



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---

• Healthcare-Associated Infection Deaths = One Full Jumbo Jet Crashing Every Day



---

---

---

---

---

---

---

---

## Beware the Invasion

- "Infections acquired during hospital stays {in the U.S.} kill more people than breast cancer, auto accidents and AIDS combined."

Dan Childs, ABC News, Medical Unit

---

---

---

---

---

---

---

---

## Know Your Enemy

### INVADER

- *Methicillin-resistant staphylococcus aureus (MRSA)*
- *Staphylococcus pneumoniae*
- *Eschericia coli*
- *Pseudomonas aeruginosa*
- *Enterobacter aerogenes*
- *Influenza-A*

### MISSION

- Skin infection, necrotizing fasciitis
- Respiratory infection
- Gastrointestinal sickness
- Tract, blood, and skin infection
- Tract, blood, and skin infection
- The flu

---

---

---

---

---

---

---

---

## Beware the Invasion

- It takes only 10 to 50 organisms to cause an infection in humans
- Microbes, or "bugs," have become more resistant to traditional modes of management
- Such microbes have the capacity to significantly impact individual athletes as well as disrupt entire programs at all levels of sport

---

---

---

---

---

---

---

---

### If an Athlete Contracts an Infection...

- Cannot compete until symptoms disappear
  - Until treated and rendered noninfectious
- \$\$\$

---

---

---

---

---

---

---

---

### Transmission Is Relatively Easy

- 80% of infectious diseases are transmitted by touch
- 28% of all surfaces in gyms/rec centers test positive for pathogens
- Authors of a recent literature review (Turbeville et al., 2006) investigating outbreaks of infectious diseases in competitive sports from 1922 through 2005 reported that more than half (56%) of all infectious diseases occurred by touch

---

---

---

---

---

---

---

---

### Transmission Is Relatively Easy

- A handshake
- A cough or sneeze
- A fomite
  - Doorknobs
  - Toilet paper holders
  - Towel bars
  - Locker room bench
  - Cell phones
  - Keyboards
  - EXERCISE EQUIPMENT

---

---

---

---

---

---

---

---

## Horrible Hygiene

- “Rhinotillexomania”-- nose picking
  - Disturbing: 91% of people pick their nose (Andrade et al., 2001)
  - On average of 4 times per day (Jefferson et al., 1995)
- Restroom hand washing (Harris Interactive, 2005)
  - 20% do not wash
    - 25% men do not
    - 10% women do not

---

---

---

---

---

---

---

---

## Germs in Gyms

- In one industry-sponsored study, the most contaminated surfaces tested in a gym were found to be
  - Interior entrance door handles
  - Shower floor
  - Incline bench headrest
  - Dumbbells



---

---

---

---

---

---

---

---

## Adaptable Bugs

- Once viewed as a panacea, or “magic bullet,” we now recognize this about antibiotics
  - Within one year of the first clinical use of penicillin, penicillin-resistant infections were reported
  - Within 10 years, penicillin resistance was commonplace in the US
  - For *Staph pneumoniae*, nearly a 100-fold higher penicillin concentration is required than just 40 years ago
  - It took 2500 years from the time of Hippocrates to discover antibiotics, but it took microbes a matter of years to outsmart our antibiotics

Spellberg, 2009

---

---

---

---

---

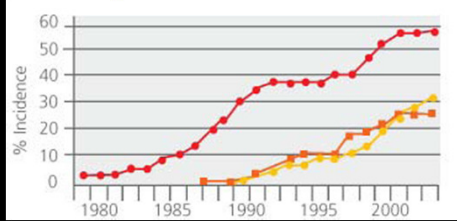
---

---

---

### Adaptable Bugs

- Despite more rigid standards in hand washing and cleaning, infection rates continue to climb



MRSA –MethicillinResistant Staphylococcus Aureus

VRE –VancomycinResistant Enterococcus

FQRP –FluoroquinoloneResistant

Pseudomonas Aeruginosa

Source: Infectious Diseases Society of America, as derived from data collected by the Centers for Disease Control and Prevention

---

---

---

---

---

---

---

---

### An Ideal Breeding Ground

- Bacteria have three requirements for reproduction
  - Moisture
  - Nutrients
  - Varying degrees of oxygen

---

---

---

---

---

---

---

---

### An Ideal Breeding Ground

- Knurling and upholstery provide a perfect stew
  - Sloughed-off skin cells
  - Sweat (moisture)
  - And, crevices that protect from UV light and chemical agents

