

MAINTAINING PRODUCTIVITY AND SAFETY DURING THE SARS-COV-2 PANDEMIC: INSIGHTS FROM A VACCINE RESEARCH LABORATORY

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ABSTRACT

The COVID-19 pandemic necessitated swift and adaptive responses from institutions worldwide, posing unique challenges to operational continuity and workforce safety. This manuscript presents insights from the Mayo Clinic Vaccine Research Group's experience in maintaining productivity and safety throughout the pandemic. Emphasizing adaptability, clear communication, and support for team members, our laboratory implemented a comprehensive policy initiative to ensure safety, including travel restrictions, mask mandates, and remote work arrangements. We discuss the efficacy of these measures in mitigating the risk of infections within our lab. Additionally, we explore the impact of remote work on productivity and highlight the logistical challenges of returning to in-person work. While our strategies have proven effective, we acknowledge that sustained pandemic policies raise questions of long-term sustainability and applicability in different organizational settings. Moreover, vaccine hesitancy and differing beliefs about immunity pose challenges for future pandemic preparedness. Our findings underscore the importance of documenting response plans to inform future crisis management and promote a resilient approach to safeguarding communities in the face of pandemics.

DISCLOSURES

Dr. Poland is the chair of a safety evaluation committee for novel investigational vaccine trials conducted by Merck Research Laboratories. Dr. Poland provides consultative advice on vaccine development to AiZtech; Atria; AstraZeneca UK Limited; Contec, Inc.; 3D Communications; Eli Lilly and Company; Emergent Biosolutions; Exelixis, Inc.; ExpertConnect; Genevant Sciences, Inc.; GlaxoSmithKline; Janssen Global Services, LLC; Janssen Research & Development, LLC; Medicago USA; Medscape, LLC; Merck & Co. Inc.; Moderna; Regeneron Pharmaceuticals, Inc.;

Sanofi Pasteur SA; Syneos Health and Vyriad. These activities have been reviewed by the Mayo Clinic Conflict of Interest Review Board and are conducted in compliance with Mayo Clinic Conflict of Interest policies.

Drs. Poland, Ovsyannikova, and Kennedy hold patents on vaccinia, influenza, and measles peptide vaccines.

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INTRODUCTION

The December 2019 emergence of the novel coronavirus, SARS-COV-2, became the COVID-19 pandemic and brought about the sudden onset of many institutional challenges around the globe. Supply chain disruptions, personnel shortages, mental health challenges, panic, and uncertainty amplified the difficult operational circumstances. Roughly three years ago, the incomplete knowledge of risks surrounding COVID-19 was severely limited by the lack of clinical and research-driven data. As a result, emotional responses such as fear, anxiety, and uncertainty were associated with poor mental health and willingness to work during a pandemic (Nabe-Nielsen et al., 2021). One of the most significant concerns for medical centers was protecting healthcare providers, scientists, and their support personnel. As a result, many organizations, including our own, took action to prevent further risks and spread of the virus until vaccines became available. Some of these actions were straightforward preventive measures commonly adopted (masking, social distancing), and others were creative attempts at adapting to the specific characteristics of the local situation or environment. Organizations will never be able to fully prevent an external crisis from causing some degree of internal impact. Still, resilience can be achieved through remaining adaptable, supportive, and focusing on clear communication (Vito et al., 2023).

Research institutions and laboratories provide the foundation for advancements in science. Their existence and output are essential under normal circumstances and critical during a pandemic. Similarly, countless other businesses provide necessary goods and services, and they must rapidly adapt to the realities of the pandemic to preserve operational capabilities. The internal operations policy of any organization should be frequently reevaluated and optimized to keep up with an everchanging environment. For this reason, pandemic policy must be similarly thought out, advancing, and changing with new data from the Centers for Disease Control, the World Health Organization, and the National Institutes of Health relevant to the unique aspects of the laboratory.

Federally grant-funded laboratories, such as the Vaccine Research Group at the Mayo Clinic, were critical in understanding the SARS-CoV-2 virus and in devising new vaccine approaches and virus-specific humoral (antibody) and cellular assays. The laboratory developed and utilized specific policies (created within the institutional policy framework) to ensure the laboratory remained operational, safe, and productive. To date, the Mayo Clinic Vaccine Research laboratory, with 20-plus employees, has not experienced any known SARS-CoV-2 infections or disruptions in personnel. Infection prevention requires diligent communication, planning, pivoting with the evolving science, and individual and collective responsibility. Here, we will share what we believe to be the primary factors contributing to our laboratory's successes in maintaining productivity and safety during and throughout the COVID-19 pandemic.

