Integrating the History of Pandemics into Medical Education: A Mixed-Methods Study at FMIOPH Lab "VIVARY"

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Abstract

Historical pandemics offer critical lessons for future physicians, yet remain underrepresented in many medical curricula. This mixed-methods study from FMIOPH Lab "VIVARY" (Fergana Medical Institute of Public Health, Uzbekistan) evaluated medical students' knowledge of major pandemics, their attitudes toward integrating pandemic history teaching, and the impact of a pilot, history-informed teaching module. A cross-sectional survey (n=180) and pre/post knowledge test (n=92) were combined with focus groups. Baseline knowledge of the 1918 influenza and early COVID-19 policy responses was low (mean score 46.3%), but 86% of students agreed that teaching on historical pandemics would better prepare them for future health crises. After a four-week blended module linking plague, 1918 influenza, HIV/AIDS, and COVID-19 to ethics and health systems, mean test scores improved by 21.4 percentage points ($p<0.001$), and self-rated preparedness for future pandemics increased significantly. The findings support structured integration of pandemic history into medical education as a feasible, valued, and educationally effective innovation in a post-COVID world.

Keywords: medical-education, pandemics, history-of-medicine, curriculum, COVID-19, preparedness

1. Introduction

The COVID-19 pandemic exposed profound gaps in health-system preparedness and in clinicians' understanding of how historical experience can guide crisis response. While historians have long argued that "history repeats itself" in patterns of fear, inequity, and policy failure, medical curricula often treat history as optional or peripheral, especially in compressed programs and in low- and middle-income settings. Recent studies from the UK and Europe show that most medical students receive little structured teaching on historical pandemics, yet strongly endorse its inclusion and perceive it as relevant to infection control, ethics, and public communication. At the same time, the COVID-19 shift to online and hybrid teaching has accelerated broader

curricular innovation in medical education, including virtual simulation and immersive technologies.

FMIOPH in Fergana, Uzbekistan, founded in the early post-Soviet period as a public health-oriented medical institute, has been actively modernizing its curriculum, expanding digital infrastructure and clinical partnerships to respond to regional health needs. Within this context, the FMIOPH Lab "VIVARY" initiated a pilot project to integrate the history of pandemics into the medical curriculum, using a historically informed, problem-based approach aligned with contemporary competency frameworks.

This study had three aims: (1) to assess FMIOPH students' baseline knowledge of major pandemics and their current exposure to pandemic history teaching; (2) to explore attitudes toward incorporating pandemic history into core medical education; and (3) to evaluate the short-term educational impact of a pilot, four-week "History of Pandemics and Medical Response" module developed by VIVARY. We hypothesized that targeted teaching would significantly improve pandemic-related knowledge and perceived preparedness, and that most students would support formal curricular integration, echoing international findings.

2. Methods

2.1 Study design and setting

We conducted a convergent mixed-methods study at FMIOPH between February and June 2025, combining a cross-sectional survey, pre/post knowledge assessment, and focus groups. The study population comprised 3rd–5th year medical students enrolled in general medicine and public health tracks. Ethical approval was obtained from the FMIOPH Institutional Review Board, and participation was voluntary and anonymous.

2.2 Survey instrument

A 32-item online questionnaire adapted from recent work on pandemic history education in UK medical schools assessed:

- Demographics and year of study.
- Previous exposure to teaching on historical pandemics.
- Knowledge of key events and concepts related to the Black Death, 1918 influenza, HIV/AIDS, and COVID-19 (12 multiple-choice items).
- Attitudes toward integrating history of pandemics into the curriculum (Likert-scale items).

The instrument was piloted on 20 students for clarity and reliability; Cronbach's alpha for the attitude scale was 0.86. The final survey was distributed via institutional email and learning management systems.

2.3 Educational intervention

VIVARY designed a four-week blended module, "History of Pandemics and Medical Response," consisting of:

- Two interactive lectures per week (plague, 1918 influenza, HIV/AIDS, COVID-19, and regional outbreaks in Central Asia).
- Case-based seminars linking historical episodes to triage, resource allocation, stigma, and communication.
- A virtual simulation exercise on outbreak decision-making, inspired by evidence on virtual simulation in medical education.

The module was embedded within an existing infectious diseases block for a volunteer cohort (n=92).

2.4 Knowledge assessment

Participants in the intervention completed a 20-item multiple-choice test immediately before (T0) and after (T1) the module. Questions covered historical timelines, mortality patterns, public-health measures, and ethical controversies, with items informed by historical and medical humanities courses at other universities. Scores were calculated as percentages.

2.5 Focus groups

Four focus groups (6–8 students each; total n=28) were conducted after the module to explore perceptions of relevance, learning experience, and suggestions for curricular integration. Discussions were audio-recorded, transcribed, and thematically analyzed using an inductive approach.

2.6 Data analysis

Quantitative data were analyzed with SPSS v.27. Descriptive statistics summarized knowledge scores and attitudes. Paired t-tests compared pre/post knowledge. Likert items on usefulness were collapsed into five categories. A p-value <0.05 was considered significant. Qualitative themes were triangulated with quantitative findings.

3. Results

A total of 180 students completed the baseline survey (response rate 64.3%), and 92 participated in the intervention and pre/post test. Participants were 58% female, with mean age 21.6 years; 55% were in year 3, 27% in year 4, and 18% in year 5. Only 19% reported previous structured teaching on historical pandemics, mainly brief lectures during COVID-19.

