

Face Masks in Context for Fighting Flu-- Health Care Workers and the General Public

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10:45 a.m., 15-minute presentation to the IOM Study
of Reusable Facemasks for Protection in
Pandemic Influenza

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Biographical sketch

Richard L. Garwin, Ph.D., is a physicist with long experience in science, technology, and national policy. He is IBM Fellow Emeritus at the Thomas J. Watson Research Center, Yorktown Heights, NY and Adjunct Professor of Physics, Columbia University. For 7 years until 2003 he was Senior Fellow for Science and Technology at the Council on Foreign Relations, NY. He has been Professor of Public Policy at the Kennedy School of Harvard University and a member of the President's Science Advisory Committee for two 4-year terms. He is a member of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine... He has been awarded the National Medal of Science (2002)...

The General Public (1)

- Personal protective measures have the potential benefit of reducing pandemic flu deaths not just by a factor 2 to 5, but by 100 or more.
- E.g., if $R_0 = 2.5$ for this flu, and the generation time is 4 days, one case $\rightarrow 2.5 \rightarrow 6.25 \rightarrow 15 \dots 1000$ in a month and a million in two months.
- If personal protective measures, universally applied, can reduce R_0 by a factor 3, we have now $R_0 = 0.83$, so the 4-day generations make new cases $1 \rightarrow 0.83 \rightarrow 0.689 \rightarrow 0.572 \dots$ for a total of $(1 + R_0 + R_0^2 + R_0^3 + \dots R_0^n \dots) = 1/(1-R_0) = 1/(1-0.83) = 6$. Instead of a million cases in two months, we would have about 6. Even with 1000 index cases, there would be only 6,000.

The General Public (2)

- Multiple pathways contribute to flu contagion
 - large droplets from coughs and sneeze
 - aerosols from coughs and sneeze
 - hand contamination from surfaces, with subsequent touching of mouth, nose, eyes
- If each pathway were reduced in effectiveness by a factor $F=3$, so would be R_0 . Less stringent reductions needed for the less important pathways.
- Measures for individuals, families, groups:
 - appropriate hand washing and gel sterilization
 - improvised masks, surgical masks, N95 respirators
 - covering sneezes and coughs
 - elbow rub to replace handshake
 - air purification

The General Public (3)

- Improvised masks or reuse of disposable masks when in contact with other people might well be sufficient to quench a flu pandemic, when combined with hand sanitation.
- Necessity to prepare and practice, motivated by the goal not just to reduce one's risk but essentially to eliminate it.
- Worth the effort to provide best practices and to determine the strength of the various pathways in order to maximize protection for a given overall effort.
- It is unlikely that vaccination or antiviral drugs can play a major role in protection of the general public.

Healthcare Workers (1)

- In a flu pandemic HCW will require far more protection than would the general public, because HCW will be in proximity to flu victims through much of the working day.
- Hence the importance of maintaining effectiveness of N95 respirators against hospital aerosols, and provisions for
 - negative-pressure isolation wards for flu victims
 - gloves, gowns, and other protection
 - antivirals and vaccination.
- Global supply, as well as global need. E.g.,

Product Name: Respirator

Model Number: GIKO 1200

Place of Origin: China

Features:

1) Maintenance free

2) Latex-free synthetic rubber head strap

3) Staple free optional

4) Contour design ensures compatibility with the wearing of glasses or goggles, reducing fogging

** Stated supply of 300,000 units per day with 30-day lead time **

Healthcare Workers (2)

Contact Information

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Some suggestions

- Flu is not anthrax. Modest heat can deactivate the virus
- There is a tension between the FDA requirements for proven effective reusability and the possible benefit from expedient measures before the capability is proven
- Reusability of nominally disposable masks offers an opportunity for novel germicidal fabrics such as the copper zeolite of Nisshinbo (Japan).

All good wishes for the effective work of this Committee.