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Editorial

Simulation of Negative Events in Hemodialysis

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Abstract

Education and practical training in medicine is neglected and pass directly from theory to do on the field. In hemodialysis it is necessary to create synergies and partnerships between different cooperating figures. Addressing organizational and legal protection of the professionals (Clinical Risk). Acquiring operational capabilities of team work. Managing the team roles and functions. It is necessary then to acquire a modern methodology where the simulation represents the main tool, "the mistake" need to "learn" and the acquisition of "awareness" about event handling (in this case on Hemodialysis), in the context of clinical scenarios absolutely realistic. The methodology is based on simulated tasks using past experience as a business tool and innovative research. Debriefing and discussion with those involved and finally debrief collegiate looking for active/latent errors and use of international guidelines. Among the types of participants was clear the minor presence of doctors of hemodialysis, probably for the wrong feeling of being checked and then judged in carrying out of actions made complex by urgency. In addition participating physicians have all stressed the usefulness of simulations of unusual events within the Hemodialysis treatment, but that if not solved can lead to death of the patient. Simulation under hemodialysis, although it's first steps, appears to be an effective methodology able to stimulate self-criticism of the operators.

EDITORIAL

The growing international focus on patient safety, accelerated by the disruptive1999 report "To Err is Human" which reported 98,000 deaths a year in the United States as a result of preventable medical errors, resulted in a stream of international relations, case studies and articles about similar situations in many health systems independently from the diversity of national economies, health policies and health funds [1]. A common theme of many of these documents is that 70% of medical errors are a result directed by "human factors". At this regard the workload decisions that the professionals are called upon to take during the hemodialysis treatment is considerably high [2]. These actions start with the basic diagnosis of nephropathy and continue with the changing clinical status of the patient (insulin dependent diabetes or not, hypotension, infarction, cardiac arrest, etc.) requiring different dialysis treatments and care. Some clinical decisions are trivial, but still important for the patient, while others may be matters of life and destruction. All these situations are crucially linked to the technical capabilities and skills of medical and nursing staff. To all this we add technical and clinical variables (Table 1), related to the dialysis treatment itself, which may involve directly the technological means (monitor for dialysis or materials for dialysis), the staff or the patient (chemical, mechanical damage) and anyway in the end can always have repercussions on the integrity of the patient: air embolism, hypovolemia, hemolysis, fluid overload and so on.

The simulation of Reality and the Reality of the Simulation in an Environment Such as Hemodialysis

Medical simulation is able to grasp or represent the wide range of problems intra-or post-dialysis, easier to verify for the learner rather than having to wait for being jn the real situation. These simulations will offer a chance to see and experience, especially about rare problems , such as air embolism or hypokalemia or anaphylactic shock that imply a serious risk with a low frequency, but at a high cost for life (Figure 1). The instructor's advantage is the fact that the training can be far reaching; introduced in a controlled manner you may establish uniform curricula and standardize performance. The opportunity, for those who are learning, consists in having reproducible and standardized educational experiences in which the participation is active and not as a passive observer. Everybody is an important part of high-fidelity medical simulation.

Learning experiences in hemodialysis, verified by instructors, immediately with learners, are profound and adapted to the demands of each person. Break down complex tasks performed during the HD session into smaller components has allowed us to develop and refine the part of learners becoming aware about negative events potentially possible although rare.

In this way, and thanks to the availability of the simulation, the participants were given the opportunity to make and correct their medical errors without any negative consequence, while

