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Microbiology Research Report

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DENTAL ADVISOR Microbiology Research Center
3110 West Liberty, Ann Arbor, MI 48103

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Aerosol and Spatter Reduction Efficacy of Mr. Thirsty® and Alternative Products

Clinician: Darlene Finnerty, B.S., RDH

Purpose:

A pilot study to compare the aerosol and spatter reduction efficacy of various hands-free high-volume evacuation (HVE) systems during an ultrasonic scaling procedure.

Challenge Device:

Mr. Thirsty®, an intraoral hands-free high-volume evacuation (HVE) suction device.

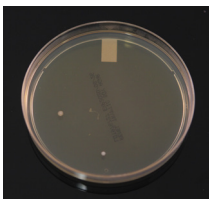
Experimental Design:

Independent Variables: Use of a standard HVE, ***Mr. Thirsty***®, ***Isodry***® (Zyris), ***Dry Shield***® (DryShield), or ***Ivory***® ***ReLeaf*** ™ (Kulzer)

Materials:

Mr. Thirsty® (Zirc Dental Products), ***Isodry***® (Zyris), ***Dry Shield***® (Dry Shield), ***Ivory***® ***ReLeaf*** ™ (Kulzer), Cavitron ultrasonic scaling unit with Cavitron FSI 10S 30K insert (Dentsply Sirona), HVE with standard suction tips, SAS Super 180 Bioaerosol Sampler, TSA with Lecithin and Poly 90 Contact plates, TSA Settling plates, patient volunteers (A, B, and C), licensed dental hygienist volunteer wearing a face shield, and Level 3 mask.

Control



Control: Chest
(CFU = 2)

Control: ASP
(CFU = 94)

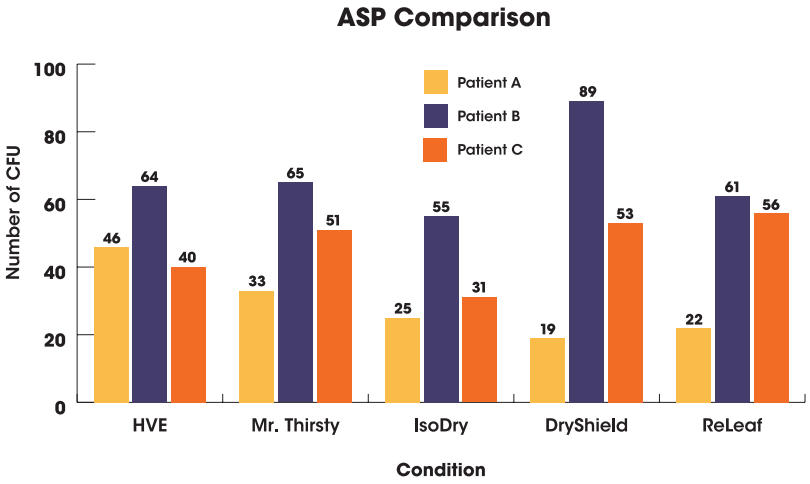
Methods:

