



The effects of team-training in intensive care medicine: A narrative review

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ABSTRACT

Purpose: Research into team-training within healthcare is growing exponentially. We aim to evaluate the effects of team-training within intensive care medicine (ICM) through a review of the literature and a narrative synthesis of the results.

Materials and methods: A search of OVID Medline, EMBASE and Scopus databases was undertaken. Keywords and MESH headings included were “team-based learning”, “team-training”, “interdisciplinary training”, “intensive care medicine”, “ICU”, “intensive care unit”, “critical care teams” and “critical care”. Relevant papers were then analysed for a narrative synthesis.

Results: Our search identified 187 articles. A total of 27 papers were analysed and their outcomes were evaluated based on the Kirkpatrick four step model of evaluation.

Conclusions: Team-training has been studied in multiple ICU team types, with crew resource management (CRM) and TeamSTEPPS curricula commonly used to support teaching via simulation. Clinical skills taught have included ALS provision, ECMO initiation, advanced airway management, sepsis management and trauma response skills. Team-training in ICU is well received by staff, facilitates clinical learning, and can positively alter staff behaviors. Few clinical outcomes have been demonstrated and the duration of the behavioral effects is unclear.

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1. Introduction

Healthcare teams were challenged to promote safety and minimize errors by the publication “*To Err is Human: Building a Safer Health System*” [1]. It reported that up to 98,000 annual deaths in American hospitals were caused by medical errors, some of which might be avoided by more effective leadership, teamwork and communication amongst staff. These types of quality improvements in healthcare remain a focus for governments and hospitals alike [2].

Research into team-training within healthcare has grown exponentially [3]. Team-training improves teamwork processes (communication, coordination and cooperation) and its implementation improves patient safety [4,5]. Simulation is the modality often used for team training and refers to the physical reproduction of clinical care environments, standardised patients, cognitive practices and role playing [3].

Crew resource management (CRM) is an educational curriculum that was initially developed for the aviation industry to improve safety,

communication and decision-making [4,6]. CRM was adapted to healthcare when patient simulators were used in anaesthesia training programs and highlights five essential core concepts: team structure, leadership, situational awareness, mutual support and communication [7,8]. TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) is a validated healthcare teamwork training system based on CRM and other earlier research that arose from collaboration between Department of Defense (DoD) and the Agency for Healthcare Research and Quality (AHRQ) almost 20 years ago [9–11]. It also focuses on key principles: team structure, communication, leadership, situation monitoring and mutual support [10]. Simulation coupled with these types of curricula is now a common training intervention methodology used in healthcare [3].

The intensive care unit (ICU) is a dynamic and complex environment where many interprofessional groups collaborate to care for critically unwell patients. Teams exist within the ICU and as rapid response teams (RRTs) that attend deteriorating patients and cardiac arrests outside the ICU. Currently, there is no published review on the effects of team-training for ICU staff. We aim to describe and evaluate the effects of team-training within intensive care medicine through this narrative review of the literature. We aim to assess the quality of research and further

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describe the different team typologies, educational modalities, utilized curricula and the specific skills taught. We then aim to report the results of the research relevant to the Kirkpatrick's model of learning evaluation [12]. We hope this study will guide both future research into team-training in ICU as well as the design of departmental education programs.

2. Materials and methods

A search of OVID Medline, EMBASE and Scopus databases was undertaken in November 2017. The search strategy used a combination of keywords, text words and thesaurus headings. Keywords included were 'team training' and 'intensive care medicine'. MESH headings searched were "team-based learning", "team-training", "interdisciplinary training", "intensive care medicine", "ICU", "intensive care unit", "critical care teams" and "critical care". The search results were limited to English language publications. Eligible articles reported original research on educational training of teams from ICU. Studies focusing on staff from outside the ICU (e.g. staff from emergency departments or medical students), education for individuals (not teams) and studies from non-English journals were excluded. Literature reviews, opinion papers and conference abstracts were also excluded.

After abstract and full text review by two authors, the listed references of all included papers were screened for any further appropriate papers. Relevant papers were then included. All included papers were then assessed for quality using either the CASP (for qualitative papers) or MERSQI (for quantitative papers) tools. These results were tabulated for comparison [13,14].

