The DiskCover System

Eliminating Stethoscope Pathogen Transmission By Touch

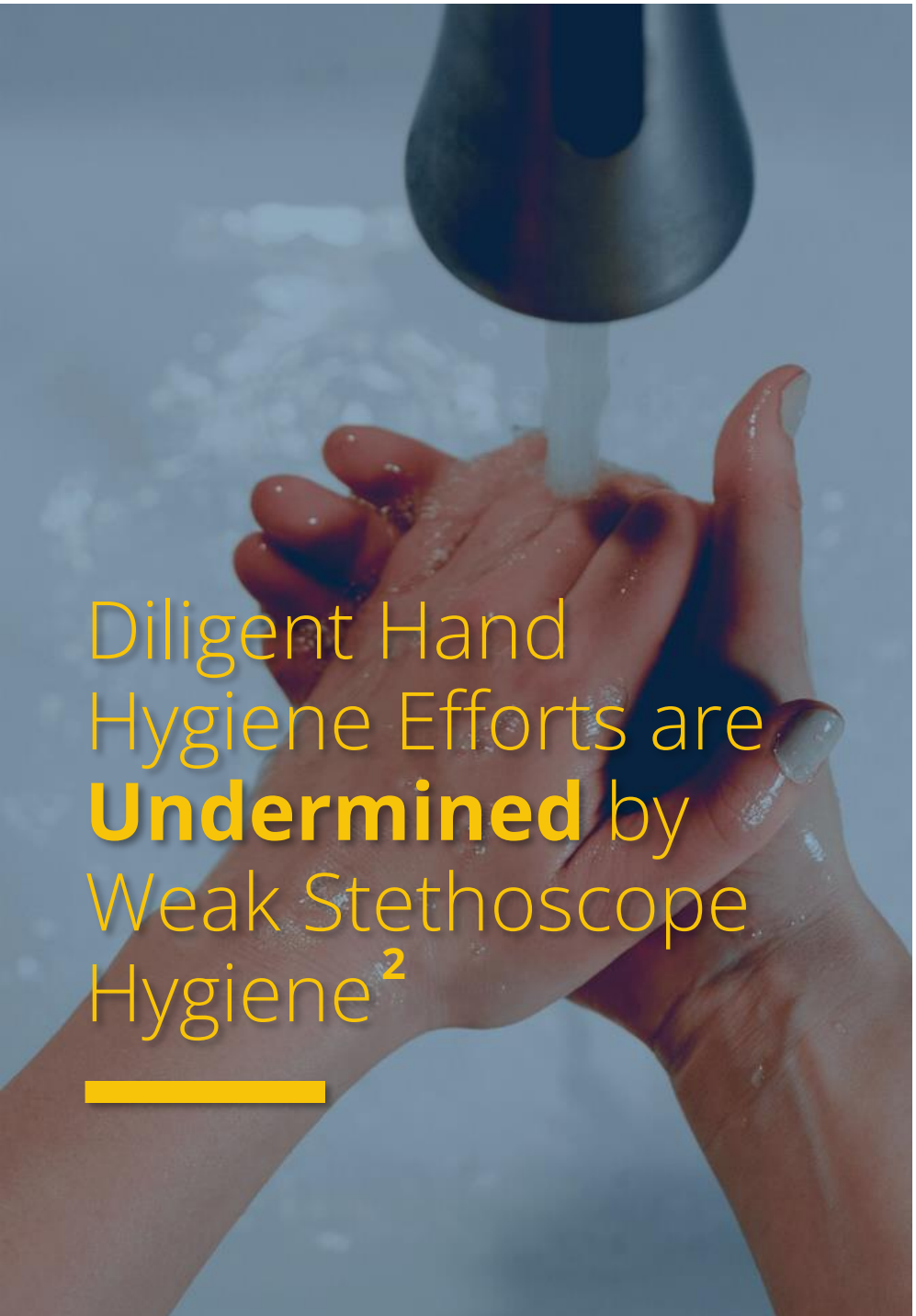
THE CLINICIAN'S THIRD HAND:

The Stethoscope

Contaminated stethoscopes are common and pose a significant safety risk.[1]

Clinical Library

A multitude of clinical and scientific publications establish the **stethoscope** as a **vector of pathogen transmission**



THE CLINICIAN'S THIRD HAND: The Stethoscope

Just like a clinician's hands, **stethoscopes harbor dangerous contaminants and organisms.**[3]

Common methods of hygiene **do not demonstrate complete efficacy**, and can even contribute to additional risks of infection.[1]

