Simulation in Medicine: 7 Years Activity

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BACKGROUND

Modern healthcare is a highly complex process with many variables, dynamics and pressures that pose many challenges to an offer with a high standard. From this point of view it is significantly high the number of decisions that professionals are required to take in the course of any diagnostic and / or therapeutic treatment [1].

The teaching approach for students of medicine, based on the apprenticeship model “look and then do” has been, for a long time, the traditional method for the training of professionals, both at the university and hospital level. However, the medical institutions are realizing, in general, that rely on this training model, to create medical and nursing professionals, is no longer adequate to the twenty-first century method [1-3].

This does not mean that the apprenticeship model should become obsolete, and the teacher always is the model to follow and imitate by younger staff. It should be stressed that while the first blood sample, the first surgery etc. are all acts that, in traditional apprenticeships, are necessarily carried out on patients, who on this occasion are real “guinea pigs”, in other works, equally complex with high responsibility, for example in the Civil and Military Air Force, the simulating training (for pilots) offered and offers obvious advantages that reduce the fear of the “first time” and anyone is able to understand its importance and scope [4]. This knowledge and general awareness are factors that contribute to a high public confidence in the aviation safety and a low accident rate reinforces this level of confidence.

Similarly, evaluation and measurement of both clinical and operational skills of the professional in the medical field, through the simulation of conditions and diseases closer to reality as possible, not only support the efforts to improve patient safety, but also help to reassure people that the competence among health care providers is monitored and for this reason of high quality.

On this line of thought, the faculties of Medicine and Scientific Societies should always use more simulation for teaching and learning basic skills, but this practice is not standardized at the institutional level and therefore the possibilities of use, for students of Medicine, remain random. Problems that also involve young doctors and nurses already working in hospitals, for which the training would continue to be needed for the construction, the creation and the strengthening of their experience and expertise [1-4].

GOALS AND METHODS

The Italian CRS Group (Clinical Risk Simulations) of Arezzo, has been working profitably for 7 years, to disseminate the importance of simulation in Medicine and to underline the advantages of this new teaching method, especially if aimed at the prevention of clinical risk and management of work in teams. From 2010 to date various events were organized of which the most relevant 2 high degree of fidelitiesimulations of maxi emergencies (a serious accident on the highway and the collapse of a scaffold at a construction site), which required the collaboration of volunteers and drivers of the Red Cross and the Emergency medical staff of the Arezzo hospital. The two events, plus 2 days of ER simulations were organized in the course of the last 3 editions of the Forum Risk of Arezzo that from 10 years, during the last week of November, is held in the Tuscan city. In addition to these more complex events, they were performed 60 simulations in small groups within First Aid Medicine (traffic or working accidents with chest trauma and hypovolemic shock) and 28 simulations as part of Hemodialysis activity: air embolism, hypovolemia, hyperkalemia, hypokalemia, acute pulmonary edema and anaphylactic shock.

To date they have been involved in the simulations, 95 doctors of various specialties (11 nephrologists, 4 pneumologists, 50 anesthesiologists and 30 First Aid and Emergency doctors) along with 50 rescuers drivers and 162 nurses (40 hemodialysis nurses and 122 emergency nurses). To measure the performance of all participants, score evaluations (with a score ranging from 1 to 16 points) were applied as described below in Table 1 and extrapolated, by CRS group, on the basis of a publication on the subject [1]. In addition in the course of the simulation days we have given to all participants, a questionnaire composed of three questions, addressed to evaluate the popularity of the method:

1. Do you believe that the simulation in medicine is useful for your professional growth?
2. Do you feel that simulation contributes to reducing clinical risk?
3. Do you believe that the simulation is useful to better coordinate the team work?

RESULTS

100% of participants reported in the performance evaluation, the minimum augurible score of 8; as regards the different medical specialists have been highlighted some differences of scoring, for example nephrologists (which accounted for only 11.4% of all physicians) have reported a lower score (between 10 and 12 points , 11 ± 1) compared to the other evaluated specialists (14-16, 15 ± 1).

Among nurses the score did not give significant differences between specialties (12-14, 13 ± 1). On the contrary, among the rescuers drivers there were substantial differences that ranged from a minimum of 8 points to 10 points (9 ± 1).

100% of the participants completed the questionnaire: with respect to the 1st question 90% responded that the simulation is useful for a professional growth, the rest answered “I do not know.” With respect to the 2nd question 70% answered that the simulation helps to reduce the clinical risk, 20% answered negatively, the remaining 10% answered “I do not know.” With respect to the 3rd question 100% of learners answered that the simulation is useful to better coordinate the teamwork.

Also are some comments given at the end of this new experience:

Comment 1: “I did not know that certain events could happen, but above all I did not know how to deal with”.

Comment 2: “sometimes the emergence of events can bring a group of people to do things they would never do with a cool head and try to solve certain difficulties in fiction can be useful then to know how to solve them into reality”.

