Abstract:

Background – The removal of personal protective equipment (PPE) after patient care may result in transfer of virus to hands and clothing of health care workers (HCWs). The risk of transfer can be modeled using harmless viruses to obtain quantitative data. To determine whether double-gloving reduces virus transfer to HCWs hands and clothing during removal of contaminated PPE, we conducted a human challenge study using bacteriophages to compare the frequency and quantity of virus transfer to hands and clothes during PPE removal with single-gloving and double-gloving technique.

Methods – Each experiment had a double-gloving phase and a single-gloving phase. Participants donned PPE (ie, contact isolation gown, N95 respirator, eye protection, latex gloves). The gown, respirator, eye protection, and dominant glove were contaminated with bacteriophage. Participants then removed the PPE, and their hands, face, and scrubs were sampled for virus.

Results – Transfer of virus to hands during PPE removal was significantly more frequent with single-gloving than with double-gloving. Transfer to scrubs was similar during single-gloving
and double-gloving. The amount of virus transfer to hands ranged from 0.15 to 2.5 log10 most probable number. Significantly more virus was transferred to participants hands after single-gloving than after double-gloving.

Conclusions - Our comparison of double-gloving and single-gloving using a simulation system with MS2 and a most-probable number method suggests that double gloving can reduce the risk of viral contamination of HCWs hands during PPE removal. If incorporated into practice when full PPE is worn, this practice may reduce the risk of viral contamination of HCWs hands during PPE removal. The use of double gloves should be explored in larger controlled studies.