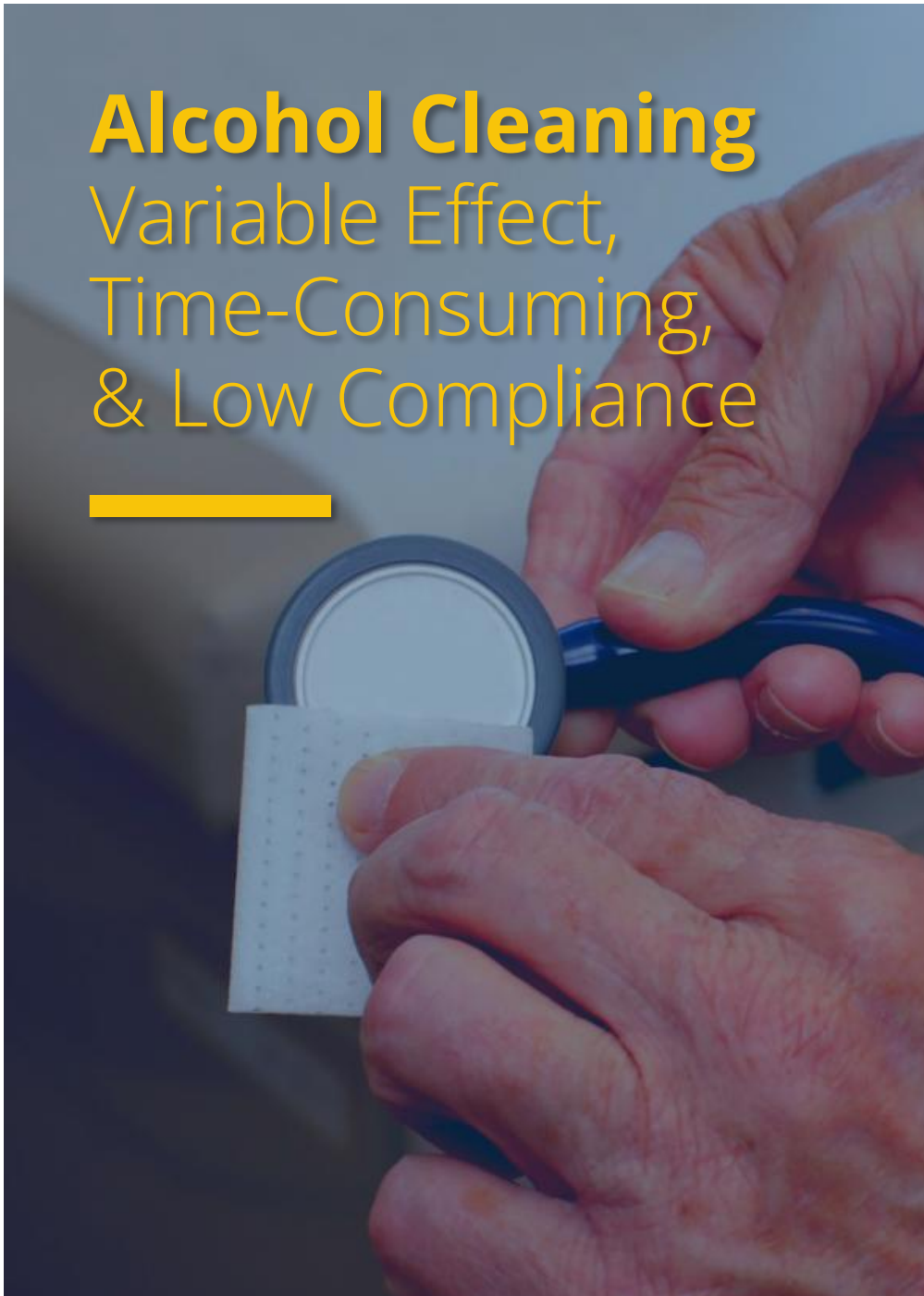
Background

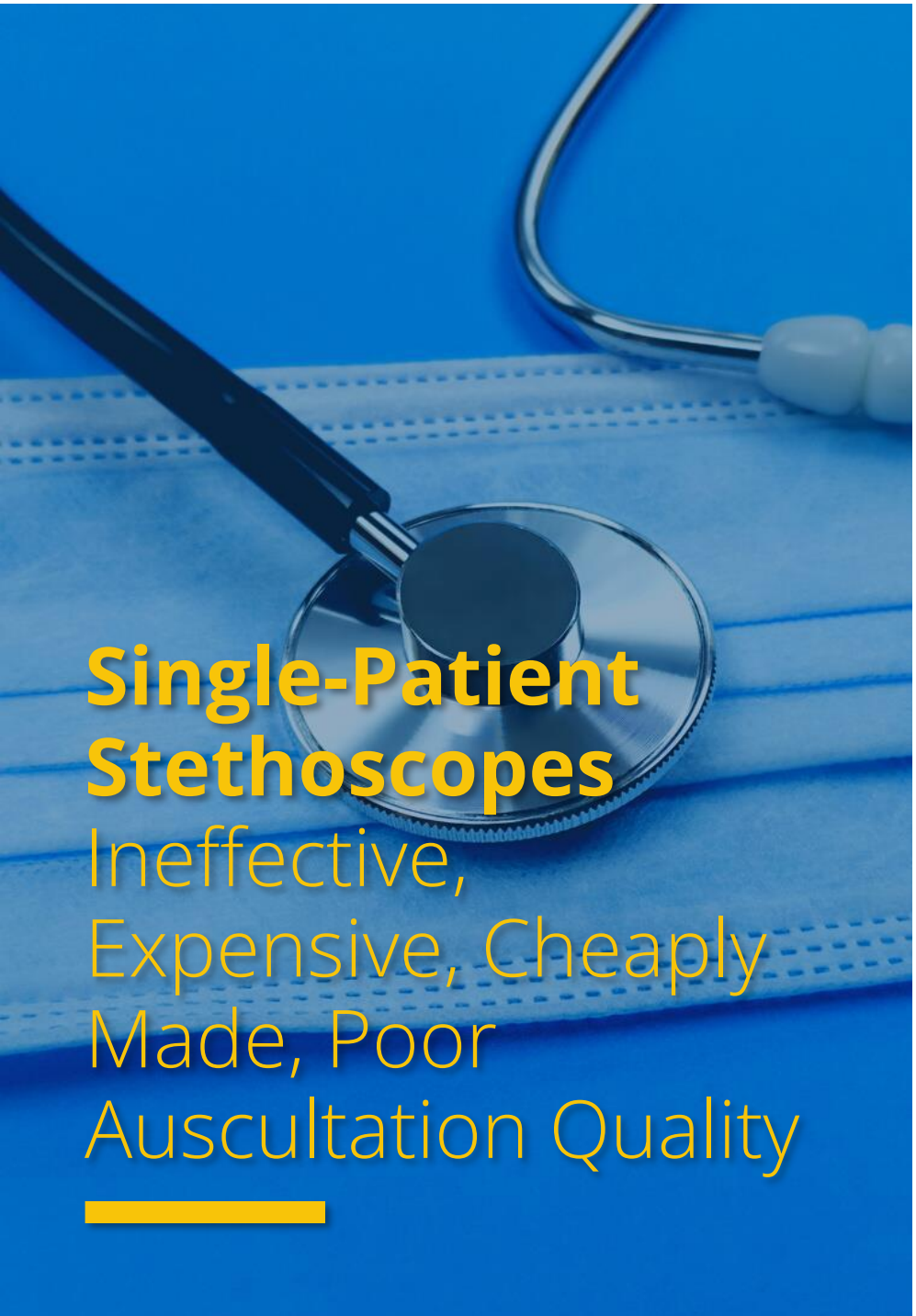
SUBOPTIMAL STANDARDS

Alcohol Cleaning

Stethoscope cleaning **is time-consuming (60-seconds)**, seldom performed, and ineffective against resistant pathogens.[3] Despite cleaning, **surfaces often remain contaminated**.[3]

Multiple studies also indicate that **clinicians rarely clean their stethoscopes.**[4]





Background

SUBOPTIMAL STANDARDS

Single-Patient Stethoscopes

Meanwhile, single-patient stethoscopes **have reduced sound quality** and may **contaminate staff and patients**.[5]

Practitioner and patient room stethoscopes are **colonized with nosocomial pathogens**, and cleaning reduces but does not always eliminate contamination.[6]

Introduction

THE DISKCOVER™ SYSTEM
PROTECT YOUR PATIENT

The DiskCover System eliminates patient risk of stethoscope "transmission by touch" by providing a clean and high-fidelity barrier, removing direct contact between patient and stethoscope.

| WAVE, APPLY, REMOVE

1) ACTIVATE

HOLD STETHOSCOPE UNDER TOUCH-FREE SENSOR

2) APPLY

PRESS GENTLY INTO APPLICATION WINDOW

3) AUSCULTATE

EXAMINE PATIENT WITH CLEAN DISK COVER BARRIER

New CDC Guidance & Stethoscope Hygiene Requirements

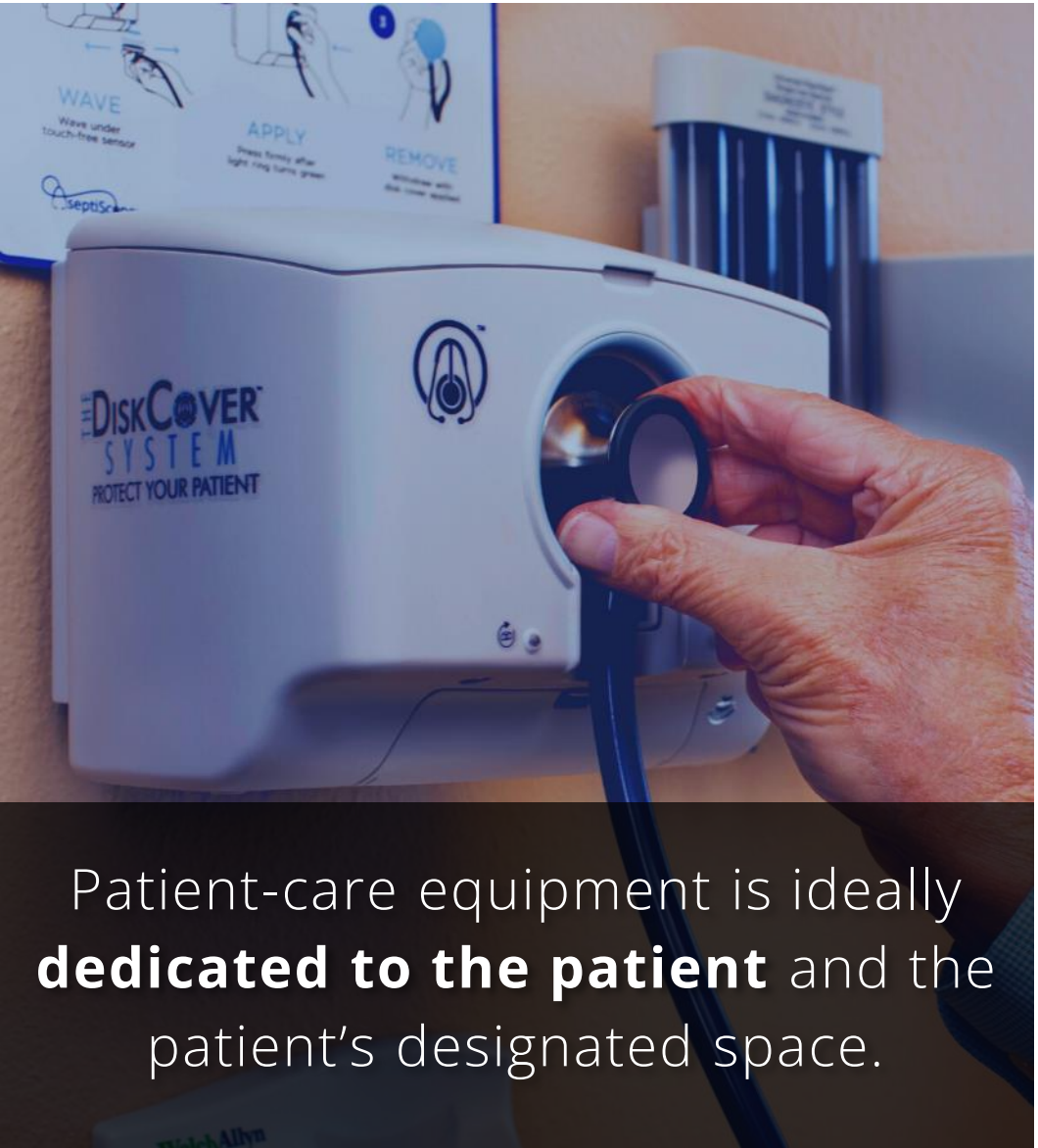
The Centers for Disease Control and Prevention (CDC) have updated their Guideline to Prevent Transmission of Pathogens in Healthcare Settings for 2024, including **new requirements for stethoscope hygiene**.

