DOI: 10.1002/hsr2.2084

LETTER TO THE EDITOR

Health Science Reports Open Access WILEY

Infections in laboratories and the potential of nudge interventions

On September 29, 2023, the National Institute of Infectious Diseases of Japan announced that one of their researchers with over 20 years of experience handling pathogens developed typhoid fever, attributing the cause to an infection with the typhoid bacterium within the laboratory.[1] A report revealed that a genomic analysis comparing the bacterium used in the experiment with the one detected from the researcher showed significant similarities; while the exact cause of the infection could not be determined and the likelihood of the facility being the cause was low, there were issues with bacterium handling, protective equipment use, and hand disinfection procedures.[1] In response, a comprehensive plan to prevent recurrence was proposed, including six measures such as establishing an audit system for BSL2 laboratories and enhancing the training and education system for pathogen handlers.[1] Although these measures, reflecting an overall policy, were announced for urgent review, the lack of specific substance in many of the proposed items underscores the need for more concrete and specific intervention strategies, essential not only for protecting the health of researchers but also for safeguarding public health in society.

Moreover, in addition to this instance, there have been reports of infections within research laboratories globally, including cases where scientists contracted pathogens such as smallpox, SARS, Marburg fever, and novel influenza, with some incidents even leading to the spread of these diseases to the general public.[2] While measures like the establishment of guidelines and the review of reporting structures have been implemented in response to such issues, given that these interventions require significant time and budget, the review by Ménard et al.[3] found that 25%–38% of respondents did not report accidents or injuries during experiments, only 40% used PPE, and 25% lacked specific hazard training, underscores an urgent need for interventions that are both more immediate and cost-effective.

While it might be challenging to fully eradicate such incidents, the critical awareness issues among researchers can be attributed to human cognitive biases, including overconfidence bias, optimism bias, and present bias, which arise from familiarity and hinder the accurate estimation of future risks. Thus, to address these issues, approaches that align with these psychological traits are required, and one possible intervention method can be the concept of nudge, derived from behavioral economics, and its framework known as EAST ("Easy," "Attractive," "Social," "Timely").[4] Nudge is recognized as a strategy that guides individuals toward socially desirable actions while preserving their freedom of choice. Specifically, placing prominently colored gloves near the entrance of a room as combined "Timely" and "Attractive" nudges at the crucial moment of entering the lab or noting the donning procedures on the equipment as "Easy" nudges can potentially increase the number of researchers adhering to PPE protocols.[4] Additionally, employing messages such as "Use hand sanitizers to protect against cluster infections" to appeal to researchers' sense of ensuring safety within the institute and leveraging the conformity effect by emphasizing that "everyone is practicing infection prevention" are among the interventions using various "Social" nudges that have been reported to encourage preventive behaviors among individuals effectively.[4]

Of note, while interventions using such nudges are believed to be effective for temporary infection prevention within laboratories, it is crucial to recognize that while nudges can effectively promote behaviors, they may have limitations in sustaining them long-term. Regarding this point, Hertwig et al.[5] have suggested that combining nudges with education is a potent strategy for solidifying behaviors. For instance, incorporating regular training sessions on pathogen handling and the use of PPE, as well as workshops on cognitive biases and risk assessment, can potentially improve the long-term adherence to safety protocols in laboratories. This integration not only prompts immediate behavioral changes but also cultivates a lasting understanding and commitment to safety, offering a more effective approach to preventing lab-acquired infections.

With the declaration of the end of the novel coronavirus 2019 pandemic and the subsequent increase in global mobility, the spread of infectious diseases, especially for diseases with longer incubation periods, has become an international concern.[6] Therefore, not only for researchers but also to shield society from the threat of infectious diseases, it is imperative to reevaluate infection control measures within laboratories. The recent incident in Japan underscores the urgency of innovation in laboratory safety management, and by integrating nudges with current management structures, we can potentially enhance the prevention of brief infections among researchers in a cost-effective manner.

AUTHOR CONTRIBUTIONS

Yudai Kaneda: study concept and design; data collection; data analysis and interpretation; writing—original draft.

CONFLICT OF INTEREST STATEMENT

The author declares no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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