American Journal of Infection Control 47 (2019) 1020–1021

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Brief Report

Determining the organic matter burden of exercise-tracking devices using adenosine triphosphate surveillance

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Key Words:
Organic matter burden
Adenosine triphosphate (ATP) surveillance
Exercise-tracking devices
Contamination
Health care professionals (HCP)

The aim of this project is to determine the amount of organic matter burden focused on exercise-tracking devices worn by heath care professionals in the clinical setting. It was completed by using adenosine triphosphate surveillance, which measures the residual organic matter that remains on a device. Because all but 1 of the devices sampled were considered contaminated, health care professionals should be aware of the potential risk associated with wearing exercise-tracking devices in the clinical setting.

The World Health Organization determined that hospital-acquired infections (HAIs) are a foremost factor relating to poor patient outcomes, as they are major sources for morbidity and mortality worldwide.[1] HAIs account for $28.4-$45 billion dollars in medical costs in the United States annually.[2] Prevention and reduction of HAIs are top priority for health care professionals (HCPs).

Because of ineffective hand hygiene and decontamination of jewelry worn by HCPs, research has demonstrated a correlation between rings and increased microbial colonization, and thus, increasing the concern for HAIs.[3] Current literature is divided on whether or not wrist wear has a negative impact on microbial colonization.[4-7] The impact of exercise-tracking devices is completely unknown. Microbial colonization in relation to wrist wear is important because they could serve as transporters for microbes because of the unlikelihood of them being cleansed by typical hand hygiene. Our objective was to determine the amount of organic matter burden focused on exercise-tracking devices worn by HCPs.

METHODS

Design

Descriptive, Prospective

Protection of human subjects

This project was not subject to Institutional Review Board for Health Sciences Research review because it was conducted as a health care delivery improvement project.

Setting and sample

This project was completed at an academic institution that has 24 inpatient units. The entire health care team was eligible for this research project. Using a random sequence generator, the first 8 units in sequential order were sampled. The neonatal intensive care unit was excluded owing to current standards prohibiting jewelry. From each unit, a convenience sample of HCPs was sampled.

Outcome measure

Organic matter burden was determined using adenosine triphosphate (ATP) surveillance, which measures the residual organic matter that remains on a device. ATP is the principle energy carrier for all organisms.[8] The tops of the exercise-tracking devices were swabbed, and the swab was inserted into a device called a luminometer, which determined the results within seconds.

ATP surveillance expresses ATP levels through relative light units (RLU). The ATP collected on the swab is used to generate light: the more light, the more ATP is present, the more ATP, the more dirty (Fig 1). Peer-reviewed studies and data from hospitals offer insight to help set appropriate RLU pass or fail limits.

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Conflicts of interest: None to report.

https://doi.org/10.1016/j.ajic.2019.01.021

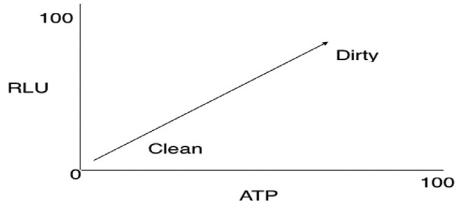

Fig 1. Diagram relating relative light units and adenosine triphosphate to clean and dirty. *ATP*, adenosine triphosphate; *RLU*, relative light units.

Hygiena recommends pass or fail RLU limits according to Table 1. In this project, the "near-patient areas" threshold was used. Based on this, the limits would be 25 RLU. Essentially, if the test fails the devices is not clean. ATP surveillance is a reliable method of monitoring because it is objective, can be considered qualitative or quantitative, it is low cost, fraud-proof, and allows for timely testing.[9]

Procedures

The collection of samples for this project was completed over the course of 8 days. One unit was sampled each day and collections began at 1000 hours. The project leader went to the each of the randomly selected units and asked HCPs if they were wearing exercise trackers. Each individual HCP wearing an exercise tracker was informed of project aim, the minimal risks, and gave informed verbal consent allowing their device to be swabbed; the results were recorded within seconds. Participation in the project was completely voluntary. The unit, time, day, the role of the HCP sampled, and the ATP score were recorded for each unit.

Data analysis strategy

The results were analyzed with SPSS software version 24.0 (IBM Corp, Armonk, NY) to determine if there is statistical significance in the percentage of unclean devices.

RESULTS

During the period of testing, 35 samples (N = 35) were collected from the convenience sampling of HCPs with direct patient contact. On average, each unit surveyed contained 12-15 HCPs during the sampling period. Occasionally, there would be an addition of a nursing student clinical group.

Twenty-one of the 35 sampled were RNs or student nurses, accounting for 60% of the total sample. Eight participants were licensed independent practitioners or medical students, accounting for an additional 22.9% of the sample. Of the 35 sampled, 1 exercise-tracking device was considered clean according to Hygiena's recommendations (Table 1). The minimum score identified was 3 RLU with a maximum score identified as 1353 RLU. The standard deviation was 335.62 RLU. The mean ATP score was 374.94 RLU, although a device is considered clean when the score is under 25 RLU; this is a 349.94 score differential.

Table 1
Relative light units pass or fail[9]

Surface/application	Pass	Fail
Hospital public areas	<50	50+
Near-patient areas	<25	25+
Sterile services	<10	10+
OR & ICU	<10	10+
Food preparation/catering	<10	10+

ICU, intensive care unit; *OR*, operating room.

DISCUSSION

This project demonstrated that a majority (97%) of exercise-tracking devices worn by HCPs were unclean. These results provide preliminary information that exercise-tracking devices worn by HCPs potentiate unnecessary and avoidable risk to patients because of their uncleanliness. The 349.94 differential demonstrates that of the 34 unclean exercise-tracking devices, there was an average of 93% variance from what is considered clean. Meaning, not only were 97% of the samples considered unclean, but they were exponentially unclean. Although ATP surveillance does not explicitly identify the specific contaminating organism, the results demonstrated that they were considered unclean.

There is a potential harm associated with wearing exercise-tracking devices in the clinical setting. Based on this project and current research, it is most beneficial to patients for HCPs to avoid wearing any jewelry while working. Additional research is needed to confirm this project and to determine the types of organisms contaminating these devices. This is of concern because increased colonization can lead to increased incidences of HAIs. Institutions should implement an organization-wide policy disallowing the adornment of exercise-tracking devices on wrists.

Limitations

This project is limited in that the sample size is small (N = 35) and not every unit in this institution was sampled. It is limited in that not every unit sampled had a statistically significant amount of HCPs wearing exercise-tracking devices. It is limited in that ATP surveillance merely provides thresholds for what is considered unclean not what is contaminating the device.

CONCLUSIONS

This project shows that exercise-tracking devices are often unclean when being worn in the clinical setting. HCPs should to ensure patient safety based on evidence-based practice. Implementation of recommendations from this project and current research should be given priority by clinical leaders.

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