Stethoscopes Newly Categorized As **Transmission Via Touch**

Stethoscope Hygiene Should Be Performed Between Patients

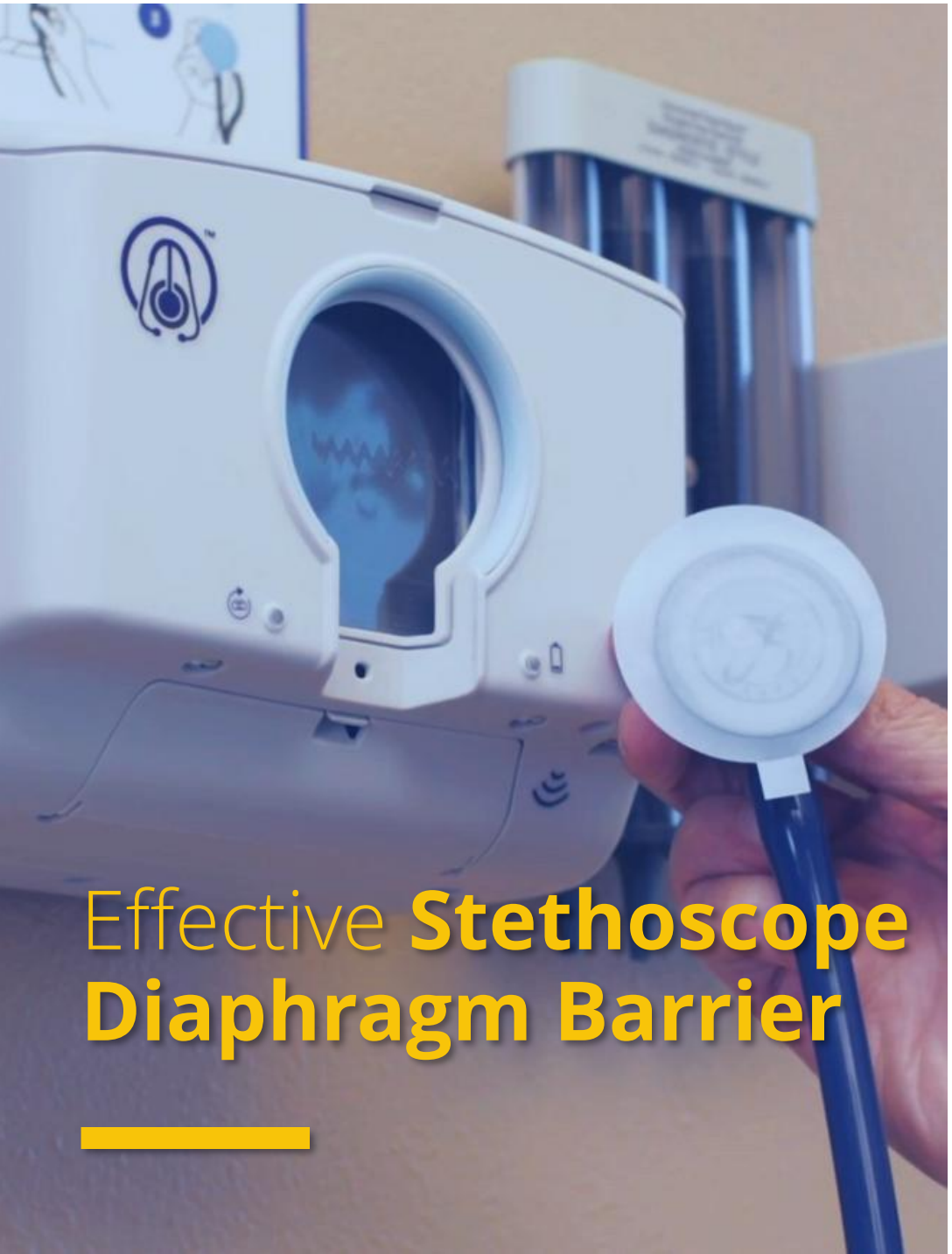
ONLY With The DiskCover System,
Stethoscopes No Longer Touch Patients

Recommendations Apply to **All Healthcare Facilities**



Patient-care equipment is ideally **dedicated to the patient** and the patient's designated space.

Disposable equipment may be used to **minimize cross-transmission.**

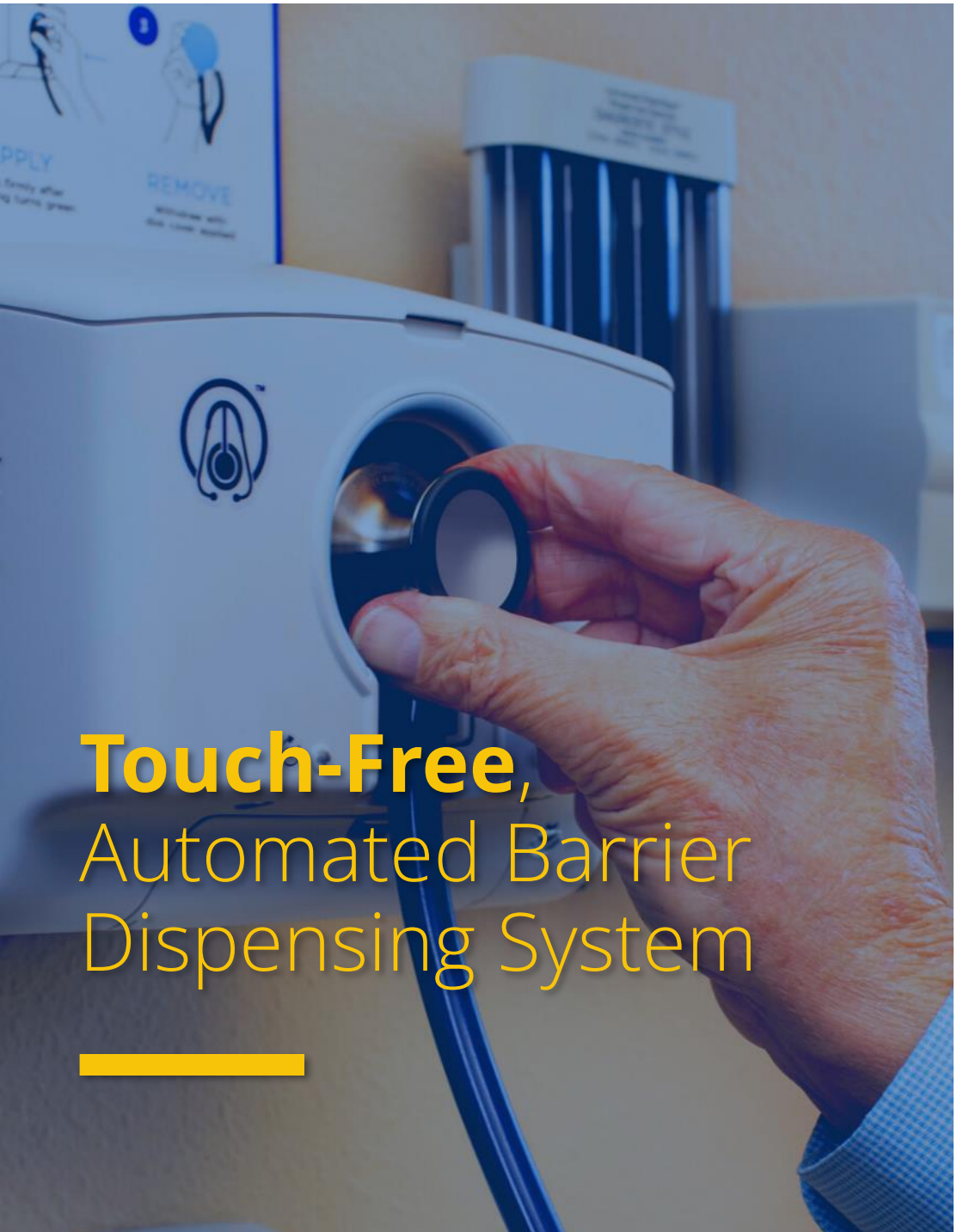


Stethoscopes Are Now Touch-Free

THE DISKCOVER SYSTEM

Features & Benefits

Stethoscopes never come in contact with patients when a **disk cover barrier** is applied, **eliminating pathogen transmission by touch.**

