

RACHEL DEERR: Hello, I'm Rachel Deerr, host of today's program, COVID-19 Critical Care: What Providers Need to Know. This is the May 22 update of DKBmed radio's coronavirus educational series COVID-19: Keeping Up with a Moving Target. Thank you for joining us.

As a reminder, we are now providing twice weekly, 15-minute webcasts and podcasts featuring the latest news, treatment updates, and clinical considerations, as well as answering your questions about COVID-19. These will be available on Wednesday evenings and Friday mornings. Sign up at COVID19.dkbmed.com to be sure you get the latest updates.

Today's program is accredited for ANCC and AMA PRA Category 1 credits.

Please visit our website for complete CME and CE information. To attest for credit, please visit COVID19.dkbmed.com. There you will find all of our previous COVID-19 programs and have access to other free CME and CE programs on a wide range of topics. Slides from today's presentation as well as previous presentations can be found in the resource center.

Today's learning objectives are:

- **State three effective methods for reprocessing and decontaminating N95 respirators**
- **List two N95 performance measures that may be affected by decontamination methods**
- **Describe the proper doffing method for N95 respirator**

I'm very happy to introduce Sue Hansen, a clinical nurse specialist at Harborview Medical Center in Seattle. This is the second part of Sue's series on PPE in the hospital setting amidst the pandemic. Sue, thanks for joining us.

SUE HANSEN: Thank you for having me. I'd also like to thank the generous support of DKBmed, The Postgraduate Institute for Medicine, and the Institute for Johns Hopkins Nursing.

Today we're going to talk about reprocessing N95 respirators and doffing, donning, and reuse methods for N95 respirators.

This is a statement that the CDC put out regarding reprocessing N95s: "While disposable filtering facepiece respirators (FFRs) like N95s are not approved for routine decontamination as conventional standards of care, FFR decontamination and reuse may be needed during times of shortage to ensure continued availability."

I wanted to include this statement because, as a nurse, and I think I can speak for many of us, I don't think there's ever been a time when we have encountered any extended use or reuse of N95 respirators. This has made a huge impact on our care, our care delivery, and our workflow, as well as our ability to feel safe in our own work environments. I think the extended use and reuse is going to become more the standard of practice versus the traditional conventional use of our N95 respirators, and it has made a huge impact on our practice.

What is effective decontamination? Decontamination serves to reduce the pathogen burden, maintain the function of the filtering facepiece, and leave no residual chemical hazards behind.

What works? This study came out just about a month ago and the NIH validated it. They analyzed four decontamination methods, UV germicidal irradiation, dry heat up to 70 degrees Celsius, 70% ethanol, and vaporized hydrogen peroxide. They compared those to steel. They evaluated the inactivation rate,

the filtration performance, and the mask integrity as it relates to the number of decontaminations. Afterward, they assessed fit and filter capabilities of the individual mask.

Ethanol seems to decontaminate the mask very quickly, but it did not maintain its performance integrity after one decontamination session.

Dry heat tended to take a little bit longer to decontaminate the masks, and they also found that some residual microorganisms were left on the metal pieces of the mask like the nose bridge, the area that forms around the nose, but the integrity of the mask was maintained up to two cycles of reprocessing.

UV germicidal irradiation also took quite a while to decontaminate the mask, but after three cycles of decontamination with the UV method, the mask maintained its fit and performance.

Vaporized hydrogen peroxide worked very well, and after three cycles the mask maintained its filter performance and fit.

Overall, I think of all four reprocessing methods, the vaporized hydrogen peroxide method was the one that seemed to perform the best.

What did the CDC recommend for reprocessing methods? They don't recommend any. They don't officially endorse any method, but during times of crisis, conservation strategies should be implemented. The three methods that they state show promise are UV irradiation, vaporized hydrogen peroxide, and even warm, moist heat methods that can be used for reprocessing.

They recommend mitigation strategies for when we have times or periods where PPE is very limited. During conventional times, which is not now, all N95 masks can be a one-time use. But during contingent periods of time where N95 materials are in short supply, institutions can implement extended use of N95s. This is for repeated close-contact encounters with several patients having the same pathogen for up to eight continuous hours. This should have little to no impact on the function of the N95 respirator. It does increase risk of contact transmission, though, and that is why when we doff, or take off, those masks, we need to be very mindful in our methods of doffing so we do not contaminate ourselves.

