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Mini Review

Education and Training for the Rapid Response System: Courses or Bedside?

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Abstract

The first consensus conference on rapid response systems defined four main components namely, the afferent arm, (to identify the deteriorating patient and escalate care), the efferent arm (the responding team), a process improvement arm, and an administrative arm. As a consequence, it is possible to assume that there are at least four different teams to educate and train in every established rapid response system. Members of each of the four arms have different background and expectations. These teams need also to be able to integrate their knowledge in order to deliver an efficient patient-centred care. The evidence shows that there are different ways to structure a rapid response system to rescue deteriorating patients in the ward in hospitals around the world. Moreover, the efferent arm responding to the calls needs to work efficiently engaging different health care professionals around the hospital. It is intuitive that there are no unique answers to the question "are courses better than bedside teaching?" There are multiple levels of education and training that should be offered. Knowledge must be also maintained, and this could be achieved using again either courses or bedside teaching. The goal of this manuscript is to identify the needs and the limitations of training and education provided to an established rapid response system. A structured rapid response system means a configuration reflecting the four arms defined by the experts during the first consensus conference. Principles of adult learning will be presented in the context of education and training using both courses or bedside tutoring. Technology will be acknowledged given the enormous contribution that this has given to improve the activation rate and the performance of the rapid response system. Luckily, bedside teaching can be integrated with alternative solutions such as immersive learning, virtual reality and simulation This possibility is relevant in relation to time limitation during training and high costs of dedicated study time. This manuscript will explore solutions to face challenges based on rapid response systems specific needs.

Introduction

The structure of a rapid response system is complex and it is variable according to different hospital settlements. To train and educate the constituent teams is challenging, expensive and time consuming. The answer to the question "are courses better than bedside teaching" is "it depends" because there are several variables that need to be taken into account. Authors will explore differences related to the training of a formal and well established rapid response system. There are distinctions between the terms training, educating and learning. As a matter of fact, training is "preparing and individual to accomplish a task with the least amount of effort". Educating is using the "construct of individual previous experiences to make decisions" [1,2].Learning is the result of combining training and education. Adult learning is based on specific characteristics and these are largely neglected in most institutions across the world [2,3]. The key points that will be covered are related to a system that should guarantee education and training in the general ward as well as the High Dependency (HDU) or the Intensive Care Unit (ICU). This manuscript will explore the listed components in details, and it will indicate specific educational and training requirements for a modern and efficient rapid response system.

The need for education and training in the ward

Up to 80% of hospital cardiorespiratory arrests are preceded by a slow deterioration in vital signs [4,5]. Over half of all patients who die without a do-not-resuscitate order in hospitals also have a long period of slow deterioration [6]. An unacceptable number of patients have serious abnormalities before being admitted to an ICU [7-10] and many admissions to the ICU could potentially be avoided [7]. Systems to identify and respond to deterioration are often inadequate and monitored beds are extremely limited [8]. The education and training of the afferent arm seems to be missing in particular in term of maintaining acquired knowledge in several wards. Therefore, education and training in the normal ward might need to shift from learning about detailed response to deterioration to understanding when and how to call for help. Several authors noticed that there is a hierarchical system in which nurses' measure abnormalities in vital signs but they are not empowered to act on them or to escalate [11]. More in general, health care providers working outside critical care areas are poorly experienced in recognizing and reacting upon acute patients' deterioration [1]. Education and training of the ward staff need to shift from nurses recording vital signs to nurses and junior doctors timely recognizing the deteriorating patient [11]. Defining patient's deterioration is also challenging and in fact there are two different dimensions to this concept. One is the clinical derangement of vital signs and the second is the mismatch between resources and demand [2]. As a matter of fact, similar patients might need escalation or transfer to HDU or ICU at a different time period depending on the resources and competences present in the general ward in any specific hospital [11]. Nurses are those activating a response in many hospitals constituting the efferent arm, which is sadly under-utilised [12-14]. Education and training is crucial and this might well correlate to an improvement in patients' outcome.

