

- Title** Facepiece Respirator for Filtering Nanoparticles
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- Reference** Technology Review Report - 009/2016, online:
http://www.moh.gov.my/index.php/database_stores/store_view_page/30/288

Aim

To assess the efficiency/effectiveness, safety and cost-effectiveness of facepiece respirator for filtering nanoparticles.

Conclusions and results

Most of the studies retrieved were in laboratory setting and not done in human. Only four studies included in this review. There was limited fair level of retrievable evidence to demonstrate the efficiency/effectiveness of facepiece respirator in filtering nanoparticles as follow:

- Loose-fitting powered air purifying respirator (Assigned Protection Factor 25) provided effective protection against copper oxide and titanium oxide nanoparticles inhalation exposure if used properly.
- Class P100 filtering facepiece respirator and elastomeric half-mask respirator produced higher simulated workplace protection factor compared to class N95 respirators in an experimental study using 10-400 nm NaCl as the source of nanoparticles.
- There was an association between particle size distribution and filter efficiency with protection factor of N95 filtering facepiece respirator. The higher the NaCl nanoparticle concentration, the lower the protection factor. The higher the filter efficiency, the higher the protection factor.
- In a laboratory testing, face seal leakages against NaCl nanoparticles by N95 filtering facepiece respirators were the same or lower than the face seal leakages against "all size particles".

There was no evidence on the safety. However, the United States Food and Drug Administration cleared the N95 respirators for usage based on safety data from biocompatibility testing and performance testing from fluid resistance and flammability testing. People with chronic respiratory, cardiac, or other medical conditions that make breathing difficult should check with their healthcare provider before using N95 respirator because the N95 respirator can make it more difficult for the wearer to breathe.

There was no retrievable evidence on the cost-effectiveness.

Recommendations (if any)

Based on this review, facepiece respirator may be used to reduce occupational exposure to nanoparticles in workers. However, facepiece respirator should be used as the last resort in the hierarchy of control when engineering controls and other control measures do not reduce the occupational exposure to nanoparticles to acceptable levels.

Methods

Electronic databases were searched through the Ovid interface: Ovid MEDLINE® In-process and other Non-indexed citations and Ovid MEDLINE® 1948 to present, Embase –1996 to 2016 April 28, EBM Reviews - Cochrane Central Register of Controlled Trials - April 2016, EBM Reviews - Cochrane Database of Systematic Reviews 2005 to April 2016, EBM Reviews - Health Technology Assessment – 1st Quarter 2016, EBM Reviews - Database of Abstracts of Reviews of Effects – 1st Quarter 2016, EBM Reviews – NHS Economic Evaluation Database 1st Quarter 2016. Searches were also run in PubMed. Google was used to search for additional web-based materials and information. Limits for human study article were applied. Additional articles were identified from reviewing the references of retrieved articles. Last search was conducted on 29 April 2016.

Further research/reviews required

Study on effectiveness in workplace setting is warranted.

Written by

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