# Financially Incentivized Reporting and CDC Guidelines Effectively Lowered Risk of Contracting COVID-19 in a Medical Device Manufacturing Setting.

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# Abstract

The objective of this study is to understand if mitigation controls recommended by the CDC influence a reduction in risk of contracting COVID-19 within the pre-vaccine era of a medical device manufacturing setting. A cross-sectional epidemiological survey that includes 1,136 participants was conducted to assess COVID-19 infection rates across a medical device company with multiple sites located in Indiana between 01JAN2020 to 31DEC2020. Among employees (N=870) who are ever on-site, there is an 86% (OR=0.14, 95% CI:0.043-0.448) reduction in the odds of contracting COVID-19 as compared to employees off-site. Additionally, no COVID-19 related deaths were reported during this period. On-site risk of contracting COVID-19 was lowered through mitigation control measures and financially incentivized leave for self-reporting of COVID-19 exposure and/or symptoms. Thus, the preventative measures taken at this medical device company in southern Indiana reduced morbidity and possibly mortality of their employees.


# Introduction

The CDC recommends protecting oneself from contracting and spreading COVID-19 by wearing a mask, staying six feet apart, getting vaccinated, avoiding crowds, and washing hands often [1]. These guidelines set a national precedent that many organizations, hospitals, and businesses follow to protect their employees. The need for these guidelines is shown with research that strongly supports COVID-19 is spread through airborne transmission [2-4]. With this information, masks and social distancing are a possible solution to prevent this type of communicable transmission. Other studies exist that discuss the results of following mask and social distancing guidelines. The most notable ones include Italian researchers testing ventilation, Japanese researchers testing on the Diamond Princess cruise ship, and a systematic review of 172 sources that concluded wearing masks and social distancing three to six feet reduces the risk of contracting COVID-19 [5-8]. Similar to the scope of this study, Saint Louis University found that masked individuals had a 7.7% Odds Ratio (OR) and unmasked individuals had a 32.4% OR of contracting COVID-19 [9]. Other studies have yielded similar results with a meta-analysis suggesting an odds reduction of 35% [10] of contracting COVID-19 in masked individuals. These examples provide strong evidence for the effectiveness of masks as a prevention intervention; however, there is still a lack of replicated robust research in manufacturing settings that needs to be further explored.

# Methods

This study is a cross-sectional retrospective analysis from an ongoing surveillance system with all data being self-reported. All methods were carried out in accordance with relevant guidelines and regulations. Experimental protocols were reviewed by the institution and deemed institutional review board approval was not applicable to the study given protections of the data and all employees already being aware of their data being used in a dashboard. After a formal institutional data protection and risk assessment review, the principal investigator obtained all data. If an employee was experiencing symptoms or thought to be exposed to COVID-19, they were asked to self-report to Environmental Health and Safety and/or

Human Resources then instructed to stay home. Employees were incentivized by being offered fully paid time off to encourage mitigation of COVID-19 and for reporting results. Data collection occurred prior to the widespread distribution of vaccines and no individuals reported being fully vaccinated, therefore, all individuals are considered unvaccinated. The categories used in this analysis were notably on-site or off-site exposure and initial test result. Initial test results fell under the categories of positive, negative, and quarantined/suspected. Employees who submitted COVID-19 test results received the positive or negative status, and employees who did not submit a test result were marked as quarantine/suspected. Employees were asked to explicitly report the location of exposure, if they knew, and were contact-traced to determine on-site or off-site exposure. The flow chart (see Figure 1) and classification description below illustrate possible pathways and defines the classifications. The CDC's mask and social distancing guidelines were enforced on-site, but these guidelines were unable to be enforced off-site. Thus, it is assumed that guidelines were not followed off-site.

Test result classifications are determined as follows: A test result (positive, negative, suspected/quarantined) is stated verbally and/or a copy of the test result is given to a company representative. The employee or representative will contact-trace to other company employees through verbal information and/or a form. If there is a potential close contact as validated through a positive test result while in an appropriate time period (14 days), then the employee will be labeled Positive|On-site, unless the employee states that their positive result was most likely due to an off-site exposure (Positive|Off-site). Employees with Off-site or On-site exposure and a negative test result are labeled Negative|Off-site and Negative|On-site respectively. Initial contact-tracing is halted once the representative finds no positives within their contact-tracing network, or they report a negative test result.

# Results

The implementation of masks, social distancing, and stay-at-home incentives within the company reduced the odds of COVID-19 transmission on-site by 86% (OR: 0.14. 95% CI: 0.043-0.448). The OR is less than one and indicates that being on-site reduced the odds of becoming COVID-19 positive, which suggests a strong protective effect on preventing communicable disease. The frequency of positives on-site was 3 and off-site was 229, see Table 1 for more detail. No deaths were reported during this time.

Table 1. Main results

| Site Exposure | Positive | Negative | Odds Ratio | Confidence Interval for OR | P-value |
|---|---|---|---|---|---|
| On-Site | 3 | 55 | 0.14 | 0.043 - 0.448 | <0.001 |
| Off-Site | 229 | 583 | | | |

# Discussion

There were 1,136 participants in the 2020 subset of this surveillance system with a variety of positions such as engineer, manager, production worker, human resource officer, janitorial staff, and more. This suggests that adequately sampling from multiple socioeconomic demographics was included in this analysis. At this time, other studies are unable to be identified that consider this parameter of fully paid time off within this setting. This parameter uniquely allows for positive reward to the employee to then encourage prevention activities. Additionally, rewarding the employee with incentivized leave allows for a more complete dataset to be obtained. Therefore, in combination with the surveillance system that responds to clusters of cases, this practice is worth continuing because it helps to prevent morbidity to the employee population.

This surveillance system was limited by a variety of factors: most notably, recall bias. The data obtained from this system came from employees who chose to self-report, and only employees who self-reported were included in the dataset. Within these reported test results, it was theorized that employees who tested positive were more likely to report results than those who tested negative given the financial incentive. However, it cannot be claimed that it incentivized them to honestly and fully self-report. It is possible that some employees overreported symptoms to receive extra paid time off. There was no time off awarded to those who reported negative test results. In contrast, employees may have simply forgotten to report non-positive results or felt it was unnecessary. This would have caused positive results to hold a larger proportion of total test results than truly accurate. In other words, it is thought the positivity rate of the population was skewed higher than true. However, this cannot be tested to verify.

Another limitation may exist with the assumptions. This study assumes that CDC guidelines were followed to nearly the full extent on-site and were not followed off-site. Employees who contracted COVID-19 on-site were strictly monitored to ensure they followed guidelines at work. In contrast, employees who contracted COVID-19 off-site could not be monitored to ensure they were following guidelines, so it was assumed they did not follow them. However, it is likely a portion of employees chose to continue to follow guidelines off-site and still contracted COVID-19.

The use of masks and social distancing as protective measures are common but still highly debated through news and social media. This report provides more independent information that citizens, health officials, and other professionals can use to make informed decisions on the topic of masks and prevention controls. Thus, the results from this surveillance system can be viewed to support an effective prevention strategy that may directly reduce morbidity in the setting applied. It can be said with confidence that on-site employees had a lower risk of COVID-19 transmission. The enforcement of the CDC's guideline on-site and the potential absence off-site demonstrated the guideline's effectiveness. Employees were incentivized to stay home by being offered full paid time off. As a result, the risk for employees contracting COVID-19 was lower on-site as opposed to off-site. From the results of this study, it can be concluded that financially incentivized reporting and CDC's guidelines are effective in combination to prevent communicable disease spread within a medical device development and manufacturing setting.

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# Figures

**Figure 1**