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Commentary

Measles immunity in emergency medical providers

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1. Commentary

The coronavirus pandemic has overwhelmed the news in 2020, but it was measles that was making the headlines just one year earlier. Measles was eliminated from the US in the early 2000s [1], but outbreaks in early 2019 were a reminder that old beasts can come back, even with an effective vaccine.

Measles is even more contagious than the virus responsible for the COVID-19 pandemic. For every person with COVID-19, an estimated 2–3.5 other people will be infected [2],. For measles, that number is 12–18 [3],. In 2019, the US had the largest measles outbreak since 1992, with more than 1200 cases [4],. The majority of those affected were unvaccinated, but a proportion of those who were affected actually were vaccinated. In measles outbreaks in 2011 and 2019, approximately 14% and 11% of affected individuals were vaccinated, respectively [5],[6].

The primary public health concern related to the resurgence of measles has been with vaccination rates, but the immunity of vaccinated individuals has also received attention. There has been an increased interest in evaluating for vaccine failure by serology testing to ensure that vaccinated people are protected [7],.

Emergency medical providers are at a high risk for contagious diseases. A paramedic service company in an urban area in the southern United States measured measles antibody levels on their vaccinated employees to determine their immune status in May of 2019. They found that only 204 of 260 (78.5%) employees had antibody levels that met the threshold for adequate protection (>25 AU/mL). Of note, immunity in 95% of the population is needed to achieve herd immunity to measles [7],.

After the finding of a high rate of decreased immunity, the characteristics of the 260 subjects were analyzed to determine if any factors were predictors of or associated with decreased antibody levels. The average age of the total population was 36 years. The proportion of females was 116/260 (45%). The proportion who were Caucasian and African American was 216/260 (83%) and 34/260 (13%), respectively. These variables were analyzed to determine if they were associated with decreased immunity. Demographic factors of sex and race were not associated. Age was a suspect because of a known correlation between age and susceptibility to infectious disease, but that was also not associated. Finally, waning immunity was suspected, so the date of vaccination of each subject was also considered. The amount of time since vaccination was not associated with decreased immunity, either. This was particularly surprising, given that previous studies have found evidence of waning immunity to measles following vaccination [8,9,10].

The importance of measles immunity and recognition of the need for additional attention in healthcare workers (HCW) has recently been noted. A measles outbreak in 2011 involved 7 healthcare-associated infections of the 14 total cases. In this outbreak, all affected individuals were unvaccinated. Nevertheless, the cost and burden of HCWs being affected emphasized the importance of making sure this population is protected [11],.

The MMR vaccine is safe, effective, and has saved millions of lives [12],[13]. Current recommendations are that HCWs receive two doses [14],. While ensuring vaccination is of primary importance in the protection of HCWs against measles, more data should be collected to determine if additional surveillance and monitoring, or even additional vaccine doses, are needed. Consideration should be given to the potential need for screening tests using measles antibodies upon hire, and at predetermined intervals thereafter, which would be comparable to tuberculosis screening [15],. The data provided here is limited by sample size and homogeneity, and may be insufficient to support new recommendations, but it signals that additional data is needed in larger and more diverse groups of healthcare personnel. As long as vaccination rates in the US continue to decline, the probability of outbreaks increases, so it is important to be aware of the level of risk of critical populations and to mitigate that risk wherever possible, given that there is a safe and accessible vaccine to do so. Of course, protection from measles extends beyond vaccination. If a patient with known or suspected measles presents to a healthcare facility, HCWs should follow the clear and extensive guidance of the CDC to prevent transmission, beginning with providing instructions before the patient arrives, if possible, and using airborne precautions during patient care [14],.

With COVID-19, it has been documented that HCWs are at increased risk [16], but the exact reasons why remain unclear. It also remains unclear whether there is differential risk among specific HCWs, such as paramedics. These groups are exposed to higher inoculating doses of pathogens, but the possible role of

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decreased immunological responses should also be considered. Further investigation into all possible variables that might be contributing to their increased susceptibility is needed, for the sake of future protection from both vaccine-preventable diseases like measles, as well as from new viral diseases.

Authorship

All authors attest they meet the ICMJE criteria for authorship.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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