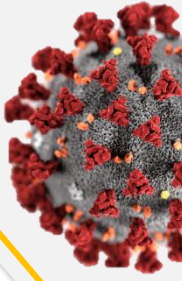




GAMMA IRRADIATION IN STERILISATION OF USED



INTRODUCTION

Personal Protective Equipment (PPE) is crucial during this CoVID-19 pandemic. Surgical masks are made for single use. Respirators are usually discarded after use, but can also be considered limited-use devices, that is, they can be reused for a limited time, unless there is a risk for contamination through the deposition of infectious particles on the surface. Because of severe shortages of respirators and surgical masks in the COVID-19 pandemic, a number of methods could be considered for the sterilisation of used masks, mostly respirators.¹ Numerous proposals suggested sterilization of used PPE with agents ranging from ethylene oxide, UV or gamma irradiation, ozone, and alcohol. There were also novel proposals such as mask-fiber impregnation with copper or sodium chloride. These are not new ideas; work was performed after prior viral epidemics to determine the feasibility of sterilizing PPE.² Gamma irradiation is a method commonly used for the large-scale sterilisation of medical devices and food items. It typically uses Cobalt 60 radiation to kill microorganisms on a variety of different products. Processing with gamma irradiation yields quick turnaround time, easily penetrating packaging and product, and is ideal for many types of materials. However, the necessary equipment is not commonly available in hospitals.

EVIDENCE ON EFFECTIVENESS AND SAFETY

A study by Feldman (2019) indicated that a dose of 20kGy (2MRad) is sufficient for the inactivation of coronaviruses.³ Ongoing studies on using gamma irradiation with a 24kGy dose to sterilise respirators have shown the possible deformation of the mask, compromising the inner filtering layer and the mask fitting on the face.¹ A study in the Netherlands showed that there was no deformation of one FFP2 mask after gamma irradiation with 25kGy, but the fit test after the decontamination process failed^{1,4}

CONCLUSION

Limited evidence suggests gamma irradiation with a dose of 20kGy may be sufficient to inactivate coronaviruse. However, it may lead to deformation of the mask. This method should only be considered as an extraordinary last-resort method in the event of imminent shortages of PPE. They should only be applied after a careful evaluation of the situation and after exploring the possibility of resource-conscious, rational PPE use, for example by extending a respirator's lifespan beyond its normal limits.

REFERENCE

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Disclaimer: This rapid assessment was prepared to provide urgent evidence-based input during COVID-19 pandemic. The report is prepared based on information available at the time of research and a limited literature. It is not a definitive statement on the safety, effectiveness or cost effectiveness of the health technology covered. Additionally, other relevant scientific findings may have been reported since completion of this report.

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