



Integration of Tools for Real-time Assessment of Residential Air Quality and Asthma Symptoms: Challenges and Lessons Learned

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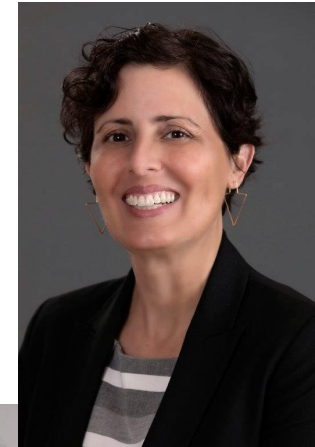
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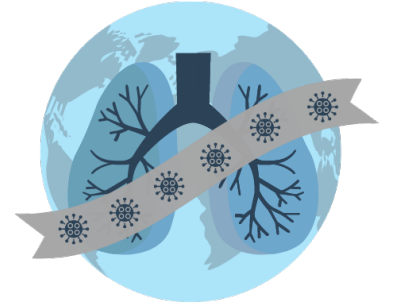


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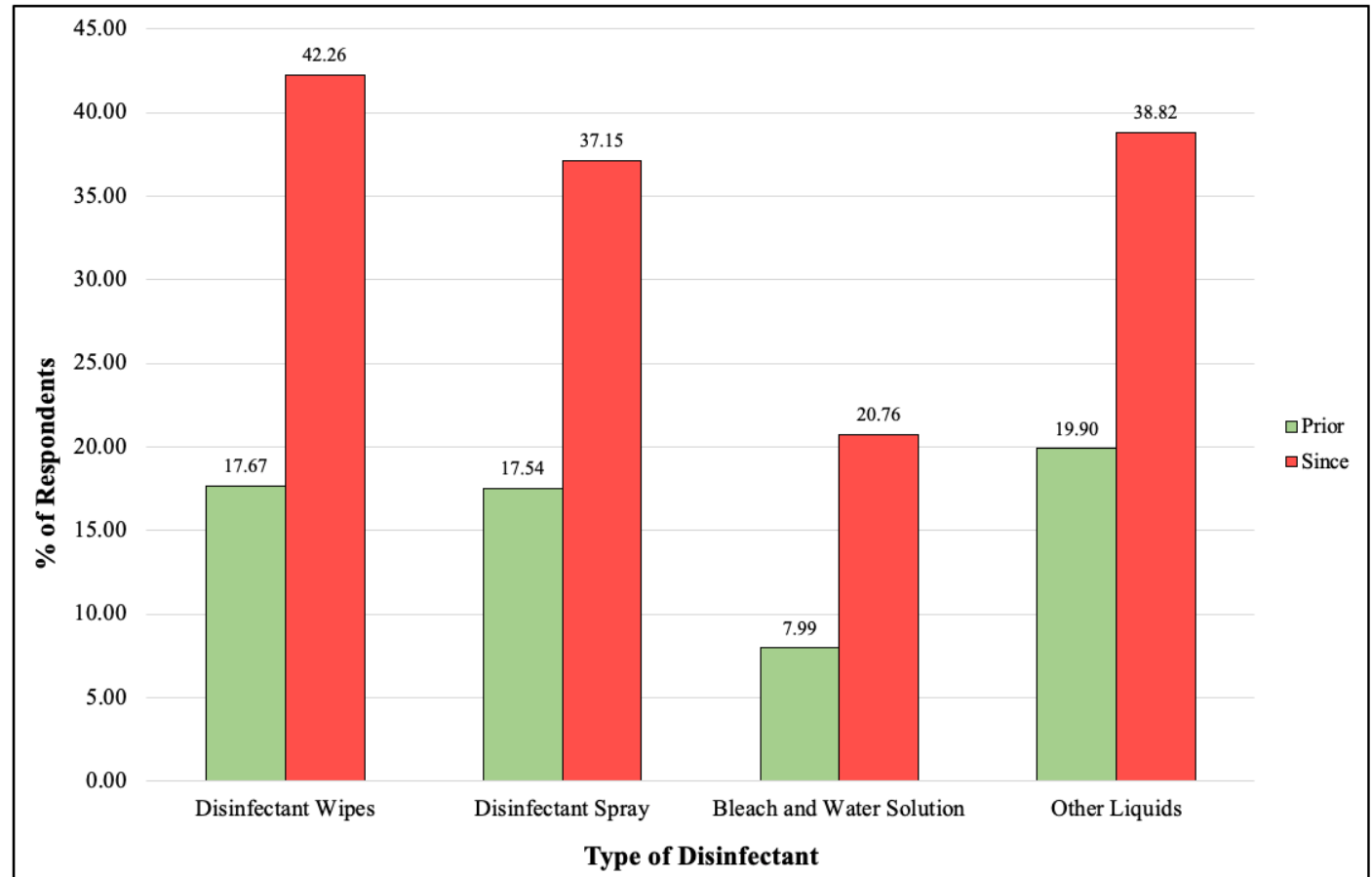
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Background

