
DATE: 04 February 2010

RESEARCH QUESTIONS:

1. What is the clinical effectiveness of using portable air purifiers for removal of airborne pathogens in close proximity settings to prevent cross-contamination between patients?

2. What is the cost-effectiveness of using portable air purifiers for removal of airborne pathogens in close proximity settings to prevent cross-contamination between patients?

METHODS:

A limited literature search was conducted on key health technology assessment resources, including PubMed, the Cochrane Library (Issue 4, 2009), University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, EuroScan, international health technology agencies, and a focused Internet search. The search was limited to English language articles published between 2000 and January 2010. No filters were applied to limit the retrieval by study type. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

RESULTS:

HTIS reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, controlled clinical trials, observational studies, and economic evaluations.
One health technology assessment and four observational studies were identified regarding the clinical effectiveness of using portable air purifiers for removal of airborne pathogens in close proximity settings. No relevant systematic reviews, meta-analyses, randomized controlled trials, or controlled clinical trials were identified. No information was found regarding the cost-effectiveness of portable air purifiers. Additional articles of potential interest can be found in the appendix.

**OVERALL SUMMARY OF FINDINGS:**

A health technology assessment of air cleaning technologies suggests that portable air cleaners be used in temporary situations when the type of pathogen and mode of transmission is not yet known. Portable air cleaners do not eliminate the need for medical staff to wear appropriate equipment, such as gloves and masks to ensure their own safety. When in use, portable devices should be stable and secure and easy to transport when not in use. Fixed air cleaning devices are generally preferred to portable units because of their reliability in producing the necessary and appropriate air flow patterns within a room.

A new mobile air treatment unit, using nonthermal-plasma reactors to reduce airborne pathogens, was tested in two high-risk hospital areas. In an operating room with a volume of 118 m, the system was able to reduce airborne pathogens larger than 0.5 µm by 90% in less than two minutes compared to the existing system which took 12 minutes. Over a 12 day period, fungus levels in the air of a hematology ward were significantly reduced.

When using a portable high-efficiency particulate air purifier (HEPA) filtration unit to diminish the amount of surface contamination by methicillin-resistant *Staphylococcus aureus* (MRSA) in a patient room, filtration rates of 140 m³ and 235 m³ per hour, in rooms containing one and two patients respectively, resulted in a significant decrease in surface contamination rates.

The ability of Ionic Breeze air purifiers, with and without germicidal protection, to reduce *S. aureus* counts was tested in a dental office. The unit with germicidal protection was able to kill 99% of bacteria collected. Five ionic purifiers (two wearable and three stationary) were assessed for their ability to reduce exposure to airborne pathogens in confined spaces. The more powerful of the two wearable purifiers was able to remove almost 100% of particles after one and a half hours. The three stationary units were all capable of reducing the particle concentration, with the most powerful unit able to remove almost 100% of particles within 10 to 12 minutes. The authors suggested that ionic air purifiers be used only intermittently in confined spaces.

Fixed air cleaning devices are typically preferred in health care settings but portable air purifiers using nonthermal-plasma reactors, HEPA filters, and ion emission for air purification are also effective at removing pathogens from the air. Portable air cleaners do not eliminate the need for health care staff to wear protective equipment and may be recommended for used in temporary situations.
REFERENCES SUMMARIZED:

Health technology assessments


Systematic reviews and meta-analyses
No literature identified

Randomized controlled trials
No literature identified

Controlled clinical trials
No literature identified

Observational studies


Economic evaluations
No literature identified

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APPENDIX – FURTHER INFORMATION:

Evidence-based guidelines


Review articles


Additional references

