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Original Research Article

Role of a Simulation Workshop Training in the Preanalytical Phase in Medical Biology: Experience of the Biochemistry Laboratory of the University Hospital of Tangier – Morocco

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Abstract

Introduction: In order to fight against preanalytical errors, a simulation workshop around the requirements of this phase was carried out by the team of the biochemistry laboratory of the university hospital of Tangier Tetouan Alhoceima. Newly recruited nurses in oncology, hematology and the sampling center benefited from this training. ***Material and Methods:*** The course of this workshop took place in the premises of the center of clinical simulation and educational innovation in health sciences of the faculty of medicine and pharmacy of Tangier (Tangier'Sim Center). The beneficiaries were 19 nurses divided into two groups. The practical part was performed on low-fidelity procedural dummies. Two questionnaires were completed pre and post training. ***Results and Discussion*:** Knowledge of the requirements and best practices of the pre-analytical phase improved significantly after this workshop, both in terms of preparing the patient and taking the sample. This approach is an original tool for training and familiarization with good practices for peripheral venous sampling, in particular the vacuum sampling system. And above all an opportunity to discuss the different requirements with a category of professionals very involved in their daily practice in the preanalytical phase. ***Conclusion*:** This experience resulted in the development of a leaflet on good practices for peripheral venous sampling which is part of the quality approach in the medical biology laboratory.

Keywords: Simulation, sample nurse, sample, pre-analytical phase.

INTRODUCTION

The pre-analytical phase is essential for the quality and validity of the results of medical biology examinations, including for outsourced medical biology examinations, as well as for their subsequent use by the prescriber. Particular attention must be paid to this phase, which extends from the prescription of the analysis to sample pre-treatment in the laboratory, including the preparation of the patient, the collection and transport of the samples. In a process of improving the practices of this pre-analytical phase at the TTA University Hospital (CHU TTA), an original simulation workshop around the requirements of this phase was organized by the biochemistry laboratory of the TTA University Hospital, for the benefit of newly recruited nurses at the oncology and hematology departments and at the specimen collection center. This workshop has two parts, a first theoretical part and a second practical part.

The main objective of this workshop is to fight against pre-analytical errors in our context and to initiate communication with the actors of this phase in its external part to the laboratory. This is so that the sample nurses send compliant samples to the analytical sites.

MATERIAL AND METHODS

Design of the practical workshop

The biochemistry laboratory of the CHU TTA in northern Morocco currently sits at the regional oncology center where the biochemical assessments of patients hospitalized in the various departments of the this center are analyzed. The biochemistry laboratory is committed to the laboratory quality management

approach according to ISO 15189, which requires the training and qualification of the actors in the pre-analytical phase, in particular the nurse samplers.

Thus, the design of this workshop took place, to assess the level of mastery of the requirements of the pre-analytical phase and to try to improve the quality of their professional practice. Various items were targeted according to the progress of the biological assessment from the medical prescription to the pre-treatment which is the stage preceding the analytical phase or the execution of the analysis itself.

The course of this workshop took place in the premises of the center of clinical simulation and educational innovation in health sciences of the faculty of medicine and pharmacy of Tangier (Tangier'Sim Center). The beneficiaries were 19 nurses divided into two groups. The training began with a pre-questionnaire and then a presentation. The practical part was performed on low-fidelity procedural dummies. The discussion was rich during all the stages of the training. After this contact, some nurses were supported in their department, in particular those from the sampling center. Information from the post-training questionnaire was collected after 10 months.

Practical modalities for carrying out the workshop

The organization of the event beforehand took place in consultation with the nurses assignment services and the academy of nursing and technical health sciences of the CHU (ASITS) and also the managers of the simulation center (tangier'Sim center).

The workshop is held over two sessions. At the beginning of each session, the beneficiaries were invited to complete a pre-questionnaire aimed at assessing their knowledge, before moving on to the different parts of the workshop: theoretical and practical (Fig 1).

Figure 1: Images showing the progress of the workshop. (Photos taken within the simulation center of the Faculty of Medicine and Pharmacy of Tangier - Morocco)

RESULTS

The majority of participants (n=14) attached responsibility for the pre-analytical phase to the nurse sample, a minority attached it to the attending physician and the laboratory department. Concerning the state of fasting before the sample, before participating in the workshop, only 73% of the participants answered that the fasting duration for the glycemic assessment is 8 to 10 hours, and 84% answered that the minimum duration of fasting for the realization of the lipid blood panel test is 12 hours. After attending this workshop 100% of participants answered correctly.

Regarding the use of the vacutainer, 47% of our participants report having had no initial training on its use. Before participating in the workshop, 48% of them said they preferred the use of the vacutainer to the use of the syringe, compared to a percentage of 78% after.

The percentage of participants knowing the risk of haemolysis following the incorrect use of the tourniquet before participation in the workshop was 63%, compared to a percentage of 100% after. And also 63% were aware of the risk of microorganism transmission by the tourniquet before versus 92% after.

The order of filling the tubes was mastered by 42% of the participants before and rose to 100% after. Regarding the importance of respecting the filling level of the tubes, it was 11% before compared to 93% after participating in the workshop. All of our results are shown in Figure 2.

