

BEME SPOTLIGHT

Title:

A BEME systematic review of teaching interventions to equip medical students and residents in early recognition and prompt escalation of acute clinical deteriorations: BEME Guide No. 62

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Key Words:

Teaching interventions; acute deteriorations; acute/ critical care; undergraduate and postgraduate training; trainee doctors (junior and senior house officers); medical education; health professions education; teaching effectiveness; teaching methods

Background and Context:

Current educational interventions and teaching for acute deteriorations seem to address acute care learning in discreet segments. Technology enhanced and team training methodologies are in vogue though well studied in the nursing profession, teaching avenues for junior 'doctors in training' seem to be a lacuna.



Review Objective:

1. What are the interventions designed for undergraduate medical students and residents to teach early recognition and/or prompt escalation of acute clinical deteriorations?
2. How effective are these teaching interventions in training them on early identification of clinical deteriorations?

Headline Conclusion:

The review showed that majority of educational interventions studied seem to be on self-reported improvements in confidence, knowledge and self-efficacy related outcomes with four studies focussing on translational long-term system and patient benefits. There were large gaps and dearth of data when it comes to training and education for the transitional year trainees, interns and house officers who are the vital workforce in recognition and immediate management of in-hospital acute deteriorations. Whilst group therapy with 'team of doctors' being trained in high-technology simulations might appear promising, individualised repetitive cognitive deliberate practice with feedback/feedforward might be needed to improve pattern recognition and prompt escalation of acute clinical deteriorations by doctors in training. The aim is to equip the junior doctors to handle situations individually with enhanced critical decision making in clinical practice. The introduction of serious game-based learning and virtual environments might bridge this lacuna and could be a promise of the future.

Implications for Practice:

Acute care teaching and learning need to evolve as a programmatic portfolio-based initiative with continuity from early undergraduate clinical years to residency. Evaluations of effectiveness of teaching interventions should aim at long term improvements in system and patient outcomes. Performance expectations should be based on the context and situational circumstances. While high technology simulations are proven to be effective tools, individual cognitive deliberate practice and cognitive dexterity through serious game-based platforms and virtual environments could be a promise of the future

Review Methodology:

Search Strategy: The review was conducted according to the pre-approved protocol by the BEME International Collaborating Centre (BICC). Databases searched included PubMed, PsycINFO, Science Direct and Scopus for original research studies on teaching interventions for doctors-in-training with a focus on early recognition and prompt escalation of acute clinical deteriorations. Other resources searched include reference list of relevant papers, review articles, google scholar and grey literature. Our search followed the PICO format (Santos et al. 2007): population, interventions, comparison and outcome. 1. Populations included medical undergraduates, house officers/interns, transitional year non-trainees, residents and senior residents. 2. Interventions included educational programs: small group teaching, interactive workshops, simulations of varying fidelity, curricular modules, live & cadaveric tissue-based training, virtual environment-based learning and multi-professional training. 3. The comparisons were either none or against no teaching intervention. 4. The outcome variables included Kirkpatrick's four-level of effectiveness: self-reported data, teachers' account of student/resident improvements, clinical supervisors' ratings and patients' clinical outcomes.

Inclusion and Exclusion Criteria:

1. Study population

Inclusion: Undergraduate training, House officers/interns Senior house officers Foundational year doctors Transitional year doctors Postgraduates Junior residents

Exclusion: Studies on training programs for non-medical and allied healthcare professionals that did not have an interprofessional component to include doctors in training



2. Teaching intervention

Inclusion: Educational programs, Teaching methods Simulation and technology-based blended learning programs Multi professional training Acute care training methods Curricular modules that intend to provide training of acute care skills Cadaver & live tissue training In contact and virtual learning modules Small group teaching/training

Exclusion: Studies on 'review & report' and early warning scores without an educational intervention focus on doctors in training Studies with no acute care focus

3. Comparator/control :None / Not applicable

4. Outcomes/effectiveness data

Inclusion: Students' self-reports of confidence, better engagement, increased participation, Future readiness data Teachers' account of student improvements Clinical supervisors' ratings Patient outcomes or clinical acute care improvement data suggesting better care Reduction in cost, preventable harm, morbidity & mortality indices etc

Exclusion: Studies quoting mere design & development of teaching intervention or the validation of the teaching methodology without reference to effectiveness/ learning outcomes

Data Extraction: Data extraction form (Microsoft Excel 2016) was adopted from the Cochrane systematic review coding sheet with modifications to suit educational studies (Supplementary Appendix 2). Thirtyseven full text articles were shortlisted for full-text review, coding and tabulation (Supplementary Appendix 3). Twenty-two studies were finalised for data analysis based on direct relationship to effectiveness data. All full text extractions were done by reviewers (AB, CD or LL) and after completion was cross checked by third reviewer (LL or CD) and final decisions on scoring and exclusion were made through consensus with face to face meetings among all three reviewers. Studies were categorized according to (a) platform used for intervention (b) BEME collaborative's modified Kirkpatrick's four-level training model (Losco et al. 2017) and (c) timing of applying intervention in the curricula.

Data Synthesis: The proposed mixed treatment comparator model (Sutton et al. 2009) in the BEME protocol could not be applied as there were heterogeneity in both the teaching methods (intervention) and the educational outcomes (end result). This review was set to map and scope all the existing information on educational interventions pertaining to acute care learning and more specifically to appraise effectiveness data on recognition & escalation of clinical deteriorations. Quantitative synthesis could not be performed due to heterogeneity in teaching interventions in terms of volume, frequency, timing and learner characteristics. Hence a narrative synthesis (Harden et al. 2004) with content analysis approach, wherein data, both quantitative & qualitative, was categorised into themes to identify dominant issues across studies (Pope et al. 2006). The method of narrative synthesis involves 'collating study findings into coherent textual narrative, with descriptions of the differences in characteristics' and where possible, capturing the validity and relevance to the context (Ryan and Consumers 2013; Campbell et al. 2018).

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