SAFETY

First and foremost, acquiring immunity to SARS-CoV-2, be it infection- or vaccine-induced, offers the greatest protection from severe disease. Although vaccination has been widely implemented as a policy, many argue that infection-induced immunity can also provide the desired public health benefits (Pugh et al., 2022). While this is true, the argument ignores the far greater health risk of disease compared to vaccination. Regardless of the nature of the acquired immunity, the continued evolution of viral variants that result in greater transmissibility and potential severity will drive an ongoing need to ensure worker safety.

As soon as the reality of the SARS-CoV-2 pandemic became apparent, our group implemented a comprehensive policy initiative to ensure safety and productivity within our lab. Laboratory policies regarding travel and masking within our group were typically beyond that of the direction given by the Centers for Disease Control and institutionally. For example, the baseline Mayo Clinic policy regarding travel suggested that all nonessential business travel be limited. We engaged in a group-wide consensus-building set of conversations regarding the known and unknown risks of business and personal travel. We built consensus toward asking our group to minimize all travel and forego travel entirely where possible. If a lab member did travel, we developed and utilized an isolated workspace for the individual to quarantine yet remain productive while awaiting required diagnostic test results—effectively creating the equivalent of two work “bubbles.” It is also likely that knowing one would require testing upon returning from travel would positively influence safe behavior during travel.

While a ban on personal travel could not be mandated administratively, it was mutually agreed upon and accepted after lab-wide discussions. Regular updates by lab supervisors and grant principal investigators followed, focusing on widely sharing and evaluating new data in real-time, planning, and considering new policies or revising existing policies as circumstances changed and new information became available. One of the most challenging issues we observed was employee anxiety and uncertainty surrounding the pandemic. Frequent and open discussions mitigated these anxieties and allowed us to receive continual feedback, resulting in actionable input and consensus. Significant time was spent building an understanding of the first wave of infections and the knowledge surrounding masking efficacy. Reduced cases in the summer

months, increased cases in the subsequent fall and winter months, and updated restrictions also became a part of our policy considerations as time advanced. The continued emergence of SARS-CoV-2 variants of concern has recently reinforced the need to observe this everchanging environment continuously.

Distancing at work and moving to remote meeting platforms proved to be one of the most effective measures we implemented. Where applicable, designating one laboratory door for incoming traffic and another for outgoing traffic significantly mitigated a common traffic bottleneck in the workplace. We utilized nonconventional spaces such as supply closets, meeting rooms, and low-traffic laboratory spaces to accommodate a growing lab by providing additional physical workspaces while maintaining social distancing. In addition, using virtual meeting platforms and working in shifts dramatically reduced proximity interactions and the chances of transmission and infection. A discrete event simulation conducted by the International Federation of Clinical Chemistry and Laboratory Medicine supports these management decisions in minimizing workplace transmission by encouraging the organization of staff into smaller teams, frequent staff change, and reduction of consecutive days worked (Lim et al., 2020).

In addition, several other measures proved critical to maintaining safety. In addition to adopting mandatory masking (a proper mask appropriately worn), we took advantage of the widespread availability of polymerase chain reaction and serology testing at the Mayo Clinic to ensure that staff members were tested at appropriate times surrounding travel and possible exposures. These negative test results also provided additional insight into policy efficacy by supporting the usefulness of our safety measures and became self-reinforcing.

PRODUCTIVITY

Three years after the onset of the COVID-19 pandemic, many individuals in the U.S. remain in a teleworking setting. The rate of teleworking in 2023 may not be as high as at the height of the COVID-19 pandemic. However, many have become accustomed to their new routines and even insist their productivity is heightened while working from home. The result of this dramatic shift to working from home has identified two distinct groups of individuals: those reluctant to return to work out of fear of infection or becoming comfortable with their new routines and those eager to resume working alongside their colleagues and returning to their sense of normalcy (Fan & Moen, 2023). In considering this issue of work location, it is important to consider several logistical issues when encouraging an office and laboratory workforce to rejoin under one roof. Notably, the technical and human resources and collaborative capacity of working alongside one another in a laboratory, office, or factory is superior to a remote work setting. Moreover, some jobs cannot be completed remotely. Laboratory work is one of those jobs, further justifying the need for a complete pandemic-setting work plan.

Many workplace COVID-19 policies have several “if-then” scenarios that attempt to predict common situations and provide actionable processes to resolve them (typically working with human resources departments about missing work due to COVID-19). Despite these measures,

many university and non-university laboratories and offices were shut down for months, and productivity was halted. Some closed laboratories deemed “nonessential” could still have been a resource and used for productive time-sensitive research if a wider lens was applied to COVID-19 operational policy, not just focusing on a binary “must work or must NOT work” approach that only encouraged COVID-19-related work. Similarly, thousands of square feet of office space became vacant while employees transitioned to work-from-home accommodations, causing gaps in workflow and leaving resources unused. As mentioned, we utilized these unused spaces to create post-travel isolation areas and to set up additional desk space to be used by current and new members for non-laboratory duties.

