



# Health simulation and patient safety: Case of the higher institutes of nursing and health techniques in Morocco

**B. Ouakhzan<sup>1</sup>, A. Barkat<sup>2</sup>, Y. Chbab<sup>3</sup>, J. El Bardai<sup>4</sup>, S. El Ghaza<sup>1</sup>,  
A. Chaouch<sup>5</sup>, E. Aouane<sup>1</sup>**

<sup>1</sup>Faculty of Science, Université Ibn Tofail, Kenitra, Morocco;

<sup>2</sup>National School of Public Health Rabat, Morocco;

<sup>3</sup>Higher Institute of Nursing Professions and Health Techniques, Ministry of Health, Rabat, Morocco;

<sup>4</sup>Business Law and Sustainable Development, Mohamed V University, Rabat, Morocco.

<sup>5</sup>Faculty of Science, Université Ibn Tofail, Kenitra, Morocco.

## Abstract

Explore and study the correlation between health simulation and patient safety. This is an exploratory study, the first of its kind in Morocco, conducted over a period of six months, from January to June 2023, at a set of Higher Institutes of Nursing and Health Techniques, with 309 students and 96 teachers belonging to these training institutions. Analysis of the results of questionnaires completed by teachers and students of the Higher Institutes of Nursing and Health Techniques revealed 90.6% of the teachers and 73.5% of the students surveyed stated that there is a link between the organization of simulation courses at HINHT level and patient safety at the level of care facilities. 88.5% of teachers and 76% of students surveyed argued that simulation reduces the risk of potential errors among students and health professionals. 90.6% of the teachers and 78.6% of the students surveyed argued that the organization of simulation courses at the HINHT level allows the reduction of the risk of nosocomial infection at the level of care facilities. Certainly, the objective of health simulation is to train competent, caring health professionals capable of providing quality and safe care to their patients. However, the search for the optimal path to achieve this goal and the identification of the elements necessary to achieve it continue to represent a constantly evolving challenge.

**Keywords:** Simulation, Health, patient safety, potential error.

**Full length article** \*Corresponding Author, e-mail: [etudesuniversitaires.2021@gmail.com](mailto:etudesuniversitaires.2021@gmail.com)

## 1. Introduction

Access to a system of health protection that ensures that every person has access to quality care and the possibility of enjoying a better state of health is a prerequisite for the right to health. Certainly, health policies and programs are key pillars of the sacralization of this condition. Nevertheless, the role of health professionals is omnipresent. Indeed, according to the 2030 Global Strategy on Human Resources for Health, the success of any health policy and program cannot be achieved without the existence of competent and competent human resources [1].

With this in mind, the Ministry of Health and Social Protection of the Kingdom of Morocco considers that the generation of human resources and the development of their skills is intrinsically part of its essential functions and a fundamental lever for increasing the efficiency of services Ouakhzan et al., 2024

and improving performance. This attention has been expressed through its various strategic axes that have focused on the quantitative and qualitative development of health professionals to make it a hinge ensuring the implementation of health programs. Nurses have always been the backbone of the health care system. The vital role that it continues to play in the implementation of health policy, the fight against diseases and the promotion of the health of the Moroccan population is not to be demonstrated. A role that has always animated the movements of changes and reforms in the training of nurses, health technicians and midwives. In this case, the adoption, in 2013, of the Bachelor Master Phd (BMP) system, by reclassifying nursing and health technical training institutes as institutes of higher education not under the supervision of the Ministry of Health and Social Protection [2]. Therefore, a great deal of effort is being made,

and continues to be made, to ensure that this training is of the required quality in terms of teaching and technique. In a desire to ensure the production of health professionals competent in their fields and having an academic level and an openness to the academic and professional environment. Besides, the production of a nursing staff of quantity and having the skills required to meet the evolving needs of the population, requires the reinforcement of the know-how and know-how of future health professionals. This need can only be sacralized through two modalities that are part of the continuum of training of nurses, health technicians and midwives, namely successively; theoretical and practical training. Clinical teaching or internship is the cornerstone of the training of nursing, health technology and midwifery professions. It occupies a very important place in the training curriculum and is a key element in the development of skills in the field of care. The passage of students through the internship fields is mandatory from the 3rd year and must continue until the end of the training at the level of the Bachelor's degree, this will allow students to learn by living authentic situations in the professional environment.

