

## TC9.6 HealthCare Facilities

Winter Meeting, (Virtual)

January 26, 2021

### MEETING MINUTES

Meeting Minutes reported by Ken Mead, TC 9.6 Secretary

**1) TC called to order at 3:01 pm by Chair Traci Hanegan (TH)**

- a) Leadership Introductions were made.
- b) Zoom tips/instructions
- c) Attendance instructions (56 attendees at start, increased up to 71)- Copy of collective attendance list for Main meeting and all subcommittee meetings is attached App B)
- d) Agenda shared on screen.
- e) Roll call by Ken Mead (KM) - members present confirmed: 12 of 15 quorum voting members present – quorum reached
- f) Also present are 5 excom non-voting members
- g) Reminder of ASHRAE Code of Ethics
- h) Reminder of TC 9.6 Committee Scope
- i) Corresponding members present 51, including 12 noted as PCM
- j) Guests present - 6
- k) YEA members – 7
- l) All Handouts, Agenda, Meeting Minutes (Draft and Final) Sign-in sheets, & subcommittee reports will be posted to the TC website: <http://tc96.ashraetcs.org>

**2) Vice-Chair Comments by Nicolas Lemire (NL):** Welcome, thank you for all your efforts over past year, thanks to Traci for her leadership, what we are doing is important!

**3) Membership Chair Report– Ron Westbrook (RW) (See Master Slides 8-12)**

Voting Members	15
Non-Quorum Members	0
Corresponding Members	104
Provisional Corresponding Members	89

- a) Voting Members Identified to roll off (1 Jul 21): Pavel Likonin, Eric Granzow, Traci Hanegan
  - b) Voting Members Identified to roll on: (1 Jul 21): Ehsan Mousavi, Laurence Wilson, Nicolas Lemire
  - c) Exec. Committee changes:
    - i) Traci Hanegan is rolling off as TC Chair
    - ii) Rolling On
      - (1) Nicolas Lemire – Chair
      - (2) Ken Mead – Vice Chair
      - (3) David Eldridge - Secretary
  - d) PCMs are a 2-yr appointment. Expiring PCM's were evaluated based upon who attended the virtual meeting June 2020 and the attendance list for onsite Jan 2020 meeting in Orlando. 13 PCMs were promoted to CM. 6 were dropped from the roster.
- 4) Chair's Report from TAC Breakfast – Presented by NL**
- a) TAC is meeting last day of TCs, Activity form due tomorrow
  - b) Reprogramming of TCs is still to be implemented, no anticipated impact on 9.6
  - c) New MTG created, entitled VIC (Vent for infection control)
  - d) Phoenix June meeting anticipated to be face-to-face
  - e) ASHRAE PDC seeking ideas for future courses
  - f) ASHRAE is also seeking ideas for future professional certifications

- 5) **Minutes of Previous Meeting**– (KM)
  - a) Meeting Minutes from Jun 2020 Virtual meeting were distributed online to voting members prior to the meeting. Motion to approve the minutes by Dylan Neu. Seconded by Amit Bhansali. Motion passed 14-0-0 CV.
- 6) **Sub-committee Reports**
  - a) Energy – David Eldridge (Copy of full report attached Appendix C)). Approx. 20 people called in.
  - b) Programs – Mark Tome: 26 people).
    - i) Sponsored by TC 9.6
      - (1) Debate 1 (Feb 10 at noon): ACH cfm/sq-ft or something else
      - (2) Sem 25 Feb 11 (0700-0850): Movement and control of airborne pathogens with HVAC systems (Co-sponsored by 1.3, 8.11) {Seminar 25: Movement and Control of Airborne Pathogens with HVAC Systems is Thursday, February 11 7:00 AM – 8:50 AM EST}
    - ii) Future topics: deadline mid-Feb to submit,
      - (1) Pandemic energy use
      - (2) Fault detection and commissioning
      - (3) Alternate care sites, ACS Guidebook, lessons learned
      - (4) Methods of onsite validation (e.g. Travis)
      - (5) Humidity levels (use during pandemic)
      - (6) Dental offices and related contaminant control
      - (7) Filtration & ashrae PD on that
      - (8) Bipolar ionization – “seeking more information”
  - c) Handbook – Pavel Likhonin (Approx 40 on call).
    - i) Continuing to meet regularly throughout year
    - ii) Contributors still having trouble with authoring portal should send email to Heather Kennedy (hkennedy@ashrae.org ) with cc to pavel (plikhonin@dewberry.com )
    - iii) Chapter will be voted on and sent to ASHRAE HdBK by May 2022
  - d) Research – David Thomsen (See report attached, Appendix D). 46 people signed in.
    - i) Thanks to volunteers since summer
    - ii) 6 active RTARs
    - iii) 2 active work statements
    - iv) 4 active RPs
  - e) Infectious Diseases – Ken Mead (See report attached, Appendix E). 51 people signed in to hear three presentations and participate in rigorous discussions.
    - i) Presentation #1 by David Eldridge: Introduction and Overview of Alternate Care Site HVAC Guidebook (ASHRAE & USACE Taskforce: Subcommittee of ASHRAE’s Epidemic Taskforce)
    - ii) Presentation #2 by Travis English: Validation of Engineering Controls and Environmental Aerosol Risk Assessments
    - iii) Presentation #3 by David J. Ahearn, DDS: Dental Practice in the Era of COVID: Exposure Risks and a Search for Control Approaches
- 7) **Webmaster** – George Augustini (see App A, Master Slides #13)
  - a) Web is up to date, including links to some meetings that Mark mentioned
  - b) Question for future discussion: How do we want to use basecamp?
  - c) Website address is <http://tc096.ashraetcs.org>
- 8) **Std 170 Operations Guide** (Ron Westbrook)
  - a) Slides were presented (copy not provided), update similar to July 2020
  - b) Still somewhat in concept development
  - c) Assistance will be needed
- 9) **ALI** – Dan Koenigshofer & Pavel Likhonin
  - a) Give class quarterly webinar
  - b) More emphases on Inf control
  - c) Might push pendulum back due to TMI on covid but will still have heavy emphasis on infection control, aerosols, filtration, ...
  - d) Next class 23 Feb – typical 20-40 people from around world attendees

10) **ASHRAE Epidemic Task Force: The USACE Alternative Care Sites Guide/USACE ACS Guide** –David Eldridge:

- a) ASHRAE/USACE ACS Guide: Alternate Care Site HVAC Guidebook, developed by a joint task force of ASHRAE and USACE with additional contributors from military and private healthcare engineering experts (co-chairs David Eldridge (ASHRAE) & Alexander Zhivov (USACE).
  - i) Vigorous discussion, lots of focus on filtration, humidification, and application of guidance (all diseases or COVID-19)?
  - ii) Completed late 2020
  - iii) Reviewed by task force members and ASHRAE Epidemic Task Force members and should serve as a valuable collaboration between ASHRAE and the US Army Corps of Engineers.
  - iv) Goal is to be useful in current and future efforts combating COVID-19 and future diseases and any associated demand for surge hospital beds.

