RISK REDUCTION GUIDANCE

FANS

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ABSTRACT

Electric fans promote cooling through convection (heat transfer to a fluid, in this case air) and evaporation (heat transferred into the process of water vaporization). Fans are effective at reducing heat stress and promoting thermal comfort, though there is no evidence regarding their effectiveness specific to preventing unplanned health care visits, hospitalization, or death. Fans are more effective for healthy younger adults and people who sweat normally and are not recommended as a cooling strategy for elders on common medications above 37°C (99°F). Fans are relatively inexpensive to obtain and operate, are widely available, and provide immediate relief when operated. There is no evidence regarding implementation of fan distribution programs. Fans should not be used as a sole cooling strategy at high temperatures (above 45°C [113°F]) and ideally would be used as part of a suite of individual cooling strategies, many of which are at least as effective.

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What is the intervention?

Fans are used to artificially circulate air, and can provide much-needed comfort and relief from the heat through convective heat loss when air temperature is lower than skin temperature and by helping sweat evaporate quicker, thus allowing more heat to leave the

body (Jay et al., 2021). Even if a room or building is already naturally ventilated or air conditioned, the circulation provided by fans can provide extra relief from the heat. Many different types of fans exist, from ceiling fans to floor fans to window fans, each with varying levels of efficacy and energy efficiency, but all of them operate on the same main principle of helping circulate the air in a room and promoting convective and evaporative cooling. Fans can also be combined with misting (water spray) and interventions like misting and wet clothes to promote cooling, though misting fans are most appropriate for outdoor settings and wet clothes combined with fans may worsen sweat losses without providing additional protection (Cramer et al., 2020).

How effective is the intervention at protecting people's health?

Fans have been found to lower heart rate and improve thermal comfort in certain conditions and populations. Current recommendations promote fan use up to temperatures of 39°C (102°F) for healthy people aged 18-40, 38°C (100°F) for healthy elders, and 37°C (99°F) for elders taking anticholinergic medications (Morris et al., 2021). There are no studies of the effectiveness of fans in preventing emergency department visits, hospitalization or death. Current CDC guidelines advise against relying solely on fans during extreme heat events (CDC, 2022) and, over 95°F, relying instead on air conditioning while maintaining proper hydration and taking cool showers (CDC, EPA, 2016).

How long does it take to implement?

Installation of electric fans can be done quickly provided that fans and electricity are available. There are reports in the literature of fan distribution as part of heat management (Sampson et al., 2013), but there are no descriptions of fan distribution campaigns.

How much does it cost?

Electric fans are widely available and can be obtained for less than $50. Fans are portable and can be moved from room to room. Electric fans require 20-50 times less electric energy than air conditioning to operate (Jay et al., 2019).

Are there downsides to consider?

The principal potential downside of electric fans is that they can worsen heat exposure at very high temperatures (i.e., above 45°C [113°F] (Jay et al., 2021). Also, because elders have reduced sweating ability (Smith et al., 2013), fans are not as effective for cooling older individuals. These considerations drive the temperature limits in the guidance promoted by Morris et al. mentioned above.

What other strategies should be considered?

Ideally, fans should be part one of several individual-level cooling strategies, deployed in appropriate conditions and in conjunction with other strategies. Air conditioning is the strongest protective factor against heat-related illness, though it is more expensive to obtain and operate than fans and worsens climate change and air pollution when powered by fossil fuels, and other methods such as cool showers, misting, and foot soaking have also been shown to be effective cooling strategies (Jay et al., 2021).

What are some good sources of additional information?

https://www.cdc.gov/disasters/extremeheat/faq.html
https://www.epa.gov/sites/default/files/2016-10/documents/extreme-heat-guidebook.pdf
https://www.cdc.gov/nceh/features/extremeheat/index.html

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