

Milwaukee Day Cares Indoor Air Quality Assessment and Educational Response Study

Full study protocol and statistical analysis plan

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Protocol Summary

Purpose

A research and community service partnership, comprising the Medical College of Wisconsin (MCW), UWM College of Nursing, and the non-profit asthma coalition Fight Asthma Milwaukee (FAM) Allies, proposes to describe and improve health-relevant indoor air quality (IAQ) conditions within diverse urban Milwaukee child day care environments. Inferior IAQ could contribute significantly to the development and exacerbation of asthma^{6,7,8} which affects 1 in 10 children in the State⁹. Day care IAQ has been assessed in few studies ^{1,10,11,12,13,14,15,16,17,18,19} and is largely unregulated by Wisconsin state law²⁰.

This project aims to understand the levels of indoor organic pollution and fine particles in the air, as well as temperature and humidity, using inexpensive, consumer-grade, Internet cloud- enabled continuous indoor air quality monitors. These air quality variables are established risk factors for both the development and exacerbation of asthma

Aims

1) Assess baseline IAQ characteristics in urban Milwaukee daycare settings.

- Objective 1.1: Deploy 36 IAQ monitors in 36 childcare settings by November, 2018.
- Objective 1.2: Collect 36 IAQ monitors from 36 daycare settings by February, 2019.
- Objective 1.3: Identify trends based on subtype analysis of IAQ baseline findings between large facility based, small home based and unlicensed daycare settings through data analysis by March 2019.

2) Determine the efficacy of the Green Cleaning for Asthma educational curriculum to alter IAQ and daycare staff cleaning/pest control behaviors objectively.

- Objective 2.1: Deliver Green Cleaning for Asthma classes for staff in 36 daycare organizations by January, 2019.
- Objective 2.2: Implement and collect IAQ pre and post surveys from 1 designated staff member in each of 36 daycare organizations by February, 2019.
- Objective 2.3: Identify trends in relationship to the educational intervention with regards to monitoring device variables including tVOC, PM2.5 and relative humidity variables and composites through data analysis by March 2019.
- Objective 2.4: Identify behavior changes of daycare staff with regards to cleaning practices, VOC generation as a result of the educational intervention through data analysis by March 2019.

3) Determine the feasibility of a future daycare oriented educational and research program to alter development of asthma and/or asthma exacerbations by improving IAQ.

- **Objective 3.1:** Assess the feasibility of educational training and community deployment of the educational curriculum.
- **Objective 3.2:** Develop proposals to investigate child health within daycare environments to determine future efficacy of IAQ interventions upon health outcomes such as asthma incidence, severity and exacerbations and daycare staff knowledge about asthma and recognition of symptoms of concern.

Research Design

A prospective randomized stepped-wedge trial is proposed. The partnership will engage day care facilities in a 4-month intervention. Half of the facilities will receive education at the second month, allowing the team to assess pre- and post-education air quality readings. The rest of the facilities will receive education at the third month. Devices will be removed from the day cares after the 4th month.

Enrolled day cares will be provided with IAQ monitoring and continuing education-eligible educational programs for day care staff. Nursing students from UWM, an Americorp worker, and MCW community health workers will be trained to provide the curriculum. The groups will be block randomized to start the educational program at either 1 month or 2 months after initial baseline IAQ measurements. Summaries of the findings from the assigned devices will be shared with day care staff at the conclusion of the study.

Two intervention schedules will be implemented:

Group A		Group B	
Month	Outreach	Month	Outreach
1	IAQ monitors deployed, pre survey	1	IAQ monitors deployed, pre survey
2	IAQ education delivered	2	
3		3	IAQ education delivered
4	IAQ monitors collected, post survey	4	IAQ monitors collected, post survey

Within each intervention group, two cohorts will be determined by licensure per the WI Dept of Children and Families' licensing for the program. Specifically, Licensed Family Child Care Centers provide care for up to eight children (to be referenced as home daycare), Licensed Group Child Care Centers provide care for nine or more children. Other data to be obtained from the daycare will include age of facility, type of heating, presence of air conditioning, type of air filtration, presence of gas ranges/stoves, usual cleaning regimen and cleaners, typical pesticide regimen, whether windows are typically opened, the State Youngstar rating (if a participant), # of children under 5, and over 5 years of age.