**11) New MTG – Ventilation for Infection Control (VIC): Rick Hermans (RH)**

- a) About 12 research topics – 2 general groups – (lab based research + field based)
- b) Some of the questions not in our bailiwick
- c) Does virus survive trip through AHU (yes – univ of Oregon, RNA found but not sure if viable)

**12) Liaison Reports**

- a) Std. 170 (Faubert & Sheerin) :
  - i) In process of 2021 version pub. (next month or two)
  - ii) Discussion on humidity – CP rejected due to lack of conclusive evidence of benefit
  - iii) -CP on changing OA required – switching to follow 62.1 method – discussion ongoing
  - iv) Research topics discussion
  - v) Interpretation requests
  - vi) Voted out to advisory pub rev on natural ventilation within healthcare (seeking public input)
  - vii) Next meeting on March 3rd
  - viii) Several addenda issued late CY2020, one in particular addendum S, encouraged to look at – addresses creating a AIIR (allows HEPA recirc in alignment with CDC guidance).
- b) Std. 189.3 (Walt Vernon) – in processing of publishing – working through gally proofs and trying coordinate with 189.1.
- c) Std. 188 (Kevin Scarlett) – [now/also Guideline 12 -2020 version]
  - i) Interested in feedback from TC 9.6
  - ii) Std 514 – new std doc intended to provide direction that coordinates with S188 and Guideline 12 – Draft Review available, docy Risk Mgmt for bldg. water systems, physical, chemical and microbial hazards.
- d) Std. 90.1 - no report.
- e) Std. 55 (Poots) – meeting to be held tomorrow
  - i) 2020 pub after this meeting. Include addenda a-f
  - ii) Dynamic CLO values
  - iii) Reducing lower limit of average air speed
  - iv) Couple months back: increased MET from 2 to 4 – might impact heavily clothed people in hospital
  - v) Vertical temp gradient – used to be static – now going to dynamic range
- f) Std. 62 – no report
- g) MTG Ventilation Air Changes Rates (Lautz) – no report
- h) Environmental Health Committee (Rick Hermans)
  - i) Working towards being more of a standing committee and less of a super TC
  - ii) Several docs recently released, others are being redone (humidity control, IA pos doc – Walt chairing the next Infectious Aerosols Position Document cmte – Representation from WHO because they want to be in alignment with ASHRAE)
- i) RP-1816 (Imaging Equipment Heat Gain) (Walt Vernon, Shannon Bunson)
  - i) Proj on hold due to covid so not much to report
  - ii) Currently conducting pandemic metering study – may be able to use some of those research partners to participate in RP-1816 research. Hoping to get more building access in next few months (or summer).

**13) New Business**

- a) Revision to committee Scope (Dan Koenigshofer):
  - i) See current mission statement (scope)(App A, slide 6)
  - ii) Note nothing there about air quality or infection control!!! {nor comfort}
  - iii) Dan's key elements of a high performance system:

- iv) Performance
- v) Safety
- vi) Reliability
- vii) Maint. Cost
- viii) Energy Cost
- ix) Adaptability in design
- x) Now covered in ALI class/handbook
- xi) Dan proposes we change our scope to adopt the concept
- xii) Good discussion
- xiii) Traci put names of group (Dan, Ron, Duncan, Larry, Rick, Kishor, Linda, Sheldon, Kevin S., Amit B., Eric G.)
- b) Ongoing Epi Task Force work for TC 9.6 (TH): [See slides #14-21 in App A]
  - i) Overview of what's happening recently in ETF
  - ii) Highlighted Frank mills
  - iii) New groups in ETF
  - iv) New on webpage (Core recommendations)
  - v) Communities of faith
  - vi) New FAQs
  - vii) Updated healthcare guidance – constantly updated as new things are learned
  - viii) Roughly half of questions received to Healthcare team are dental related
  - ix) Dismantling myths paper on airborne transmission on sars-2

**14) Meeting adjourned at 5:08pm**



# TC 9.6 Healthcare Facilities

Main Meeting

Tuesday, January 26, 2021

3:00-5:00 p.m. (EST)

## Zoom Tips

- Open “Participants” on Zoom
- If your full name is not displayed, please highlight your name, select “More” and use rename to add our full name.
- Make sure you are on “Mute” unless you are talking or getting ready to talk.
- Keep your webcam off to minimize band width requirements.

# Attendance Sheet

Please go to <https://form.jotform.com/210187687959171>  
and fill out the form so we have a record of your attendance at today's meeting.

# Agenda

Item	Description	Person	Time (min)
1	Introductions, agenda, conference call and attendance documentation instructions	Hanegan	6
2	Roll call, quorum check.	Mead	2
3	Minutes	Mead	2
4	Vice Chair's Comments	Lemire	4
5	Membership Chair Report, Roster Changes, Welcome PCM's	Westbrook	5
6	Chair's Report TAC Breakfast Meeting	Lemire	5
7	Energy Subcommittee Report	Eldridge	4
8	Programs Subcommittee Report	Tome	3
9	Handbook Subcommittee Report	Likhonin	3
10	Research Subcommittee Report	Thomsen	6
11	Infectious Diseases Subcommittee Report	Mead	10
12	Webmaster Report	Augustini	3

13	Std170 Operations Guide	Westbrook	4
14	ALI	Koenigshofer Likhonin	3
15	Epidemic Task Force: The USACE Alternative Care Sites Guide	Eldridge	10
16	MTG Ventilation for Infection Control Update	Hermans	5
	MTG Ventilation Rates (ACH or cfm/sf) Update	Lautz	2
17	Liaison Reports -Std. 170 -Std. 189.3 -Std. 188 -Std 90.1 -Std 55 -Std 62 -Environmental Health	Fauber Vernon Scarlett Boldt Poots / Mora Darwich Taylor	3 2 2 2 2 2 2
18	RP-1816 (Imaging equipment heat gain) status update.	Vernon/Bunsen	2
19	Other New Business – Revision to Committee Scope (Koenigshofer), Ongoing Epidemic Task Force work for TC9.6 (Hanegan)	Koenigshofer, Hanegan	20
20	Closing Remarks	Hanegan	2



In all your interactions at these meetings,  
please remember...

## Code of Ethics

*“As members of ASHRAE or participants in ASHRAE activities, we pledge to act with honesty, fairness, courtesy, competence, integrity and respect for others in our conduct. We will avoid conflicts of interest and behavior that is discriminatory and/or harassing.”*



## TC9.6 Scope

TC 9.6 is concerned with the application of ventilating, air-conditioning, refrigeration, life safety, and energy conservation systems to healthcare (hospital, outpatient, long-term care) facilities.

## Vice Chair Comments



# Membership Report – Ron Westbrook

# TC9.6 Subcommittees

- Handbook (HVAC Applications, Chapter 8)
- Research
- Standards (includes participation on TC 9.6 sponsored standard committees and/or as TC Liaison to cognizant standard committees 55, 62, 90, 188, 189)
- Programs
- Membership
- Healthcare Energy subcommittee
- Infectious Diseases subcommittee
- Honors and Awards
- Webmaster
- ALI Coordinator
- Chapter Technology Transfer
- TC associated MTG's (MTG-ACR, Air exchange rates, Ventilation for Infection Control)

# Roster Changes – Voting Members Effective 8/1/2021

## Rolling Off

- Traci Hanegan
- Pavel Likhonin
- Erik Granzow

## Rolling On

- Nicolas Lemire
- Larry Wilson
- Ehsan Mousavi

# Roster Changes – Excom Effective 8/1/2021

## Rolling Off

- Traci Hanegan as Chair

## Rolling On

- Nicolas Lemire - Chair
- Ken Mead – Vice Chair
- David Eldridge - Secretary

# Join TC9.6

[Home](#)[Membership](#)[Meetings](#)[Documents](#)[Functions](#)[More](#)

## Member Roster

Current as of 6/19/2020

[Join TC 9.6](#)

If you want to become a provisional corresponding member of this TC, click on the "Join TC" button above. You will be automatically added to the roster and will receive all TC communications.