However, according to the ethical requirements of the practice of medical and nursing students of the Higher Institutes of Nursing and Health Techniques (HINHT) must benefit from simulation training as an essential modality of their practical education [3]. Moreover, based on the axiom «never the first time on a patient» simulation training is an innovative teaching method, which allows the student to master the technical gestures necessary for the development of his skills. Indeed, simulation is a method used to produce an experiment without going through the real event. It opens up opportunities that are not available in real-life event learning, and at the same time provides a multi-faceted safety container for learning [4]. In view of all these considerations, a study of teachers and students at HINHT is of great importance in order to have an overview of health simulation at HINHT level in order to improve the offer and quality of practical teaching at these institutes.

## 2. Material and Method

This is an exploratory study, the first of its kind in Morocco, conducted over a period of six months, from January to June 2023, at a set of Higher Institutes of Nursing and Health Techniques, with 309 students and 96 teachers belonging to these training institutions.

### 2.1 Inclusion criteria

This study includes students and teachers of the Higher Institutes of Nursing and Health Techniques who have expressed informed consent to participate in the survey.

### 2.2 Exclusion Criteria

Students and teachers from the Higher Institutes of Nursing and Health Techniques:

- Refusing to participate in the study;
- Having participated in the test of the questionnaire used for field data collection;
- Did not complete the questionnaire.

### 2.3 Data collection

This study is conducted through two questionnaires: Ouakhzan et al., 2024

A questionnaire for teachers in training institutions under the Ministry of Health with questions on:

- Age;
- Sex;
- Training establishment;
- Seniority in the position;
- The existing simulation platform at their institute;
- The link between simulation and patient safety;
- The relationship between simulation and non-technical skills development.

A second questionnaire for student in training institutions under the Ministry of Health with questions on:

- Age;
- Sex;
- Training establishment;
- Level of education;
- The existing simulation platform at their institute;
- The link between simulation and patient safety;
- The relationship between simulation and non-technical skills development.

### 2.4 Ethical considerations

Informed consent was obtained from each individual at the time of study entry. Participation in the study was free of charge, respecting confidentiality and anonymity.

### 2.5 Some definitions

#### 2.5.1 Higher Institutes of Nursing and Health Techniques (HINHT)

The Higher Institutes of Nursing and Health Techniques are higher education institutes that do not belong to universities, they are under the supervision of the Ministry of Health, and they are specialized in training in nursing and health techniques.

#### 2.5.2 Simulation Platform

By simulation platform this work means the existence of premises and equipment necessary for the organization of health simulation courses at HINHT.

#### 2.5.3 Patient Safety

Patient Safety in this work is defined as defined by the World Health Organization as the absence of avoidable harm to a patient and the reduction to an acceptable minimum of the risk of unnecessary harm associated with health care [5].

### 2.6 Statistical analysis

The collected data were coded and subjected to computerized analysis using (SPSS V20 software). The variables were expressed as percentages.

## 3. Results

### 3.1 Characteristics of the study target population

The target population of the study consists of two subgroups; the teachers' and students' groups. 57.3% of the first group are female and 42.7% are male. Almost 45% of the first group have an age between 31 and 40 years and 25% have an age between 41 and 50 years. 29.17% of the members of this group are from HINHT Casablanca, 20.83% are from HINHT Rabat and almost 15% are from HINHT Agadir. The teachers (es) surveyed have a seniority of less than 5 years in

35.4%, a seniority between 5 and 10 years in 30.2% and a seniority of more than 10 years in 34.3%. The group of students (es) are female in 73.8%. They are all under the age of 20. 25.89% of them are from HINHT of Rabat, 15.86% from HINHT of Oujda and 10.35% from HINHT of Tiznit. They study in 2nd place in 41.4%, in 6th place in 23.6% and in 4th place in 22.7%. (Table 1).