Hindsight plays a large role in the development of pandemic policy. Still, proactivity and responsivity throughout a pandemic are necessary for developing and effectively implementing an operational pandemic response plan. Research laboratories within the Mayo Clinic all developed individualized responses to the pandemic within the framework of institutional policies. The extra steps the Vaccine Research Group took proved successful in maintaining safety and productivity. Our laboratory members and principal investigators saw an increase in demand for their time due to their involvement in Mayo Clinic’s institutional COVID-19 pandemic response. Despite increased demand for group effort, our group operationalized the aforementioned response plan and demonstrated exceptional productivity. In 2019 (before COVID-19), our group authored 17 peer-reviewed publications to be shared with the scientific community. In 2020 (during COVID-19), we authored 31 publications, supporting the notion that diligent planning and execution of nonconventional measures can maintain or significantly improve workplace safety and productivity outcomes.

CONCLUSION

The COVID-19 pandemic of December 2019 brought unprecedented challenges to institutions and workplaces worldwide; our laboratory was no exception. Our experiences and dedication taught us valuable lessons about maintaining productivity and safety in a global crisis. While our focus has been on a laboratory setting, the principles and strategies discussed can be adapted to various work environments. As we reflect on the past three years, we recognize the clear dangers of a pandemic and the importance of swift and diligent action. The constantly evolving scientific landscape demands continuous reassessment and optimization of operational policies. We achieved remarkable results by fostering adaptability, supporting our team members, and prioritizing clear communication.

However, our strategy is not without drawbacks. For example, some may question the sustainability of certain measures in the long term or their applicability in different types of organizations depending on resource availability. Furthermore, it is essential to acknowledge that vaccine hesitancy and differing beliefs about immunity exist within society. Addressing these concerns through open dialogue, education, and fostering trust in public health initiatives will be critical in building a commonly accepted and resilient response to future pandemics.

Individuals and organizations need to document their response plans to the COVID-19 pandemic. This will ensure the availability of situation- and site-specific data that can be invaluable in future pandemics. By recording our experiences and strategies, we can better equip ourselves to respond effectively and efficiently during the next crisis, promoting a more informed and prepared approach to safeguarding our communities.

Table 1. Productivity and Safety Measures to Common Workplace Pandemic Scenarios	
Workplace Scenario	Response
Presence of highly transmissible virus	Wear proper mask, vaccinate when vaccine is approved and available
Need for social distancing Productivity disrupted by fragmented team	Utilize uncommon spaces/resources, remove bottlenecks, meet remotely, and operate in shifts
Nonessential travel.	Deploy isolated workstations, implement rapid testing, and utilize workspace safety “bubbles”
Everchanging institutional policy occurring	Identify and agree upon fundamental principles—this facilitates rapid policy changes as needed to uphold those principles Engage in team consensus-building conversation to agree on group-specific policy that minimizes collective exposure risk
Productivity disrupted by fragmented team	Collaborate and utilize all available resources and space to allow for safe work to continue under one roof
Need for frequent cleaning of workspaces	Wiping down common touchpoints and making hand sanitizer available outside of every door

REFERENCES

- Fan, W., & Moen, P. (2023). Ongoing remote work, returning to working at work, or in between during COVID-19: What promotes subjective well-being? *Journal of Health and Social Behavior*, 64(1), 152–171. <https://doi.org/10.1177/00221465221150283>
- Lim, C. Y., Bohn, M. K., Lippi, G., Ferrari, M., Loh, T. P., Yuen, K. Y., Adeli, K. & Horvath, A. R. (2020). Staff rostering, split team arrangement, social distancing (physical distancing) and use of personal protective equipment to minimize risk of workplace transmission during the COVID-19 pandemic: A simulation study. *Clinical Biochemistry*, 86, 15–22. <https://doi.org/10.1016/j.clinbiochem.2020.09.003>
- Nabe-Nielsen, K., Nilsson, C. J., Juul-Madsen, M., Bredal, C., Hansen, L. O. P., & Hansen, Å. M. (2021). COVID-19 risk management at the workplace, fear of infection and fear of transmission of infection among frontline employees. *Occupational and Environmental Medicine*, 78(4), 248–254. <https://doi.org/10.1136/oemed-2020-106831>
- Pugh, J., Savulescu, J., Brown, R. C., & Wilkinson, D. (2022). The unnaturalistic fallacy: COVID-19 vaccine mandates should not discriminate against natural immunity. *Journal of Medical Ethics*, 48(6), 371–377. <https://doi.org/10.1136/medethics-2021-107956>
- Vito, R., Schmidt Hanbidge, A., & Brunskill, L. (2023). Leadership and organizational challenges, opportunities, resilience, and supports during the COVID-19 pandemic. *Human Service Organizations: Management, Leadership & Governance*, 47(2), 83-98. <https://doi.org/10.1080/23303131.2022.2157355>