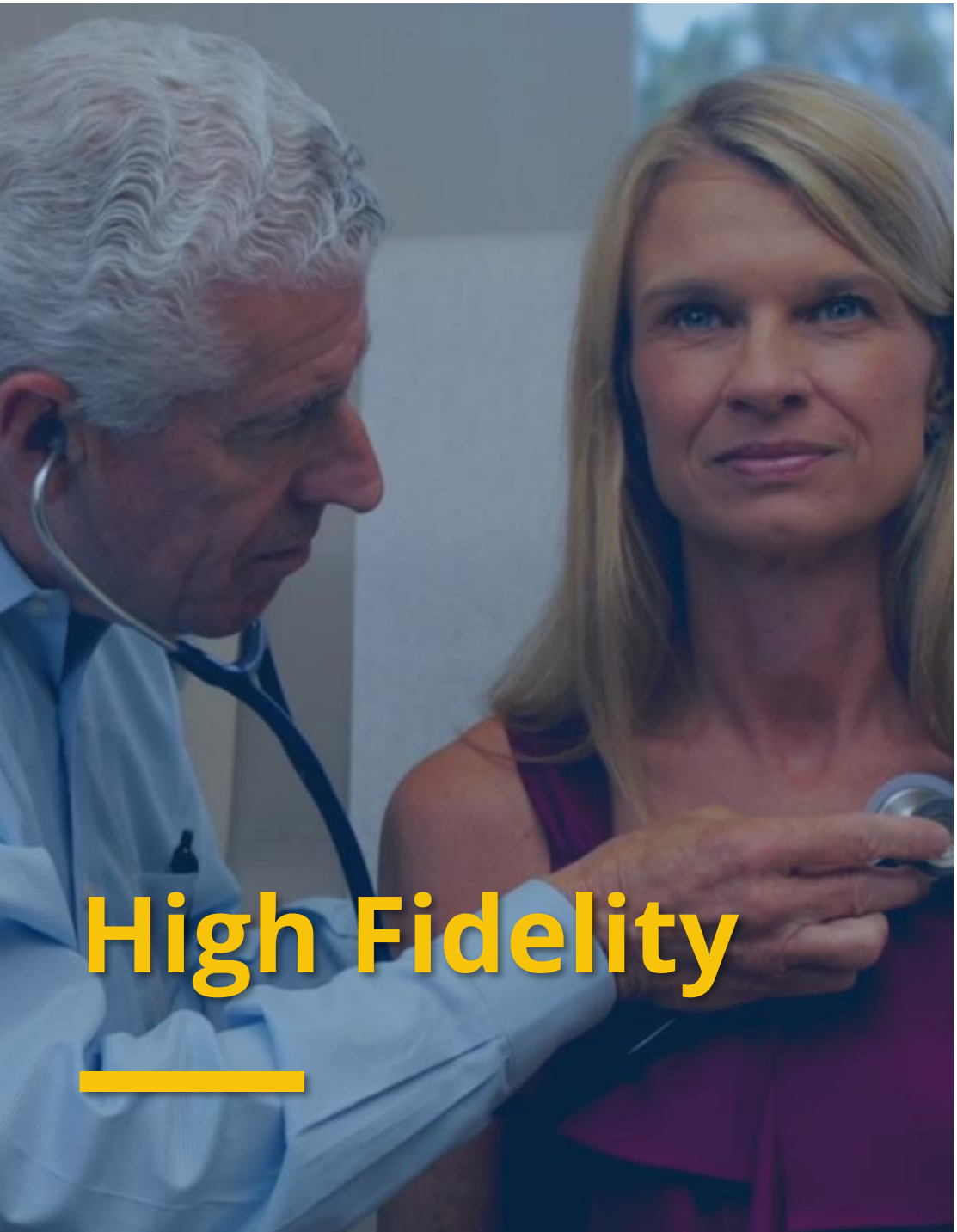


Touch-Free Barrier Application

THE DISKCOVER SYSTEM

Features & Benefits

Ensures each patient examination is **clean and aseptic.**[7]



High Fidelity

THE DISKCOVER SYSTEM

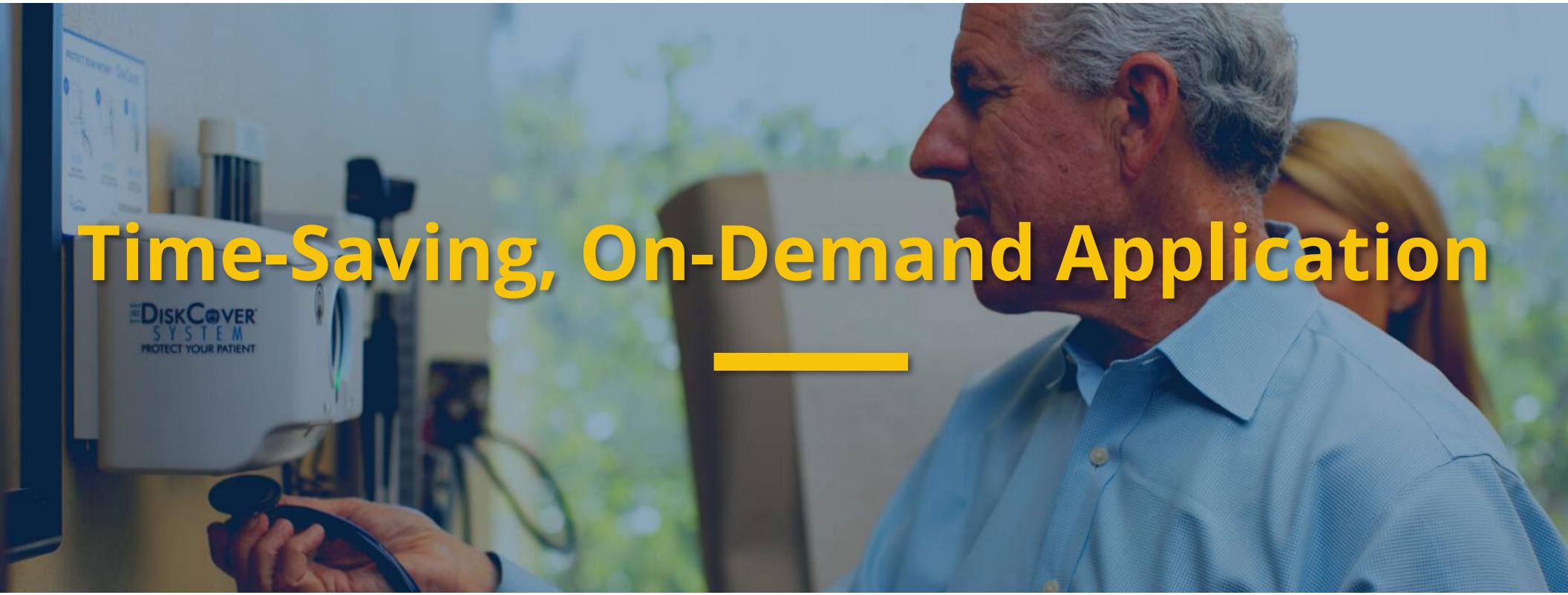
Features & Benefits

Each disk cover is **“acoustically invisible”** for high quality auscultation, resulting in no loss in sound.[5]