Committee members can download a copy of the complete roster in any of three formats by logging in to their ASHRAE member account, clicking on my account and selecting Committees.

A provisional corresponding member is a two year appointment. Once you demonstrate your engagement by participating in one or more of our subcommittees your membership will be changed to corresponding member. Once a corresponding member, based on your level of interest, participation, and engagement you can be considered for becoming a voting member of TC 9.6.





Website – <https://tc0906.ashraetcs.org/>



## Healthcare Facilities

ASHRAE Technical Committee 9.6

[Home](#)

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### Agenda

[2020 Austin Meeting Agenda TC0906](#)

[2020 Winter Orlando Agenda TC9 6](#)

### Upcoming TC Meetings

Location: [Virtual Conference](#) - Zoom meeting information may be accessed using the links below.

(All meeting are listed in Eastern Time)

#### Wednesday, 01/20/2021

10:00 AM - 11:00 AM [RP 1816 PMS meeting \(Project Monitoring Subcommittee Members Only Please\)](#)

#### Tuesday, 01/26/2021

8:00 AM - 9:30 AM [Infectious Diseases Subcommittee](#)

9:30 AM - 11:30 AM [Research and Handbook](#)

12:00 PM - 1:30 PM [Energy & Program Subcommittees](#)

3:00 PM - 5:00 PM [Main Meeting](#)

[See More](#)

### Committee Chair

[Traci Hanegan](#) [TC0906@ashrae.net](mailto:TC0906@ashrae.net)

### Committee Scope

TC 9.6 is concerned with the application of ventilating, air-conditioning, refrigeration, life safety, and energy conservation systems to healthcare (hospital, outpatient, long-term care) facilities.

[More](#)

### Upcoming Society Conferences

[ASHRAE Virtual Conference](#)  
February 9-11, 2021



# Epidemic Task Force (ETF) - Update

- EHC Cognizant to Epidemic Task Force (ETF) per ASHRAE ExCom
- Primary role is for the ETF to communicate with those involved in the built environment:
  - Review all technical questions/requests for technical guidance submitted
  - Coordinating activities of ASHRAE's internal resources
  - Partnering with and monitoring the activities of external organizations, including the more than 60 members of the [ASHRAE Associate Society Alliance \(AASA\)](#) of organizations related to the HVAC&R industry around the world
  - Reviewing, organizing, consolidating and publishing clear and concise summaries with citations of the most relevant information available to the built environment

# Epidemic Task Force (ETF) - Update

- Working on 1-pagers (In-room air cleaners, Outdoor Dining)
- Science Applications Summaries (Ionizers, UVC dose for SARS-CoV-2)
- COVID-19 resources/guidance page [ashrae.org/covid19](https://www.ashrae.org/covid19). Over 560,000 pageviews.
- Answers to over 1106 questions to web site ([COVID-19@ashrae.org](mailto:COVID-19@ashrae.org) )
- Collaboration with other organizations (ASHE, WHO, CIBSE, REHVA, etc.)
- More than 302 news articles
- Over 6,390,717,361 media impressions
- Preparing to update the infographic (over 54,751 downloads)



## TC9.6 Member Involvement



- TC9.6 Member Frank Mills – post promoting COVID-19 Buildings: Re-occupation after lockdown course
- Liaison between Epidemic Task Force and CIBSE (Chartered Institution of Building Services Engineers)

# Epidemic Task Force (ETF) - Update

## Focus Areas as of January 2021

- Healthcare (including long-term care)
- Residential
- Commercial / retail
- Schools
- Transportation
- Building Readiness
- Laboratories
- Resource inventory
- Science/Literature review
- Filtration and disinfection
- Science Applications
- Industrial
- Communications
- Grassroots/**Government Activities**
- Advocacy / developing economies
- External partnerships

# ETF – New Guidance since Austin Virtual Meeting



**Core Recommendations  
for Reducing Airborne  
Infectious Aerosol  
Exposure**

[LEARN MORE](#)



**ASHRAE Epidemic Task Force  
Laboratory Subcommittee  
Guidance Document**



**Questions Answered**

**Frequently Asked Questions and Glossary  
of Terms**

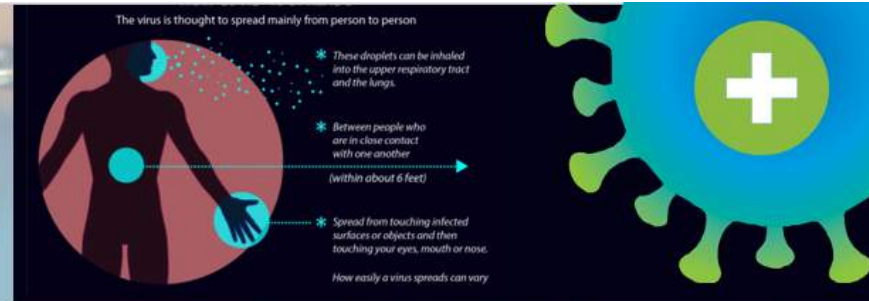






## ASHRAE EPIDEMIC TASK FORCE

HEALTHCARE | Updated 10-22-2020



### BACKGROUND/CONTEXT

- [Modes of Transmission/Aerobiology](#)
- [ASHRAE Statements on Airborne Transmission](#)
- CDC recommends Airborne Infection Isolation rooms for aerosol generating procedures (AGPs)
- [Secondary Infection Susceptibility](#)
- Committing Airborne Infection Isolation rooms for use as inpatient rooms limits future flexibility. Work with clinical staff to establish use requirements.
- [Cohorting – Cautions and current methods](#).
- See [ASHRAE COVID-19](#)
- ASHRAE members have provided input on [Disaster Planning and Emergency Management for Healthcare Facilities](#). Partner on your local professional engineering partners for input and guidance during this time.

### GOALS

- Do No Harm
- Protect Healthcare Workers, Family, and Visitors
- Protect Other Patients
- Empower people to make and carry out the best decision they can.
- Work as a team – weigh competing concerns, define key areas, share the plan.
  - Consider the type of HVAC system, the configuration, clinical needs, facility infrastructure capacity, and limited resources available.

### LIFE SAFETY

- Confirm that power-consuming equipment is connected to the appropriate branch of the essential power system.
- Maintain Egress
- Consider defend-in-place plans and smoke compartments
- Increased facility oxygen use elevates risk of a fire spreading more rapidly
- [First responder protection](#).
- Develop Interim Life Safety Measures as applicable

### SUGGESTED APPROACHES

- [Passive Isolation](#)
- [Strategically utilize All Rooms](#)
- [Airflow from Clean to Less Clean](#)
- [Increase Filtration Level if possible](#)
- [Guidance on Recirculation and Increased Outside Air](#)
- [Maintain relative humidity at 40-60%](#).
- [Evaluate continued operation of recovery wheels](#)
- [Improve/Consider room airflow direction/patterns](#)
- [Utilize portable ante rooms/vestibules with HEPA filtration](#)
- Utilize UV light (see [Facilities/Maintenance – Disinfection](#))
- Areas for non-COVID patients should still be treated with care because someone could be unknowingly infected.