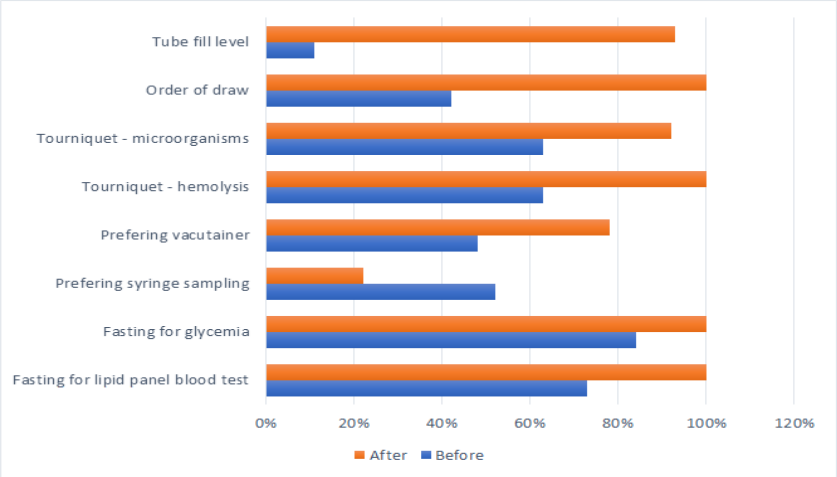

Figure 2: Presentation of the results of the pre and post training questionnaires

DISCUSSION

The medical biology examination is a medical act which contributes to the prevention, diagnosis or assessment of the risk of occurrence of pathological states, to the decision and to the therapeutic management, to the determination or the follow-up of the physiological or therapeutic state of the human being [1]. A medical biology examination takes place in three phases: pre-analytical, analytical and post-analytical.

Various studies have shown that the pre-analytical phase is an important step that determines the quality of the laboratory examination and the results obtained after the analysis. Indeed, according to the study carried out by Wiwanitkit, the distribution of errors in laboratory examinations showed that 85% of the errors recorded stem from the pre-analytical phase, while the errors recorded during the analytical and post-analytical phases are respectively 4% and 11% of all the errors studied. Researchers have concluded that these errors will have several possible consequences for the patient such as an error in diagnosis, care and treatment, which prolongs the duration of the patient's stay and therefore weighs negatively on the performance indicators of the hospital [2].

In the process of quality management within the biochemistry laboratory of the CHU of TTA, a mapping of the processes has been established. It includes management processes, production processes and support processes. The training and qualification of the various stakeholders in all phases including the pre-analytical phase is a normative requirement of ISO 15189. The laboratory must have a documented procedure for personnel management and keep the corresponding records up to date to all personnel to demonstrate compliance with requirements [3]. Laboratory management should document the qualifications of personnel for each position. Qualifications should reflect appropriate training and experience, as well as demonstrated skills necessary and appropriate for the tasks performed [3].

Pre-analytical non-conformities can be linked to an error in prescription, sampling, labeling, choice of tube, etc. Sampling must be carried out under well-defined conditions so that the sample taken does not undergo any change before analysis. Thus, the laboratory director must refuse any sample taken under non-compliant conditions [4].

The following definition of health simulation was used in the recent HAS report: "The term health simulation corresponds to the use of equipment (such as a dummy or a procedural simulator), virtual reality or of a standardized patient to reproduce situations or environments of care, with the aim of teaching diagnostic and therapeutic procedures and of rehearsing processes, medical concepts or decision-making by a healthcare professional or a team of professionals (House of Representatives, USA, 111th congress 02-2009) [5].

The classification of simulation according to G. Chiniara distinguishes the so-called organic simulation from the so-called inorganic one, which itself is subdivided into electronic or synthetic, depending on whether computer-generated information plays a preponderant role in it or not [6, 7].

Simulation fidelity is the degree to which the simulation reproduces the appearance or qualities of reality [6]. The classic design distinguishes low-fidelity simulators (procedural simulators), like the ones we used here, from high-fidelity simulators (complex manikins with or without clinical immersion).

The choice of running this workshop in a simulation center was not arbitrary in our case, but based on the possibility of this tool to include one or more cognitive, psychomotor (procedures and technical

skills) and/or learning objectives. or affective (behaviour). It thus allows to:

- Train health professionals in procedures, gestures or the management of situations.
- Acquire and update technical and non-technical knowledge and skills (teamwork, communication between professionals).
- Analyze their professional practices by taking a new look at themselves.

Learning in the health sciences through simulation methods can reduce medical risk, and contribute to "primum non nocere" [7]. It follows the postulate "never the first time on a patient".

Our simulation workshop was well accepted by the newly recruited nurses, even better, the results of this workshop were satisfying. This study supports the idea that simulation teaching improves learning and knowledge. The debriefing phase is one of the characteristics of Jeffries' simulation-based pedagogy design, which is a key phase in the consolidation and anchoring of knowledge. In addition, the benefits are noticeable over time, i.e. the knowledge developed by the simulation is sustainable [8]. A number of reviews, reported that simulation sessions significantly increase the knowledge of nursing students [9, 10]. Leroy *et al*., in their simulation workshop on the prevention of medication errors in pediatrics for the benefit of pediatric nurses, concluded that the real situation of solving a practical case associated with a fun and educational animation brings together the ideal conditions for effective learning [11].

This approach is an original tool for training and familiarization with good practices for peripheral venous sampling, in particular the vacutainer sampling system. And above all an opportunity to discuss the different requirements with a category of professionals very involved in their daily practice in the pre-analytical phase.

CONCLUSION

The new imperatives in terms of quality and safety of care lead to constant evolution of the nursing profession and in addition to the development of additional skills. The simulation allows beneficiaries to acquire a certain number of skills and transfer them in order to meet these requirements encountered during practice. This experience resulted in the development of a leaflet on good practices for peripheral venous sampling, which is part of the promotion of clinical-biological dialogue and the quality approach in the medical biology laboratory. A generalization of this workshop to all the nurses of the CHU TTA would be useful to fight against pre-analytical errors.

Conflicts of interest: The authors declare that they have no conflicts of interest.

Contribution of the authors: All the authors actively participated in this work.

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