### **3.2 Evaluation of the simulation platform by the respondents**

41.7% of surveyed teachers reported that their HINHT provides them with simulation materials. Among these 40 people 85% said that they use this material in practical courses that they find it useful in 25% of cases and very useful in 50% of cases. In addition, among these 40 people 57.5% said they use the material with scenarios; 23 people. Almost half or half of those who reported that their HINHT provides simulation equipment suggested that their HINHT has a lab room, a control room, and a briefing and debriefing room. This study also found that 63 teachers (es) of the 96 respondents (es) never participated in a training on the organization of courses in simulation. The students on their side advanced in 92.7% of the answers that their HINHT makes available to them simulation material, 285 students (es) out of the 309 respondents. In this number 3 student (es) reported that they do not use this material in practical courses. 80% of students (es) find this material useful and 14.74% find it very useful for their course. 73.33% of students (es) use the material without scenarios, 63.16% their HINHT have a practical room, 76.84% their HINHT do not have a control room, 87.72% say they do not have a briefing and debriefing room at their HINHT level and 65.96% find their simulation training useful to them. Moreover, this work has attested that 89.6% of teachers (es) and 60.2% of students surveyed (es) find that the hourly volume dedicated to simulation training at the HINHT level is insufficient (Table 2).

### **3.3 Assessing the link between simulation and patient safety**

90.6% of the teachers (es) and 73.5% of the students (es) surveyed stated that there is a link between the organization of simulation courses at HINHT level and patient safety at the level of care facilities. 88.5% of teachers (es) and 76% of students (es) surveyed argued that simulation reduces the risk of potential errors among students and health professionals. 90.6% of the teachers (es) and 78.6% of the students (es) surveyed argued that the organization of simulation courses at the HINHT level allows the reduction of the risk of nosocomial infection at the level of care facilities. 74% of teachers (es) and 72.5% of students (es) surveyed reported that there is a link between the organization of simulation courses at the HINHT level and the reduction of the length of hospitalization of patients. 76% of teachers (es) and 73.5% of students (es) surveyed said that there is a link between the organization of simulation courses at the HINHT level and the prognosis of patients at the level of care structures. 96.9% of the teachers (es) and 87.7% of the students (es) surveyed argued that simulation allows students and health professionals to acquire technical skills. 97.9% of the teachers (es) and 87.7% of the students (es) surveyed reported that simulation allows the increase of performance in care among students and health professionals. 83.3% of teachers (es) and 78% of students (es) surveyed said that

simulation allows compliance with professional ethics. 88.5% of teachers (es) and 75.4% of students (es) Respondents suggested that there is a link between the use of simulation at the HINHT level and the improvement of care processes and outcomes. 76% of the teachers (es) and 71.5% of the students (es) surveyed reported that the simulation allows the reduction of the mortality rates and the morbidity of the patients at the level of the structures of care (Table 3).

### **3.4 Assessment of the relationship between simulation and non-technical skills development**

Regarding the use of simulation at HINHT level, 90.6% of teachers (es) and 81.9% of students (es) surveyed reported that it facilitates teamwork at the level of care structures; 82.3% of teachers (es) and 71.8% of students (es) Respondents stated that it improves coordination between care teams at the level of care structures; 92.7% of teachers (es) and 68.3% of students (es) Respondents said it anchors the notion of mutual aid and mutual support among students; 95.8% of teachers and 81.6% of students surveyed said it increases students' self-confidence 78.1% of the teachers (es) and 70.2% of the students (es) surveyed claimed that it improves inter-professional communication at the level of care structures; 78.1% of the teachers (es) and 67.6% of the students (es) respondents stated that it improves the organization of care at the level of care structures (Table 4).