Immediate & Workflow Compatible

THE DISKCOVER SYSTEM

Features & Benefits



Time-Saving, On-Demand Application

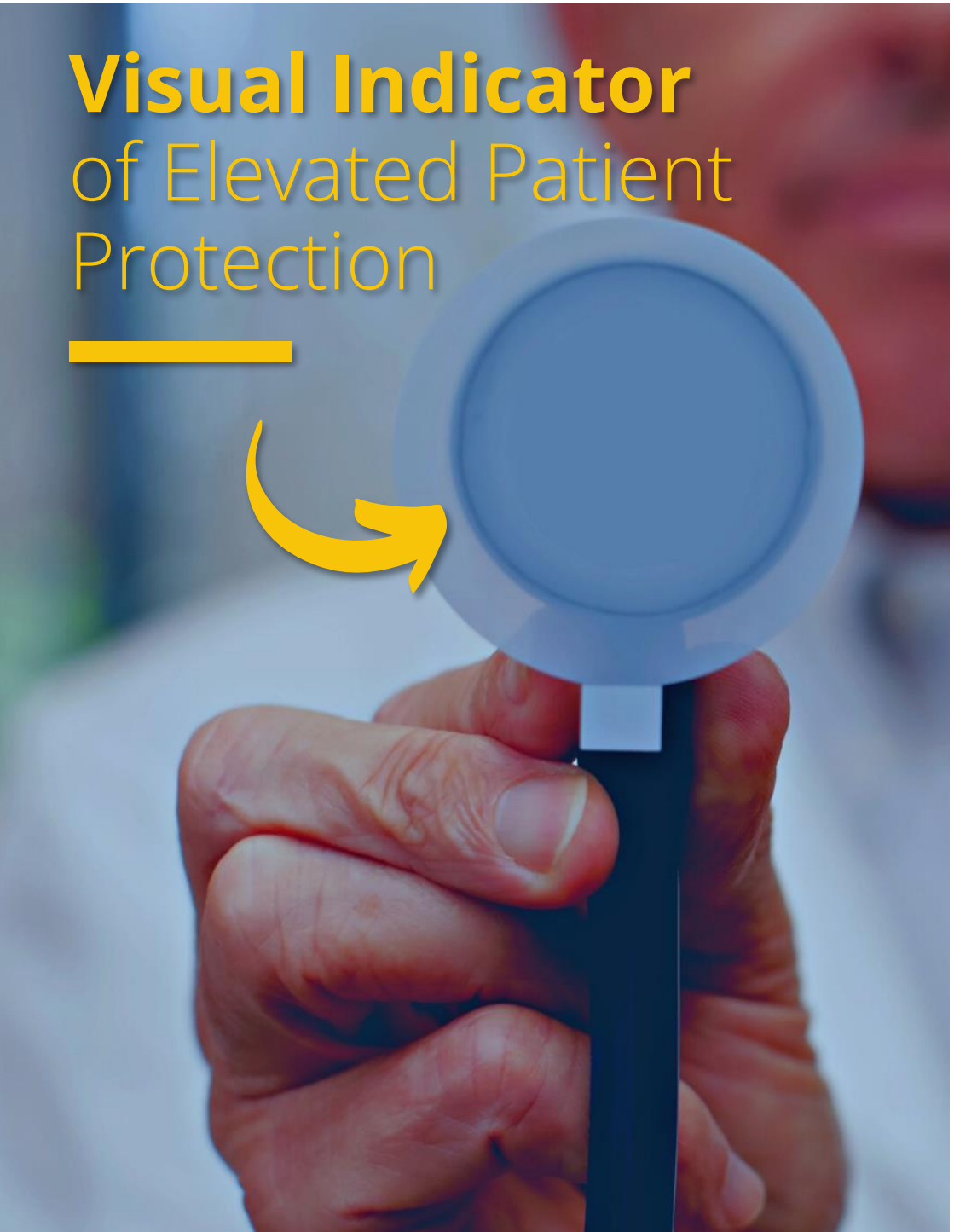
Disk covers are applied right at the point of care, making them **compatible with clinical workflow**.[8]

Patient Protection & Optimal Safety

THE DISKCOVER SYSTEM

Features & Benefits

Each disk cover **protects patients from pathogen exposure.**[3, 7]



Patient Satisfaction

THE DISKCOVER SYSTEM

Features & Benefits

Disk covers are visible to patients and help **boost patient satisfaction.**

Sustainability

THE DISKCOVER SYSTEM

Features & Benefits

Each disk cover uses **<0.5% of disposable material** of a single-patient stethoscope.

Antimicrobial Stewardship

THE DISKCOVER SYSTEM

Features & Benefits

Disk covers **do not contribute to antimicrobial resistance** of pathogens.[3]

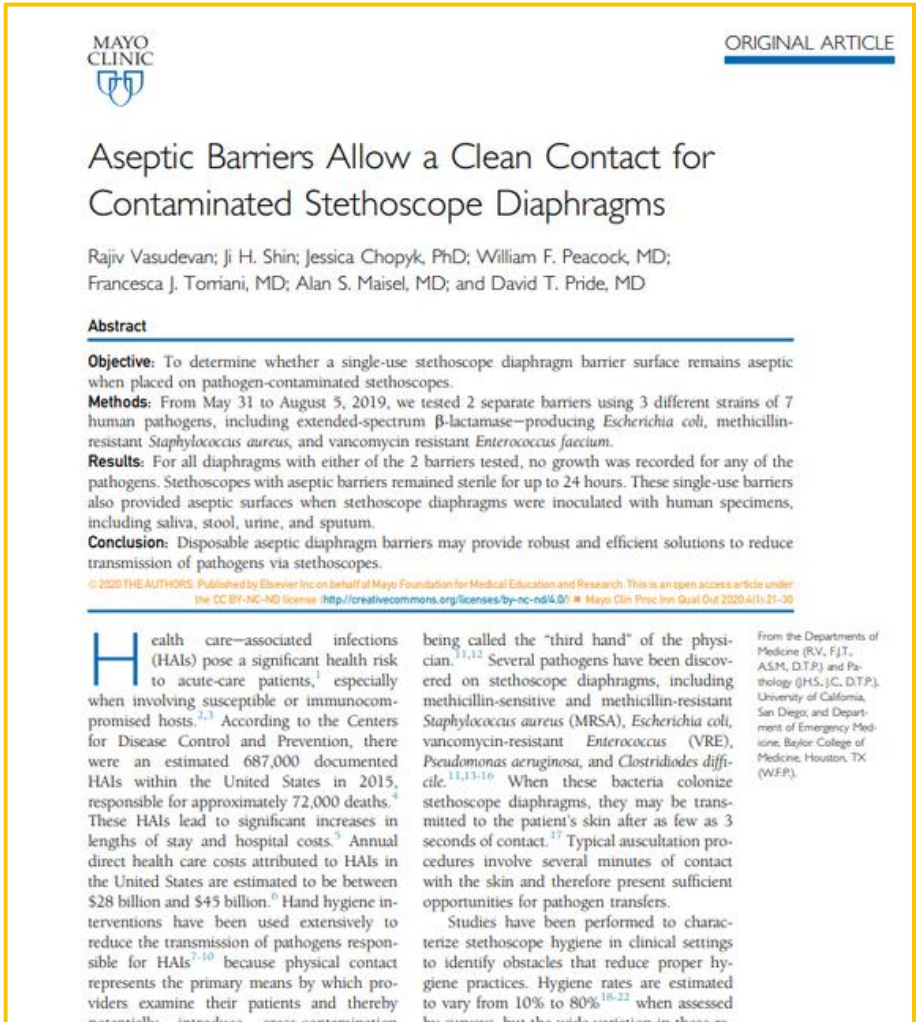
Aseptic Barriers Allow a Clean Contact for Contaminated Stethoscope Diaphragms

Rajiv Vasudevan; Ji H. Shin; Jessica Chopyk, PhD; William F. Peacock, MD; Francesca J. Torriani, MD; Alan S. Maisel, MD; and David T. Pride, MD

Mayo Clinic Proceedings: Innovations, Quality & Outcomes

Key Points:

- Diaphragms protected by a disk cover were ***100% culture negative***.[7]
- Disk covers may ***reduce transmission of pathogens*** via stethoscope.[7]



MAYO CLINIC

ORIGINAL ARTICLE

Aseptic Barriers Allow a Clean Contact for Contaminated Stethoscope Diaphragms

Rajiv Vasudevan; Ji H. Shin; Jessica Chopyk, PhD; William F. Peacock, MD; Francesca J. Torriani, MD; Alan S. Maisel, MD; and David T. Pride, MD

Abstract

Objective: To determine whether a single-use stethoscope diaphragm barrier surface remains aseptic when placed on pathogen-contaminated stethoscopes.
Methods: From May 31 to August 5, 2019, we tested 2 separate barriers using 3 different strains of 7 human pathogens, including extended-spectrum β-lactamase–producing *Escherichia coli*, methicillin-resistant *Staphylococcus aureus*, and vancomycin resistant *Enterococcus faecium*.
Results: For all diaphragms with either of the 2 barriers tested, no growth was recorded for any of the pathogens. Stethoscopes with aseptic barriers remained sterile for up to 24 hours. These single-use barriers also provided aseptic surfaces when stethoscope diaphragms were inoculated with human specimens, including saliva, stool, urine, and sputum.
Conclusion: Disposable aseptic diaphragm barriers may provide robust and efficient solutions to reduce transmission of pathogens via stethoscopes.

