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Filtration evaluation of expired elastomeric P-100 filter cartridges after months of real-world use during the coronavirus disease 2019 (COVID-19) pandemic

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To the Editor—Complicating the frontline healthcare worker (HCW) response to the COVID-19 pandemic has been the widespread shortage of personal protective equipment (PPE), including disposable single-use N95 filtering facepiece respirators (FFRs). To that end, the Centers for Disease Control and Prevention (CDC) has provided guidance on strategies that healthcare facilities may use to conserve N95s. This guidance includes extended use and reuse of previously single-use N95 FFRs coupled with various modalities of decontamination and augmenting respirator supplies with reusable devices like elastomeric respirators.[1,2]

In the healthcare setting, there is consensus that elastomeric filter cartridges should be replaced if they become visibly soiled, wet, damaged, or notably harder to breathe through.[2] Otherwise, the recommended timing for replacing elastomeric filter cartridges varies from every 30 days to annually.[3,4]

We previously determined that unopened P100 elastomeric filter cartridges received from the strategic national stockpile (SNS), which were 6 years past their shelf-life, offered similar filtration efficiency to the N95 respirator.[5] Our current study evaluates how these filters performed following use in the real-world (ie, healthcare) setting. Information pertaining to this topic is lacking.

Three pairs of P100 filter cartridges that had been in use for 5 and 6 months were obtained from frontline healthcare workers: 1 respiratory therapist (P100 RT 4-2020), 1 progressive care nurse (P100 RN 8MPLM 3-2020), and 1 medical intensive care nurse (P100 RN 8MICU 3-2020). The used cartridges were compared to an unopened and unused filter cartridge (P100- control) from the same SNS batch.

The cleaning protocol for the outer casing of the filters consists of wiping it down with premoistened quaternary ammonium/isopropyl alcohol wipes between patients. This procedure could be repeated up to 10 times per day. At the end of the shift, the wiped filter pair is disassembled from the mask, which then undergoes further cleaning.[4]

There was no subjective feeling that the filters were difficult to breathe through by any of the users. No external damage apart from the expected "wear and tear" of the filter cartridge label, likely due to multiple episodes of wiping and cleaning, was noted with the used filters.

Filtration efficiency of the used filters and the control P100 filters from our expired stock was quantified using the methodology described by Patolia et al.[5] The pair of filter cartridges from each user was tested with the testing run in duplicate.

The filtration efficiencies of the control, RT 4-2020, and RN 8MPLM 3-2020 cartridges were mostly >95% across different particle sizes. The filtration efficiency of the P-100 RN 8MICU 3-2020 cartridge was ~90%–95% but was not significantly different from that of the control (Fig. 1).

Elastomeric filters that were in good condition but long past their shelf life remained effective at filtering out aerosol-sized particles after being used in the "real-world" healthcare setting. We saw a small but nonsignificant decrease in filter efficiency in 1 of the 2 filter pairs that had been in use for 6 months. Our findings suggest that similar SNS supplies of well-kept but expired P100 filters may be used in the healthcare setting for at least 6 months, in contrast to other published literature regarding the duration of use of filter cartridges.[2,3]

The quantitative data demonstrated in our study is a strength, although the small sample size is a limitation. Tests were performed in duplicate to address this issue. We were unable to test the same exact filter cartridges before and after use because the testing process renders the filter device unusable. We caution that these findings may not be applicable to nonexpired filters, but we intuitively suspect that the duration of use could be longer.

With the continued coronavirus disease 2019 (COVID-19) pandemic and the possible surge in recently described highly transmissible variants, we anticipate that the use of elastomeric respirators will remain a key component in HCW protection.

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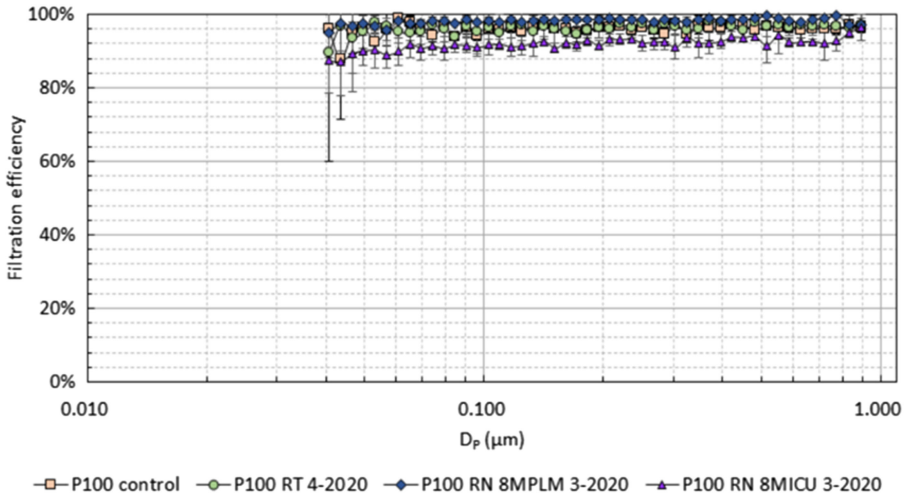

Fig. 1. The filtration efficiency of unused P-100 filters (P-100 control), P-100 filters used by a respiratory therapist (RT) for 5 months (P100 RT 4-2020), P-100 filters used by a nurse (RN) in a progressive care unit (PCU) for 6 months (P100 RN 8MPLM 3-2020), and P-100 filters used by an RN in an intensive care unit (ICU) for 6 months (P100 RN 8MICU 3-2020).

Our findings may offer other health systems guidance on the duration of use of expired elastomeric filters received from the SNS. Further studies should be conducted in the healthcare setting to determine the optimal duration of the use of nonexpired filters.

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Infection prevention and control considerations for safe outpatient monoclonal antibody infusions in patients with coronavirus disease 2019 (COVID-19)

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To the Editor—The management of patients with mild to moderate coronavirus disease-19 (COVID-19) has evolved to include early outpatient monoclonal antibody treatment of adults and adolescents at high risk for clinical progression to severe illness, which require hospitalization or result in death. The US Food and Drug Administration (FDA) has granted separate emergency use authorizations (EUAs) to anti-spike monoclonal antibodies, including balmlanivimab with or without etesevimab and casirivimab with imdevimab for treatment of these patients.[1-3] These new treatment options for mild to moderate COVID-19 have shifted the recommendations from symptomatic management and strict isolation at home to having the patients access healthcare teams and facilities to receive monoclonal antibody infusions in the outpatient setting.

The timing of infusing monoclonal antibody is limited; maximal clinical benefit is most evident early in the course of the disease. The FDA EUA limits their use to ≤10 days of symptom onset. Patients who are eligible to receive the monoclonal antibody infusions are therefore early in their clinical disease, when they have high viral loads and are most likely in their highly infectious stage

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