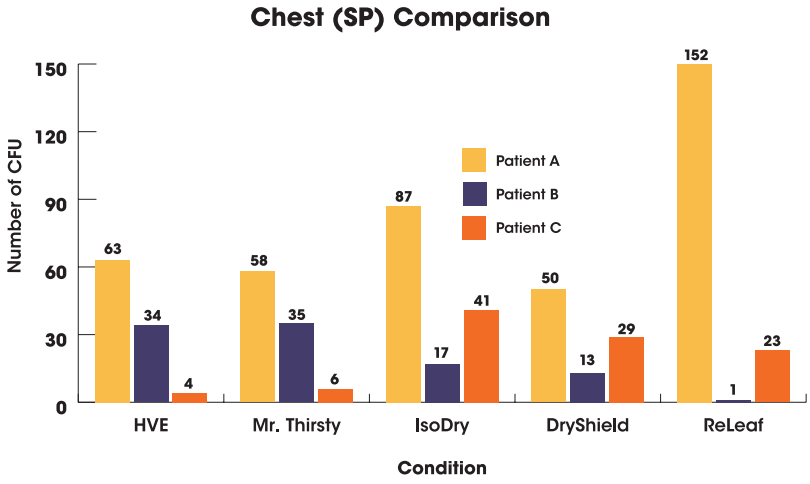
Each ultrasonic scaling procedure was completed while the office was closed, and all procedures were completed in one designated operatory. Prior to the first patient, HVE lines were cleaned with an evacuation line cleaner and traps were changed. An additional saliva ejector line plus two HVE lines were running during the study to simulate a four operatory practice using a dual vacuum pump. The same dental hygienist performed all ultrasonic scaling procedures in this study. The ultrasonic scaler was consistently set to 60Hz and set to the highest water spray level. A control sample of the operatory air was taken for 5 minutes while patient A and the dental hygienist were seated in the room, prior to any aerosol generation. The control air sample was taken using the SAS Super 180 Bioaerosol Sampler with a TSA with Lecithin and Poly 90 Contact Plate (ASP, air sampling plate) placed 18 inches from the patient's mouth and a TSA Settling Plate placed on the patient's chest 8 inches from their mouth (Chest SP). The positioning of each plate was consistent for all testing for the duration of the study. For each ultrasonic scaling procedure, all quadrants of the mouth were treated, anterior and posterior, buccal and lingual. After 2 minutes, 30 seconds the devices were used on the opposite side of the mouth. An ASP in the SAS Super 180 Bioaerosol sampler and HS Chest SP were used to routinely collect air quality samples for 5 minutes during each procedure and were replaced between each new condition. Five separate conditions were utilized for comparison purposes on each patient volunteer.

The first condition utilized a standard HVE, the second condition utilized ***Mr. Thirsty®***, the third condition utilized ***Isodry®***, the fourth condition utilized ***Dry Shield®***, and the fifth condition utilized ***Ivory® ReLeaf™***. There was a 10-minute room turnaround time between each patient, during which appropriate clinical contact surface cleaning and disinfection and other recommended protocols were followed. After each test run, the exposed plates were immediately processed and incubated at 37°C for 48 hours. Microbial growth was analyzed and recorded for all plates. All testing procedures were repeated on a total of three patient volunteers. Before testing, all volunteers agreed to participate in the study and to having their photos taken.

Results:

Air sampling plate (ASP) data and chest settling plate (Chest SP) data is presented below, showing individual data for the three patients.





Discussion:

Overall, the data show a trend that the use of ***Mr. Thirsty®*** performed most similarly to HVE when considering both ASP and Chest SP results. It should be noted that all HVE devices used in this study reduced air sample bacterial counts when compared to the control air sample. With respect to the Chest SP, an outlier was observed for ***Ivory® ReLeaf™***. Among the remaining hands-free devices, more variability was seen across the three patients with ***IsoDry®*** than for the other devices. Use of ***IsoDry®*** resulted in lower ASP CFU and the greatest variability was found for ***DryShield®***.

Use of any HVE device holds clinical advantage; hands-free devices seem to be preferred by hygienists. There were some limitations in this study, including the limited number of patients. A larger sample size could provide a better representation of the population, may reduce variability, and would enable determination of statistical significance. In addition, standardized laboratory testing in conjunction with clinical testing would be useful in future research.

Conclusion:

Preliminary data in this pilot study showed ***Mr. Thirsty®*** to perform most similarly to a standard HVE in both air sampling and chest spatter plates while also giving the dental professional the advantage of utilizing a hands-free high-volume suction.

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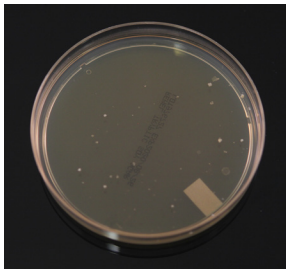
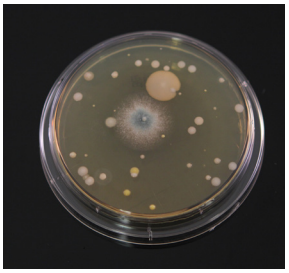
Patient A

