NUS National University of Singapore

Educational Programs on Emerging Infectious Disease Outbreak Management for Medical and Nursing Students: A Scoping Review

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Date: 19 Nov 2024

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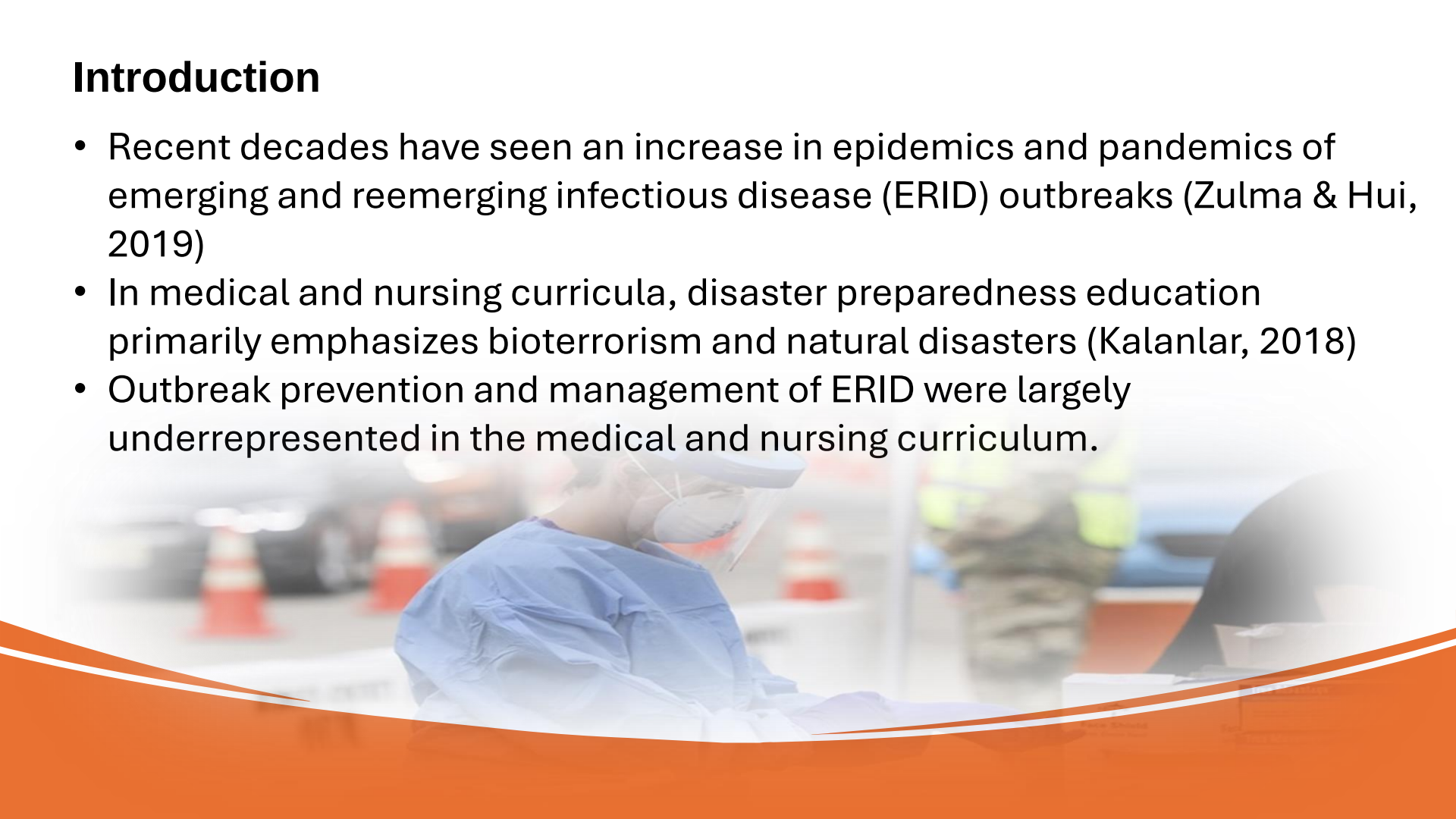
NUS Nursing

- Alice Lee Centre for Nursing Studies (NUS Nursing) was established in 2005 in the Yong Loo Lin School of Medicine, National University of Singapore (NUS)
- NUS is Singapore's flagship university, and a leading global university centred in Asia
- We offer Undergraduate & Postgraduate Programmes and have a total population of over 1,500 students
- We provide Continuing Education and Training (CET) programmes for nurses and allied healthcare professionals

Introduction

- Recent decades have seen an increase in epidemics and pandemics of emerging and reemerging infectious disease (ERID) outbreaks (Zulma & Hui, 2019)
- In medical and nursing curricula, disaster preparedness education primarily emphasizes bioterrorism and natural disasters (Kalanlar, 2018)
- Outbreak prevention and management of ERID were largely underrepresented in the medical and nursing curriculum.



