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ORIGINAL BREVE

Is online pathology education an effective and equitable approach for medical students?

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Abstract
Introduction: We assessed the performance of two cohorts of Australian medical students who were taught Pathology practical classes online or face-to-face, to see if online teaching creates an inequity in learning.
Methods: All medical students enrolled at the University of New South Wales in 2023 and 2024 were invited. The third-year Pathology practical classes for main campus students were taught face-to-face while students in rural campuses were taught online by the same teachers. All students sat a formative assessment after completing a course with 4 practical classes.
Results and discussion: A total of 328 students (out of 621, 53%) completed the formative assessments of whom 49 (15%) were rural students. There was no statistically significant difference in the average assessment score between the two groups (67% vs. 61.25%, $p = 0.073$). The learning resources developed by the Pathology Department of the University of New South Wales had likely reduced the inequity of online teaching.

PALABRAS CLAVE
Patología;
Facultades de Medicina;
Licenciatura;
Enseñanza en línea;
Australia

¿Es la educación en patología en línea un enfoque eficaz y equitativo para los estudiantes de medicina?

Resumen
Introducción: Evaluamos el desempeño de dos cohortes de estudiantes de medicina australianos a quienes se les impartieron clases prácticas de Patología en línea o cara a cara, para ver si la enseñanza en línea crea una inequidad en el aprendizaje.

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Métodos: Se invitó a todos los estudiantes de medicina matriculados en la Universidad de Nueva Gales del Sur en 2023 y 2024. Las clases prácticas de Patología de tercer año para los alumnos de los campus principales se impartieron de forma presencial mientras que los alumnos de los campus rurales fueron impartidas en línea por los mismos profesores. Todos los alumnos se sometieron a una evaluación formativa tras finalizar un curso de 4 clases prácticas.
Resultados y discusión: 328 estudiantes (de 621, 53%) completaron las evaluaciones formativas de los cuales 49 (15%) eran estudiantes rurales. No hubo diferencia estadísticamente significativa en el puntaje promedio de evaluación entre los dos grupos (67% vs. 61,25%, p = 0,073). Los recursos de aprendizaje desarrollados por el Departamento de Patología de la Universidad de Nueva Gales del Sur probablemente habían reducido la desigualdad de la enseñanza en línea.

Introduction

Undergraduate Pathology teaching in Australia and New Zealand has changed over the last two decades to embrace new techniques like virtual microscopy making online Pathology teaching easier.[1] Yet, shifting to online teaching may create unintended inequalities in learning experience specially in settings where the financial means to invest in new learning platforms is limited.[2] Even in well-resourced settings online-taught students may be at a relative disadvantage if their peers are taught the same classes in person.

New South Wales (NSW) is the most populous state in Australia and 3.1 of its 8.2 million population lives in "regional metro" and rural areas. A government-cofunded initiative to improve health in rural NSW is to set up Rural Clinical Campuses (RCCs) affiliated to top Universities in the state such as the University of New South Wales (UNSW) where the main campus is in Sydney, the largest Australian city. Medical undergraduates in RCCs can complete their entire medical degree or parts of it while living in rural communities. Pathology teaching at RCCs depends on Sydney-based teachers delivering some of the classes online due to staff shortage. This creates a potential inequity in learning for RCC students as their peers in Sydney main campus are taught the same classes face-to-face. However, the Department of Pathology at UNSW has pioneered innovations in online teaching to bridge this gap.[3,4] This study aimed to evaluate the effectiveness of online versus face-to-face teaching of Pathology practical classes for medical undergraduates at UNSW.

Methods

The UNSW main Campus is in Sydney, Australia while its RCCs are in the small regional townships in Port Macquarie, Albury, Wagga Wagga, Griffith and Coff's Harbour. For this study, all RCC students were considered as one group because all were taught in the same online class using Microsoft Teams. The practical classes evaluated were for third-year students where Pathology content was taught using clinical case scenarios. The technical innovations used in teaching included virtual histopathological slides (VSlides with a ×40 capacity to zoom equivalent to high power in a light microscope, https://www.best.edu.au/slice) replacing glass microscope slides, a high-resolution online image database (with associated clinical information) of human Pathology specimens owned by UNSW (https://iod.med.unsw.edu.au/) accessible as an app on smartphones, and online self-paced adaptive tutorials made on H5P platform to supplement in-class teaching.[3,4]

All Pathology practical classes (n = 4) within the "Oncology and Palliative Care" course were selected for evaluation as the students had limited exposure to the topic prior to this course, and it presented an opportunity to gauge their learning exclusively from the practical classes. RCC students were taught online, and main campus students in Sydney were taught face-to-face by the same teachers. End-of-course student performance was assessed with a formative Moodle-administered automatically graded assessment (one attempt per student) consisting of multiple choice and picture (histopathology slides) based questions, built on the principle of constructive alignment.[5]

Results

This study was conducted over 2 years from 2023–2024 inviting 621 medical students from two successive batches enrolled at UNSW Sydney of whom 87 (14%) were from the RCCs. Three-hundred and twenty-eight students (53%) completed the formative assessment (2023: 147, 2024: 181), of whom 49 were from the RCCs (15%, 2023: 26, 2024: 23). Both years combined, there was no statistically significant difference in the average assessment score between the RCC students and the Sydney campus students (67% vs. 61.25%, p = 0.073, Independent T test). When stratified by the calendar year, RCC students scored significantly higher in 2023 (71.2% vs. 62%, p = 0.022) and similarly in 2024 (62.3% vs. 60.7%, p = 0.744) compared to Sydney-based students.

Discussion

RCC students at UNSW were not disadvantaged by online teaching of their Pathology practical classes. This non-

inferior performance of RCC students is likely due to the significant investments made in developing the above-mentioned technical innovations for online teaching.[4] All the above resources were available to both main campus and RCC students except for physical access to macroscopic specimens which was only available to main campus students. Resources like Vslides encourage active learning, with associated tools allowing students to make real-time annotations and notes on the image which can then be shared as a link with peers or teachers for collaborative learning.[1] Similarly, the online Images of Disease database enabled the RCC students to see the macroscopic specimens photographed in different angles with associated meta-data on clinical presentation. These resources may have bridged the learning inequity of online teaching. As for limitations, these findings from one Australian University on Pathology teaching may not be generalised to other subjects taught at the same University or to Pathology teaching in other universities, especially those in resource-limited settings.[2] However, it showcases how an equitable learning experience in undergraduate Pathology teaching can be achieved when backed by technological resources and innovations built on evidence-based educational research.

Ethics approval

This study was approved (HC190567) by the Human Research Ethics Advisory Panel (Biomedical) of the University of New South Wales, Australia. All participants provided informed consent.

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Conflict of interests

The authors have no conflicts of interest to declare.

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