Patient A: HVE

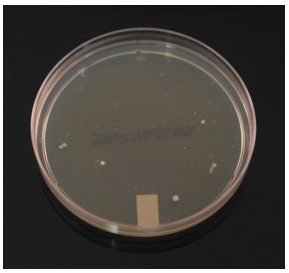


HVE: Chest (CFU = 63)

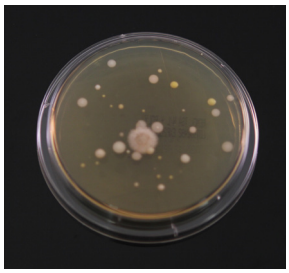


HVE: ASP (CFU = 46)

Patient A: Mr. Thirsty®

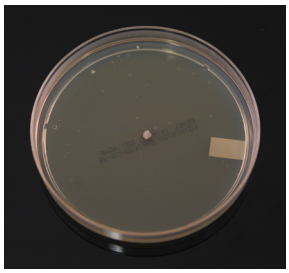


Mr. Thirsty®: Chest (CFU = 58)

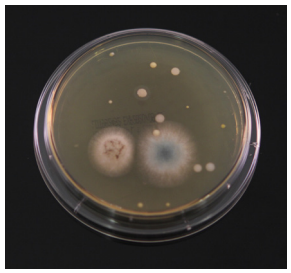


Mr. Thirsty®: ASP (CFU = 33)

Patient A: DryShield

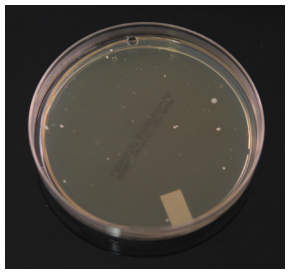


DryShield: Chest (CFU = 50)

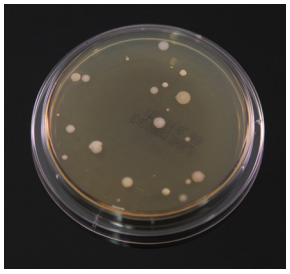


DryShield: ASP (CFU = 19)

Patient A: IsoDry

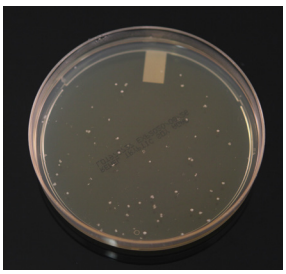


IsoDry: Chest (CFU = 87)

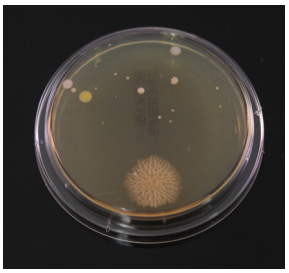


IsoDry: ASP (CFU = 25)

Patient A: ReLeaf



ReLeaf: Chest (CFU = 152)



ReLeaf: ASP (CFU = 22)

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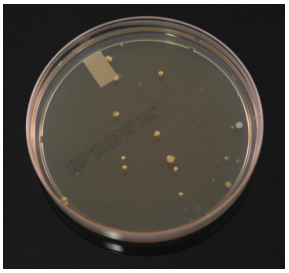
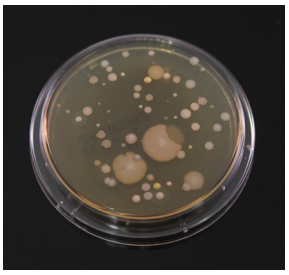
Patient B

Patient B: HVE

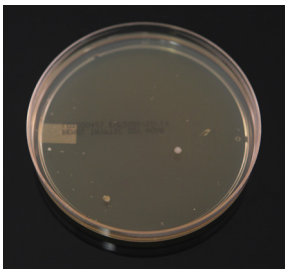


HVE: Chest (CFU = 34)

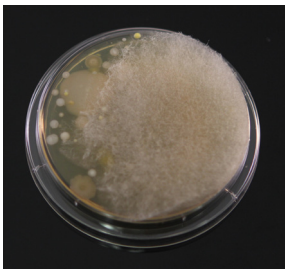


HVE: ASP (CFU = 64)