- The COVID-19 crisis has altered cleaning practices and time spent at home.
- Research assessing residential exposure to cleaning/disinfecting products among adults with asthma and the impact on asthma symptoms are lacking.
- Exposure to indoor environmental triggers is associated with asthma exacerbations.

Household Use of Disinfectants ≥ 5 Times per Week Prior and Since Covid-19



Purpose

To discuss the challenges and lessons learned during integration of:

- 1) an air quality monitor,
- 2) spirometer,
- 3) ecological momentary assessment (EMA)

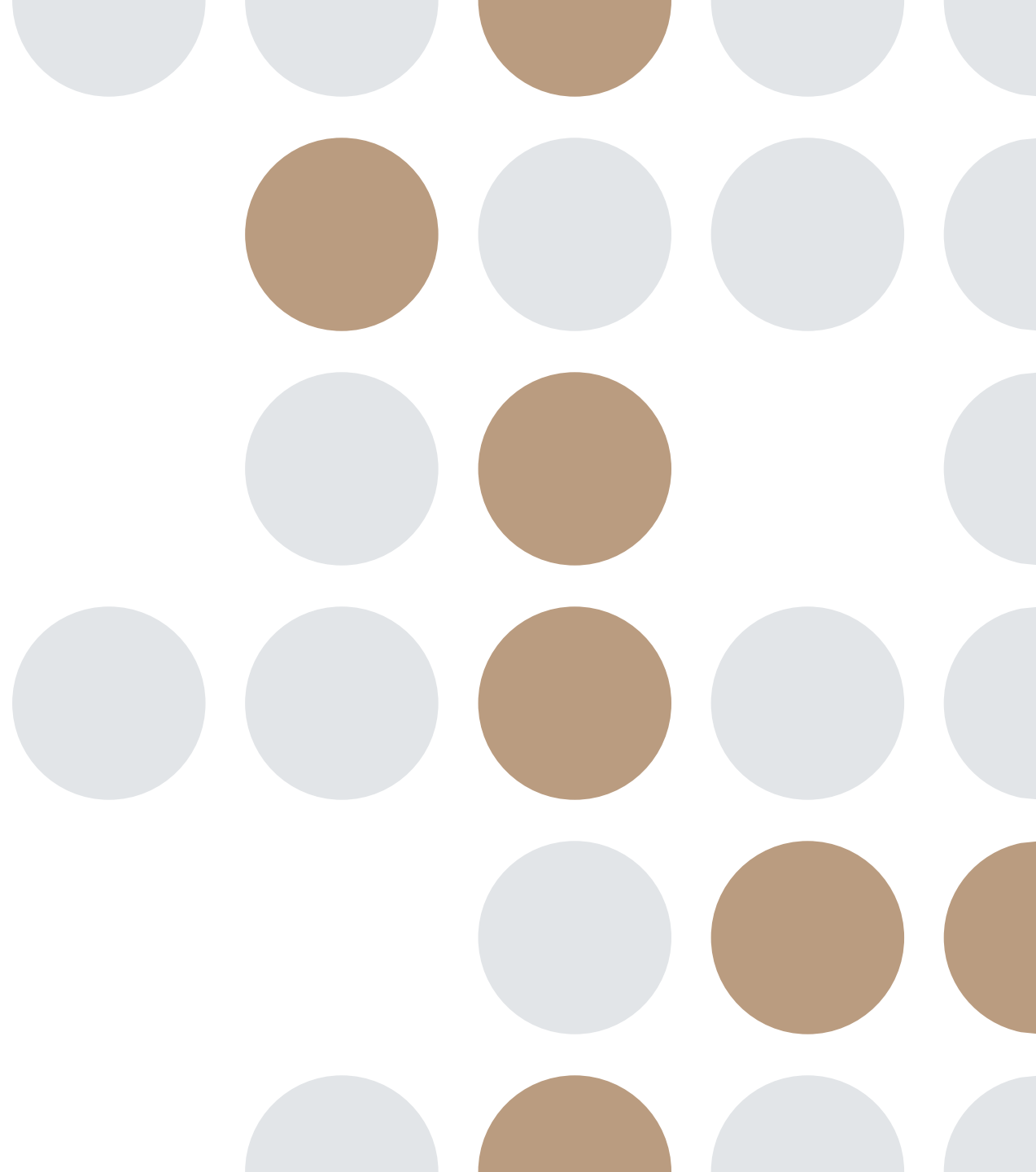
to assess residential air quality and asthma symptoms among adults with asthma.

