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Commentary

Safe university: a guide for open academic institutions through the pandemic

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Almost 2 years after the initial detection of severe acute respiratory syndrome coronavirus 2, the pandemic perseveres, and the academic community is constantly facing uncertainty regarding the ability to sustain in-person university services and the means to achieve this academic experience in a (semi)closed academic community with minimal morbidity.

Two major parameters drive the pandemic dynamics at the moment: The wide availability of efficacious and safe vaccines for all ages involved in academic life, and the emergence and subsequent dominance of novel viral variants. Of these variants, delta (PANGO lineage B.1.617.2) currently prevails in most of Europe, the United States, and Canada, characterized by significantly enhanced transmissibility and partial immune evasion that may lead to breakthrough infections, combined with waning vaccine efficacy (both reversed by a booster shot) [1]. The appearance of Omicron variant (PANGO lineage B.1.1.529) in late November 2021, and its consequent dominance, further perplexes the pandemic trajectory, due to its significant immune escape potential.

The authors have developed an evolving guide incorporating these novel aspects in an attempt to build a pathway to an unhindered academic season. It is a complex task that can easily be dismissed as unattainable or, on the other end, regressive. What is at stake, though, is of paramount importance: Colleges and universities need to function in-person. Interactions between teachers and students cannot be replaced by remote teaching, and nor can digital communication replace living in the academic climate. Our guide is based on modules, which we describe in the following.

University as a closed environment

Minimizing viral entrance into the academic community minimizes the possibility of intra-academic transmission and subsequent disruptive clusters. Entry into such an environment could be based on the development of a digital de-identified immunity status platform and an individual pass, with vaccinated personnel and students entering by default, and nonvaccinated staff and students entering after displaying a valid diagnostic test. Personnel and students quarantined as either infected or exposed will not be granted entrance. Alternatively, in countries where general immunity passes/certificates are implemented in everyday life, they could be used also for academic entrance. Entrance to persons unrelated to academia should be kept to a minimum (in numbers, frequency, and duration), and access should only be granted upon demonstration of a similar certificate. Institutions may, if possible, relocate certain services interacting with the public, allowing for a separate entry.

Safe classroom

Student audience should be stratified according to their vaccination/immunity status, with nonvaccinated individuals counting as three, because their potential as a transmitting unit is far higher than the relative potential of vaccinated/immune individuals. Access should only be allowed to individuals wearing masks (mask type preferences may differ in the event of emergence of novel, more transmissible, variants), and masks should be worn constantly in any closed space. Inappropriate use or absence of masks will result in the individual being expelled.

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Relevant academic departments can evaluate each classroom's characteristics: total air capacity, presence of windows and their width and height, presence of preinstalled heating, ventilation, and air-conditioning facilities and the ability to update their function with the installation of high-efficiency particulate absorbing filters, size and location of room entrance, air currents produced when keeping both windows and entry door open, characteristics of the adjoining detonation spaces (i.e. halls), specific local weather characteristics that affect the ability to constantly keep windows open, and the outcome of open windows in air changes (because the difference between inner and outer temperature is analogous to air change speed) [2]. Classroom dimensions and natural ventilation feasibility are the main factors in judging suitability. Bazan and Bush [3] estimated that, in the absence of mask usage, the safe time after an infected individual enters a room is 1.2 hours (and significantly more for mechanical ventilation).

Classroom air safety can be evaluated by carbon dioxide detectors. One could stratify CO_2 detector values as follows: Values < 700 parts per million (ppm) are indicative of a clean environment, 700 to 800 ppm of the need for transient window opening, 800 to 1000 ppm of requiring further actions (including portable air cleaning devices), and >1000 ppm of very high transmission risk and a need for multiple additional interventions [4]. Technical air cleaners vary according to their hourly air cleaning capacity, noise levels, and optimal position in a specific classroom. Alternatively, a particular classroom can be considered unsuitable for use or able to host a smaller number of students.

Each academic space needs a different ventilation approach: A library is a space with minimal virulent aerosol generation (no one speaks), whereas dining facilities are the opposite (no mask, space mass-populated at specific hours), as are music teaching classrooms. Offices are typically not crowded (a mandate for a maximal visit of 10 minutes and for a strictly limited number of people could be introduced).

Typical surface cleaning measures should be continued despite the relatively limited effect of fomites in severe acute respiratory syndrome coronavirus 2 transmission.

Methods of teaching

To minimize transmission, smaller student working groups should be created, ideally constant in their synthesis. Many academic institutions, however, are not strictly closed environments, and function inside the urban web, with significant student and personnel interaction with the outer community. Yet, in terms of intra-academic transmission, the cohort allows for adequate tracing when a new case emerges.

The syllabus will need modifications, adapted to smaller working groups (and thus extended teaching times): re-evaluating what is essential educational material, incorporating additional distant educational courses where possible, and focusing live educational sessions on subjects unsuitable for e-learning will allow for a more flexible but nevertheless complete body of learning. Preparations for online continuation of education, if a case surge mandates another lockdown, should be enhanced, ensuring that all students will have adequate access to educational material and support in terms of physical and mental health.

Residence halls

Many European academic institutions do not function as a campus, where students reside inside the university facilities. When such residence halls exist, they may act as a cluster multiplier owing to the mixing of students from different educational working groups/departments. Enhanced surveillance with random testing may be performed in such facilities, as well as wastewater surveillance. Quarantine apartments should be preselected. When a case is detected, residence halls can be epidemiologically approached by surveillance-based informative testing, depending on floor proximity with the identified case [5].

