Objection 6:

- **"Disk covers are too expensive"**

Refutation:

This objection is best answered with direct economic comparison to current standards of stethoscope hygiene, but clinical data can be used in support.

Data Point 1: Cost of hospital-acquired C. diff infections

According to the Centers for Disease Control and Prevention (CDC), *Clostridioides difficile* hospital-acquired infections in U.S. hospitals cost up to $4.8 billion each year in excess care costs for acute care facilities alone.[2] **The cost of a single case of C. *diff* is ~$35,000,[1] while the cost of each single-use Disk Cover from AseptiScope is under $0.40 (actual price will vary by hospital). One prevented case of C. *diff* would pay for nearly 100,000 auscultations.**

Data Point 2: Cost of Current Stethoscope Hygiene Standards – Disposables Stethoscopes

Beyond the poor quality and inefficacy of disposable stethoscopes lies the costs associated with their use.

Disposable stethoscopes on the **low-end of both cost and quality**, such as the yellow plastic stethoscopes one may commonly mistake for a child's toy, **cost on average ~$2.00 per unit at bulk pricing.**

On the **higher end**, disposable stethoscopes cost on average **~$7.00 per unit**.

Data Point 3: Cost of Current Stethoscope Hygiene Standards - Alcohol Wipes

Certain pathogens have become increasingly resistant to alcohol-based disinfectants over the years due to their continued use in healthcare environments.[3] The CDC estimated the cost of antimicrobial resistance is $55 billion every year in the United States.[4]

The DiskCover System is intentionally designed to remove the need for antimicrobials. The use of aseptic barriers inherently excludes development of resistant pathogens and does not increase the probability of expanding MDROs. Disk cover barriers offer an aseptic surface and can be considered a tool consistent with quality antimicrobial stewardship practice.

Citations:

1. Zhang, Shanshan, et al. "Cost of Hospital Management of Clostridium Difficile Infection in United States—a Meta-Analysis and Modelling Study." *BMC Infectious Diseases*, vol. 16, no. 1, 2016, https://doi.org/10.1186/s12879-016-1786-6.
2. "Nearly Half a Million Americans Suffered from Clostridium Difficile Infections in a Single Year." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 22 Mar. 2017.
3. Pidot, Sacha J., et al. "Increasing Tolerance of Hospital Enterococcus Faecium to Handwash Alcohols." *Science Translational Medicine*, vol. 10, no. 452, 2018, https://doi.org/10.1126/scitranslmed.aar6115.
4. Dadgostar, Porooshat. "Antimicrobial Resistance: Implications and Costs." *Infection and Drug Resistance*, Volume 12, 2019, pp. 3903–3910., https://doi.org/10.2147/idr.s234610.

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DOI 10.1186/s12879-016-1786-6

BMC Infectious Diseases

RESEARCH ARTICLE Open Access

Cost of hospital management of *Clostridium difficile* infection in United States—a meta-analysis and modelling study

Shanshan Zhang[1,2*], Sarah Palazuelos-Munoz[3], Evelyn M. Balsells[1], Harish Nair[1], Ayman Chit[4,5] and Moe H. Kyaw[4]

Abstract

Background: *Clostridium difficile* infection (CDI) is the leading cause of infectious nosocomial diarrhoea but the economic costs of CDI on healthcare systems in the US remain uncertain.

Methods: We conducted a systematic search for published studies investigating the direct medical cost associated with CDI hospital management in the past 10 years (2005–2015) and included 42 studies to the final data analysis to estimate the financial impact of CDI in the US. We also conducted a meta-analysis of all costs using Monte Carlo simulation.