## **4. Discussion**

In order to have an overview of health simulation at HINHT level in order to improve the offer and quality of practical teaching at these institutes, this work was carried out to find that: The teachers (es) surveyed consider that the use of simulation material in practical courses is useful in 25% of cases and very useful in 50% of cases. While, students (es) find it useful in 80% of cases. Corroborating the literature that has advanced several studies that talk about the benefits of health simulation. In this case, the work of Saleem et al explored aspects of simulation in health care education to highlight its usefulness [6]. Among teachers (es) using simulation material 42.5% said they use the material with scenarios and almost half or half suggested that at their HINHT level there is no lab room, a control room and a briefing and debriefing room. However, the advances of the International Association for Clinical Simulation and Learning stipulate that best practices in simulation must include, inter alia, sufficient pre-briefing, an established case scenario and adequate debriefing [7]. This study also found that 63 teachers (es) of the 96 respondents (es) never participated in a training on the organization of courses in simulation. While, Whitworth et al wrote on their professional development article in medical simulation that Simulation professionals must continually adapt to meet the needs of the population they serve [8].

**Table 1:** Study population characteristics

	Teacher (e) N=96		Student N=309	
	Effective	Percentage	Effective	Percentage
<b>Sex</b>				
Female	55	57,3	228	73,8
Masculine	41	42,7	81	26,2
<b>Age</b>				
< 20 years	00	00	309	100
[20-30 years old]	11	11,5	00	00
[31yrs-40yrs]	43	44,8	00	00
[41 years-50 years]	24	25	00	00
> 50	18	18,7	00	00
<b>Training establishment</b>				
HINHT Rabat	20	20,83	80	25,89
HINHT Agadir	14	14,58	08	2,59
HINHT d'Errachidia	03	3,12	04	1,29
HINHT of Khenifra	01	1,04	01	0,32
HINHT Casablanca	28	29,17	21	6,80
HINHT de Laâyoune	01	1,04	03	0,97
HINHT Marrakech	04	4,17	08	2,6
Safi HINHT	03	3,13	10	3,2
Settat HINHT	03	3,13	08	2,6
HINHT d'Essaouira	02	2,08	23	7,44
HINHT of Fez	01	1,04	10	3,24
Kenitra HINHT	04	4,17	00	0
Meknes HINHT	03	3,13	24	7,77
HINHT d'Ouarzazate	01	1,04	20	6,47
HINHT Oujda	03	3,13	49	15,86
HINHT Tétouan	01	1,04	08	2,59
Tiznit HINHT	04	4,17	32	10,35
<b>Seniority in your position</b>				
< 5 years	34	35,4		
[5yrs-10yrs]	29	30,2		
> 10 years	33	34,3		
<b>Level of education</b>				
1 <sup>er</sup> semester			22	7,1
2 <sup>nd</sup> semester			128	41,4
3 <sup>rd</sup> semester			5	1,6
4 <sup>th</sup> semester			70	22,7
5 <sup>th</sup> semester			11	3,6
6 <sup>th</sup> semester			73	23,6

**Table 2:** Evaluation of the simulation platform by the respondents

		Teacher N=96		Student N=309	
		Effective	Percentage	Effective	Percentage
<b>Availability of simulation equipment at IPSITS</b>					
Yes		40	41,7	285	92,7
Non		56	58,3	24	7,8
<b>Use of materials in practical courses</b>					
Yes		34	85	282	98,95
Non		6	15	3	1,05
<b>Assessment of equipment used</b>					
Not very useful for the course		10	25	15	5,26
Useful for the course		10	25	228	80
Very useful for the course		20	50	42	14,74
<b>Use of material with scenarios</b>					
Yes		23	57,5	76	26,67
Non		17	42,5	209	73,33
<b>Availability at HINHT level</b>					
Practice room	Yes	21	52,5	180	63,16
	Non	19	47,5	105	36,84
Control room	Yes	20	50	66	23,16
	Non	20	50	219	76,84
Briefing and debriefing room	Yes	20	50	35	12,28
	Non	20	50	250	87,72
<b>Participation of training on the organization of simulation courses</b>					
Yes		33	34,4		
Non		63	65,6		
<b>Simulation training is useful for students (es)</b>					
Yes				188	65,96
Non				97	34,04
<b>The adequacy of the hourly volume dedicated to simulation training</b>					
Yes		10	10,4	123	39,8
Non		86	89,6	186	60,2