■ Mayo Clin Proc Inn Qual Out 2020;4(1):21-30

Health care–associated infections (HAIs) pose a significant health risk to acute-care patients,[1] especially when involving susceptible or immunocompromised hosts.[2,3] According to the Centers for Disease Control and Prevention, there were an estimated 687,000 documented HAIs within the United States in 2015, responsible for approximately 72,000 deaths.[4] These HAIs lead to significant increases in lengths of stay and hospital costs.[5] Annual direct health care costs attributed to HAIs in the United States are estimated to be between $28 billion and $45 billion.[6] Hand hygiene interventions have been used extensively to reduce the transmission of pathogens responsible for HAIs[7-10] because physical contact represents the primary means by which providers examine their patients and thereby being called the "third hand" of the physician.[11,12] Several pathogens have been discovered on stethoscope diaphragms, including methicillin-sensitive and methicillin-resistant *Staphylococcus aureus* (MRSA), *Escherichia coli*, vancomycin-resistant *Enterococcus* (VRE), *Pseudomonas aeruginosa*, and *Clostridioides difficile*.[11,13-16] When these bacteria colonize stethoscope diaphragms, they may be transmitted to the patient's skin after as few as 3 seconds of contact.[17] Typical auscultation procedures involve several minutes of contact with the skin and therefore present sufficient opportunities for pathogen transfers.

Studies have been performed to characterize stethoscope hygiene in clinical settings to identify obstacles that reduce proper hygiene practices. Hygiene rates are estimated to vary from 10% to 80%[18-22] when assessed

From the Departments of Medicine (R.V., F.J.T., A.S.M., D.T.P.) and Pathology (H.S., J.C., D.T.P.), University of California, San Diego; and Department of Emergency Medicine, Baylor College of Medicine, Houston, TX (W.F.P.).

Stethoscope hygiene: A call to action. Recommendations to update the CDC guidelines

Sarathi Kalra; Alpesh Amin; Nancy Albert; Cindy Cadwell; Cole Edmonson; Robert Gaynes; Mary Hand; Mark Marinella; Colleen Morely; Sandra Sieck; and Rajiv S. Vasudevan

Infection Control & Hospital Epidemiology

Infection Control & Hospital Epidemiology (2021), **42**, 740–742
doi:10.1017/ice.2021.115

SHEA

Commentary

Stethoscope hygiene: A call to action. Recommendations to update the CDC guidelines

Sarathi Kalra[1], Alpesh Amin[2], Nancy Albert[3], Cindy Cadwell[4], Cole Edmonson[5], Robert Gaynes[6], Mary Hand[7], Mark Marinella[8], Colleen Morely[9], Sandra Sieck[10] and Rajiv S. Vasudevan[11]

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Abstract

Healthcare-acquired infections are a tremendous challenge to the US medical system. Stethoscopes touch many patients, but current guidance from the Centers for Disease Control and Prevention does not support disinfection between each patient. Stethoscopes are rarely disinfected between patients by healthcare providers. When cultured, even after disinfection, stethoscopes have high rates of pathogen contamination, identical to that of unwashed hands. The consequence of these practices may bode poorly in the coronavirus 2019 disease (COVID-19) pandemic. Alternatively, the CDC recommends the use of disposable stethoscopes. However, these instruments have poor acoustic properties, and misdiagnoses have been documented. They may also serve as pathogen vectors among staff sharing them. Disposable aseptic stethoscope diaphragm barriers can provide increased safety without sacrificing stethoscope function. We recommend that the CDC consider the research regarding stethoscope hygiene and effective solutions to contemporize this guidance and elevate stethoscope hygiene to that of the hands, by requiring stethoscope disinfection or change of disposable barrier between every patient encounter.

(Received 2 December 2020; accepted 5 March 2021; electronically published 19 May 2021)

The Centers for Disease Control and Prevention (CDC) reports that ~72,000 hospital patients with healthcare-acquired infections (HAIs) died during their hospitalization in 2015.[1] HAI mortality thus represents the equivalent of a jet airliner crashing, with zero survivors, every day in the United States. Although great effort has been undertaken to combat this tragedy by hand hygiene, the stethoscope, which drapes around necks, is placed in pockets, and is touched by unwashed hands day in and out, has predominately been ignored. The lack of attention to stethoscope hygiene belies contemporary data. Current Centers for Disease Control and Prevention (CDC) guidelines[2] clearly state that "the stethoscope can be contaminated and spread disease."[3,4] Pathogens cultured from the medical practitioner's fingers are duplicated on the stethoscope diaphragm,[5–7] which functions as a third hand[8] in the spread of disease. Furthermore, the ability of the stethoscope to transmit bacteria from the diaphragm to the patient has also been documented.[9–12] Despite data reflecting the need to disinfect it before use, stethoscope hygiene is essentially ignored in contemporary clinical practice.[13–16]

The CDC defines the stethoscope as a noncritical surface[2] and states that weekly disinfection with alcohol is acceptable unless it is visibly soiled. Although this would never be acceptable for the hands, the tool with identical pathogens and that is rubbed on the skin of a majority of patients is subject to vastly different disinfection recommendations than hands. The differences in the recommendations between the hands and the stethoscope should be addressed, especially now that the possibility of stethoscope-related coronavirus disease 2019 (COVID-19) transmission must be considered.[12,17] How many stethoscope transmissions may have occurred in the COVID-19 era?

The evidence suggests that isopropyl alcohol is partially effective in stethoscope disinfection.[18] Recent studies show that disinfected stethoscopes can maintain significant rates of pathogen colonization.[18–24] And after decades of alcohol disinfectant use, some pathogenic resistance to its sterilization effects have become apparent.[25,26] Ultimately, although some pathogens are unaffected by alcohol (eg, *Clostridioides difficile* spores),[27] the critical intervention to prevent their spread is the actual disinfection of the stethoscope. Unfortunately, no observational study, of the many that have been performed, has ever documented a reasonable rate of disinfection practice.[8,13–15,28] Clearly, current CDC recommendations are inconsistent with the overwhelming number of publications demonstrating that self-disinfection by medical providers is ineffectual,[15,20,29] inconsistent,[30,31] and almost never

Key Points:

- Mounting research and evidence supports the ***need for elevated stethoscope hygiene***.[9]
- Just like hand hygiene, stethoscope hygiene should be ***required between every patient encounter***.[9]

Aseptic Disposable Stethoscope Barrier: Acoustically Invisible and Superior to Disposable Stethoscopes

Sarathi Kalra; Jitesh B. Shewale

Mayo Clinic Proceedings

Key Points:

- Aseptic barriers are ***acoustically invisible*** and do not alter high-fidelity auscultation.[5]
- Aseptic barriers are ***superior to disposable stethoscopes*** in both sound quality and cost.[5]

LETTERS TO THE EDITOR

levels of physical activity have been consistently associated, in a dose-dependent manner, with reduced ASCVD events and mortality risks after adjustment for major ASCVD risk factors.[3,4] Although we agree with Dr Langland that the available evidence supports the view that a very highly active person with a CAC score ≥100 is at lower risk of ASCVD than a less active person with the same CAC score, the evidence regarding absolute risk for adverse cardiovascular outcomes in such patients is limited at present and should therefore be interpreted with caution. Statin therapy is associated with reduced incidence of ASCVD events across the spectrum of baseline risk, and, although risk may be lower in highly active individuals for a given level of CAC, it is uncertain whether risk of ASCVD events is low enough to justify withholding statin therapy in those with CAC scores ≥100.[2] Clinical judgment and a clinician–patient dialog is required regarding the potential benefits and risks of statin therapy in highly active patients with borderline or intermediate estimated 10-year risk and CAC scores ≥100.