The third time is during times of crisis, when we do not have enough N95s in supply, which our institution and many others have experienced. Reuse is when you doff after each encounter and you store that mask for another use later. Limited reuse means the mask can be used up to five times. There is a risk of contact transmission to the staff member who's wearing it, so again, we need to be mindful of doffing methods when removing a mask and storing it for later use.

You may think, wow, this slide is busy, how am I going to follow this? And you are correct, it is very busy, and it's busy because when you doff your PPE equipment, you have to be very methodical when removing it to not contaminate the mask you're going to reuse and contaminate yourself. Ideally, you should have a trained observer or someone outside watching you doff this equipment. I know some institutions do not have that. We were fortunate to have the staff to assign that trained observer to watch us take off our PPE and not contaminate ourselves.

To shorten things up, our participant here had already doffed his gown and gloves inside the patient's room, performed hand hygiene, come out, and we put on a new pair of clean gloves before taking off the eyewear and the masks. Under conventional circumstances, you would be doing this over a garbage

bin. You would remove your eyewear, put them in the garbage, and perform hand hygiene over those same existing pair of gloves before you start taking off your mask. When removing your N95 mask, you need to remove the bottom strap first, pull those straps taut, and pull it over your head so it dangles right in front of your face over the garbage bin. At that time, you should be performing hand hygiene again before you touch the upper straps, because both of those straps are considered dirty. When you remove the upper strap, ideally under conventional circumstances you would just toss that into the garbage bin, remove your gloves, and perform hand hygiene.

But to reuse, you will need to store the mask. There are several methods for doing that. You'll need to store that mask before removing your gloves. Once you remove your gloves after you doff the mask for the final time, then you of course perform hand hygiene again.

Depending on how your N95 is reprocessed, you'll have to label your masks in different ways. If you're using the vaporized hydrogen peroxide method — our institution has just started using the vaporized hydrogen peroxide method by Battelle. With this method, you need to label your masks with your institution's code, which is given to you by the company. The masks are reprocessed hundreds to thousands at a time. You will not get your individual mask back, but it will come back to your institution.

If you're using the UV for reprocessing, label it with your name and the unit you work on. In addition, once it's reprocessed, a hash mark will be put on the one of the straps to indicate how many times it has been reprocessed. Some studies show that with the Battelle method, you can reprocess that mask up to 20 times, but with UV radiation or irradiation, it should only be reprocessed up to three times, and that's why we place hash marks.

How do you store them? Nurses were very creative in coming up with ways to properly store the masks. However you choose to store it, you need to maintain the integrity of the N95 mask and its fit so you can reuse it, as well as protect it from surface contamination. Remember that N95 is not a new practice, we've done that all the time with other different types of pathogens like tuberculosis, but because COVID-19 is also transmitted with contact surfaces, we need to make sure that we don't recontaminate that mask by how we store it.

You can use a lunch container, you can use a to-go box, here we also have a container for a water pitcher, and if you use a paper bag method, you can use a straw to support the straps. The goal is to not let the straps come into contact with the inside of the mask or the outside of the mask, and you do not want to put it away in such a way that it destroys the form or the function of the mask, either. I'm very impressed with how great nurses have been in finding ways to store these masks.

Retrieving your mask is another story in itself. It can be kind of complicated. This is where your trained observer comes into play, watching you retrieve that mask and don it appropriately. Again, you need to perform hand hygiene and put on your gown and gloves in the proper fashion. When you retrieve your mask, do not grab it by the strap. Pinch it on the sides, and when you're putting it back on, don't touch the outside of the mask. Don your mask with the bottom strap first, as always, and then the top strap. Then perform hand hygiene because those straps were dirty. Remember, they were on your head before. Then perform a fit test. The goal of the fit test is to ensure that there are no leaks and there is nothing that would increase the risk to you by wearing that mask again. Once you perform that fit test, remove your gloves, perform hand hygiene again, and put on your shield. If you don't have a shield, you

can put on goggles. At Harborview we recommend if you're only using goggles, use a simple mask over the reprocessed N95 as well.

Before you use that mask, after you have donned it, perform a fit test. The fit test ensures that the straps have maintained their elasticity and they fit over the crown of your head and the nape of your neck. Ensure that the bridge of your nose, that steel portion, fits tightly around your nose, and the sides of the mask and the very bottom of the mask work as they can gape a bit. Make sure it fits tightly around your face, with no leaks. I always tell people, especially if they wear glasses, to exhale really hard. The glasses should not fog up and you should feel no air moving outside the mask.