The importance of continuity of care

Several authors describe the high mortality and incidence of Serious Adverse Events (SAEs) as a result of the lack of continuity in patients' care [2,3]. Although, the individual skills of clinicians can be of a high caliber and the functioning of individual departments such as Intensive Care Units (ICUs) and Emergency Departments (ED) can be exemplary, patients can fall between the cracks [2]. Vital signs may not be accurately recorded when measured manually. Those might not be efficiently or timely conveyed to an efferent arm. Technology could be of help, however, material and equipment might not be adequate in the ward [1]. Furthermore, patients in hospital are increasingly older presenting multiple comorbidities [2-

4]. These complex patients with multi-organ dysfunction are coming under the care of physicians who are becoming increasingly more specialized around a particular discipline, disease state or even single organ dysfunction. Hospital managers support health care professionals to certify and train in acute care and resuscitation. Nevertheless, it is difficult to maintain sufficient skills in all areas of medicine [2,3]. Courses in this particular setting are not enough to enhance safety. Moreover, healthcare professionals often have no time and resources to preserve these skills. The standard of hospital care might be disjointed or inadequate for the level of illness of patients in general wards. On the other hand, the number of ICUs or monitored beds is extremely limited in Europe [3-5]. The United States and Canada have more monitored beds compared to Europe, however globally only few patients can be monitored or admitted to an ICU. Several reports suggest that there are many parts of a hospital where rapid resuscitation does not occur and where immediate care is not available [3-5]. It is questionable whether it is more useful and cost effective to provide and maintain continue education organising courses in acute care for all healthcare professionals in the hospital or to train an ad hoc rapid response team. Mature rapid response systems have an effective response and the number of calls received from the ward is higher compared to smaller hospitals [5]. The efferent arm in structured rapid response systems is fully trained and it can provide bed side education for ward staff and junior doctors [2]. Hospital costs for this service are not related to the number of calls and training is part of the service provided. Experts define this system cost effective because it is based on fixed costs which are independent from the system activation rate. Small hospitals or structures with no established response have variable costs which increase based on the number of calls. These are at risk of being less efficient and more expensive. The low activation rate is therefore a limitation for bedside training and a concern for maintaining the desired knowledge using bed side teaching. Another constraint of a hospital trusting a well-trained response team or efferent arm is that the afferent arm needs to timely, systematically and appropriately call for help. This has sadly been reported as poorly functioning and maybe amenable to improve using technology [4,5].

Team education and training

For the purpose of this paper a "team" is a system composed by two or more individuals who have specific roles, perform interdependent tasks, are adaptable, and share a common goal [15]. The members of a team share a common goal that for the rapid response system is the reduction of SAEs. This "common goal" does not mean that the all members of a rapid response team have to be trained using courses in cardiorespiratory resuscitation. The rapid response team is not a cardiac arrest team and the aim is preventing instead of treating SAEs. The prerequisite of attending courses or bedside training is therefore related to the candidate's:

a. area of interest (afferent arm, efferent arm, etc.)

b. level of knowledge and expertise (nurse, doctor, etc.)

c. hospital resources in term of equipment (simulation centre, teaching rooms, computers, etc.), money (cost per course per person) and time (paid study leaves per person per year).

The Institute of Medicine has recommended that organizations establish interdisciplinary team training programs that incorporate proven methods for team management and assessment [16,17]. Extensive research on teamwork during the past 20 years suggests that teamwork is defined by a set of interrelated KSAs that facilitate coordinated, adaptive performance and support one's teammates, objectives, and mission [18-20]. Teamwork is distinct from task work (for example, operational skills) but both are required for teams to be effective in complex environments. Recently, key organizations involved in the education of physicians have recognized the importance of developing team-related knowledge and skills during medical education [21-22]. Effective teams possess five characteristics of success (the five Cs): commitment, common goals, competence, consistency (of performance), and communication [23]. Effective teams adapt to changes in task requirements, anticipate each other's actions and needs [24,25]. More recently simulators allow the use of videos to record team performance. Video analysis of team performance is an extremely valuable training tool because it removes any challenge to factual events, helps trainees clearly visualize each event, and can be used as a permanent record or an archive for future educational activities [25].

Discussion

Training and education generate learning according to basic principles of androgogy [26]. Andragogy refers to any form of adult learning and can be considered equivalent to the term pedagogy. In Greek androgogy means man-leading in comparison to pedagogy, which means child-leading. It was the credit of Alexander Kapp, a German educator, to introduce the term andragogy in 1833. According to this educator: Adults need to be involved in the planning of their instruction. Experience is the basis for learning. Adults are most interested in learning subjects that have immediate impact on their job. Adult learning is problem-centered rather than content-oriented. Adults have knowledge, skills and experience and these could influence learning in both positive and negative ways. In the adult population, it is possible to have spontaneous and planned learning. Courses are an example of planned learning while bedside education allows spontaneous acquisition of knowledge. Courses can prepare trainees with the necessary knowledge and skills for structured and protocoled practice in acute care facilities [26]. Planned learning can also be used at the bedside by targeting daily goals, identifying learning opportunities, using planned feedback and bedside assessments [26].