3.1 Attitudes toward integrating pandemic history

Figure 1 shows student ratings of the usefulness of integrating pandemic history into the core curriculum. Fully 62% considered it "very useful" and 24% "somewhat useful," while only 6% rated it as "not very useful" or "not useful." Overall, 86% expressed positive attitudes toward curricular integration, broadly consistent with UK data.

Perceived usefulness of integrating history of pandemics into the core FMIOPH medical curriculum (n=180)

Figure 1. Perceived usefulness of integrating the history of pandemics into the FMIOPH core medical curriculum (n=180).

3.2 Knowledge and preparedness outcomes

Table I summarizes baseline knowledge and pre/post test performance. Mean baseline knowledge (12-item survey subset) was 46.3% (SD 14.8), with the lowest scores on questions about the 1918 influenza's global mortality and infection-control measures used during earlier cholera epidemics, aligning with international findings of limited pandemic history awareness.

Table I. Knowledge and preparedness outcomes before and after the VIVARY module (intervention cohort, n=92)

Measure	Pre (mean ± SD)	Post (mean ± SD)	p-value
Pandemic knowledge test (%)	48.6 ± 13.9	70.0 ± 11.7	<0.001
Self-rated preparedness (1–5)	2.4 ± 0.8	3.8 ± 0.7	<0.001
Perceived relevance to future practice (1–5)	3.7 ± 0.9	4.4 ± 0.6	<0.001

Students' knowledge scores improved by 21.4 percentage points on average (95% CI 18.6–24.2; p<0.001). Self-rated preparedness for future pandemics increased from 2.4 to 3.8 on a 5-point scale, and perceived relevance to future practice also rose significantly. Gains were similar across years of study.

3.3 Qualitative themes

Focus groups revealed three dominant themes. First, students viewed historical pandemics as a "mirror" that made COVID-19 policies and public reactions more intelligible, echoing global calls for a "usable past" in pandemic response. Second, they valued the integration of history with ethics and communication, particularly around triage, misinformation, and stigma—issues that also feature prominently in decolonizing global health debates. Third, participants stressed that interactive formats—case discussions and virtual simulations—were more engaging than didactic lectures, reinforcing evidence that immersive technologies and virtual simulation enhance motivation and skill acquisition.

Representative comments included: "Seeing how doctors in 1918 handled shortages made me think differently about our own oxygen crisis," and "History made ethics feel real, not abstract."

4. Discussion

This study from FMIOPH Lab "VIVARY" adds to emerging international evidence that integrating the history of pandemics into medical curricula is both desired by

students and educationally beneficial. We found substantial baseline knowledge gaps about historical pandemics among Uzbek medical students, despite their lived experience of COVID-19, mirroring findings from the UK and elsewhere.

The four-week VIVARY module produced significant gains in factual knowledge and perceived preparedness, with a mean improvement of over 20 percentage points in test scores. These gains are comparable to those observed with other structured innovations such as virtual simulation experiments in microbiology and online clinical programs during COVID-19, which have shown improved knowledge retention and self-efficacy. The combination of historical case studies with virtual or scenario-based components appears particularly powerful in helping students connect past and present, an approach aligned with broader movements in medical humanities and narrative medicine.

Our findings also intersect with conversations about decolonizing global health education. Histories of pandemics have often been told from Euro-American perspectives, emphasizing “tropical medicine” and colonial narratives. In our module, including Central Asian and Uzbek experiences of cholera, plague, and COVID-19, as well as Soviet-era public health campaigns, resonated strongly with students and elevated local knowledge. This aligns with recommendations to challenge Western dominance in global health curricula and foreground regional histories and indigenous perspectives.

The overwhelmingly positive attitudes toward integrating pandemic history suggest that students do not see it as “extra” or ornamental, but as directly relevant to clinical decision-making, health-system design, and communication under uncertainty. This echoes the argument that historical literacy is part of professional competency, helping future clinicians interpret epidemiologic curves, appreciate the social determinants of health, and anticipate recurring patterns of inequity and mistrust.

However, several limitations warrant caution. First, this was a single-institution pilot with voluntary participation in the intervention, introducing potential selection bias; students interested in history or public health may have been over-represented. Second, the knowledge test measured short-term gains immediately after the module; we did not assess long-term retention or impact on actual clinical behavior, issues highlighted as gaps in the educational innovation literature. Third, although we incorporated local and global case studies, the module covered only a subset of possible topics (e.g., smallpox eradication, HIV activism, and indigenous responses to disease could be further developed).

Future work at VIVARY will therefore include longitudinal follow-up to assess retention, randomized comparisons with standard teaching, and expansion of content to encompass decolonial perspectives and community-engaged learning.

Collaborations with international partners could help co-develop regionally grounded pandemic history modules, building on examples from Canada, Kenya, and Brazil where history and justice themes have been woven into health-professional training.

Conclusion

Integrating the history of pandemics into medical education at FMIOPH Lab "VIVARY" proved both feasible and impactful. Students arrived with limited knowledge of past pandemics but a strong desire to learn from them; a brief, structured module substantially improved their understanding and sense of preparedness, while qualitative data underscored the value of historically informed, interactive teaching.

In a century likely to see recurrent infectious threats, climate-related health crises, and persistent inequities, history is not a luxury but a practical tool: it equips future clinicians to recognize patterns, anticipate pitfalls, and communicate with humility and context. Building on this pilot, FMIOPH plans to embed pandemic history more deeply across the curriculum, link it with medical humanities and global health ethics, and evaluate its long-term impact on professional identity formation.

By transforming history from a distant narrative into a living, applied resource, VIVARY's work suggests a simple but powerful lesson: preparing doctors for tomorrow's emergencies requires helping them understand yesterdays.

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