Comment 3: “the leadership and charisma cannot be bought (or you have it or you do not have it), but you can try to exercise them, sometimes with good results, sometimes with less spectacular results, the important thing is that mistakes are always useful”.

In our view the answers to the questionnaire and the final comments testify the good index of acceptance of this new method of learning, whose limits and potentials are yet to be discovered and applied.

DISCUSSION

Today the progress and technological innovations have allowed possibilities in the training of health professionals previously unthinkable and not available. Not least among these advances is the degree to which the patient simulators can replicate realistic physiological and pathological responses to a growing number of defined clinical interventions [1-5].

Instructors can create, control and deflect from clinical scenarios using sophisticated software and optimize training opportunities, but perhaps the most important element is that the simulation provides the tools to establish a standard for the care of patients consistently and universally agreed, under which all services can be measured and standardized. The patient simulators allow you to get much more than a simple acquisition of procedural techniques. Placed in a simulated environment, which reflects the external factors and pressures that constitute the real work environment (which in turn can adversely affect the quality of performance), such procedures today can be practiced and perfected in the ‘real world’ (Figures 1-3).

This opportunity allows doctors and nurses to be more adequately prepared and able to provide assistance of a higher quality from the start of their careers rather than waiting for the experience to be built ‘on the field’ [6-8]. Even complex situations that affect multiple people require team training. Up to now, a
specific training was not expected to assess the effectiveness of the group. It is not obvious that bring together a team of experts is sufficient to ensure a good quality team performance. The simulation addresses these requirements of the formation in a way that is impossible for other training methodologies.

Rare events but critics with a strong time pressure can be recreated in a simulation procedure, so as to establish specific protocols and identify communication problems and improve them (non-technical skills and solving problems). The cases of adverse patient outcomes, can be inserted in a simulated scenario, re-examined, evaluated with the so-called “debriefing” and inserted into an exercise program for continuous improvement [6].

A systematic review [9], of 670 articles, peer-reviewed journals, in which different scenarios and uses of high-fidelity medical simulations were used in a range of specialties that included cardiology, anesthesiology and surgery shows that there is a strong association between the hours of practice of high-fidelity medical simulators and standardized learning outcomes: the association approximates a dose-response relationship or the meta-analysis concludes that the hours of high-fidelity simulation have a positive working relationship with standardized learning outcomes in medical education. The article calls for more rigorous research methods and more stringent editorial policies of the newspapers for the advance of this field of research in medical education. Another work [10], shows that a major limitation in the use of high-fidelity simulators is the lack of targets and measures of validated performance. Objective measures are needed if the simulators should be used to evaluate the expertise and training of doctors and the team or to assess the impact of processes or new designed equipments on the overall performance of the system.

The solution of the problem is the so called “situation awareness” (SA), which refers to a perception of the person (in this case, the doctor or nurse) and to its understanding of the dynamics with the environment. This awareness and understanding are essential to make appropriate decisions that ultimately lead to correct / carry out actions in medical care settings. An objective measure of SA may be more sensitive and analytical than other performance measures.

113 articles have been included in another revision [11]. The simulation-based training has been shown to lead to a clinical improvement in 2 simulation research areas: laparoscopic surgery showed improvement in procedural performance in the operating room. In addition, trained on simulators they were more likely to adhere to the advanced cardiac life support protocol (ACLS) than those who received standard training for patients with cardiac arrest. In other areas of medical education, simulation has proven to lead improvements in medical knowledge, comfort in procedures, and performance improvement during repeat testing in simulated scenarios.

The simulation has also been demonstrated to be a reliable tool to assess students and for teaching topics such as teamwork and communication. Only a few studies have shown direct improvements in clinical outcomes related to the use of simulation for training. A study of 2013 [12,13], has demonstrated the effectiveness of the simulation in the teaching of basic and clinical knowledge, in procedural skills, in teamwork, and communication, as well as for the evaluation at the university level.

However, this meta-analysis also concludes that with the spread more and more of the simulation in medicine and education schools resident, other studies will be needed to see if the simulation training with better patient outcomes. From our experience it shows however as specialists working in the emergency, including intensive care specialists, are more open and accustomed to this kind of teaching methodology and therefore less difficulty in performing simulations; unlike others as nephrologists that are more in difficulty in front of the fear of being measured and then judged professionally, which may have influenced the lower performance scores.

CONCLUSIONS

Though practiced in other work areas for more than 30 years, in the field of Medicine the simulation started in the last 15 years, even in Italy. The amount of data in favor of the positive aspects of the simulation in healthcare is growing, but its availability is still patchy and dependent on the experimental nature of some individuality and departments. One of the limitations of the simulation is that it cannot be proved that the performance of the participants on the simulator reflects their actions in clinical reality. Although all of our learners have stated that the experience has changed them, it was not shown to be affective the impact of training with simulation in actual practice every day. However medical professionals who every day are told by patients “my life is in your hands” should not wait for more evidence.

REFERENCES

The NMC and Council of Deans (UK).