**Table 3:** Assessment of the link between simulation and patient safety

	Teacher N=96		Student N=309	
	Effective	Percentage	Effective	Percentage
<b>Existence of a link between the organization of simulation courses at HINHT and patient safety at the level of care structures.</b>				
Yes	87	90,6	227	73,5
No	9	9,4	82	26,5
<b>Simulation reduces the risk of potential errors for students and healthcare professionals.</b>				
Yes	85	88,5	235	76
No	11	11,5	74	24
<b>Existence of a link between the organization of simulation courses at HINHT and reduced errors related to the prescription and administration of drugs at the level of care structures.</b>				
Yes	87	90,6	243	78,6
No	9	9,4	66	21,4
<b>Existence of a link between the organization of simulation courses at HINHT and the reduction of the risk of nosocomial infection at the level of care structures.</b>				
Yes	89	92,7	243	78,6
No	7	7,3	66	21,4
<b>Existence of a link between the organization of simulation courses at HINHT and the reduction of the length of hospitalization of patients.</b>				
Yes	71	74	224	72,5
No	25	26	85	27,5
<b>Existence of a link between the organization of simulation courses at HINHT and the prognosis of patients at the level of care structures.</b>				
Yes	73	76	227	73,5
No	23	24	82	26,5
<b>Simulation allows students and healthcare professionals to acquire technical skills.</b>				
Yes	93	96,9	271	87,7
No	3	3,1	38	12,3
<b>Simulation enables increased performance in care for students and healthcare professionals.</b>				
Yes	94	97,9	271	87,7
No	2	2,1	38	12,3
<b>Simulation allows compliance with professional ethics.</b>				
Yes	80	83,3	241	78
No	16	16,7	68	22
<b>Existence of a link between the use of simulation at HINHT level and the improvement of care processes and their results.</b>				
Yes	85	88,5	233	75,4
No	11	11,5	76	24,6
<b>Simulation allows the reduction of mortality rates and morbidity of patients at the level of care structures.</b>				
Yes	73	76	221	71,5
No	23	24	88	28,5

**Table 4:** Assessment of the relationship between simulation and non-technical skills development

	Teacher N=96		Student N=309	
	Effective	Percentage	Effective	Percentage
<b>The use of simulation at the HINHT level facilitates teamwork at the level of care structures.</b>				
Yes	87	90,6	253	81,9
No	9	9,4	56	18,1
<b>The use of simulation at the HINHT level allows the improvement of coordination between the care teams at the level of the care structures.</b>				
Yes	79	82,3	222	71,8
No	17	17,7	87	28,2
<b>The use of simulation at the HINHT level allows anchoring the notion of mutual aid and mutual support among students (es).</b>				
Yes	89	92,7	211	68,3
No	7	7,3	98	31,7
<b>Simulation courses increase students' self-confidence about their professional practices.</b>				
Yes	92	95,8	252	81,6
No	4	4,2	57	18,4
<b>The use of simulation at the HINHT level allows the improvement of interprofessional communication at the level of care structures.</b>				
Yes	75	78,1	217	70,2
No	21	21,9	92	29,8
<b>The use of simulation at HINHT level allows the improvement of the organization of care at the level of care structures.</b>				
Yes	75	78,1	209	67,6
No	21	21,9	100	32,4