Patient B: Mr. Thirsty®

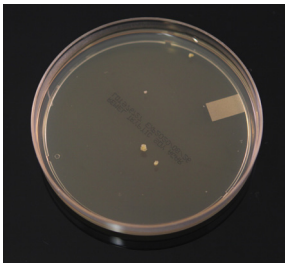


Mr. Thirsty®: Chest (CFU = 35)

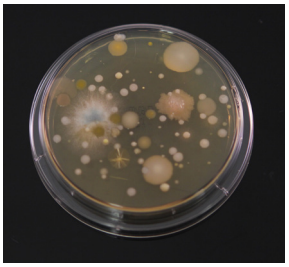


Mr. Thirsty®: ASP (CFU = 65)

Patient B: DryShield

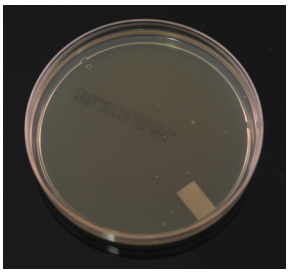


DryShield: Chest (CFU = 13)

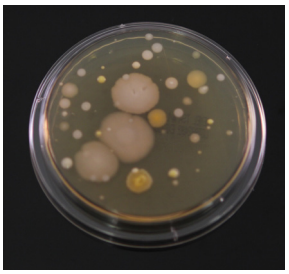


DryShield: ASP (CFU = 89)

Patient B: IsoDry

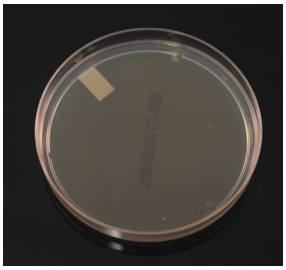


IsoDry: Chest (CFU =17)

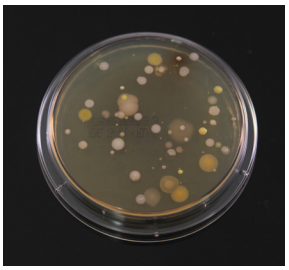


IsoDry: ASP (CFU = 55)

Patient B: ReLeaf



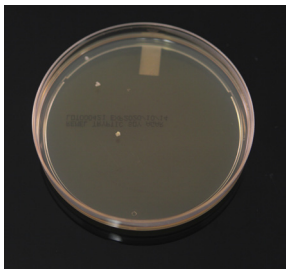
ReLeaf: Chest (CFU = 1)



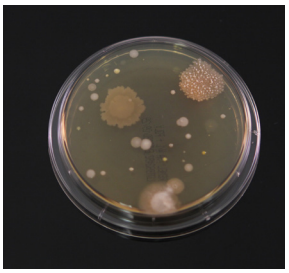
ReLeaf: ASP (CFU = 61)

Patient C

Patient C: HVE

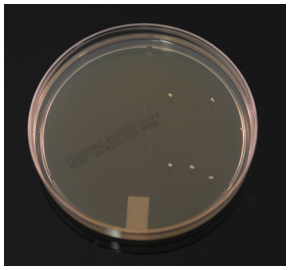


HVE: Chest (CFU = 4)

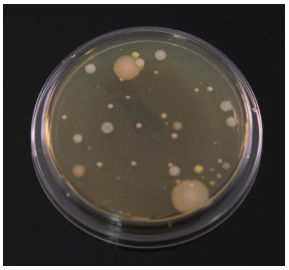


HVE: ASP (CFU = 40)

Patient C: Mr. Thirsty®

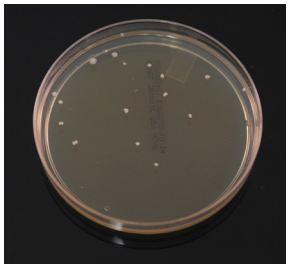


Mr. Thirsty®: Chest (CFU = 6)

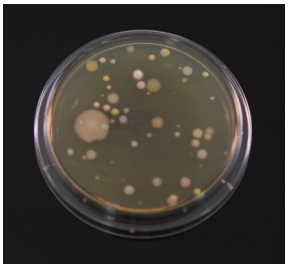


Mr. Thirsty®: ASP (CFU = 51)