Procedures

Educational curriculum: A day care-specific modification of the FAM Allies “Green Cleaning for Asthma” curriculum will be provided to each facility by UWM nursing students, an AmeriCorps worker, FAM Allies volunteers, or MCW staff. Surveys of present cleaning/pesticide practices and air quality inventory will be obtained before and after the educational intervention. One person from each daycare will fill out the pre and post surveys and will receive a \$25 gift card upon completion of the post survey. Each daycare organization will receive a \$25 gift card for coordinating the training and housing the indoor air quality device.

IAQ monitoring: Portable IAQ devices will be deployed within the day care facility to measure variables pertinent to asthma such as total volatile organic compounds (tVOC), particulate matter (PM2.5), temperature, and relative humidity. These consumer-grade monitors are inexpensive, silent, unobtrusive, and upload data continuously via a cellular WiFi hotspot device provided by the study. Continuous data will be tagged with date of the educational intervention, and statistical analysis for trends over time as a result of the intervention will be conducted. Secondary analyses will evaluate which variables and practice changes are associated with improved IAQ.

Timeline providing details of each organization’s role:

April – May, 2018

- Public Allies (AmeriCorps) hiring process
- Flier development and marketing to day care organizations
- Recruitment of day care organizations
- Purchase supplies and contracts: IAQ monitors and hotspots

June, 2018

- FAM Allies volunteer training
- MCW staff training
- FAM Allies/MCW: Deploy 14 IAQ/hotspots in 14 day care organizations (Groups A and B)
- FAM Allies/MCW: Collect IAQ pre surveys from designated staff member in each of 14 day care organizations (Group A and B)

July, 2018

- FAM Allies/MCW: Teach educational intervention in 7 day care organizations (Group A)

August, 2018

- FAM Allies/MCW: Teach educational intervention in 7 day care organizations (Group B)

September, 2018

- FAM Allies/MCW: Collect 14 IAQ/hotspots from day care organizations (Groups A and B)

- FAM Allies/MCW: Collect IAQ post surveys from designated staff member in each of 14 day care organizations (Group A and B)
- FAM Allies/MCW: Compile data (Groups A and B)
- Public Allies (AmeriCorps) onboarding and training
- UWM nursing student training
- UWM Nursing: Deploy 6 IAQ/hotspots in 6 day care (Groups A2 and B2)
- UWM Nursing: Collect IAQ pre surveys from designated staff member in each of 6 day care organizations (Group A2 and B2)

October, 2018

- UWM Nursing: Teach educational intervention in 3 day care organizations (Group A2)
- Public Allies (AmeriCorps): Deploy 16 IAQ/hotspots in 16 day care organizations (Groups A3 and B3)
- Public Allies (AmeriCorps): Collect IAQ pre surveys from designated staff member in each of 14 day care organizations (Group A3 and B3)

November, 2018

- UWM Nursing: Teach educational intervention in 3 day care organizations (Group B2)
- Public Allies (AmeriCorps): Teach educational intervention in 8 day care organizations (Group A3)

December, 2018

- UWM Nursing: Collect 6 IAQ/hostpots from 6 day care organizations (Groups A2 and B2)
- UWM Nursing: Collect IAQ post surveys from designated staff member in each of 6 day care organizations (Group A2 and B2)
- UWM Nursing: Compile Data (Groups A2 and B2)
- Public Allies (AmeriCorps): Teach educational intervention in 8 day care organizations (Group B3)

January, 2019

- Public Allies (AmeriCorps): Collect 16 IAQ/hotspots from 16 day care organizations (Groups A3 & B3)
- Public Allies (AmeriCorps): Collect IAQ post surveys from designated staff member in each of 16 day care organizations (Group A3 and B3)
- Public Allies (AmeriCorps): Compile data (Groups A3 and B3)

February, 2019

Data compilation and submission to biostatisticians

March, 2019

- Final data reports and reporting to Funder
- Share data reports with all participating day care organizations

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