This work confirmed that 89.6% of teachers (es) and 60.2% of students surveyed (es) find that the hourly volume dedicated to simulation training at the HINHT level is insufficient. In the literature there is a clear lack of good quality evidence on the results, consequences and effectiveness of a given hourly volume of simulation-based training [9]. 90.6% of the teachers (es) and 73.5% of the students (es) surveyed stated that there is a link between the organization of simulation courses at HINHT level and patient safety at the level of care facilities. 88.5% of teachers (es) and 76% of students (es) surveyed argued that simulation reduces the risk of potential errors among students and health professionals. Corroborating work that suggests that simulation allows students to improve and acquire new skills and ensure patient safety and compliance [9]. 90.6% of the teachers (es) and 78.6% of the students (es) surveyed argued that the organization of simulation courses at the HINHT level allows the reduction of the risk of nosocomial infection at the level of care facilities. 74% of teachers (es) and 72.5% of students (es) surveyed reported that there is a link between the organization of simulation courses at the HINHT level and the reduction of the length of hospitalization of patients. 76% of teachers (es) and 73.5% of students (es) surveyed said that there is a link between the organization of simulation courses at the HINHT level and the prognosis of patients at the level of care structures. 97.9% of the teachers (es) and 87.7% of the students (es) surveyed reported that simulation allows the increase of performance in care among students and health professionals. 88.5% of the teachers (es) and 75.4% of the students (es) surveyed argued that there is a link between the use of simulation at HINHT level and the improvement of care processes and their results. 78.1% of the teachers (es) and 67.6% of the students (es) surveyed said that it improves the organization of care at the level of care structures. 76% of teachers (es) and 71.5% of students (es) According to interviewees, simulation allows the reduction of mortality rates and morbidity of patients at the level of care structures. Confirming the work that has highlighted that simulation-based professional development improves the quality of care and health systems [10-11-12-13]. 96.9% of the teachers (es) and 87.7% of the students (es) surveyed argued that simulation allows students and health professionals to acquire technical skills. Corroborating the work of Castanelli et al who reported that simulation plays a role in teaching technical skills to novices in anesthesia [14]. 83.3% of teachers (es) and 78% of students (es) surveyed said that simulation allows compliance with professional ethics in the clinical environment. Affirming the work of Vana et al who found that simulation raises ethical questions because its formation is not only technical, but also, a way to learn and train to face the emotional challenges of real-life ethical situations [15]. 90.6% of the teachers (es) and 81.9% of the students (es) surveyed reported that the use of simulation at the HINHT level facilitates teamwork at the level of care structures. 82.3% of the teachers (es) and 71.8% of the students (es) surveyed said that it allows the improvement of the coordination between the care teams at the level of the care structures. 78.1% of the teachers (es) and 70.2% of the students (es) surveyed claimed that it allows the improvement of interprofessional communication at the level of care structures. 92.7% of teachers (es) and 68.3% of students (es) surveyed said that it allows the anchoring of the notion of

*Ouakhzan et al., 2024*

mutual aid and mutual support among students (es). Certifying the advances of the literature that stipulated that simulation successfully trains team work, coordination and communication skills in situations of care provision [16-17-18]. 95.8% of the teachers (es) and 81.6% of the students (es) surveyed said that it increases the self-confidence of the students (es) regarding their professional practices. The results of several studies have found that simulation training develops students' self-confidence [19-20].

## 5. Conclusion

Certainly, the objective of health simulation is to train competent, caring health professionals capable of providing quality and safe care to their patients. However, the search for the optimal path to achieve this goal and the identification of the elements necessary to achieve it continue to represent a constantly evolving challenge.

## Acknowledgements

We would like to thank all the people who participated in this study at different Higher Institutes of Nursing and Health Techniques. We also thank all the authors who read, criticized and approved this article.

## Conflicts of Interest

None.