To recap, I want to hit home that reprocessing masks, even though the CDC states under the contingent circumstances it should have very little impact on form and function, it does have a great impact on staff nurses and other staff as well. This is not what we were used to. I believe we have gotten used to reprocessing and reusing masks, but this has made a huge impact on how safe we feel in our work environment, and I think we need to come at it with a mindset that it's here to stay, that reuse and reprocessing masks are not going to go away, and that it is very safe. We have been using the extended method of wearing N95s for quite a long time with other respiratory illnesses and it has shown to be safe. We are not increasing our risk any more than by using them one time, and these new methods of reprocessing, specifically the Battelle, have been around for a couple years. But assuming in this day and age we're going to find more and more companies reprocessing masks, they will prove to be very safe and effective for all of our patients and our staff to reuse.

That is all I have; I will be happy to take questions if you have any.

RACHEL DEERR: Thank you, Sue. For our learners, these are the references for some of the information Sue provided us with today. These slides will also be available in the resource center. We'll now continue to the listener Q&A. To submit questions for Sue about next week's topic, Camp COVID: What we have learned so far. Please send questions to QA@dkbmed.com. If we are not able to address your questions in this session, we will try to address it in another session.

Sue, first question: I manage staff who work in school clinics. When we do get back to school, what do you recommend for clinic staff to use for PPE?

SUE HANSEN: That's a really good question. I think some of it depends on your state regarding universal masking. I know in the state of Washington, everyone masks everywhere we go. That possibly will extend into the workplace for other areas besides hospitals. In that instance, all of your staff members should be wearing masks while you're working. If you have a child coming to the clinic who's exhibiting respiratory symptoms, you will of course want to put a mask on them and ensure that you have a mask yourself. You'll always want to be wearing gloves when caring for that student as well as in-between students. Wipe down all contact surfaces, all chairs, if you have couches that they lie on, any type of equipment that you use for them you should wipe all those down as well. In addition, if your school district can provide disposable materials like stethoscopes, thermometers, things like that, that's always preferred over multiuse items.

Lastly, I think if a child is sick and they have or are positive for some respiratory-type virus like COVID-19, it would be great if the school system had a process in place before the school year started regarding notification of the school and other families. Those kids go out and play on the playground several times

a day, and the classrooms are generally overcrowded with students. They have 25 to 30 students in each classroom, which provides an environment for cross-contamination, and those other families and students as well as other employees of the school district will need to be notified promptly. It would also be good to have a process in place for when those kids can return to school.

RACHEL DEERR: Our last question: what are some common errors made when donning or doffing?

SUE HANSEN: There are many. Consistently with donning is taking things that are not needed into the isolation room. When you're going into an isolation room, the only thing you should be wearing is scrubs. You should not be wearing scrubs with a t-shirt underneath. You should have the bottoms of your scrub pants tucked into your socks. You should not be taking in stethoscopes, pens, pencils, papers, pagers, cell phones, ID badges, all those materials should be left outside. If you take it inside the room and you bring it out and then you wear it throughout the hospital, that's where you will be contaminating other areas and potentially other staff within the hospital. Just remember, the only thing you go into an isolation room with is your PPE and your scrubs and nothing else.

Regarding doffing, probably the most consistent things we see as a mistake is people going too fast or they don't have a trained observer and they're not following the steps. It's so tedious and has so many steps because those steps are there to protect you and the steps should be in sequential order so you won't contaminate yourself, so please read those steps. I tell folks read them one at a time to ensure that nothing is missed and you're going in the appropriate order. That way, it may take a few minutes longer, but you know you can leave that room or that unit and can go home, and your chances of contaminating yourself will be very small if you follow those meticulous steps.

RACHEL DEERR: Thank you again Sue for your contribution to the program. As a reminder, to claim CME or CE credit, please complete the evaluation at COVID19.dkbmed.com and select today's activity. You'll receive your certificate immediately after. Any questions or issues, feel free to email us at the address listed. Don't forget to access our resource center at COVID19.dkbmed.com. There you'll find information on the latest COVID-19 data and statistics, medical society guidelines, and resources in Spanish. Please be on the lookout for our next activity on Wednesday, May 27 featuring Dr. Paul Auwaerter from Johns Hopkins School of Medicine. We will send out an email when it becomes available. Any questions can be submitted by sending to QA@dkbmed.com. Again, thanks for joining us and thank you for your dedication to your patients with COVID-19. Thank you again so much, Sue for your contribution to the program.