Disadvantages of planned learning are

Costs of each course, time off clinical work, and application of content to real life scenario including changing individual clinical practice. Spontaneous learning can be achieved using role modelling, by immersion, by doing and social interaction. These are typical elements fulfilled at the bedside, using immersive learning or in simulation. Advantages of spontaneous learning are that it happens all the time that it is directly linked to practice and to behaviour. The learning can be integrated in the daily clinical practice with no extra time or attention needed. Disadvantages of spontaneous learning are that it might be self-evident with minimal critical appraisal. It does not always prevent negative behaviour to be learned, and it might encourage "clinical inertia". Asking the question "Which methods of teaching and learning are considered especially useful?" A recent survey done among intensive care medicine fellows the more authentic the context, the better the retaining of knowledge [27]. Workplace based training and assessment is therefore preferred in intensive care medicine. Fellows however, voiced a need for formal training and teaching sessions apart from working and learning in the ward. Interestingly, the majority of young clinicians have a smartphone, and access to technology that allows accurate translation of a variety of languages into the learners own native tongue. In addition to traditional journal articles, learning materials from conferences and courses are made accessible. There has been a noticeable increase in the amount of conference content being broadcast live to a wider audience. Online courses or webinars are becoming common place, with a dramatically increased accessibility to high quality educational material and information overload. Obviously, such online content is accessible 24 hours a day, seven days a week. Therefore, the way health care providers communicate and learn has been impacted by technology. Social media (SoMe) describes the myriad of cloud- and web-based applications that allow people to create and exchange content. Closely related to SoMe, is the concept or Free Open Access to Medical Education (FOAMed) where online resources (articles, videos, audios, etc) are shared freely and openly to the wider audience. In addition, the major publishers/journals have developed a SoMe profile, likened to the marketing strategies of any consumer company. The digital era has offered disruptive innovation mostly for technical knowledge while health care professionals struggle in learning crisis management, leadership, communication and professionalism. Non-technical skills are crucial for rapid response systems given the nature and complexity of this structure. A promising quality improvement modality which is targeted to train a mature rapid response system is the use of Non-Technical Skills (NTS) training, which aims to address human factors through improvements in performance of leadership, communication, situational awareness and decision-making. Originating in the airline industry, NTS training has been successfully introduced into anaesthesia, surgery, emergency medicine and other acute medical specialties [27]. Specialists in the mentioned fields expressed a very positive experience learning NTS both in courses and bedside to improve daily clinical practice. Some aspects of NTS have already achieved acceptance for cardiac arrest teams. Leadership skills are emphasized in Advanced Life Support training and have shown positive results when employed in simulated and clinical resuscitation scenarios [28]. A recent review highlights potential benefits of NTS competency for cardiac arrest teams and, more importantly, rapid response teams, due to the diversity of clinical scenarios encountered [28].Trainees indicated NTS as very important and NTS are now included in most professional curriculum. Implementation of any training course should receive appropriate scrutiny to refine team and institutional performance.

Other researchers, in addition to studying and measuring team KSAs in health care professionals working in the fours limbs of a rapid response system, have developed training programs that teach teamwork to practitioners either through in-services, tools, simulation, immersive learning (virtual reality) or some combination thereof [29,30]. There is evidence to suggest that human beings, being social creatures

may enjoy learning in groups. The internet means facilitation of global conversations about the latest medical practice and literature, develops professional networking and friendships, and consolidate information with colleagues at home and abroad. These discussions can take the form of online forums (e.g.) or real-time discussions on platforms such as Google Hangout. These can be in a more traditional teacher/expert-learner relationship or a more peer-based approach where learners discuss the issues amongst themselves. The communication and the case discussion simulates bedside teaching and in the former, the teacher could lead the online discussion by actively participating in real-time. Learners have direct access to 'experts' where their queries, uncertainties and ideas can be addressed in real time. This is much less time consuming compared to tradition means of communication. Online communication and discussions improve the ability of individuals to network with like-minded colleagues across the globe. This is also relevant because it enhances communication and collaboration training a rapid response system and improving "Team performance "more than individual performance. Teamwork depends on each team member's knowledge, skills and attitude (KSAs). This is challenging and needs a combination of training methods as expressed in the manuscript. Currently, courses, webinars and conferences can be accessed on line and cases can be discussed real time on SoME or FOAMed instead of at the bedside [31-35].

Conclusion

In summary, four different arms create the rapid response system. Members of each arm need to be trained independently and together they must work as a team. The team is directed by the common goal of decreasing adverse events in the hospital. This does not imply that all members of the rapid response system need to be able to perform cardiorespiratory resuscitation. The team performance is based on each member's capability to react, to intervene, to prevent critically ill patients to deteriorate in the ward. The four limbs can be trained in courses and at the bedside according the personal needs, level of knowledge, time and resources. There is not a predominant way to plan and maintain the training given the complexity and breadth of a rapid response system.

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