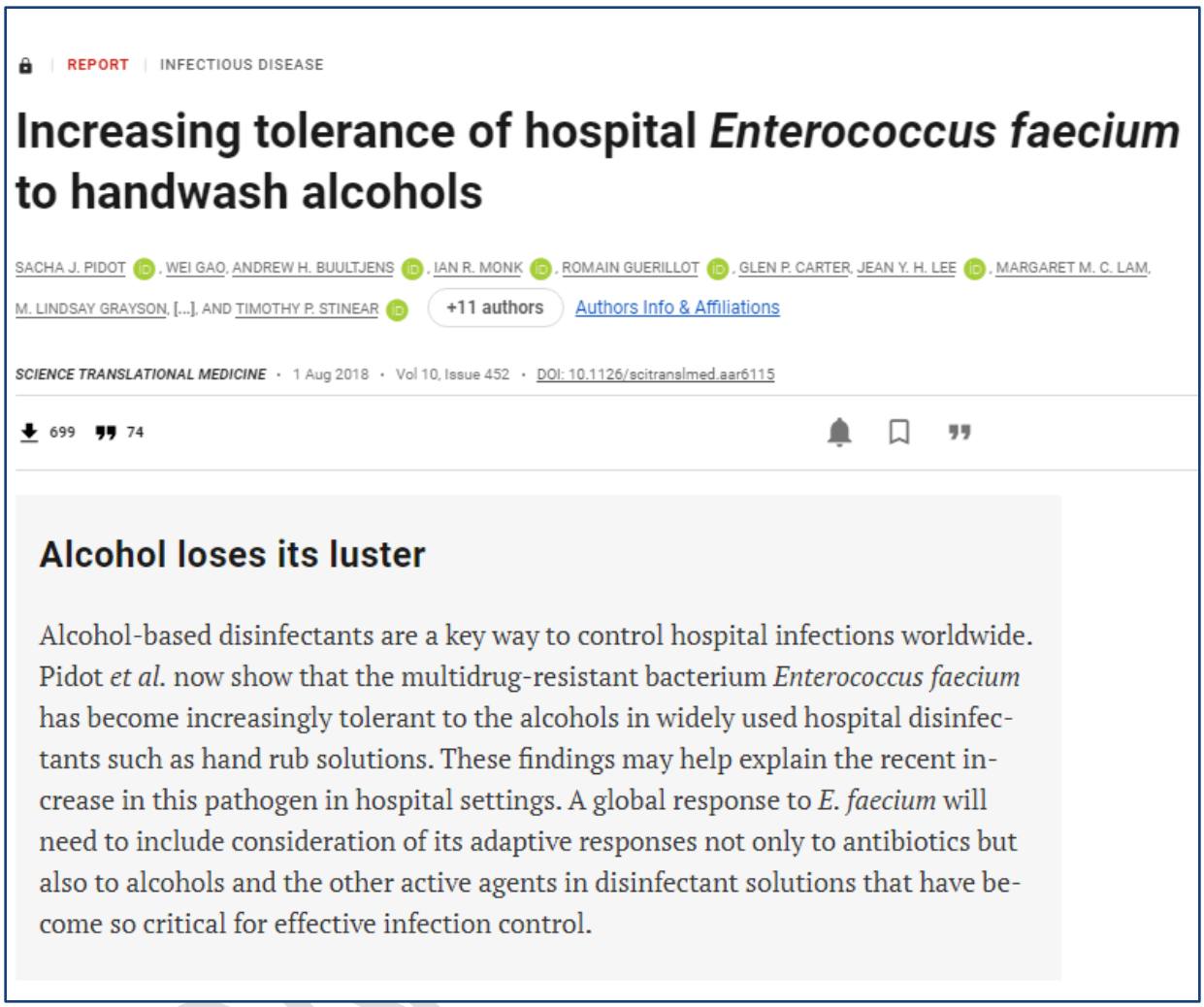
Results: The average cost for CDI case management and average CDI-attributable costs per case were $42,316 (90 % CI: $39,886, $44,765) and $21,448 (90 % CI: $21,152, $21,744) in 2015 US dollars. Hospital-onset CDI-attributable cost per case was $34,157 (90 % CI: $33,134, $35,180), which was 1.5 times the cost of community-onset CDI ($20,095 [90 % CI: $4991, $35,204]). The average and incremental length of stay (LOS) for CDI inpatient treatment were 11.1 (90 % CI: 8.7–13.6) and 9.7 (90 % CI: 9.6–9.8) days respectively. Total annual CDI-attributable cost in the US is estimated US$6.3 (Range: $1.9–$7.0) billion. Total annual CDI hospital management required nearly 2.4 million days of inpatient stay.