the instructors could give their whole attention without having to worry of patients: teaching quality after the distractions that occur in real-world context of patient care is diluted during periods of loss of acquisitions that then compromise learning opportunities [3]. A key characteristic of high-fidelity simulation was the opportunity for scholars to work on the subject and get a constant pattern to improve the technical skills correcting errors, improving their execution and making demonstration competences more automatic and reproducible. In our opinion the effects of repetitive practice enable the acquisition of competences in periods shorter the exposure to the everyday work of departments. A correct process of development of tutorials, ranging from conceptualization to their realization and the critical analysis of the actions carried out, using an evaluation methodology well codified, which would allow the articulation of a valid and well pre-designed debriefing, represents the prerequisite for the simulation to have an impact that could change behavior, organization and leadership (nontechnical skills) and thus could improve the effectiveness of the emergency response [4]. The only negative report is the poor adhesion of Nephrologists (less than 10%) compared to nurses, to the meetings. In our opinion this attitude is due to a mistrust linked to belief and then to the annoyance of being under scrutiny, when instead the spirit and objective of the simulation is the simple recording of individual reaction in the face of unexpected events and therefore to peer discussion on how to find the best solution to reduce clinical risk. Participation that in contrast in other specialist areas (anesthesiologists, emergency doctors etc ...) has always found acclaim and a desire to be measured. We would like to highlight that during the simulation, the doctors are never assessed professionally [5-7].

Table 1: Adverse events during the dialysis session related to the patient or technology or both.

Event	Causes
Air embolism	Monitor Malfunction
Blood loss or Hemolysis	Monitor Malfunction
	Dialyzer Breakage
Hypothermia or Hyperthermia	Monitor Malfunction
	Error Setting
Electrolytic or Osmotic imbalances	Monitor Malfunction
	Error Setting
Fluid overload or Hypovolemia	Monitor Malfunction
	Error Setting
	Patient related causes
Underdialysis	Monitor Malfunction
	Error Setting
	Patient Related Causes
Hypoglycemia or Hyperglycemia	Inappropriate Therapy
	Patient Related Causes
Chemical or Mechanical Damage	Poor Maintenance
	Monitor Malfunction
	Water System Malfunction
Patient's Vascular Damage	Anatomical Access Difficulties
	Inexperience of staff
Infections	Bad hygiene of the patient or staff
	Mishandling
Electric shock or Burns	Monitor Malfunction
	Bad Maintenance
Hypersensitivity Reactions	Patient's Medical Problems Unknown

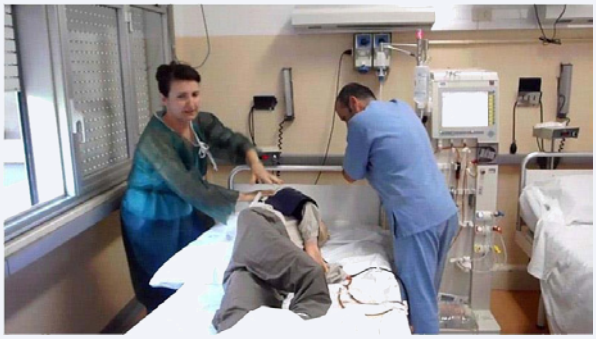

Figure 1 Simulation of air embolism during the HD session, two nurses assist the dummy/patient after they have solicited a doctor who deliberately late to arrive.

RESULTS OF OUR FIELD EXPERIENCE

To date have been implied in the simulation, in the field of Nephrology and Hemodialysis 90 nurses and 10 Nephrologists. During the days of simulation, we gave them a questionnaire to measure the popularity index of this new method. The responses have testified the good index by acceptance of this new method of upgrading, whose boundaries and potentials are still to be identified and to be applied, especially in a special area of medication which is represented by hemodialysis. Nevertheless, we are convinced that it can determine space and applicability to clinical and Interventional Nephrology: simulations regarding the introduction of central venous catheters and their complications are already experienced.

CONCLUSIONS

Though practiced in other work fields for more than 30 years, in the discipline of Medicine the simulation started in the last 15 - 20 years, even in Italy The measure of information in favor of the positive prospects of the simulation in healthcare is growing, but its accessibility is still patchy and dependent on the observational nature of some individuality and departments [8]. Concerning the simulation in the field of Nephrology and dialysis still lack experiences worldwide. We we're dealing with for several years (8 yrs). One of the limitations of simulation is that it is not provable that the performance of participants on simulator could reflect their actions during the clinical reality. Although all our learners have stated that the experience has changed them, it has not been demonstrated the impact of training with simulation in real practice every day. However professionals who every day on Dialysis are told by patients "my life is in your hands" should not wait for further testing.

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