### SPECIFIC “HOW-TO” AND UNIQUE AREAS

- [Layered approach for normal and small surge operations](#)
- [Source Control Options](#) for patient beds
- [Operating on COVID-19 positive patient](#)
- [Variable Air Volume Adjustments & Modification to economizer or reduced recirc.](#)
- [Cautions on Recirculating Room Units](#) (Fan coils, induction units, etc.)
- [2-person patient rooms](#) – creating or managing existing
- [Use Operating rooms for inpatient rooms/temp ICU](#)
- [Emergency Department](#)
- [Warning on Older ICU units](#)
- Transmission through the air in toilet rooms
- Provide areas for safely doffing PPE, such as shoe cover removal followed by “tacky mats” for personnel exiting an area.
- [Gastrointestinal Endoscopy](#)

### SURGE AREAS

- [Initial Considerations](#)
- [Alternate Care Site Design Concepts](#)
- [Single patient room considerations vs. 2-patient rooms](#)
- [General Parameters for ACH, Temp, Filtration, and RH](#)

### FACILITIES/MAINTENANCE

- [PPE basics](#)
- [Filter changing](#)
- [Room turnover](#)
- Verify performance of critical HVAC systems – airborne infection isolation rooms, Emergency Departments, etc.
- Disinfection: [Normal, UV, VHP, Hypochlorous Acid](#)
- See [ASHRAE COVID-19 Filtration and Disinfection section for greater detail](#).
- Considering the possibility of being short-staffed in the future, run-test and re-fuel emergency generator system.
- Coordinate any planned rescheduling or postponement of Inspection, Testing, Maintenance (ITM) with local or state AHJ. Submit waivers as required.
- Check to be sure COVID-19 area AHU return air isn't being used to condition mechanical rooms.
- [Waterborne Pathogen Prevention](#)

### MEDICAL GAS/VACUUM SYSTEMS

- Demand for gasses in [ICU rooms](#)
- Demand for gasses in [med-surg rooms and OR's](#)
- [Accommodating increased demand \(flow\) in fixed piping systems](#)
- [Impact of demand/consumption on existing gas systems](#)
- Consider providing [supplementary gas sources](#)

### OTHER

- Reduce # of rooms utilized off a single HVAC system to free up AHU capacity to achieve performance goals. 25 beds with desired airflow/temps better than 30 beds with airflow/temp deficiencies.
- Document the Action Plan and Alternations in Place. Obtain AHJ approval for long-term alternations.
- [Healthcare Team Members](#)
- [Acknowledgements & Disclaimer](#)



Half of all Epidemic Task Force  
Inquiries through the COVID-19  
website assigned to the  
Healthcare Team were Dental  
related.



REVIEW ARTICLE | ARTICLES IN PRESS

## Dismantling myths on the airborne transmission of severe acute respiratory syndrome coronavirus (SARS-CoV-2)

Julian W. Tang • William P. Bahnfleth • Philomena M. Bluyssen • ... Raymond Tellier • Pawel Wargocki •  
Stephanie J. Dancer   • [Show all authors](#)

Published: January 12, 2021 • DOI: <https://doi.org/10.1016/j.jhin.2020.12.022>



## Appendix B

Submission Date	First Name	Last Name	Phone Number	E-mail	Affiliation / Company	Which meeting(s) are you attending?
2021/01/26 14:11:42	Aaron	Johnson		aaron.johnson@tlc-eng.com	TLC Engineering Solutions	Main TC meeting
2021/01/26 10:08:13	Aaron	Johnson	(407) 810-0440	aaron.johnson@tlc-eng.com	TLC Engineering Solutions	Infectious Diseases
2021/01/26 10:05:36	Aaron	Johnson	(407) 810-0440	aaron.johnson@tlc-eng.com	TLC Engineering Solutions	Handbook
						Handbook
2021/01/26 08:34:43	Austin	Barolin	(609) 206-1991	abarolin@mazzetti.com	Mazzetti	Research
						Infectious Diseases
						Program
						Handbook
						Research
2021/01/26 07:11:34	Alejandro	Falcon Bonilla	(050) 694-1996	alejandro.falconbonilla@aecom.c	AECOM	Main TC meeting
						Infectious Diseases
						Handbook
						Research
2021/01/26 10:05:58	Amit	Bhansali		amit.bhansali@wsp.com	WSP	Main TC meeting
2021/01/26 14:04:08	Anand	Seth		anandseth004@gmail.com	ASA Engineers	Main TC meeting
2021/01/26 08:35:16	Anand	Seth		anandseth004@gmail.com	ASA Engineers	Handbook
2021/01/26 07:08:21	Antonio	Lewis		antonio.lewis@siemens.com	Siemens Industries	Infectious Diseases
						Infectious Diseases
						Program
						Handbook
						Research
2021/01/26 11:12:35	ARDAS	SABUNCUYAN	(214) 240-8856	ardas1968@gmail.com	TDINDUSTRIES.COM	Main TC meeting
						Research
2021/01/26 13:20:20	paul	supan	(703) 509-0666	astro@mindspring.com	American Dental Assoc.	Main TC meeting
2021/01/26 13:18:02	paul	supan	(703) 509-0666	astro@mindspring.com	ADA	Infectious Diseases
2021/01/26 08:36:22	Brendon	Burley	(443) 500-7685	bburley@bkma.com	Burdette, Koehler, Murphy and	Research
2021/01/26 14:08:13	Brad	Cochran	(970) 227-1462	bcochran@cppwind.com	CPP, Inc.	Main TC meeting
						Infectious Diseases
						Program
						Handbook
						Research
2021/01/26 07:09:02	Chris	Kirchner	(157) 148-2095	ckirchner@jjkllc.com	Kirlin Design Build, LLC	Main TC meeting
2021/01/26 07:06:38	David	Anderson	(814) 269-9300	danderson@hflenz.com	HF LENZ	Infectious Diseases
						Infectious Diseases
						Program
						Handbook
						Research
2021/01/26 07:06:04	David	Thomsen		david.thomsen@providence.org	Providence	Main TC meeting