Conclusions: This review indicates that CDI places a significant financial burden on the US healthcare system. This review adds strong evidence to aid policy-making on adequate resource allocation to CDI prevention and treatment in the US. Future studies should focus on recurrent CDI, CDI in long-term care facilities and persons with comorbidities and indirect cost from a societal perspective. Health-economic studies for CDI preventive intervention are needed.

Keywords: *Clostridium Difficile*, Economic analysis, Systematic review, Meta-analysis

Abbreviations: CDI, *clostridium difficile* infection; CIs, confidence intervals; CO CDI, community-onset CDI; HCF, healthcare facility; HIV, human immunodeficiency virus; HO-CDI, hospital-onset cdi; ICD-9-CM, the international classification of diseases, ninth revision, clinical modification; ICUs, intensive care units; IQR, interquantile range; LTCF, long-term care facility; NIS, national independent sample; SD, standard deviation; US, United States

Zhang, Shanshan, et al. "Cost of Hospital Management of Clostridium Difficile Infection in United States—a Meta-Analysis and Modelling Study." BMC Infectious Diseases, vol. 16, no. 1, 2016, https://doi.org/10.1186/s12879-016-1786-6.



REPORT | INFECTIOUS DISEASE

Increasing tolerance of hospital *Enterococcus faecium* to handwash alcohols

SACHA J. PIDOT, WEI GAO, ANDREW H. BUULTJENS, IAN R. MONK, ROMAIN GUERILLOT, GLEN P. CARTER, JEAN Y. H. LEE, MARGARET M. C. LAM, M. LINDSAY GRAYSON, [...], AND TIMOTHY P. STINEAR +11 authors Authors Info & Affiliations

SCIENCE TRANSLATIONAL MEDICINE · 1 Aug 2018 · Vol 10, Issue 452 · DOI: 10.1126/scitranslmed.aar6115

699 74

Alcohol loses its luster

Alcohol-based disinfectants are a key way to control hospital infections worldwide. Pidot *et al.* now show that the multidrug-resistant bacterium *Enterococcus faecium* has become increasingly tolerant to the alcohols in widely used hospital disinfectants such as hand rub solutions. These findings may help explain the recent increase in this pathogen in hospital settings. A global response to *E. faecium* will need to include consideration of its adaptive responses not only to antibiotics but also to alcohols and the other active agents in disinfectant solutions that have become so critical for effective infection control.

Pidot, Sacha J., et al. "Increasing Tolerance of Hospital Enterococcus Faecium to Handwash Alcohols." Science Translational Medicine, vol. 10, no. 452, 2018, https://doi.org/10.1126/scitranslmed.aar6115.

Infection and Drug Resistance

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REVIEW

Antimicrobial Resistance: Implications and Costs

This article was published in the following Dove Press journal:
Infection and Drug Resistance

Porooshat Dadgostar

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Abstract: Antimicrobial resistance (AMR) has developed as one of the major urgent threats to public health causing serious issues to successful prevention and treatment of persistent diseases. In spite of different actions taken in recent decades to tackle this issue, the trends of global AMR demonstrate no signs of slowing down. Misusing and overusing different antibacterial agents in the health care setting as well as in the agricultural industry are considered the major reasons behind the emergence of antimicrobial resistance. In addition, the spontaneous evolution, mutation of bacteria, and passing the resistant genes through horizontal gene transfer are significant contributors to antimicrobial resistance. Many studies have demonstrated the disastrous financial consequences of AMR including extremely high healthcare costs due to an increase in hospital admissions and drug usage. The literature review, which included articles published after the year 2012, was performed using Scopus, PubMed and Google Scholar with the utilization of keyword searches. Results indicated that the multifactorial threat of antimicrobial resistance has resulted in different complex issues affecting countries across the globe. These impacts found in the sources are categorized into three different levels: patient, healthcare, and economic. Although gaps in knowledge about AMR and areas for improvement are obvious, there is not any clearly understood progress to put an end to the persistent trends of antimicrobial resistance.