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3. Arnett DK, Blumenthal RS, Albert MA, et al. 2019 ACC/AHA guideline on the primary prevention of cardiovascular disease: Executive Summary: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2019;74(10):1376-1414.
4. 2018 Physical Activity Guidelines Advisory Committee. 2018 Physical Activity Guidelines Advisory Committee Scientific Report. Washington, DC: US Department of Health and Human Services; 2018. Available at: https://health.gov/paguidelines/secondedition/report. Accessed October 4, 2020.

https://doi.org/10.1016/j.mayocp.2020.10.025

Aseptic Disposable Stethoscope Barrier: Acoustically Invisible and Superior to Disposable Stethoscopes

To The Editor: Health care-associated infections (HAIs) occur in ~1.7 million patients annually, and 100,000 patients die, at a cost of $147 billion.[1] Overall, 85% of stethoscopes (the physician's third hand) are contaminated with the identical pathogens as found on the hands.[2] Although hand hygiene is emphasized, cleaning stethoscopes between patients occurs in as few as 10% of encounters.[3]

Unfortunately, Centers for Disease Control and Prevention (CDC) guidelines rely on outdated strategies, instructing providers to clean their own stethoscopes, an intervention that has repeatedly been a dismal failure. Contemporary methods to decrease stethoscope-mediated transmission of pathogens include single-use disposable aseptic diaphragm barriers placed on high-fidelity stethoscopes[4] (Figure) or auscultation with a disposable single-use stethoscope. How these strategies affect the stethoscope's auscultory function has not been previously described. Our purpose was to evaluate the auscultation impact of a disposable aseptic barrier and the physician's preferences vs a disposable stethoscope.

We performed an institutional review board-exempt prospective evaluation assessing the sound transmission effects of an aseptic barrier (DiskCover, AseptiScope Inc, San Diego, California) placed on a stethoscope diaphragm. Using the Littmann 3200 recording stethoscope (3M, Maplewood, Minnesota) and a simulation mannequin (iSTAN, CAE, Sarasota, Florida), 28 physicians performed auscultations in prespecified locations, for 15 seconds of respiratory wheezes, normal heart sounds, systolic murmurs, and diastolic murmurs. Physicians were blinded to the barriers' presence and received sounds in random order. Digital audio files

Our Third Hand: Stethoscope Hygiene in the Era of Alcohol-Resistant Organisms

W. Frank Peacock, MD; Francesca J. Torriani, MD; Zainab Shahid, MD; Abhay Dhand, MD; Alfred Luk, MD; Sanjeet Dadwal

The American Journal of Medicine

ADVANCING HIGH VALUE HEALTH CARE

THE AMERICAN JOURNAL of MEDICINE

Our Third Hand: Stethoscope Hygiene in the Era of Alcohol-Resistant Organisms

W. Frank Peacock, MD,[a] Francesca J. Torriani, MD,[b] Zainab Shahid, MD,[c] Abhay Dhand, MD,[d] Alfred Luk, MD,[e] Sanjeet Dadwal[f]

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The stethoscope is one of the oldest tools in the physician's armamentarium. To this day, it persists as a highly visible image in the practice of medicine; it is used actively and is recommended in most health care encounters and is expected by patients.[1] Yet, while health care workers have been taught for more than150 years,[2] and more recently are mandated to perform the World Health Organization (WHO) 5 moments of hand hygiene between every single patient,[2] stethoscope hygiene practices are only marginally adopted.[3,4] This persists despite that the stethoscope diaphragm carries the same quantity and diversity of pathogens associated with health care. Moreover, many of the most virulent pathogens are resistant or have evolved resistance to alcohol. In this context, alcohol has direct relevance in the era of multidrug resistant organisms (MDROs). This article provides context on how stethoscope hygiene is a critical component of effective prevention of infections associated with health care.

In October 2022, with the winding down of the coronavirus disease 2019 (COVID-19) pandemic and following the first in-person meeting of the Infectious Disease Society of America in the prior 3 years, a group of stethoscope and infectious disease experts gathered to discuss the challenges of stethoscope hygiene in the era of increasing antimicrobial resistance and MDROs. The importance of this meeting was to enhance awareness that the stethoscope can serve as a vector for pathogens and to provide solutions to mitigate this challenge. Multiple studies characterizing the pathogens that are present on stethoscopes have demonstrated that microbes associated with hospital acquired infection, including MDROs,[5-7] can be cultured from the stethoscope diaphragm. This is true despite the practitioner cleaning their stethoscope. In fact, various studies have documented that in bacterial cultures of more than 300 stethoscopes, the sum of *Acinetobacter baumannii*, and methicillin-resistant *Staphylococcus aureus* (MRSA) were found on about 10% of all stethoscope diaphragms.[6,7]

The stethoscope diaphragm, commonly referred to as the clinicians "third hand,"[8] represents the point of vector contact for the stethoscope. Although no randomized controlled trial has demonstrated the acquisition of an infectious disease between patients solely via the stethoscope, studies using nontoxigenic bacterial species as a tracer have demonstrated that the stethoscope represents a potential oppor-

Funding: AsceptiScope, Inc, San Diego, California, reserved the room in which the meeting was held.

Conflicts of Interest: WFP reports research grants from Brainbox, Instrument Labs, Salix; serving as a consultant for Abbott, Brainbox, Instrument Labs, Janssen, Osler, Roche, Siemens, Viforl; having stock/ownership interests in AsceptiScope Inc, Brainbox Inc, Braincheck Inc, Coagulo Inc, Comprehensive Research Associates LLC, Comprehensive Research Management Inc, Emergencies in Medicine LLC, Fast Inc, Forrest Devices, Ischemia DX LLC, Lucia Inc, Prevencio Inc, RCE Technologies, ROMTech, ScPharma, Trivinam Inc, Upstream Inc. FJT reports serving as a consultant for Moderna, Inc., Replimune, Inc., AsceptiScope Inc. ZS reports serving on an advisory board and having stock options

Key Points:

- Overreliance of cleaning agents contributes to ***resistant pathogens***.[3]
- Stethoscope cleaning ***compliance is low***.[3]
- These factors ***support the use of disposable barriers*** for stethoscope hygiene.[3]

Stethoscope Hygiene, Workflow, and Patient Safety: The Crux of Healthcare Associated Infections

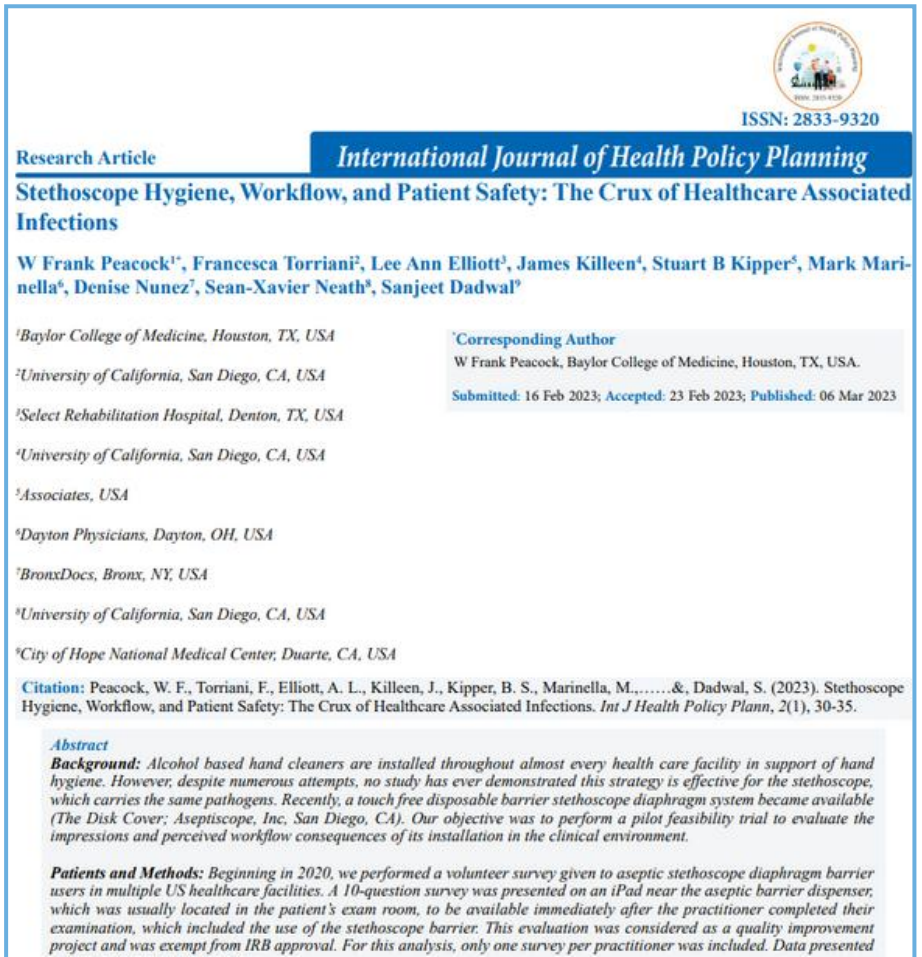
W. Frank Peacock; Francesca Torriani; Lee Ann Elliott; James Killeen; Stuart B Kipper; Mark Marinella; Denise Nunez; Sean-Xavier Neath; Sanjeet Dadwal

