SYNOPSIS

04/12/2020

Review of “Effectiveness of Surgical and Cotton Masks in Blocking SARS-CoV-2: A Controlled Comparison in 4 Patients”


One-minute summary

- Previous studies have shown that masks may be effective as source control (i.e., worn by an ill patient) to prevent transmission of some bacterial and viral pathogens.
- To evaluate if masks can protect others from symptomatic COVID-19 patients, the authors conducted an experiment with 4 symptomatic, hospitalized COVID-19 patients.
- The subjects held a 90mm x 15mm petri dish with viral transport media 20cm from their mouths while coughing 5 times. This was performed without a mask, with a surgical mask, with a cotton mask, and again with no mask. The outer and inner surfaces of the masks were then swabbed.
- The author detected a similar quantity of virus from the petri dish with and without masks: median viral load (log copies/mL) = 2.56 without masks, 2.42 with a surgical mask, 1.85 with a cotton mask.
- All swabs from the outer mask surfaces were positive for COVID-19 virus; however, most swabs from the internal mask surface were negative.
- The authors conclude that neither a cotton nor surgical mask effectively filtered the COVID-19 virus during coughs by infected patients. The author hypothesize that COVID-19 viral particles may be too small to be filtered by these masks.

Additional information

- The disposable surgical mask (180mm x 90mm) tested had 3 layers: a mixed polypropylene/polyethylene inner layer, a polypropylene filter, a polypropylene outer surface. The reusable 100% cotton mask (160mm x 135mm) had 2 layers.
- Patient 1: 61y male with pneumonia
  - Nasopharyngeal swab 7.68 log copies (lc)/ml; saliva 4.29 lc/ml
  - Median viral loads (lc/mL) on petri dish: 3.53 (no mask), 3.26 (surgical mask), 2.27 (cotton mask), 3.23 (no mask)
- Patient 2: 62y female with upper respiratory infection
  - Nasopharyngeal swab 5.42 lc/ml; saliva 2.59 lc/ml
• Median viral loads (lc/mL) on petri dish: 2.14 (no mask), 1.80 (surgical mask), not detected (cotton mask), 2.06 (no mask)
• Patient 3: 35y male with upper respiratory infection
  • Nasopharyngeal swab 5.98 lc/ml; saliva 5.91 lc/ml
  • Median viral loads (lc/mL) on petri dish: 2.52 (no mask), 2.21 (surgical mask), 1.42 (cotton mask), 2.64 (no mask)
• Patient 4: 82y female with pneumonia and acute respiratory distress syndrome
  • Nasopharyngeal swab 3.57 lc/ml; saliva 3.51 lc/ml
  • Median viral loads (lc/mL) on petri dish: not detected (no mask, surgical mask and cotton mask), 2.44 (no mask)

PHO reviewer’s comments

• The counter intuitive finding of more viral detection on outer compared to inner mask surfaces is not well explained. The authors state that the aerodynamic features of the masks may explain this finding, or that small aerosols at high velocity penetrate the mask. Neither of these explanations fully explain the lack of viral detection on the inner surface.
• The small size of the petri dish may not give a representative picture of the extent of environmental contamination by the coughs.
• The dimensions of masks vary by the brand. Also, different facial features would affect the “fit” of masks. These factors could also affect the ability of these masks in blocking and/or diverting respiratory droplets.
• The authors appropriately acknowledge that this small study does not reflect actual viral transmission.
• Large population-based studies are needed to evaluate the impact of particularly cotton masks, to provide source control and reduced transmission of COVID-19.

Citation


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