2021/01/26 14:09:48	Douglas	Barnes	(216) 339-7185	dbarnes@karpinskieng.com	Karpinski Engineering	Main TC meeting Infectious Diseases Program Handbook Research
2021/01/26 08:32:33	Douglas	Barnes	(216) 339-7185	dbarnes@karpinskieng.com	Karpinski Engineering	Main TC meeting Infectious Diseases Program Handbook Research
2021/01/26 08:35:48	Debbie	Kielt	(407) 497-1035	debbie.kielt@carrier.com	Carrier Corporation	Main TC meeting Infectious Diseases Program
2021/01/26 07:08:09	David	Eldridge	(773) 490-5038	deldridge@grummanbutkus.com	Grumman/Butkus Associates	Main TC meeting
2021/01/26 10:05:40	Dan	Koenigshofer	(919) 425-7616	dkenigshofer@dewberry.com	Dewberry Engineers	Main TC meeting Infectious Diseases Program Research
2021/01/26 08:35:59	duncan	curd	(647) 403-4328	duncan.curd@dristeem.com	DriSteem	Main TC meeting
2021/01/26 14:04:33	Duncan	Phillips	(519) 823-1311	duncan.phillips@rwdi.com	RWDI	Main TC meeting
2021/01/26 14:04:01	Duncan	Phillips	(519) 823-1311	duncan.phillips@rwdi.com	RWDI	Infectious Diseases Infectious Diseases Program Handbook Research
2021/01/26 07:06:21	Eric	Granzow	(309) 269-8767	egranzow@specializedeng.com	SES	Main TC meeting Handbook Research
2021/01/26 08:35:16	Erick	Phelps		ephelps@ssr-inc.com	Smith Seckman Reid	Research
2021/01/26 08:34:12	Erica	Eskins	(419) 217-3821	erica@watermanagementadvisor	Water Management Advisors,	Research
2021/01/26 07:11:16	Erica	Eskins	(419) 217-3821	erica@watermanagementadvisor	Water Management Advisors,	Infectious Diseases Infectious Diseases Program Handbook Research
2021/01/26 07:07:16	George	Augustini	(303) 409-6550	gaugustini@ssr-inc.com	Smith Seckman Reid	Main TC meeting
2021/01/26 14:09:39	Steven	Welty		greencleanair@aol.com	Green Clean Alr	Main TC meeting
2021/01/26 07:07:05	Steven	Welty		greencleanair@aol.com	Green Clean Alr	Infectious Diseases Program
2021/01/26 08:34:27	Traci	Hanegan	(509) 328-2994	hanegan@coffman.com	Coffman Engineers	Main TC meeting
2021/01/26 08:33:44	Traci	Hanegan	(509) 328-2994	hanegan@coffman.com	Coffman Engineers	Handbook
2021/01/26 08:33:08	Traci	Hanegan	(509) 328-2994	hanegan@coffman.com	Coffman Engineers	Research

2021/01/26 07:06:52	Traci	Hanegan	(509) 328-2994	hanegan@coffman.com	Coffman Engineers	Infectious Diseases
2021/01/26 14:10:50	Heather	Schopplein	(707) 318-4307	hschopplein@gmail.com	University Mechanical & Engin	Main TC meeting Infectious Diseases Program
2021/01/26 08:35:19	James	Piscopo	(732) 768-4232	james.piscopo@gmail.com	Ballinger	Main TC meeting
2021/01/26 14:03:59	John	Carter	(970) 221-3371	jcarter@cppwind.com	CPP, Inc.	Main TC meeting
2021/01/26 11:07:05	John	Carter	(970) 221-3371	jcarter@cppwind.com	CPP, Inc.	Program
2021/01/26 10:04:58	John	Carter	(970) 221-3371	jcarter@cppwind.com	CPP, Inc.	Handbook
2021/01/26 08:42:54	John	Carter	(970) 221-3371	jcarter@cppwind.com	CPP, Inc.	Research
2021/01/26 07:12:38	John	Carter	(970) 221-3371	jcarter@cppwind.com	CPP, Inc.	Infectious Diseases
2021/01/26 14:16:52	John	Castelvecchi	(804) 644-3021	JCastelvecchi@sjincva.com	Shultz & James, Inc.	Main TC meeting Infectious Diseases Program Handbook Research
2021/01/26 07:35:47	Jeffrey	Cichonski	(860) 760-7469	jeffc@bvhis.com	BVH Integrated Services	Main TC meeting
2021/01/26 06:59:17	Jonathan	Flannery	(501) 813-2400	jflannery@aha.org	ASHE	Main TC meeting Research
2021/01/26 10:15:25	Juli	Johnson	(404) 606-2161	jjohnson@newcomb-boyd.com	Newcomb & Boyd	Main TC meeting
						Infectious Diseases Program Handbook Research
2021/01/26 10:07:38	Josephine	Lau	(402) 554-2079	jlau3@unl.edu	University of Nebraska	Main TC meeting
2021/01/26 08:35:52	john	aykroyd	(972) 809-0862	john.aykroyd@chemaqua.com	Chem-Aqua inc	Infectious Diseases Infectious Diseases Handbook Research
2021/01/26 07:00:29	Jeremy	Fauber	(937) 224-0861	jpfauber@heapy.com	HEAPY	Main TC meeting
2021/01/26 14:06:13	John	Putnam	(571) 215-1059	jputnam@ieqhealth.com	Environmental Dynamics Inc.	Main TC meeting Research
2021/01/26 11:56:13	John	Putnam	(571) 215-1059	jputnam@ieqhealth.com	Environmental Dynamics Inc.	Main TC meeting Infectious Diseases Program
2021/01/26 07:31:53	John	Putnam	(571) 215-1059	jputnam@ieqhealth.com	Environmental Dynamics Inc.	Program
2021/01/26 14:03:29	Katja	Auer	(979) 219-2477	kauer@auvco.com	American Ultraviolet	Main TC meeting
2021/01/26 07:00:37	Katja	Auer	(979) 219-2477	kauer@auvco.com	American Ultraviolet	Infectious Diseases
2021/01/26 14:12:07	Ken	Frazier	(410) 579-8100	ken.frazier@wsp.com	Leach Wallace Associates/WSP	Research
2021/01/26 14:10:05	Ken	Frazier	(410) 579-8100	ken.frazier@wsp.com	Leach Wallace Associates/WSP	Main TC meeting
2021/01/26 14:08:25	Ken	Frazier	(410) 579-8100	ken.frazier@wsp.com	Leach Wallace Associates/WSP	Infectious Diseases

2021/01/26 14:08:32	Kevin	Scarlett	(360) 688-0771	kevin.scarlett@doh.wa.gov	WA Dept of Health	Main TC meeting
2021/01/26 08:34:59	Kishor	Khankari	(734) 327-4079	kishork@ansight.com	AnSight LLC	Research Infectious Diseases Handbook Research
2021/01/26 07:00:45	Ken	Mead		kmead@cdc.gov	CDC/NIOSH	Main TC meeting
2021/01/26 14:04:42	Laurence	Wilson	(630) 202-9003	laurence.wilson@wsp.com	WSP USA	Main TC meeting
2021/01/26 07:12:35	Laurence V.	Wilson, P.E.	(630) 202-9003	laurence.wilson@wsp.com	WSP USA	Infectious Diseases
2021/01/26 14:04:29	LINDA	Lee	(281) 639-0386	Linda@lindadleehcllc.org	Linda D Lee Healthcare Consult	Main TC meeting Program Handbook
2021/01/26 08:38:59	Linda	Lee	(281) 639-0386	Linda@lindadleehcllc.org	Linda D Lee Healthcare Consult	Research
2021/01/26 06:59:36	Linda	Lee	(281) 639-0386	Linda@lindadleehcllc.org	Linda D Lee Healthcare Consult	Infectious Diseases Infectious Diseases Program
2021/01/26 07:06:08	Mark	Tome	(717) 814-8237	mark.tome@sitelogiq.com	Sitelogiq	Main TC meeting
2021/01/26 07:09:35	Martin	Stangl	(519) 242-6484	martin.stangl@rwdi.com	RWDI Consulting Engineers and	Infectious Diseases
2021/01/26 14:09:59	Mark	Bender	(619) 704-1900	mbender@benderdean.com	Bender Dean Engineering	Main TC meeting
2021/01/26 11:53:21	Mark	Bender	(619) 704-1900	mbender@benderdean.com	Bender Dean Engineering	Program
2021/01/26 11:17:05	Mark	Bender	(619) 704-1900	mbender@benderdean.com	Bender Dean Engineering	Research Infectious Diseases Handbook Research
2021/01/26 14:08:29	Mike	Keen	(905) 334-1189	michael.keen@unityhealth.to	Unity Health Toronto	Main TC meeting
2021/01/26 14:03:19	Michael	Sheerin		michael.sheerin@tlc-eng.com	TLC Engineering Solutions, Inc.	Main TC meeting
2021/01/26 10:31:08	Michael	Sheerin		michael.sheerin@tlc-eng.com	TLC Engineering Solutions, Inc.	Handbook
2021/01/26 10:05:28	Michael	Sheerin		michael.sheerin@tlc-eng.com	TLC Engineering Solutions, Inc.	Research
2021/01/26 07:17:39	Michael	Sheerin		michael.sheerin@tlc-eng.com	TLC Engineering Solutions, Inc.	Infectious Diseases
2021/01/26 14:06:37	Michael	Craig		mike.craig@rwdi.com	RWDI	Main TC meeting
2021/01/26 14:04:07	Mark	Malkin	(608) 263-3371	mmalkin@wisc.edu	University of Wisconsin - Madison	Main TC meeting Infectious Diseases Program Handbook Research
2021/01/26 07:06:36	Nicolas	Lemire	(514) 953-3996	nlemire@pageaumorel.com	Pageau Morel	Main TC meeting Infectious Diseases Program Handbook Research
2021/01/26 08:34:41	Justin	Opperman	(507) 422-6359	opperman.justin@mayo.edu	Mayo Clinic	Main TC meeting