---

---

---

---

---

---

---

---

### Bacteria Hide in the Tiniest Places



---

---

---

---

---

---

---

---

### Athletes Are *More* Susceptible

- Despite being young and robust, athletes may be especially susceptible to spread of infection
  - Close contact
  - Moist environments and clothing/equipment
  - Shared equipment
  - Skin abrasions
  - Generally poor hygiene
  - Sleep deprivation among college students

---

---

---

---

---

---

---

---

### Athlete Infection Rate

- The MRSA infection rate of football players has been shown to be **16 times greater** than the national average

Texas Dept. of Health, accessed April 11, 2011

---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---

Training Solutions: Relevance of Overtraining

- Affects an estimated 10-20% of athletes
- Overtraining may increase susceptibility to infection, especially upper respiratory
- Adequate rest /sleep enhances natural killer cells

---

---

---

---

---

---

---

---

### Dietary Solutions

- Vitamin C
  - 15% college students are deficient
  - Needed to form collagen and therefore skin
- Protein
  - Used to rebuild damaged tissue
- Glutamine
  - Amino acid used as primary energy source for white blood cells
- Avoid rapid weight loss or extremely hypocaloric diets
- Water
  - Do NOT share water bottles
- Honey
  - Mild hydrogen peroxide activity when *applied* to a wound (*not eaten*)

---

---

---

---

---

---

---

---

### Hand and Body Hygiene

- Coaches, athletes, and healthcare providers should all wash hands regularly
- Hands should be washed after blowing the nose or sneezing into the hands (MRSA is increasingly found in nasal secretions)
- Liquid anti-bacterial soap should be provided at all sinks and showers
- Athletes should shower after every practice and dry off thoroughly with a fresh towel
- Put on clean clothes
- Note that hand sanitizers are an adjunct to—not a replacement for—hand washing (CDC)

NATA Position Statement, 2010

---

---

---

---

---

---

---

---

### A Hand Wash How-To

1. If needed, dispense paper towel
2. Wet hands
3. Apply antibacterial soap
4. Scrub between fingers and backs of hands for at least 15 seconds
5. Rinse and dry with disposable paper towel

NATA Position Statement, 2010

---

---

---

---

---

---

---

---



## Equipment Cleaning

- EPA-approved cleaning agents
  - Hospital broad-spectrum disinfectant (HSD)
  - Bactericidal, fungicidal, virucidal efficacy
- Policy and procedures manual re: frequency, type of cleaner, duration of penetration, etc., *and* consequences of not following policy.
- Cleaner and/or wipes should be readily available for both staff and athletes
- Gear and uniforms should be washed *daily*

NATA Position Statement, 2010

---

---

---

---

---

---

---

---

## Limitation

- Note that all measures of cleaning are temporary

---

---

---

---

---

---

---

---

## Touch Surfaces

- Touch point = dirty
- Despite widespread use, stainless steel scratches easily and harbors bacteria, even for weeks
- Despite marketing to the contrary, silver-impregnated materials are not convincingly antimicrobial
- Rediscovery of a common metal's antimicrobial properties in a comparison of doorknobs

---

---

---

---

---

---

---

---

## Antimicrobial Copper

- Intriguing because it
  - Continually kills bacteria and inactivates viruses
  - Never wears out
  - Is naturally antimicrobial
  - Is safe to use

---

---

---

---

---

---

---

---

## Antimicrobial Copper

- Intriguing because it
  - Disinfects (even better?) when tarnished
  - Kills bacteria despite repeated applications of contagion
  - Kills normal amounts of infectious bacteria within 15 minutes of contact
  - Kills on surfaces you can't readily see or easily clean (e.g., knurled grip)

---

---

---

---

---

---

---

---



---

---

---

---

---

---

---

---

## Antimicrobial Copper

- Effective against
  - *Staphylococcus aureus*
  - *Enterobacter aerogenes*
  - *Eschericia coli (E. coli)*
  - *Pseudomonas aeruginosa*
  - Methicillin-resistant *Staphylococcus Aureus (MRSA)*
  - Influenza-A

---

---

---

---

---

---

---

---

## Antimicrobial Copper

- Imagine
  - A weight room which essentially has brand-new, disinfected equipment at the start of every day
- Importantly, regular cleaning is still recommended
- Buyer beware
  - Antimicrobial metals must be solid (i.e., not a plating) and at least 60% copper
  - In the US, only copper mined in the US can be certified by the EPA as antimicrobial (i.e., may not be imported)

---

---

---

---

---

---

---

---

## Infection control is a multifaceted challenge



---

---

---

---

---

---

---

---

For More Information

- Visit me at the booth



---

---

---

---

---

---

---

---