Descriptions of the study characteristics were tabulated for textual description and qualitative analysis. Educational modalities, learner participants and team typologies, clinical skills taught and outcome

measures were then clustered and grouped as a summary for development of a preliminary synthesis. Any further relevant themes were then identified. Results were then reported. Outcome measures were categorized relative to Kirkpatrick's model of evaluation. Perceived outcomes describe the participants' reaction to the training. Learning outcomes look at the participants' acquisition of knowledge and skills. Behavioral outcomes refer to participants' application of what they learned into their job performance and perceptions of altered behavior. Clinical outcomes referred to the eventual outcome of the training on the patients, family members and staff within the ICU.

3. Results

The literature search is summarised in a PRISMA diagram below (see Fig. 1).

3.1. Team types

The majority of studies replicated real clinical teams from a single ICU type, with interprofessional teams from adult, paediatric, neonatal ICUs training together. Two studies investigated teams from mixed ICU types. Other studies looked at specific clinical teams within an ICU (including post-cardiac surgical emergency thoracotomy teams, teams from the mobile ICU and RRTs). Table 2 summarizes the frequency of the different ICU team types studied.

3.2. Outcomes of team-training

The twenty-seven studies analysed described a variety of taught clinical skills, including ALS provision ($n = 14$), ECMO initiation,

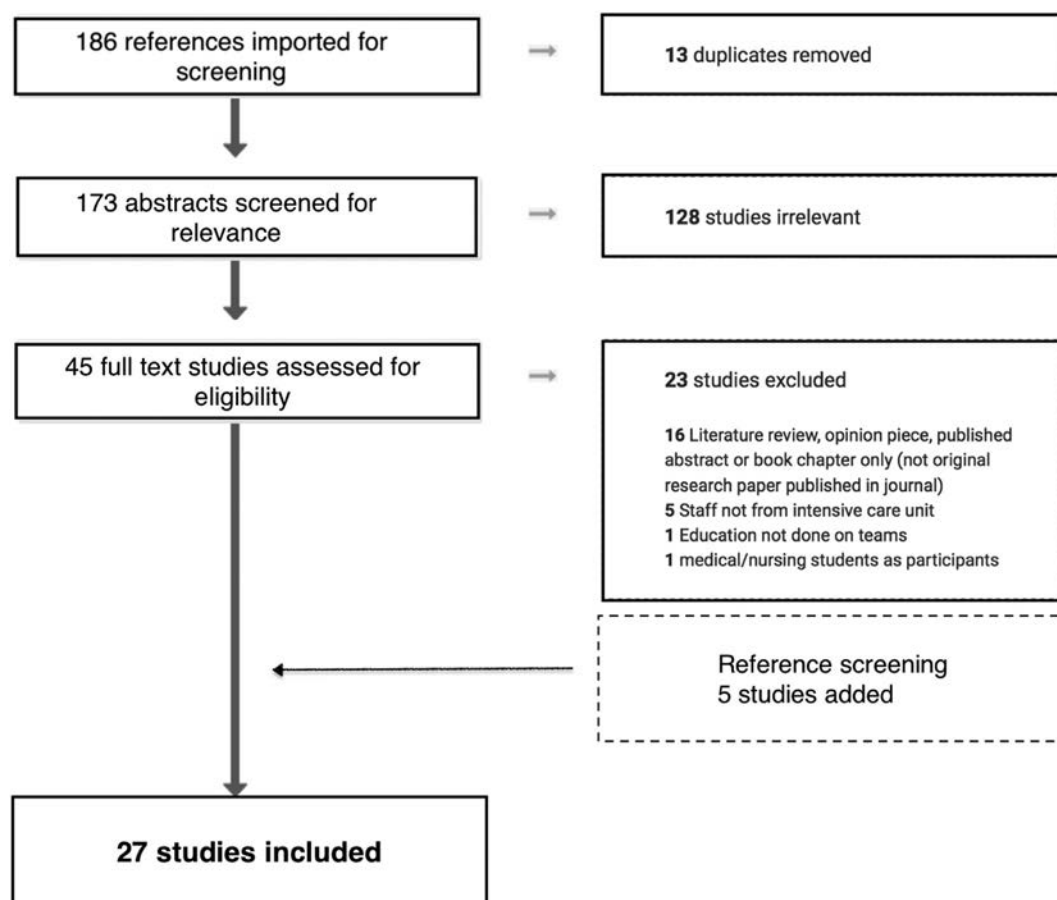


Fig. 1. – PRISMA diagram. All included studies are tabulated as a grouped summary (see Table 1) to highlight the variety in training modalities, clinical skills taught, simulation setting and participants, measured outcomes and key findings.

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