Public Health Ontario | Santé publique Ontario

RESPONSE TO SCIENTIFIC/TECHNICAL REQUEST

COVID-19: Fans and Air Conditioning Units

Key Findings

- Fans and air conditioning units require routine maintenance and monitoring.
- Fans and portable air conditioners (AC) need to be strategically located to minimize potential health care associated infections.
- Long term care homes (LTCH) should also consider alternative cooling methods.

Request and Scope

- A request to provide guidance on the use of portable fans and air conditioner units in LTCH and RH where ventilation is poor.
- This document was prepared for the MLTC and MOH.
- Several LTCHs have old building design and many with no centralized heating, ventilation and air conditioning (HVAC) system.
- With the COVID-19 pandemic, and the use of personal protective equipment (PPE) homes were requesting guidance on the use of fans and portable air conditioning units.

Methods

- A meeting was held May 27th 2020 with the representatives from PHO, MLTC and MOH to discuss the issues and concerns raised by the stakeholders and to provide guidance.
- A review of current best practice documents was conducted.

Background

- "Microorganisms proliferate in environments wherever air, dust, and water are present, and air-handling systems can be ideal environments for microbial growth."[1]
- "Heating ventilation air conditioning [HVAC] systems require routine maintenance and monitoring to provide acceptable indoor air quality efficiently and to minimize conditions that favor the proliferation of health-care associated pathogens."[1]
- "Accumulation of dust and moisture within HVAC systems increases the risk for spread of health-care– associated environmental fungi and bacteria. Clusters of infections caused by Aspergillus spp., P. aeruginosa, S. aureus, and Acinetobacter spp. have been linked to poorly maintained and/or malfunctioning air conditioning systems."[1,2]
- Strong air flow from air conditioners could propagate infectious COVID-19 droplets further.[3]
- Portable fans will disperse dust particles and microorganisms.[4]
- Careful consideration of where fans and AC units are placed is important.
- HVAC systems that incorporate fresh outdoor air are ideal and various guidance advise this i.e. limiting air recirculation as far as practically possible.[5]
- The Ministry of Labour Training and Skills Development (MLTSD) recommends the Threshold Limit Values (TLVs) for Heat Stress and Heat Strain published by the American Conference of Governmental Industrial Hygienists (ACGIH). These values are based on preventing workers' core body temperatures from rising above 38°C.[6]
- Alternative methods for cooling can be considered and are preferred.

Alternative Cooling Methods

Strategies

- Monitor indoor heat and determine thresholds to implement cooling strategies.[6] Have a written heat stress plan in place for both resident and worker safety.
- Ensure adequate hydration of residents and staff (e.g. water coolers, popsicles).
- Ensure cooling supplies are available for your residents (e.g. cool washcloths, ice packs, cooling jackets, cooling, blankets, ice water baths) and appropriate support to avoid injury.
- Provide cooling options/areas, available for several hours each day, (designated cool room, cool showers, fan, portable air conditioner and place to bathe hands/forearms or sponging with cool water).
- Block direct sun: Use window awnings, shutters, thermal curtains/blinds, and outdoor umbrellas.
- Increase air flow: Encourage cross breezes by opening windows, providing the humidity outside is low (RH of 30 to 50% is normal.
- Central dehumidification: Effective in areas with high humidity. Note that portable dehumidifiers can give off heat and may raise the temperature in the room.
- Evacuate room(s) if extremely high temperature occurs (determine on a case by case basis).

> Central HVAC systems should be well maintained with scheduled filter changes. Air diffuser/air return grills should be cleaned regularly. Ventilation incorporating fresh outdoor air is ideal (limiting air recirculation as far as practically possible).

General Guiding Principles with the Use of Portable Air Conditioning Units and Portable Fans

- Large industrial hall fans are to be avoided in resident care areas and in any outbreak unit.
- Any fans or portable AC units should meet the criteria of the LTCH. Provide families with key features required when purchasing. (e.g. appliance must meet all current CSA standards; is cleanable and compatible with housekeeping cleaning and disinfection products).
- Regular cleaning and maintenance of the fans and AC units to be part of the home's responsibility. Follow the manufacturer's instructions to clean, disinfect and maintain the fan on a scheduled basis and as necessary.
- "Non-central air-handling systems are prone to problems associated with excess condensation accumulating in drip pans and improper filter maintenance; health-care facilities should clean or replace the filters in these units on a regular basis while the patient is out of the room."[1,2] Some portable A/c units use a condensation exhaust system to expel water vapor collected during the cooling/dehumidification process. This is preferable as the moisture is released through an exhaust hose along with the hot air to the outside.

Portable Air conditioning units

It is recommended that portable AC unit not be in use in rooms with Droplet and Contact Precautions.

If portable bedside air conditioners are used:[2]

- Turn AC unit off during any resident treatment, wound care or aerosol generating medical procedures.
- Keep fan setting on the AC unit to low.
- Follow the manufacturer's instructions to clean, disinfect and maintain the air conditioner on a scheduled basis (e.g., daily, weekly, monthly). Perform hand hygiene when cleaning, handling, or maintaining air conditioner components.
- Never leave water sitting in the air conditioner when it is not in daily use - empty, clean, and disinfect the drip pan; allow the drip pan to dry before storing. Select AC units with water vapor collection through an exhaust hose, draining to the outside of the building.

Portable oscillating fans

It is recommended that portable fans not be in use in rooms with Droplet and Contact Precautions.