Keywords: antimicrobial resistance, AMR, implications, cost

Background

Antimicrobial Resistance (AMR) occurs when microorganisms including bacteria, viruses, fungi, and parasites become able to adapt and grow in the presence of medications that once impacted them.[1,2] AMR is considered a significant threat to the public health systems not just in developing countries but throughout the world.[1,3] The fact that infectious diseases can no longer be treated with antibiotics depicts an unknown future in health care.[4] Infection with AMR leads to serious illnesses and prolonged hospital admissions, increases in healthcare costs, higher costs in second-line drugs, and treatment failures.[3,5,6] For instance, just in Europe, it has been estimated that antimicrobial resistance has been correlated with more than nine billion euros per year.[3,7] Furthermore, according to the Centers for Disease Control and Prevention (CDC), antimicrobial resistance adds a 20 billion dollar surplus in direct healthcare costs in the United States, which is exclusive of about 35 billion dollars in loss of productivity annually.[8]

The daunting threat of antimicrobial resistance is of particular importance in the category of antibiotic resistance in bacteria.[3] According to the CDC, more than two million people in the United States become ill with antibiotic-resistant diseases every year, resulting in a minimum of 23,000 deaths.[8] Antibiotic resistance compromises a human immune system's capacity to fight infectious diseases and also

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Summation:

A New Normal for The Clinician's Third Hand: Stethoscope Hygiene and Infection Prevention

On November 6th, 2022, I published an article in the press in the *American Journal of Infection Control*, titled *A New Normal for the Clinician's Third Hand: Stethoscope Hygiene and Infection Prevention*[1] outlining all key clinical arguments presented in this document on the importance of adopting The DiskCover System, an innovation in and elevation of stethoscope hygiene alongside.

The authors include these highly influential professionals in the field of infection prevention and control:

- **Roy F. Chemaly**, MD, MPH, FIDSA, FACP, Department of Infectious Diseases, Infection Control **at MD Anderson**
- **Francesca Torriani**, MD, FIDSA, AAHIVS, Medical Director, Infection Prevention and Clinical Epidemiology at **UC San Diego Health**
- **Zainab Shahid**, MD, FACP, FIDSA, Infection Prevention in Immunocompromised People at **Memorial Sloan Kettering**
- **Sanjeet Dadwal**, MD, Chief, Division of Infectious Diseases at **City of Hope**

This article is an excellent tool to reference to prospects, as it is a publication in one of if not the most influential peer-reviewed journals in the field of American infection control that summarizes the most key findings in the contemporary field of stethoscope hygiene and infection prevention. Published not by industry but by infectious disease and infection prevention experts from some of the most influential cancer centers across the nation, this is strong evidence backing the elevation in stethoscope hygiene through adoption of The DiskCover System for vulnerable patients.

Table. Comparison of Stethoscope Hygiene Attributes[1]

	Stethoscope Hygiene Strategies		
Attribute	**Isopropyl Alcohol Wipes**	**Single Use Stethoscopes**	**The DiskCover System**
Rapid to use (<2 seconds)	NO	YES	YES
Prevents between patient contamination	NO	YES	YES
Always provides aseptic patient contact	NO	NO	YES
May transfer pathogens between staff	NO	YES	NO
Impairs auscultation	NO	YES	NO
Inexpensive (<50 cents)	YES	NO	YES
Digital use compliance monitoring	NO	NO	YES
Remote supply status monitoring	NO	NO	YES
May harm stethoscope tubing	YES	NO	NO
Evidence of increasing E. faecium resistance	YES	NO	NO
Evidence of increased C. dificile sporulation	YES	NO	NO
May allow C. difficile transfer between patients	YES	NO	NO
Evidence of increased A. baumannii growth	YES	NO	NO