Study Aims

- Determine **feasibility and usability** of:
 - ecological momentary assessment (**EMA**) to assess self-report residential environmental exposures and asthma symptoms.
 - home monitoring of objective environmental exposures (total volatile organic compounds [**VOCs**], particulates [**PM2.5**]), and lung function (**home spirometry**).
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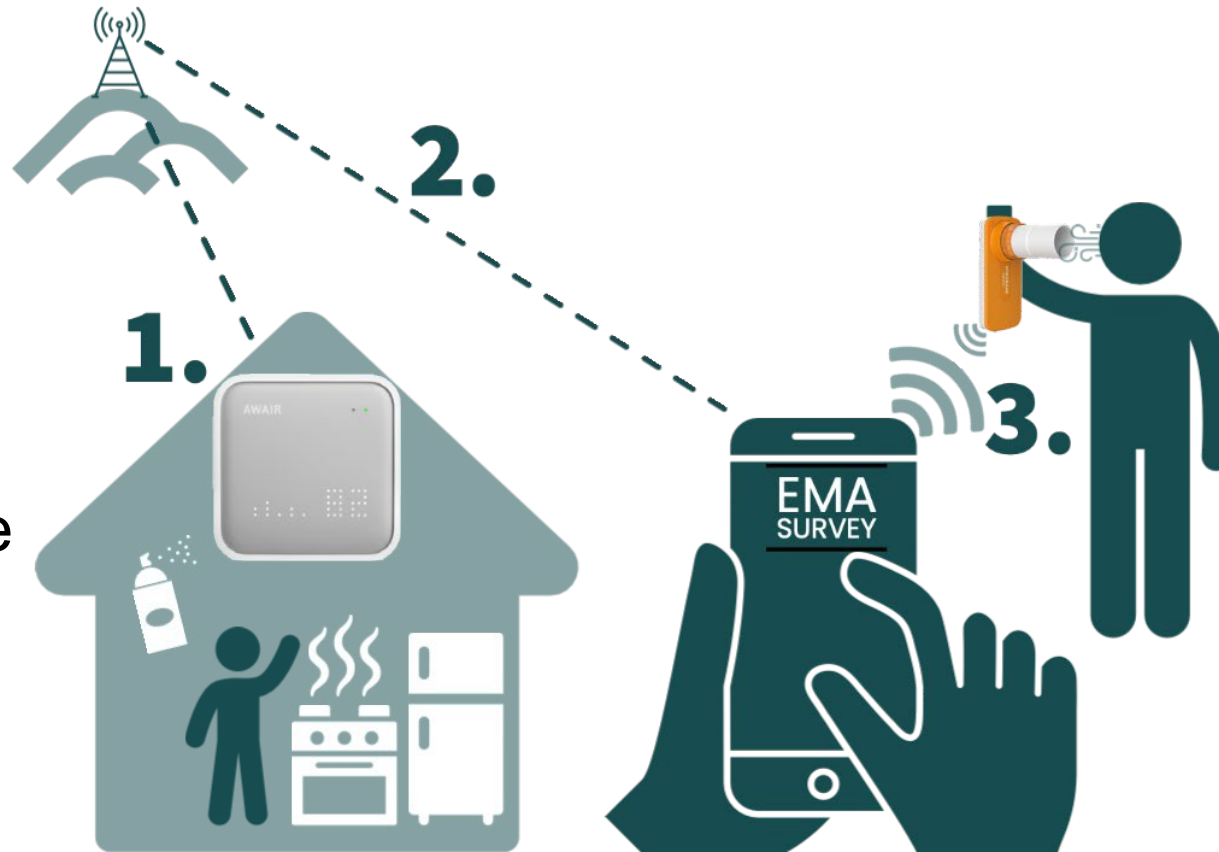
Study Aims