Patient C: DryShield

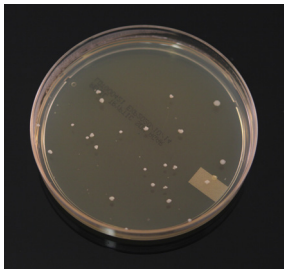


DryShield: Chest (CFU = 29)

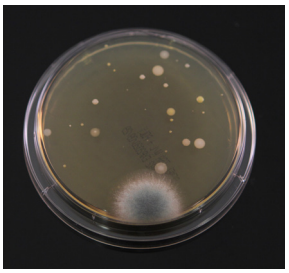


DryShield: ASP (CFU = 53)

Patient C: IsoDry

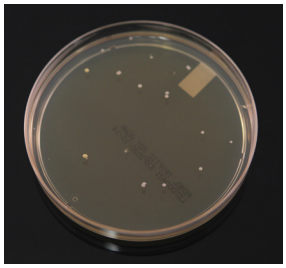


IsoDry: Chest (CFU = 41)

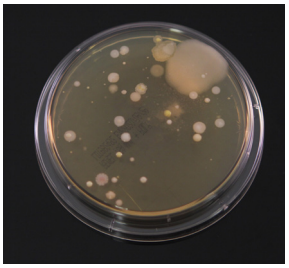


IsoDry: ASP (CFU = 31)

Patient C: ReLeaf



ReLeaf: Chest (CFU = 23)



ReLeaf: ASP (CFU = 56)

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Clinician and Patient Feedback on Hands-Free HVE Devices

Clinician Comments:

- The use of ***Mr. Thirsty®*** seemed to reduce aerosol and spatter. It also gave me the advantage of utilizing a hands-free high-volume suction."
- "I feel that the angle of the hose on ***Isodry®*** is too hard and rigid. Compared to ***Dry Shield®***, it is hard to work around."
- "***Mr. Thirsty®*** was easy to move during procedures, and kept the patient dry. I love it because it provides clear vision and holds the tongue back well. It takes a little practice to place it correctly for the first time."
- "We usually don't use HVE; we use Saliva Ejector and hang it on the patient's cheek. Having a hands-free device is awesome and much less awkward than using traditional HVE. I can still use my mirror."
- "***Ivory® ReLeaf ™*** works well but it is positioned on one side of the mouth. The visual field is good with it and I'm able to use the mirror more easily."
- "There is definitely more water and saliva pooling with ***Ivory® ReLeaf ™***."
- "Many of the hands-free devices may not be appropriate for patients with a gag reflex."

Patient Comments:

- "For ***Isodry®***, we were using the small mouthpiece and it was pressing quite a bit, causing discomfort. Saliva seemed to pool in the back of my mouth and it definitely did not keep me as dry as ***Mr. Thirsty®***."
- "For me as a patient, ***Mr. Thirsty®*** was initially a little rigid and a bit much, but once it was a little wet seemed to fit better. I have a small size mouth and the small size was a little large but not uncomfortable or pressing anywhere like other devices."
- "I did not feel with ***Mr. Thirsty®*** that I was drowning. It kept me very dry and was comfortable."
- "***Ivory® ReLeaf ™*** was definitely more comfortable than the other HVE devices; however, I was completely splashed on my chest and face."
- "I was able to bite down with ***Ivory® ReLeaf ™*** and it increased suction. It was the most comfortable but not comparable to an HVE as an evacuation device. Honestly, as a patient, ***Mr. Thirsty®*** was the most comfortable and kept me the most dry. If I had to pick between ***DryShield, IsoDry*** and ***Mr. Thirsty®*** I would pick ***Mr. Thirsty®*** hands down. It worked and I didn't have a hose pressing on my face."
- "I did not like traditional HVE, it did an ok job suctioning, but I did not love the water all over my face; I felt like I was drowning and it seemed much messier."
- "***Isodry®*** was a little bulky around the connector near my face."
- "***Mr. Thirsty®*** was more comfortable, but as a patient, I think it is important to tell the patient to bite down. It makes it much more comfortable."
- "When having ***Ivory® ReLeaf ™*** in my mouth, I missed the ability to bite down on something. I definitely felt more spatter on my face."

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