International Journal of Health Policy Planning

Key Points:

The DiskCover System was reported as:

- ***Easy*** to Use[8]
- ***Superior*** to Disposables[8]
- ***Improvement*** to Clinician Workflow & Patient Safety[8]



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Research Article

International Journal of Health Policy Planning

Stethoscope Hygiene, Workflow, and Patient Safety: The Crux of Healthcare Associated Infections

W Frank Peacock[1*], Francesca Torriani[2], Lee Ann Elliott[3], James Killeen[4], Stuart B Kipper[5], Mark Marinella[6], Denise Nunez[7], Sean-Xavier Neath[8], Sanjeet Dadwal[9]

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Abstract

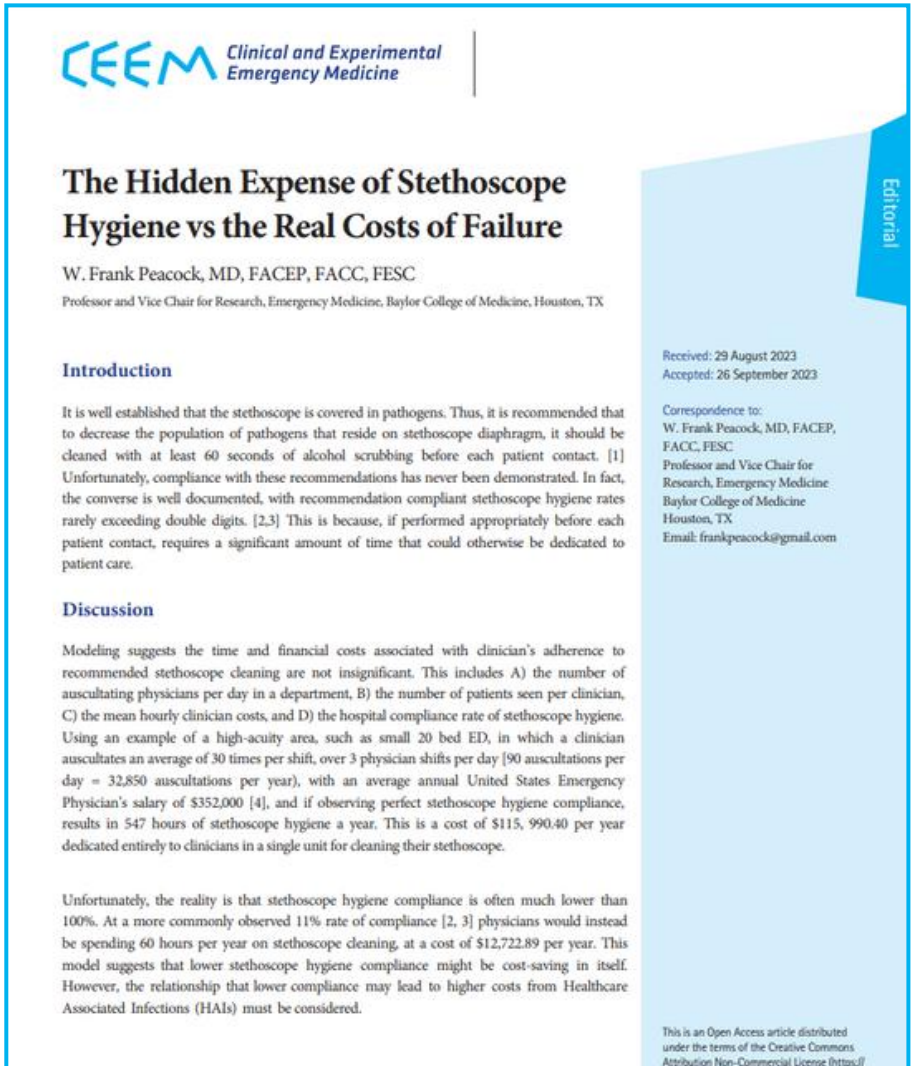
Background: *Alcohol based hand cleaners are installed throughout almost every health care facility in support of hand hygiene. However, despite numerous attempts, no study has ever demonstrated this strategy is effective for the stethoscope, which carries the same pathogens. Recently, a touch free disposable barrier stethoscope diaphragm system became available (The Disk Cover; Aseptiscope, Inc, San Diego, CA). Our objective was to perform a pilot feasibility trial to evaluate the impressions and perceived workflow consequences of its installation in the clinical environment.*

Patients and Methods: *Beginning in 2020, we performed a volunteer survey given to aseptic stethoscope diaphragm barrier users in multiple US healthcare facilities. A 10-question survey was presented on an iPad near the aseptic barrier dispenser, which was usually located in the patient's exam room, to be available immediately after the practitioner completed their examination, which included the use of the stethoscope barrier. This evaluation was considered as a quality improvement project and was exempt from IRB approval. For this analysis, only one survey per practitioner was included. Data presented*

The Hidden Expense of Stethoscope Hygiene vs The Real Costs of Failure

W. Frank Peacock, MD

Clinical and Experimental Emergency Medicine



CEEM Clinical and Experimental Emergency Medicine

Editorial

The Hidden Expense of Stethoscope Hygiene vs the Real Costs of Failure

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Introduction

It is well established that the stethoscope is covered in pathogens. Thus, it is recommended that to decrease the population of pathogens that reside on stethoscope diaphragm, it should be cleaned with at least 60 seconds of alcohol scrubbing before each patient contact. [1] Unfortunately, compliance with these recommendations has never been demonstrated. In fact, the converse is well documented, with recommendation compliant stethoscope hygiene rates rarely exceeding double digits. [2,3] This is because, if performed appropriately before each patient contact, requires a significant amount of time that could otherwise be dedicated to patient care.

Discussion

Modeling suggests the time and financial costs associated with clinician's adherence to recommended stethoscope cleaning are not insignificant. This includes A) the number of auscultating physicians per day in a department, B) the number of patients seen per clinician, C) the mean hourly clinician costs, and D) the hospital compliance rate of stethoscope hygiene. Using an example of a high-acuity area, such as small 20 bed ED, in which a clinician auscultates an average of 30 times per shift, over 3 physician shifts per day [90 auscultations per day = 32,850 auscultations per year), with an average annual United States Emergency Physician's salary of $352,000 [4], and if observing perfect stethoscope hygiene compliance, results in 547 hours of stethoscope hygiene a year. This is a cost of $115, 990.40 per year dedicated entirely to clinicians in a single unit for cleaning their stethoscope.

Unfortunately, the reality is that stethoscope hygiene compliance is often much lower than 100%. At a more commonly observed 11% rate of compliance [2, 3] physicians would instead be spending 60 hours per year on stethoscope cleaning, at a cost of $12,722.89 per year. This model suggests that lower stethoscope hygiene compliance might be cost-saving in itself. However, the relationship that lower compliance may lead to higher costs from Healthcare Associated Infections (HAIs) must be considered.

Key Points:

- **Clinician time, potential HAIs, and disposable stethoscope** costs reveal extensive expenses of stethoscope hygiene failure.[10]
- Adoption of dispensers of touch free stethoscope barriers offset these costs to provide a **positive return on investment**.[10]

ROI & Value Analysis Data available upon request.

Only The DiskCover System Can Fulfill All Key Attributes[1]

Stethoscope Hygiene Attribute	Isopropyl Alcohol Wipes	Single-Use Stethoscopes	THE DISKCOVER SYSTEM
Prevents Contamination Between Patients	✗	✓	✓
Always Provides Aseptic Patient Contact	✗	✗	✓
Fully Effective Against Pathogens (Including MDROs)	✗	✓	✓
Mitigates Transmission Between Clinicians	✓	✗	✓
Rapid To Use (<2 Seconds)	✗	✓	✓
Does Not Impair Auscultation Quality	✓	✗	✓
Cost-Effective	✓	✗	✓
Data Capture (Usage & Supply)	✗	✗	✓
Does Not Degrade Stethoscope	✗	✓	✓

Table 2 (Adapted)[1]

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