- Assess frequency and degree of residential environmental exposures via **self-reported data**, and home monitoring **objective measures**.
 - Assess level of **asthma control** as indicated by self-reported symptoms and **lung function**.
 - Explore associations of self-reported and objective measures of residential environmental exposures with self-reported and objective measures of asthma control.
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Methods

- Study will be conducted with 50 adults.
- Impact of cleaners/disinfectants on asthma symptoms will be determined through integrating the following platforms...



1. Awair senses increased VOCs and/or increased $PM_{2.5}$ from disinfectant use and/or cooking.

2. VOCs \Rightarrow 333ppb and/or $PM_{2.5}$ \Rightarrow 15.

3. EMA survey and instructions to use spirometer sent via smartphone with 60 min. follow-up survey.

Awair Omni

- ▶ Indoor air quality monitor
- ▶ Tests room air for high levels of e.g. VOCs & signals EMA app

PiLR EMA App

- ▶ Ecological Momentary Assessment
- ▶ Elevated VOCs, asthma symptoms, and mitigation strategies

ZEPHYRx

- ▶ Home spirometry
- ▶ Assesses lung functioning

REDCap

- ▶ Surveys collect baseline and feasibility data and manage multiple participant contact points



Fig. 1. Awair Omni monitor

<https://www.getawair.com/products/omni>

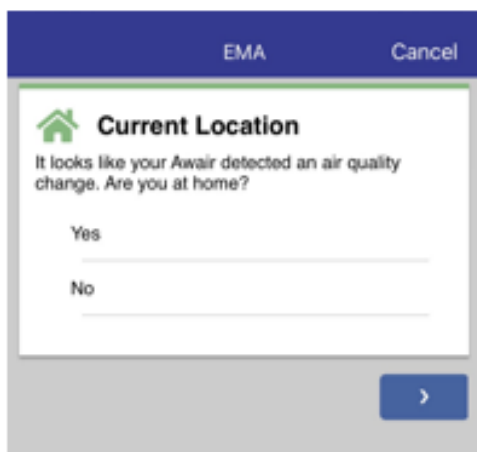


Fig. 2. Sample item from EMA

<https://cloud.pilrhealth.com/>



Fig. 3. Home spirometer

<https://www.zephyrx.com/>

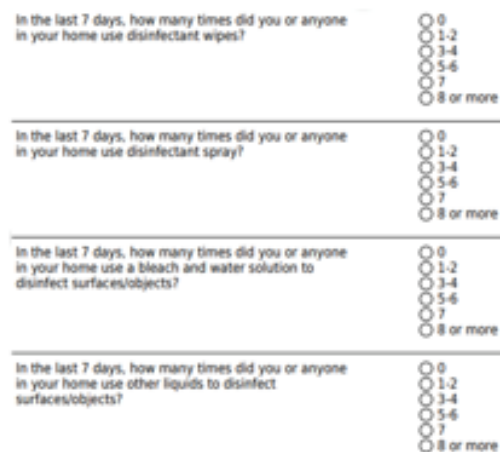
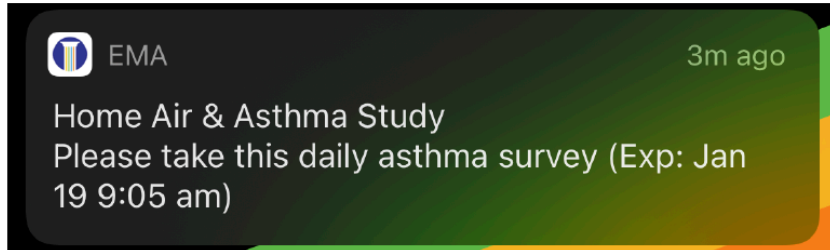
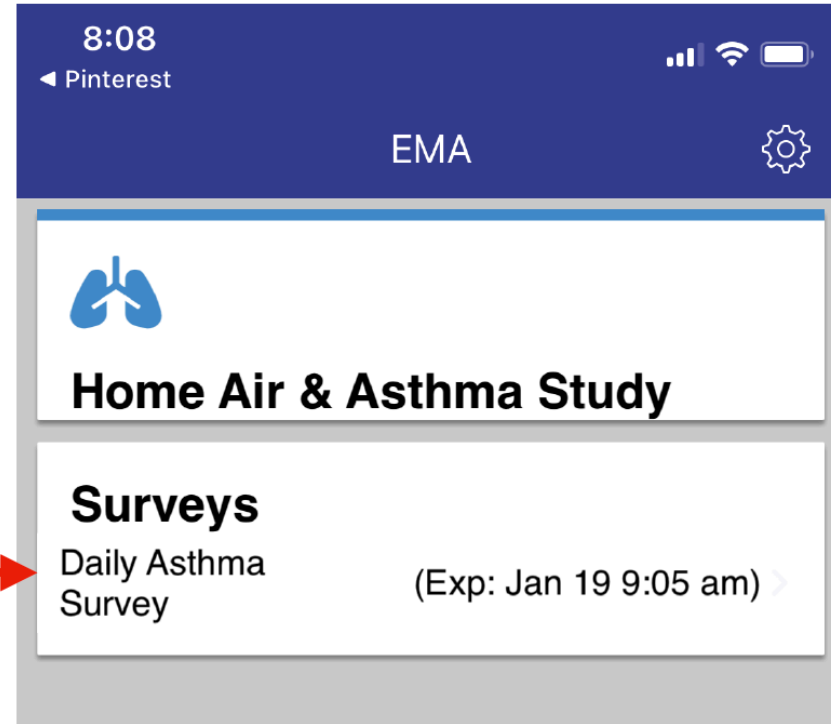


Fig. 4. REDCap sample items

<https://redcap.kumc.edu>

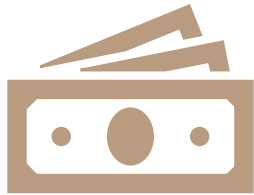


- You will receive a notification similar to this when you are prompted to fill out a survey. All you have to do is select it and you will be taken directly to the EMA app. Once there, all you have to do is select the survey under the “Surveys” tab



Ecological Momentary Assessment (EMA)

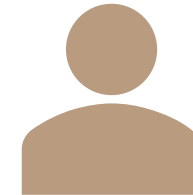
Integration: EMA platform + Awair air quality monitor



Budget



Algorithm and interfacing
with tech support



What is an api?