If portable fans are used:

- Fans should be turned off during any resident treatment, wound care, or any aerosol generating medical procedures.

Position the fan[4]

- Position the fan so airflow is in the direction of the resident but airflow is directed above their head. The direction of flow should be upwards toward the ceiling, avoiding smoke detectors.
- Fans should be turned to low setting.
- Position fan on a clean surface at the resident's bed level or higher.
- Ensure airflow is not directed towards the door of the room or across environmental surfaces.
- In non-resident areas, such as healthcare staff stations, ensure airflow is directed within the area. Fans should not be placed in clean utility rooms and medication rooms.

Cleaning and Maintenance[4]

- Determine who will be responsible for cleaning the fan.
- Fan blades should be cleaned prior to use and receive regular cleaning.[4,7]
- Perform hand hygiene before and after handling the fan.
- Planned preventative maintenance to ensure ongoing suitability (safe) for use.[8]

References

1. Alberta Health Services. Use of portable bedside air conditioners in facility and supportive living [Internet]. Edmonton, AB: Alberta Health Services; 2017 [modified 2020 Apr; cited 2020 May 26]. Available from: https://www.albertahealthservices.ca/assets/healthinfo/ipc/if-hp-ipc-info-sheet-portable-air-con.pdf

2. Health Canada. Health facilities preparation for extreme heat: recommendations for retirement and care facility managers. Ottawa, ON: Government of Canada; 2018. Available from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/climat/health_facilit-instal_sante/health_facilit-instal_sante-eng.pdf

3. Lu J, Gu J, Li K, Xu C, Su W, Lai Z, et al. COVID-19 outbreak associated with air conditioning in restaurant, Guangzhou, China, 2020. Emerg Infect Dis. 2020;26(7). Available from: https://doi.org/10.3201/eid2607.200764

4. Dhanda J, Gray J, White H. Bacterial cross-infection related to the use of bladeless fans in a clinical setting. J Hosp Infect. 2019;103(4):478-80. Available from: https://doi.org/10.1016/j.jhin.2019.08.020

5. Dietz L, Horve PF, Coll DA, Fretz M, Elsen JA, Van Den Wymelenberg K. 2019 Novel coronavirus (COVID 19) pandemic: Built environmental considerations to reduce transmission. Appl Environ Sci. 2020; 5(2):e00245-20. Available from: https://msystems.asm.org/content/msys/5/2/e00245-20.full.pdf

6. Jacklitsch B, Williams WJ, Musolin K, Coca A, Kim J-H, Turner N. NIOSH criteria for a recommended standard occupational exposure to heat and hot environments [Internet]. Cincinnati, OH: Centers for Disease Control and Prevention, Department of Health and Human Services; National Institute for Occupational Safety and Health; 2016 [cited 2020 Jun 1]. Available from: https://www.cdc.gov/niosh/docs/2016-106/pdfs/2016-106.pdf

7. Our Health Service. 2018 guidelines for the use of portable electric fans in healthcare settings [Internet]. Dublin: Health Service Executive; c2018 [cited 2020 May 26]. Available from: https://www.hse.ie/eng/services/list/5/publichealth/publichealthdepts/extreme/fan-guidelines.html

8. Centers for Disease Control and Prevention. Guidelines for environmental infection control in health-care facilities [Internet]. Atlanta, GA: Centers for Disease Control and Prevention; 2003 [cited 2020 May 26]. Available from: https://www.cdc.gov/infectioncontrol/guidelines/environmental/background/air.html#c3e

Sources

- Health Protection Scotland; NHS National Services Scotland. Health Protection Scotland (HPS) position statement [final] August 2018. SBAR: Portable cooling fans (bladed and bladeless) for use in clinical areas [Internet]. Glasgow: Health Protection Scotland; 2018 [cited 2020 May 26]. Available from: https://hpspubsrepo.blob.core.windows.net/hps-website/nss/2680/documents/1_sbar-fans-v1.pdf

- Vancouver Costal Health, Infection Prevention and Control. IPAC best practices guideline: portable fans in acute care [Internet]. Vancouver, BC: Vancouver Coastal Health; 2016 [modified 2018 Sep; cited 2020 May 26]. Available from: http://ipac.vch.ca/Documents/Acute%20Resource%20manual/Portable%20Fans%20in%20Acute%20Care.pdf

- Vancouver Costal Health, Infection Prevention and Control. Algorithm for use of a portal fan within Vancouver Costal Health [Internet]. Vancouver, BC: Vancouver Coastal Health; n.d. [cited 2020 May 26]. Available from: http://ipac.vch.ca/Documents/Acute%20Resource%20manual/Fan%20%28portable%29%20Algorithm.pdf

- Alsaffar L, Osborne L, Bourne NT. Bacterial colonization of bladeless electrical fans. J Hosp Infect. 2018;100(4):476-7. Available from: https://doi.org/10.1016/j.jhin.2018.08.020

Disclaimer

This document was developed by Public Health Ontario (PHO) an agency of the Government of Ontario. PHO provides scientific and technical advice to Ontario's government, public health organizations and health care providers. PHO's work is guided by the current best available evidence at the time of publication.

The application and use of this document is the responsibility of the user. PHO assumes no liability resulting from any such application or use.

This document was produced specifically in response to a request from MLTC and MOH and may contain confidential or proprietary information from PHO. As such, this document may not be shared, cited or reproduced without express written permission from PHO. No changes or modifications may be made to this document without express written permission from PHO.

Ontario