2021/01/26 08:35:46	Oscar	Cobb	(313) 442-8483	oscar.cobb@smithgroup.com	SmithGroup	Research Main TC meeting Infectious Diseases Handbook Research
2021/01/26 07:12:08	Thomas	Parker	(416) 553-6713	parkerth@smh.ca	Unity Health Toronto	Main TC meeting
2021/01/26 07:07:36	Peter	Gerngross	(202) 236-3473	Peter.Gerngross@va.gov	Department of Veterans Affairs	Infectious Diseases Infectious Diseases Program Handbook Research
2021/01/26 11:15:22	Pavel	Likhonin	(919) 425-7623	plikhonin@dewberry.com	Dewberry	Main TC meeting
2021/01/26 09:01:48	Pavel	Likhonin	(919) 425-7623	plikhonin@dewberry.com	Dewberry	Research
2021/01/26 06:59:59	Pavel	Likhonin	(919) 425-7623	plikhonin@dewberry.com	Dewberry	Infectious Diseases
2021/01/26 08:37:15	Ricardo	Walker	(407) 841-9050	ricardo.walker@tlc-eng.com	TLC Engineering Solutions	Handbook
2021/01/26 08:35:53	Ricardo	Walker	(407) 841-9050	ricardo.walker@tlc-eng.com	TLC Engineering Solutions	Handbook Infectious Diseases Research
2021/01/26 07:36:36	Roger	Lautz	(608) 220-1315	rlautz@aeieng.com	Affiliated Engineers	Main TC meeting Research
2021/01/26 08:42:06	Rick	Peters	(206) 842-0143	rp@tbs-engineering.com	TBS Engineering	Main TC meeting
2021/01/26 07:02:51	Rick	Peters	(206) 842-0143	rp@tbs-engineering.com	TBS Engineering	Infectious Diseases
2021/01/26 14:03:36	Ronald	Westbrook	(315) 420-7269	rwestbrook@twcny.rr.com		Main TC meeting Infectious Diseases Program Handbook Research
2021/01/26 10:05:08	Stephanie	Mages	(202) 744-6749	s_mages@yahoo.com	GEM LLC	Main TC meeting
2021/01/26 14:12:55	Shannon	Bunsen		sbunsen@mazzetti.com	Mazzetti	Main TC meeting Infectious Diseases Program Handbook Research
2021/01/26 08:34:48	Sean	Hecker	(131) 626-2269	sean.hecker@pec1.com	PEC	Main TC meeting Handbook Research
2021/01/26 10:05:18	Gina	Semerad	(212) 530-9454	semeradg@jbb.com	JB&B	Main TC meeting
2021/01/26 14:05:22	Scott	Hammond	(740) 277-9286	shammond@nemiconline.org	NEMIC	Main TC meeting
2021/01/26 14:03:23	Shannon	Schmidt	(618) 616-6411	shannon.schmidt@aafintl.com	AAF/Flanders	Main TC meeting
2021/01/26 10:05:29	Shannon	Schmidt	(618) 616-6411	shannon.schmidt@aafintl.com	AAF/Flanders	Infectious Diseases
2021/01/26 14:10:42	Tim	Earhart	(814) 241-7463	tearhart@comcast.net	MBP	Main TC meeting

2021/01/26 08:36:48	Ted	Folstad	(952) 658-7254	TFolstad@PrecisionAirProducts.c	Precision Air	Research
2021/01/26 06:59:43	Thomas	Mastbaum	(937) 823-2029	tom.mastbaum@tem-associates.	TEM Associates	Main TC meeting
						Infectious Diseases
						Infectious Diseases
						Program
						Handbook
						Research
2021/01/26 08:34:54	Travis	English	(714) 469-9553	travis.r.english@kp.org	Kaiser Permanente	Main TC meeting
						Infectious Diseases
						Program
						Handbook
						Research
2021/01/26 08:36:05	Viken	Koukounian	(647) 464-6800	viken@logison.com	KRM	Main TC meeting
						Infectious Diseases
						Research
2021/01/26 08:36:26	Walt	Vernon	(415) 652-4222	walt.vernon@gmail.com	Mazzetti	Main TC meeting
						Infectious Diseases
						Handbook
						Research
2021/01/26 07:10:23	Dylan	Neu		xhw2@cdc.gov	CDC/NIOSH	Main TC meeting
2021/01/26 14:03:50	Zacc	Poots	(310) 413-1767	zacc@toroaire.com	ToroAire	Research
2021/01/26 12:04:29	Zacc	Poots	(310) 413-1767	zacc@toroaire.com	ToroAire	Main TC meeting

**Energy Subcommittee**  
**Agenda / Minutes**  
**Tuesday, January 26, 2021**  
**12 p.m. - 1 p.m. EST**

AGENDA / MINUTES

1. Roll Call / Introductions
2. No previous meeting due to pandemic
3. Towards Zero Guide
4. Energy end-use breakdown
5. Program ideas from energy subcommittee:
  - a. Pandemic energy use, I have some case studies, would others join?
    - a. David Thomsen: sees similar effect at Providence
    - b. Tracy: NYSERDA provided a study of this based on ETF measures such as outside air, UV lights, etc. ETF reviewing papers now. Could be public by February/March. Some hospitals were included.
    - c. Walt: NFPA study for electrical loads, metered ~8 hospitals in six states looking at branch circuits. Interesting correlation between patients and energy use / power. Started in March. NFPA wants one year of data.
  - b. MBCx / FDD been kicking this one down the road but also interested to participate. Maybe send a questionnaire to find out what questions people have.
  - c. ACS HVAC Guidebook – may not be needed if vaccines roll out
6. New business:
  - a. Walt: how are states doing with complying to the most recent versions of ASHRAE 90.1 as they roll out. How are hospitals complying, what can be done to improve adoption of the newer versions?
    - i. Terry Sharp: Standard 100 energy targets being updated from 2003 to 2012 shows median value has increased 3% from 2003 to 2012 (PRELIMINARY!) in terms of kBtu/sf/year.
    - ii. David Thomsen at Providence: built one new hospital during this period, not many new whole greenfield sites there, much more renovation/addition. Notes that many new buildings are MOB's and outpatient, care center, etc. (DSE commentary)
    - iii. Walt: healthcare systems that operate in CA, OR, WA and the north division cost less and use less energy when built.
    - iv. David Thomsen: 2012 hospital is 115 kBtu/sf/year but that's a rare new replacement hospital.