AIMS

- To summarizes program modalities, teaching methods, curriculum content, and the impact of ERID outbreak training programs on pre-registration medical and nursing students' learning outcomes.

Methods

- The Arksey and O'Malley 5-stage framework guided this scoping review (Arksey & O'Malley, 2005).
- Adhered to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Extension for Scoping Reviews (Tricco et al., 2018).

Search strategy

- Ten databases were searched from September 2023 – July 2024: CINAHL, Embase, Cochrane, PubMed, PsycINFO, Scopus, Web of Science, ProQuest Dissertations and Theses, MedNar, and Google Scholar.
- **Search keywords:** 'medical students,' 'nursing students,' 'communicable diseases,' 'disease outbreaks,' 'educational programs.'

Eligibility Criteria

- Students in undergraduate medical or nursing programs.
- Programs focused on managing infectious diseases in the WHO Priority Blueprint (e.g., COVID-19, MERS, Ebola) (World Health Organization, [WHO], n.d.) and unspecified outbreaks were included.
- Programs were included if they covered modalities, teaching methods, curriculum content, or impact on learning outcomes

Screening and Selection

- Two reviewers independently screened the title and abstract, then selected studies underwent full-text review.

Data Analysis

- Popay et al. (2005) narrative synthesis guided the analysis; textual summaries for each study were created and systematically refined.

Quality Appraisal

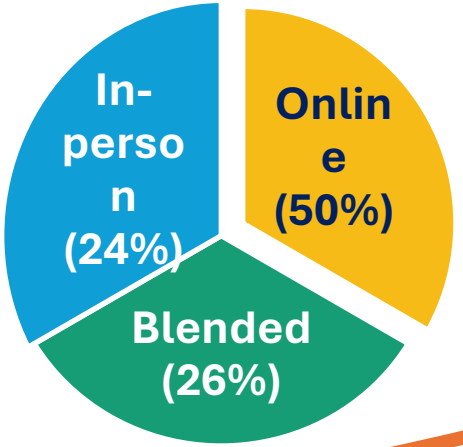
- Two reviewers independently appraised the included studies using the **Mixed Methods Appraisal Tools** and **Joanna Briggs Institute Appraisal Tools** for each study design, e.g., cohort studies.

Results

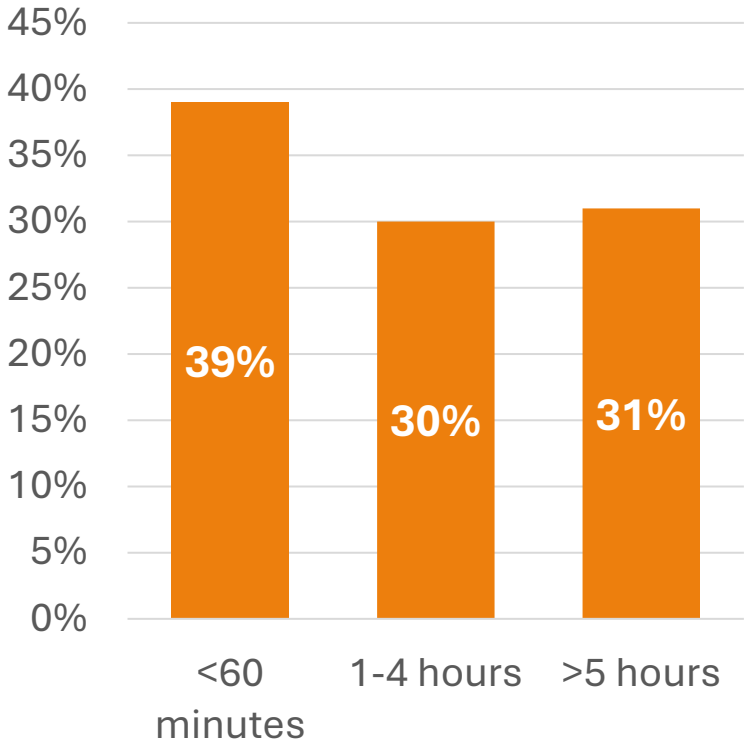
- **35 studies** (published between 2015-2024) were included.
- **80%** of the programs were published in response to the **COVID-19 pandemic**, **18%** to the **Ebola** epidemic, **1%** to **MERS**, and unspecified outbreaks.

Mode of Delivery

- The majority were delivered via **online platforms due to COVID-19 restrictions.**
- Blended programs were held online and in person.



