Emergency Glove Disinfection Protocol

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To Whom It May Concern,

Medline is the largest supplier of exam gloves in the world, distributing over 2.1 billion gloves every month. The world is experiencing a serious exam glove shortage that we anticipate will worsen as the pandemic continues. The purpose of this communication is to help the healthcare community prepare. In case it becomes necessary, we urge you to consider developing an emergency hand hygiene protocol and guidance to reduce consumption of exam gloves.

Production capacity of exam gloves cannot significantly increase in a relevant timeframe. Unlike facemasks, where new production capacity can be built relatively quickly and inexpensively, there is almost nothing that can be done in the short term to increase the supply of exam gloves. Prices may go up, but the number of gloves available in the world will not grow very much. Demand for gloves has increased enormously around the world, and this demand will far outpace availability in the near future. About nine months are required to build a new nitrile glove production line. Moreover, at least another year will be required to significantly increase the production of nitrile butadiene rubber, the primary raw material. Consequently, it is not possible to increase output sufficiently to support the growing demand.

The most practical solution is to use fewer exam gloves. When a shortage of gloves makes it necessary, a viable, effective and inexpensive emergency protocol may be for healthcare workers to rinse their gloved hands to remove visible soil, and then either spray, wipe or dip their gloved hands in a receptacle containing a disinfectant solution (such as bleach), without replacing their gloves. Medline would like to offer our research, test data and practical solutions to help aid development of emergency protocols.

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The United States Centers for Disease Control and Prevention (US CDC) published 'Strategies for Optimizing the Supply of Disposable Medical Gloves', which was last updated on 27 October 2020.1 The guidance includes a sample disinfection protocol that may be considered in circumstances where glove supply is critically low and in situations where extending the usable life of exam gloves may be necessary. Medline has explored this consideration with the use of bleach, as it is a widely available and inexpensive chemical for effective disinfection. Medline is not aware of any other glove disinfection protocol, recommendation or practical guide that can be easily and effectively implemented in a fast-paced healthcare setting.

To further support disinfection with bleach as a viable option for extending the use life of exam gloves, a recent study published by The University Medicine Griefswald, Institute for Hygiene and Environmental Medicine (Griefswald, Germany) in February 2020 evaluated the reduction of viral infectivity of coronaviruses with the use of various disinfectants. The study confirmed that a 0.1% to 0.5% bleach solution produced a >3 Log_{10} reduction of viral infectivity in one minute.[2]

We recognise that a primary concern regarding the disinfection and reuse of exam gloves is both durability and material integrity after repeated exposure to disinfection chemicals. Therefore, using both European and US test standards (EN 374-3 and ASTM F 739-12), Medline conducted studies on both vinyl and nitrile gloves to demonstrate that they can withstand a wide range of chemicals, including 10 to 13% sodium hypochlorite, for greater than 480 minutes (8 hours) without chemical permeation.[3]

Additionally, Medline tested the performance of nitrile exam gloves after exposure to 0.5% bleach solution. The study concluded that after 30 minutes, 2 hours (120 minutes) and 8 hours (480 minutes) of exposure to a 0.5% solution, the nitrile exam gloves still meet tensile strength standards per ASTM D412-16. After 30 minutes of contact with 0.5% solution, nitrile gloves still meet force at break standards per EN 455-2.[4] For our customers to make a comparison to their current products, Table 1 below contains

[1] US CDC guidance: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/gloves.html
[2] See attached study: 'Potential role of inanimate surfaces for the spread of coronaviruses and their inactivation with disinfectant agents'.
[3] Attached to this letter are four chemical permeation study reports: 1) '3G VINYL, PN 103063H', 2) 'MDS192075, PN 130081B – Chemical', 3) 'PINK6075, PN 130081C – Chemical' and 4) 'SIlk, PN 120111'.
[4] See attached Medline study: 'L20-089 Final Report REV 01 (Complete)'.

the glove models and materials that were used to perform the testing with bleach. If you have any questions about your glove type/model and compatibility with disinfection chemicals, please contact us.

Table 1: Medline exam gloves (European product numbers/specifications) subjected to testing

Test	Product number	Glove name	Weight (g)	Average finger thickness (single wall/mm)	Average palm thickness (single wall/mm)	Average cuff thickness (single wall/mm)	Material type
Chemical permeation test samples: ASTM D412-16	MDS7085	SensiCare Silk Powder-Free Nitrile	3.20	0.09	0.07	0.05	Nitrile
	PINK6075	Generation Pink Powder-Free Synthetic	5.68	0.09	0.08	0.05	Synthetic (vinyl)
	MDS192075	Accutouch Powder-Free Synthetic	4.99	0.09	0.08	0.05	Synthetic (vinyl)
	103063H	3G Vinyl Gloves	5.68	0.10	0.08	0.06	Synthetic (vinyl)
Tensile strength and force at break test samples: EN 455-2	FG3002	FitGuard Touch Nitrile Exam Gloves	2.83	0.09	0.07	0.05	Nitrile
	MDS2585	SensiCare Silk Powder-Free Nitrile	3.20	0.09	0.07	0.05	Nitrile

When disinfecting a glove by submersion, spray or wiping the glove's surface, it may be difficult to safely disinfect the cuff. A possible solution may be to don two pairs of gloves at the beginning of a shift. Roll down the cuff of the outer glove to disinfect it and then roll it back. If the outer glove has visible holes or damage, it should be replaced. The underglove can normally remain in place throughout the duration of the shift. The use of two gloves per healthcare worker as suggested here will still lead to a significant reduction in the overall consumption of exam gloves. Table 2 contains an estimation of the potential impact on glove consumption if using a glove disinfection protocol.

Table 2: Potential impact on glove consumption if using a glove disinfection protocol

Department	Normal glove usage	Glove usage: COVID-19	Glove usage: disinfection	Rationale	Bleach applicable
Med-surg/floor beds	40%	35%	35%	Decreased general admissions	NO
EVS/housekeeping	15%	25%	9%	Increased cleaning protocols	YES
Emergency department	10%	10%	10%	Increased COVID admissions, fewer general ED admissions	NO
ICU	10%	40%	14%	Increased COVID admissions	YES
Phlebotomy	10%	10%	4%	Increased COVID admissions, fewer general admissions	YES
Oncology	5%	4%	4%	Consistent	NO
Operating theatre	5%	4%	4%	Decreased elective surgeries	NO
All others	5%	4%	4%	Consistent or slightly lower	NO
Total	***100%***	***132%***	***84%***		

We also identified the departments within a healthcare facility that may benefit from glove disinfection with bleach. The calculations are based on the assumptions that healthcare workers in these departments could potentially wear the same pair of gloves for up to four hours if gloves are free of visible soil, rips, tears and holes. Across the three areas where bleach could be beneficial, healthcare workers may change their gloves approximately every 10 minutes, thus consuming an average of 18 gloves every 90 minutes. Conservatively, if healthcare workers don two pairs of gloves initially, then change the outer pair every hour and then *both* pairs every 1.5 hours, only six gloves (versus 18 gloves) would be consumed every 90 minutes.

In summary, the world is experiencing an exam glove shortage. Current glove production capacity and availability of raw materials cannot support the demand. Therefore, we encourage you to share this

information with your team of regulatory and infection control professionals so your facility can begin planning an emergency protocol. Medline's quality and regulatory leaders are available to support your team.

We will share relevant new information with you as it becomes available, whether from regulatory agencies or the infection control professionals in our customer base.

Sincerely,

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