## TC9.6 Research Subcommittee Report

- Subcommittee met this morning January 26, 630am PT Start
- 50-60 attendees
- Great volunteer effort!
- Presentation
  - California Energy Commission Research at Kaiser Permanente Hospital
    - Phase 1 – sensors and baseline, Phase 2 – CAV to VAV conversion, Phase 3 – IAQ
  - Notable
    - 2-12 ACH have little difference
    - Natural gas savings 22-29%, Electrical savings 31-39%
    - No direct correlation between IAQ and ventilation rate

## TC9.6 Research Subcommittee Report

- Four ongoing sponsored or co-sponsored research projects
- Eight ongoing sponsored development projects
- One co-sponsored development project
- One potential co-sponsorship development publication
- Action Items
  - Chair to forward development documents to sub-committee for review
  - Upon review, forward to main committee for voting

# Sponsored and Co-Sponsored Research

- TC9.6 Sponsor - RP-1816: Reporting the Energy Use and Heat Gain from Imaging Equipment
  - Oscar: COVID delay – data being collected but no access, hoping for summer 2021 restart
- TC9.6 Co-sponsor - 1833 RP: Literature Review for Evidence of the Basis for Specified Air Change Rates (ACR) for Cleanrooms, Laboratories, and Healthcare Facilities with medium to high ACR.
  - Roger/Kishor: COVID delay - target completion June 2022
- TC9.6 Co-sponsor - RP-1760: Update of clothing database for existing and new Western clothing ensembles, including effects of posture, body and air movement
  - Mike: COVID delay – medical portion not completed
- TC9.6 Co-sponsor - RP-1780: Test method to evaluate cross-contamination of gaseous contaminant within total energy recovery wheels.
  - Brendon: COVID delay - research lead change/COVID delay – deadline of March 2022

# Sponsored Research Development

- 1889 WS: Graywater use in Healthcare Facilities; determining risk and appropriate design responses
  - Eric/Erica/Tyler: Advancing – distribution to TC for voting soon (research sub-committee and RL reviewing)
- 1864 WS: Investigating the applicability of Standard 62.1's Ventilation Rate Procedure for Healthcare Rooms
  - Paul/Ken/Kathleen/Alejandro/Arun/Abdel: Advancing - distribution to TC for voting soon (research sub-committee and RL reviewing)
- XXXX RTAR: Anteroom ventilation rate, temperature range, pressure relationship, and boundary conditions
  - Kishor/Ken/Tom: Limited movement
- XXXX RTAR: Ventilation Mixing/Dilution – air flow patterns and air change rates
  - Kishor/Ken/Tom: Team has been discussing, potential to incorporate Travis/KP research
- XXXX RTAR: Big Data Operating Room Air Change Analysis
  - Juli/Tom/Sean/Gina: Team has been discussing, will be connecting with RP-3 leads Roger and Fred for further direction
- XXXX RTAR: Efficiency of filtration with respect to the extra cost and energy burdens
  - Ardas/Kathleen/Ramon/Geoff: Advancing - distribution to TC for voting soon (research sub reviewing and RL complete)
- XXXX RTAR: Recirculation efficiency in reducing energy consumption when compared with the potential of infection transmission costs
  - Ardas/Kathleen/Ramon/Geoff: Starting now
- XXXX RTAR: Understanding the appropriate application of humidity and temperature control strategies across climate zones on infectious aerosol transmission
  - Alejandro/Duncan/Traci: Connecting with S170 Workgroup (Amit, Jonathan, etc)

# New Research Development

- XXXX RTAR: Bathroom ventilation design
  - Steve/Ken/Rick/Travis/Kishor/Linda/Stephanie
- XXXX RTAR: Local exhaust ventilation/commissioning protocol
  - Dr Ahearn gave presentation on dental intervention
  - Ken/Mike/Travis

# Co-Sponsored Research Development

- TC9.6 Co-sponsor - 1873 WS: UVGI Design Applications for Large Volume Spaces
  - Ken: RAC approved with reasonable comments
- TC9.6 Co-sponsor - PTAR: Publication - Guidelines for State Codes on Secondary Water Treatment Systems for Buildings
  - Eric: Research sub-committee reviewing and will inform TC of support (or not) of co-sponsor

Thanks

# TC 9.6 Infectious Disease Subcommittee

## Meeting 1/26/2021

Introductions: Only presenters were introduced to save time and hassle in a virtual environment

Presentation #1 by David Eldridge: *Introduction and Overview of Alternate Care Site HVAC Guidebook (ASHRAE & USACE Taskforce: Subcommittee of ASHRAE's Epidemic Taskforce)*

Presentation #2 by Travis English: *Validation of Engineering Controls and Environmental Aerosol Risk Assessments*

Presentation #3 by David J. Ahearn, DDS: *Dental Practice in the Era of COVID: Exposure Risks and a Search for Control Approaches*

### Chat Log and Paraphrased Verbal Responses

#### From Steve Welty to Everyone: 08:03 AM

<https://www.sciencedirect.com/science/article/pii/S0160412020317876> How can airborne transmission of COVID-19 indoors be minimised

#### From Katja Auer to Everyone: 08:03 AM

Thank you Steve!

#### From David Anderson to Everyone: 08:04 AM

of course, IT blocks the page on my end :-(

#### From Traci Hanegan to Everyone: 08:04 AM

Here is the attendance link if you want to copy it into your browser.

<https://form.jotform.com/210187687959171>

#### From Alain Trahan iPad to Everyone: 08:08 AM

atrahan@h2obiotech.com

atrahan@h2obiotech.com TC 3.6 Water Treatment Chair Here to see if we need to establish a Liaison with our TC. Thank you.

### During Presentation #1 Alternate Care Site HVAC Guidebook

#### From Michael Meteyer to Everyone: 08:24 AM

Can you explain the logic for using Merv 14 on supply air and HEPA filter for exhaust?

Verbal Response from Eldridge: HEPA used for air recirculated to space

#### Verbal question from Ken Mead: What's next?

Verbal Response from Eldridge: No formal process for how this is revised, but comments can be sent to Alexander, David, or to the TC. If enough new info came in I think ASHRAE and other shareholders would be supportive of an effort to update it.

#### From Michael Meteyer to Everyone: 08:29 AM

Was there any tracking of infection or HAI from ACS?



Verbal: I don't know, this was on the construction side, we didn't have jurisdiction to track that. Sites built at the beginning weren't apparently tracking or counting

**From Kishor Khankari to Everyone: 08:29 AM**

Are you recommending negative pressure pods? If yes, what is your design recommendation to maintain negative pressure?

Verbal response: Yes. One of the choices would be to have individual patient rooms or containers provided. The scenarios are laid out for where the air comes in and out with illustrations.

