that Clinell Universal Wipes are an effective killing intervention against pathogens associated with HCAI and in reducing overall microbiological burden<sup>(7)</sup>

### Recommendations

- Continued good hand hygiene practice and daily cleaning of B&L with Clinell Universal wipes
- B&L should be removed when undertaking any clinical examination/procedure/transfer to avoid patient contact

### References:

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# Biologists' study: Cleaning the HCW badge

“Security swipe cards & scanners are potential reservoir for hospital acquired infection” presented by Hibah Abusulaiman, a diagnostic bacteriologist at the College of Applied Medical Science, University of Umm al-Qura Microbiology Department located in Mecca, Saudi Arabia on Dec 3, 2011.

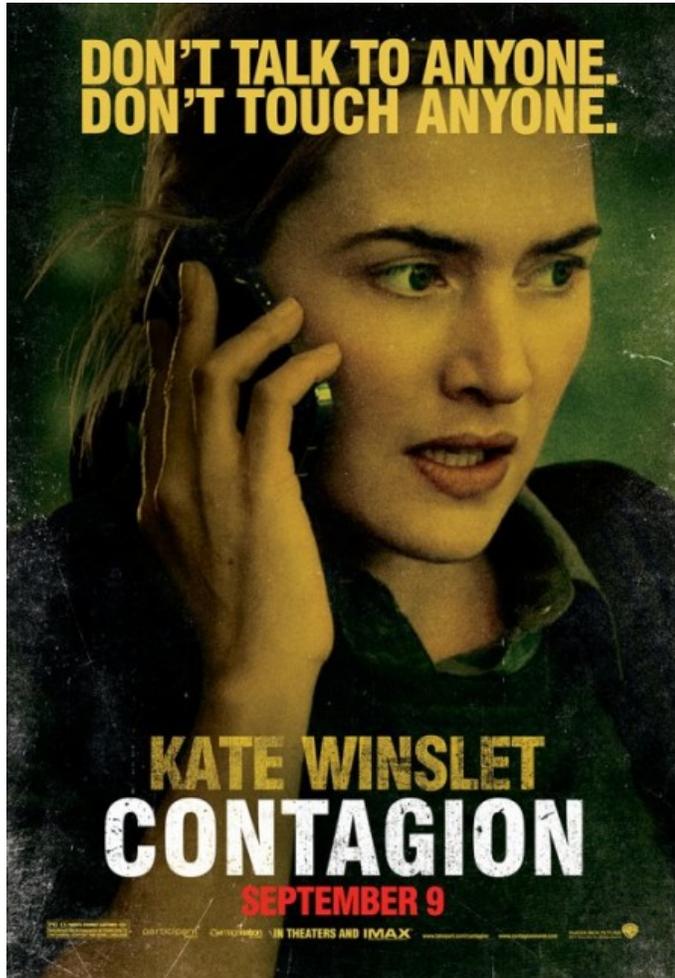
Bacteria with significant pathogenic potential were isolated from 20.5% of the badges/cards

Conclusions: Cleaning the card / badge with alcohol in a controlled fashion effectively removes all bacteria from the surface.

Or make the card out of antimicrobial plastic



# Public Awareness - Contagion (Warner Bros.)



A Movie called “Contagion” (Warner Bros.) is the story of a fictional virus reaches humans through a series of animal encounters: a bat eats some fruit then drops it in a pig pen, the pig eats it, then is butchered and handled by a chef who comes in contact with Gwyneth Paltrow.

# Future Solutions

They are not manufactured today, but the patent has been issued for cards/badges that will inhibit the growth and transmission of germs, viruses and dangerous pathogens that thrive on the surfaces of intensely circulated products using antimicrobial plastic.

How it works: Antimicrobial master batches are available for just about any type of extruded plastic. The antimicrobial master batch is added to the plastic in the molding process or embedded in the thin layer of PVC film on top of the surface.

Antimicrobial plastic compounds are directly incorporated into the thermoplastic materials during the time of molding, it makes it impossible for allergens, bacteria, molds, and mildew to survive on the surface, yet these compounds have no known effect on humans. Antimicrobial properties are embodied within the plastic itself, or just applied to the card, so that the antimicrobial benefits will last through the life of the card.



# Bio of the Presenter: Lisa Holmes

Lisa Holmes has worked for 35 years within the government and commercial healthcare sector. Daily interactions with government healthcare policy setters and clinical staff empowered her with a laser focus on patient safety and infection control. While on a site visit to a Veterans Affairs Medical Center over 6 years ago, she observed a caregiver bending over a wheelchair bound veteran. The caregiver touched the patient with her government ID badge, then turned and touched another patient with the same badge. Lisa realized that the transfer of microbes, viruses and other sources of contamination via plastic cards had been overlooked. She knew cross-contamination could be controlled and limited by making the card with antimicrobial infused plastic, and set about to shape the way we interact with cards and badges.

- Contact: Lisa Holmes
- Tel: 817.680.1220
- Email: facebook1962@gmail.com



# Discussion

Questions?

# Obtaining CME/CE Credit

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<http://amsus.cds.pesgce.com>