Programme Duration

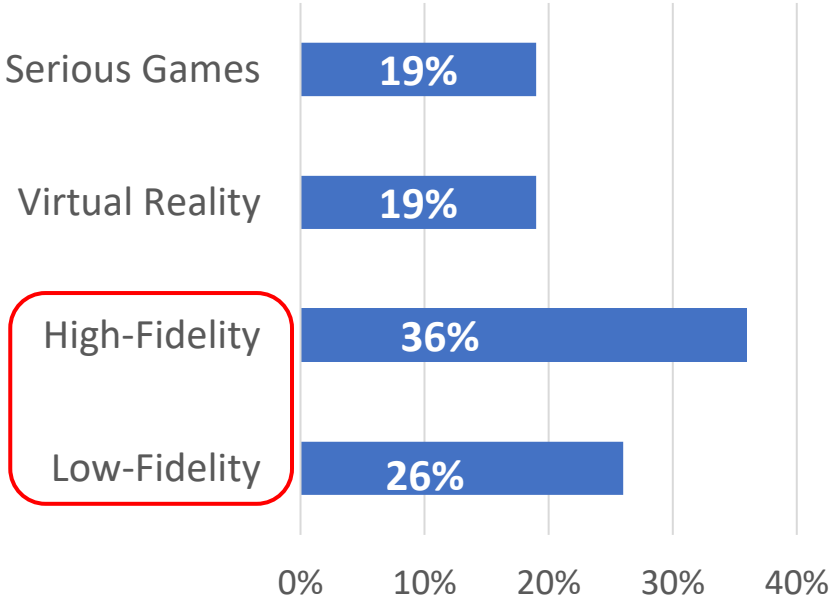


Duration < 60 mins

- **Shortest** duration: **10-minute** presentation.
- **Longest** duration: **40-hour** eLearning course.

Teaching Methods

- **83%** incorporated interactive elements; **discussions, group work, and presentation.**
- **46%** were **simulation-based programs**.



High-Fidelity Simulation

- **Focus on realistic outbreak scenarios** using role-plays, standardized patients, and manikins.
- **Develops clinical skills** e.g. PPE use and infection control under pressure.
- **Enhances critical soft skills** e.g. communication, and teamwork during outbreaks.

Low-Fidelity Simulation

- **Lacks realistic scenarios**; e.g. table-top simulation for scenario-based discussions. Using manikins for **basic skill-based tasks**; e.g. CPR , ECG.

Virtual Reality Simulation

- **Fully immersive 3D environment** using headsets.
- They are used for **skill-based tasks** e.g. PPE donning, hand hygiene, and swab acquisition.

Serious Games

- **Simulation of real-world events designed for solving a problem.**
- Features like leaderboards. Used for **theoretical knowledge and retention.**

Curriculum Content

Fundamentals of Infectious Diseases	• Cause and spread of infectious diseases • Identifying the signs and symptoms.
Epidemiology and Surveillance	• How diseases spread among the population. • Analysing epidemiological data.
Clinical Management of Infected Patients	• Assessment, diagnosis & treatment of patients. • Symptom management of infected patients.
Infection Prevention and Control	• To prevent the spread of infectious disease. • Standard precautions; over-emphasis on PPE donning and doffing.
Public Health and Pandemic Preparedness	• Public health communication and principles of pandemic preparedness. • Ethical consideration (resource allocation; e.g. bed allocation) during patient care

Impact on Students' Learning Outcomes

2. Attitude

Overall improvement in:

- Confidence level in (e.g. disaster nursing)
- Fear and burden (e.g. managing COVID19 and PPE use)
- Self-efficacy in care of infected patients
- Clinical reasoning/Critical thinking in respiratory infectious diseses

Impact on Students' Learning Outcomes

3. Technical skills

- Virtual reality improved skills e.g. PPE donning. Low-fidelity enhanced e.g. CPR but not triaging.

Discussion

- Limited studies incorporate curriculum content on (1) IPC clinical skill competencies other than donning and doffing of PPE, and (2) public health and pandemic preparedness.
- Educational programs on ERIDs can rely on traditional teaching methods (e.g., F2F lectures and simulation) instead of using virtual reality modalities to achieve similar learning outcomes.
- Variability in delivery modes, duration, teaching methods, and outcomes underscores the absence of standardised approaches.
- Most programs improved knowledge and application but were limited to lower-order thinking skills (Bloom's Taxonomy), lacking emphasis on higher-order skills like analysing and evaluating.
- Limited improvement in critical thinking and clinical reasoning skills, vital for outbreak preparedness and decision-making.
- Attitude changes (e.g., willingness to respond and self-efficacy) showed minimal improvement, highlighting the complex nature of influencing attitudes compared to knowledge and skills.

Conclusion and Implications:

- There is a call for more comprehensive studies addressing essential clinical skills for medical and nursing students in outbreak response, coupled with an examination of the programs' impact on these skills.
- Future research should strive to bridge the existing gap in healthcare readiness during outbreaks, particularly in areas related to patient care, treatment, and the broader clinical aspects of managing outbreaks.

Reference

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THANK YOU

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