Study Challenges

- Periodic updates to apps, websites, phone operating systems leading many versions of quick start guides.
 - REDCap update
 - iPhone updates
 - Set up screen changes with Awair
 - Coordinating the interval of data should be reviewed and downloaded from various dashboards.
 - Discuss when to discontinue data sharing on apps.
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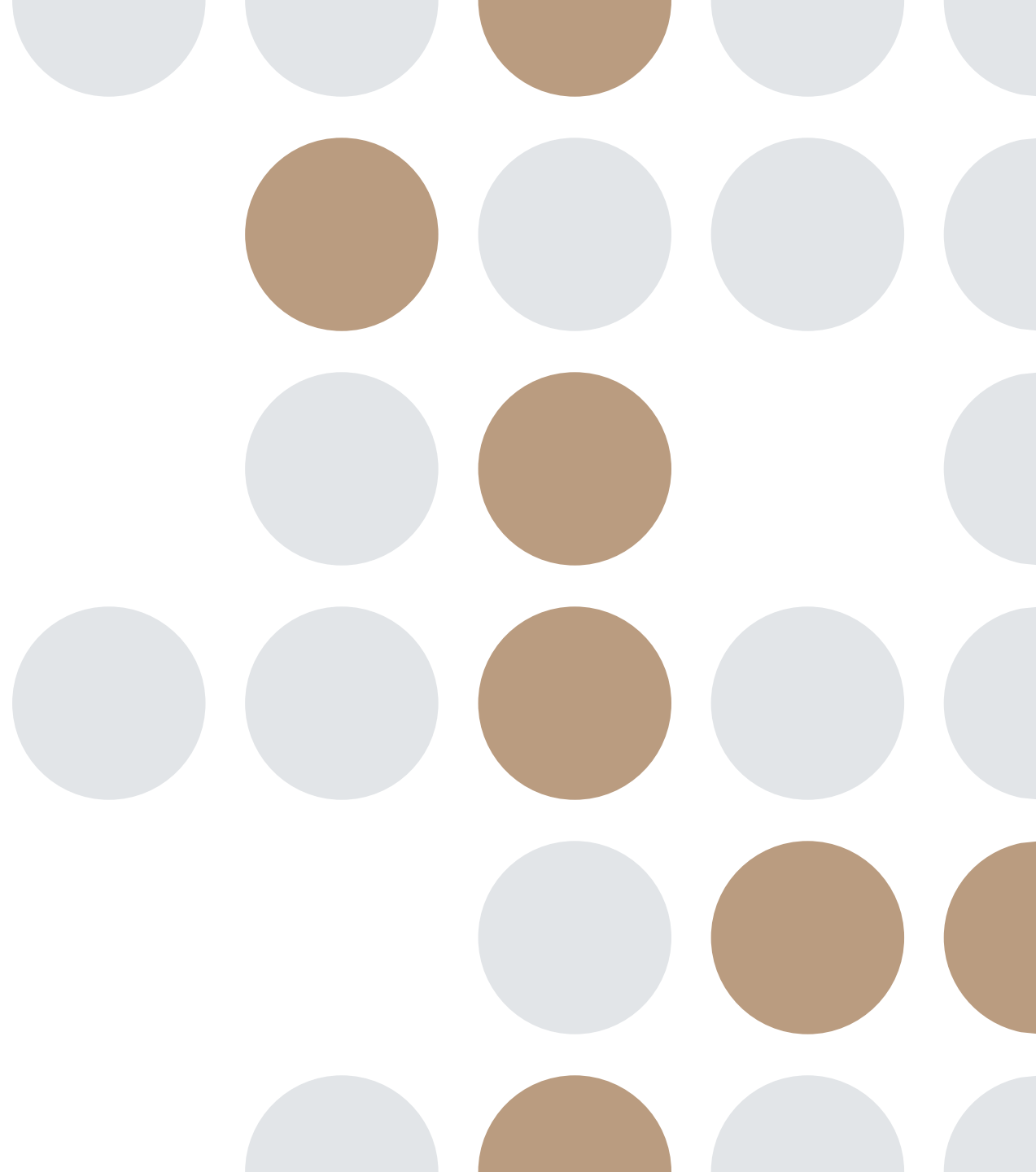
Results

- Data collection using 3 software platforms (Awair Omni, ZEPHYRx, PiLR EMA) with diverse dashboards and technological requirements required creativity and diligence.
 - Additional time for novel integration between the Awair Omni and the PiLR EMA platforms and testing of the integration was required.
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Results

- Developing study instructional materials for each platform in an iterative process with the study team was critical to minimizing burden on study participants.
 - Feedback from an asthma Community Advisory Board led to modifications in instructional materials, reduced EMA notifications, limited data collection to 14 days, and added a 3-day run-in period.
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Discussion

- Finalizing surveys, forms, and procedures, and frequently pilot testing study processes provides unique insights into the intricacies of assuring all aspects are in place prior to launching data collection.
 - Role-playing and practicing allowed for significant improvement.
 - Clear and frequent communications with staff of vendors is key.
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Discussion

- Recording technical meetings facilitates training and minimizes confusion.
 - Requires more time than expected to troubleshoot.
 - Regular working meetings are essential for sustained progress and troubleshooting.
 - Advanced skills are needed for data linkage and processing.
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Conclusion

The complexity of the proposed strategies highlights the need for research teams with the right skill-set and willingness to consult with others.

Integration of multiple platforms will allow for capturing real-time subjective self-reported and objective home exposure data.

This pilot study will guide future studies to develop innovative intervention strategies for those with asthma addressing the impact of changes in environmental exposures related to COVID-19 and enhancing our preparedness for future infectious disease outbreaks.

Thank you!

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Session Q&A Discussion

Please submit your questions for the session speakers through Whova – on your mobile device or laptop.

Make sure to note WHOM your question should be addressed to.



*Pushing Ahead: Application
and Communication in Science*

Thank you for participating in Part 1 of
Session 4B!

**Part 2 of the session will begin
momentarily.**