**From Viken Koukounian to Everyone: 08:30 AM**

Does the document address other IEQ parameters?

Verbal: Probably, we refer to 170, so it talks about filtration and particulates

**From Viken Koukounian to Everyone: 08:34 AM**

Thank you for the reply. I was wondering if the document went beyond ventilation/air quality and touched upon other items (while seemingly less 'critical' to health/operation) such as lighting, acoustics, thermal, etc. Thanks.

-Vik

**From Larry Wilson to Everyone: 08:32 AM**

in an ACS, were the base building HVAC systems turned off with just the local/dedicated newly provided systems used?

Verbal response: It could be either way. The corps wants to stay low cost and quick deployment. Thus if base building HVAC was available, it was used.

**From Steve Welty to Everyone: 08:32 AM**

How did you arrive at 30% rh minimum? 170 allows 20%.

Verbal response: This was one of our big discussion points. Looking at the research for the aerosol transmission, for this virus, we wanted higher than the minimum if possible. We understand not all sites will be able to do that

**From dkoenigshofer to Everyone: 08:34 AM**

we were half done with a VA home when Covid hit. They had us redesign to incorporate central, 100% OA precond wings and central exh. Pavel knows more details

**From David Eldridge to Everyone: 08:36 AM**

Thanks Dan, I'll follow up with Pavel

**During Presentation #2: Travis English: Validation of Engineering Controls and Environmental Aerosol Risk Assessments**

**From Jeremy Fauber to Everyone: 08:43 AM**

Is there any more information on why 500 CFM HEPA unit only netted 65 CFM? Was unit not doing 500 CFM, was it not mixing well with room, or some other thought?

Verbal response: I think it has to do with mixing. We don't know for sure. Ceiling supply and return seems to mix pretty well. When you add other systems, the mixing seems to not work as well

#### From Rick Hermans to Everyone: 08:52 AM

Is the Aqua Net a play on Aerosol term?

Verbal response: No that's just our aerosol surrogate. A 10-15 second puts about 1500-2000 micrograms of aerosol in the air. When we test the headboard, you can't use hairspray because of the velocity

#### From RPM 3 to Everyone: 08:52 AM

Did you run into any circumstances where you found yourself measuring aerosol that you did not generate with your fouling

Verbal response: Mostly no. Most hospitals have very clean air ( $PM_{2.5} < 10$  or even zeroing out). In that scenario, it's really easy to get fouling

#### From Duncan Phillips to Everyone: 08:52 AM

I too am surprised by the poor assistance provided by the HEPA unit. Was that unit located near the intake or exhaust in that the clean Air was short circuited out of the room or were you cleaning new air to the room? the HEPA unit should be better.

Verbal response: Verbal response: I agree. If you are adding a HEPA unit the room, we found that moving it around the room can help. Directionality and velocity definitely matter. But adding floor mixing

#### From RPM 3 to Everyone: 08:53 AM

did you do any QA/QC checks on your AMAZON aerosol detectors. does the hairspray foul your detector?

Verbal response: We don't QC them, but we do check against each other. We have not had a detector that failed from the hair spray

#### From dkoenigshofer to Everyone: 08:53 AM

with the headboard unit, where did you do sampling?

Verbal response: Will send the pictures, we had 2 meters one around the knees on the bed, on by the feet, and one in the room

#### From Peter Gerngross to Everyone: 08:54 AM

So a possible take home message is doors might be a plan for future clinic builds? This is not current state for many dental clinics.

Verbal response: I don't know yet, but you should talk to Mike Meteyer, but yes

#### From Steve Welty to Everyone: 08:55 AM

what was the size of the aerosols generated? You were measuring .3 micron particles exclusively which are very hard to generate. Why didn't you measure 2.5 micron particles?

Verbal response: The can of hair spray produces a good distribution of size from .1 to 3 micron. We also used a salt aerosol from a household humidifier. We measured multiple sizes but not shown on slides

From Michael Sheerin to Everyone: 08:55 AM

Is the HEPA unit a sample test of one ?

Verbal response: We tested multiple units depending on the space.

From RPM 3 to Everyone: 08:55 AM

are you at liberty to share your slides? lots of great information but you talk faster than I think :-)

From Pavel Likhonin to Everyone: 08:56 AM

Yes, slides would be great!

From Kevin Scarlett to Everyone: 08:56 AM

Can you share this presentation with attendees?

From Dr. Nadia DRISS to Everyone: 08:57 AM

:)

Verbal response: Slides can be shared and there is a longer version of this on YouTube that can be shared as well

From Kishor Khankari to Everyone: 08:58 AM

With open doors pressurization does not work. There is bidirectional air movement through large openings such as through open doors.

Verbal response: We did find inadvertent airflow through doors that wouldn't show up in a balance report

From David Eldridge to Everyone: 08:59 AM

Did you find some HEPA fan-filter units that did perform as expected? The recommendation is to verify, not that the strategy doesn't work in general?

From Katja Auer to Everyone: 09:00 AM

Thank you Travis! Great preso

During Presentation #3: David J. Ahearn DDS: Dental Practice in the Era of COVID: Exposure Risks and a Search for Control Approaches

From Kishor Khankari to Everyone: 09:03 AM

Need to share the screen. Can't see the slides

From Jeremy Fauber to Everyone: 09:03 AM

You can go to his video screen and under the ellipsis click to pin the video to make it large

From David Eldridge to Everyone: 09:03 AM

Look for "speaker view" if you see all the participant thumbnails

From Kishor Khankari to Everyone: 09:04 AM

Thanks

From RPM 3 to Everyone: 09:13 AM

Does the air sheath protect the lense from fouling with patient aerosol or do you have to clean it frequently?

Verbal response: We expected that would be a problem, we even started work on a wiper design. The airflow is high enough at the distance to be minimal, not negligible, but small. The lens can also be changed out and put in a washer.

**From Kishor Khankari to Everyone: 09:13 AM**

Will this unit promote recirculation of contaminated air? What is the impact of room HVAC on the capture efficiency of this unit?

Verbal response: We found that 100-150 CFM, we had enough flow to overcome buffeting and cross flows. In a closed room we could get some, but there's nothing too bad.

**From Travis English - 714-469-9553 to Everyone: 09:16 AM**

Not a question, just a comment - I think it's a great strategy to use a very local capture device. We've bought some similar things for our dental units, but, i have't been able to test them. It would be great to develop a commissioning procedure.

**From dkoenigshofer to Everyone: 09:17 AM**

what is cfm of unit?

Verbal response: 100-150 cfm at 55-60 dB close to the unit. It must allow conversation because of the setting

**From Peter Gerngross to Everyone: 09:17 AM**

How do you clean shields between patients?

Verbal response: Uses a medical washer with disinfectant

**From Kishor Khankari to Everyone: 09:17 AM**

You can use CFD to optimize the design.

Verbal response: We would welcome that but didn't have the expertise to do that. We want to optimize this product but keep it cost effective.

**From RPM 3 to Everyone: 09:19 AM**

what commercially available alternatives are there for dentistry and do you see any pros/cons of your approach vs others?

Verbal response: There are some high vac suction and in mouth options. They don't work well enough at capture. The combination of shield and pressure was key.

**From Steve Welty to Everyone: 09:24 AM**

<https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciab039/6103221?login=true> Airborne Transmission of SARS-CoV-2: What We Know Linsey Marr new 2021 paper --