Vaccination

Numerous academic institutions have issued vaccination prerequisites for participation in in-person academic activities. Nevertheless, vaccination coverage in those of student age remains low throughout Europe: Double vaccination percentages stand at 68.4% for those age 18 to 24 years, and <2% in that age group have had a booster dose as of December 8, 2021 [6]. On the other hand, because academic institutions' mission is, among others, to promote science, one would expect universities to have a central role in educating the adjoining community on the benefits of vaccinations. For that purpose, the percentage of vaccinated educators may be made public. Vaccination might be made obligatory for teachers because they are possible supertransmitters by being in contact with different student working groups and emitting more potentially infectious aerosols through constantly speaking in a closed space. Mandatory vaccination might be further considered for other individuals with multiple and diverse student interactions, such as personnel working in academic dining facilities.

Academic institutions should promptly and decisively deal with any academia member who spreads fake news and disinformation regarding the pandemic. One may argue that heretic views on the pandemic should be protected under the umbrella of academic free speech and that defining what is fake is sometimes hard, but the abundance of scientific data on most aspects of the pandemic eases this discrimination.

A recent model estimated that 90% vaccination coverage with a vaccine of 85% efficacy is adequate for uninterrupted university life without diagnostic testing. On the other hand, when coverage decreases to 50%, daily testing is needed to sustain an open, safe university [7]. Vaccination centres should be created inside the campus and serve as promoters of information about the benefits of the vaccine. This can be achieved easily for institutions hosting health sciences departments.

In recent weeks, the definition of adequate vaccination has evolved owing to the demonstration of waning protection against infection (but not severe disease) at 105 to 150 days after vaccination in the form of breakthrough infections. Students are a population prone to multiple contacts; thus, breakthrough infections have the temporary potential to initiate or participate in transmission chains. It is thus of paramount importance to ensure that a booster dose is administered to all eligible students and personnel. Dissemination of information on the utility and safety of the booster dose should be an additional task of the aforementioned vaccination centres.

Testing, tracing, isolation, and wastewater surveillance

Many countries have made periodic testing for nonvaccinated individuals compulsory. Yet, the validity of such testing may vary. The existence of a specific testing unit at each academic institution that will perform rapid antigen tests upon entrance may be a costly venture, but it will ensure that no forged tests are used. The possible development of in-house diagnostic methods and use after validation should be entertained for institutions that host health sciences departments. Existing health sciences departments may develop tracing teams for suspected contacts of confirmed cases. These teams may also augment caring for isolated individuals,

Table 1
Feasibility acceptance and estimated cost of proposed interventions

Intervention	Feasibility	Cost	Acceptance	Comments
Entry passports	+	€	++	€ if using community passports, otherwise €€
Masking	+	€	+	
Classroom adaptation	++	€€	+	
Classroom ventilation	++	€€	+	Costs of portable ventilators, for example, but of long-term utility
Smaller working groups	+++	€€	++	Will need personnel to perform additional hours or need to hire more personnel
Student vaccination	+	€	++	Not universally accepted: a student group at the medical school of Aristotle University of Thessaloniki protested for their right to deny vaccination
Mandatory vaccination	+	€	+++	Will raise issues of free will in a minority
Testing	++	€–€€	++	Possibility of forged external tests
Tracing	+	€	++	Adequacy of information given
Isolation	++	€€	++	Isolation needs support, compliance generally low
Wastewater surveillance	+	€ -€€	+	

+, easy to implement/acceptable; ++, cost may raise issues of acceptance; +++, will need additional funding/will raise debates.

particularly those living outside residence halls, in terms of both physical and mental needs [8].

Wastewater surveillance should be performed periodically at all academic buildings and facilities to identify any unrecognized spread and allow for targeted testing [9].

A continuing process

Keeping universities safe and open during an evolving pandemic means that any approach and rule may soon become outdated. Keeping up with all novel parameters in a pandemic reality is of paramount importance to adapt university policies. A level of viral transmission that is considered incompatible with in-person education should also be predefined.

The analytical guide has been posted in the Knowledge and Uncertainty Research Laboratory website (http://gav.uop.gr/docs/safe-university/index.html) in Greek, with an English version on the way, as well as an updated version adjusted to waning immunity and omicron aspects. The authors recognize that institutions, regions, and countries have vastly different epidemiologic factors that influence viral circulation and vaccination coverage. Political (viewing mandates as reactionary), cultural (the close-contact Mediterranean culture), economic (this is a plan that needs immediate financial support from the state, which is often unfeasible despite the overall favourable cost—benefit risk), technical (universities that have departments widespread in a larger urban setting, or more than one setting), scheduling (for vaccine efficacy to have an effect, you do need 1 month), regulatory, or even supernatural (the effect of religious minorities with an antivaccine stance) concerns may prohibit the implementation of similar approaches.

The present guide contains numerous parameters that are difficult to implement. Table 1 roughly presents the feasibility of each proposed intervention, as well as an estimate of its cost and acceptance by university personnel. For example, separating vaccinated and nonvaccinated individuals in activities such as lunch (even more in laboratories) may be practical (fewer additional measures for vaccinated groups, more for nonvaccinated groups), but it is also an ethical, and even legal, issue: Nonvaccinated individuals may feel that such segregation is a violation of their human rights (a group of medical students at the Aristotle University of Thessaloniki recently protested for their right to deny vaccination), but on the other hand, vaccination in pandemic times is also an issue of social responsibility.

Nevertheless, the time to act was yesterday. The evolution of the pandemic necessitates that academic institutions at least should make every effort to remain open and safe, educating in parallel the overall community and the state on how one can do it [10].

Transparency declaration

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Author contributions

The development of the Guide was Manolis Wallace's conception. Both authors jointly designed and prepared the Guide. Both authors jointly wrote and revised the mansucript.

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