## References

- [1] O. mondiale de la Santé. (2016). Ressources humaines pour la santé: stratégie mondiale à l'horizon 2030. Genève: Organisation mondiale de la Santé.
- [2] Ministère de la santé et de la protection sociale. (2013). Décret n°2.13.658 du 30 septembre 2013 de création des HINHT.
- [3] J. Levraut, J.-P. Fournier. (2012). Never the first time on the patient. Springer. Urgence. (2012) 2:361-363.
- [4] A. Heckenauer. (2019). Apprentissage par simulation pour la construction des compétences en formation infirmière. Spécificités. (3): 97-110.
- [5] L. Slawomirski, N. Klazinga. (2022). The economics of patient safety: from analysis to action.
- [6] M. Saleem, Z. Khan. (2023). Healthcare Simulation: An effective way of learning in health care. Pakistan Journal of Medical Sciences. 39(4): 1185.
- [7] E. Stephenson, J. Poore. (2016). Conseils pour réaliser le pré-brief pour une simulation. J Contin Educ Infirmières. 1er août. 47 (8):353-5.
- [8] K.A. Whitworth, J.P. Long. (2023). Développement professionnel en simulation médicale. [Mise à jour le 24 juillet 2023]. Dans : StatPearls [Internet]. Île au trésor (FL) : Stat Pearls Publishing. janvier.
- [9] D.G. Krishnan A.V. Keloth, S. Ubedulla. (2017). Avantages et inconvénients de la simulation dans l'enseignement médical : une revue. Éducation. 3 (6) : 84-87.
- [10] A.W. Dow, E. Salas, P.E. Mazmanian. (2012). Améliorer la qualité des systèmes de soins : résoudre des défis complexes grâce au développement professionnel continu basé sur la simulation. J Contin Educ Prof. Santé Automne. 32 (4) :230-235.
- [11] G. Lamé, M. Dixon-Woods. (2020). Using clinical simulation to study how to improve quality and safety in



- healthcare. *BMJ simulation & technology enhanced learning*. 6(2): 87.
- [12] D.S. Nielsen, P. Dieckmann, M. Mohr. et al. (2014). Augmentation des modes de défaillance des soins de santé et de l'analyse de leurs effets grâce à la simulation. *Simul Santé*. 9 : 48-55.
- [13] W. McCaghie, B. Issenberg, E. Cohen, J. Barsuk, D. Wayne, juin. (2011). La formation médicale basée sur la simulation avec une pratique délibérée donne-t-elle de meilleurs résultats que la formation clinique traditionnelle ? Un examen comparatif méta-analytique des preuves, *Acad Med*. Juin. 86(6) : 706-711.
- [14] D.J. Castanelli. (2009). The rise of simulation in technical skills teaching and the implications for training novices in anaesthesia. *Anaesthesia and intensive care*. 37(6): 903-910.
- [15] I. Budić, S. Pavlović, M. Stević, I. Petrov, V. Perić, M. Jović, D. Simić. (2018). Medical simulation: Moral and ethical issues. *Acta Medica Medianae*. 57(1): 64-69.
- [16] J.M. Beaubien, D.P. Baker. (2017). The use of simulation for training teamwork skills in health care: how low can you go? *Simulation in Aviation Training*. 445-450.
- [17] W. Riley, E. Lownik, C. Parotta, K. Miller, S. et Davis. (2011). S. Création d'équipes de haute fiabilité dans le domaine des soins de santé grâce à une formation par simulation in situ. *Adm. Sci*. 1(1), 14-31.
- [18] Miller D1, Crandall C, Washington C 3rd, McLaughlin S. Améliorer le travail d'équipe et la communication dans les soins de traumatologie grâce à des simulations in situ. *Acad Emerg Med*. Mai. 19(5) :608-612.
- [19] S. Fuglasng, C-W. Bloch, H. Selberg. (2022). Formation par simulation et confiance en soi professionnelle : une étude à grande échelle auprès d'étudiants infirmiers de troisième année. *Nurse education today*. Elsevier. Tome 108. Janvier.
- [20] H.B. Yuan, B.A. Williams, J.B. Fang. (2012). La contribution de la simulation haute-fidélité à la confiance et à la compétence des étudiants en soins infirmiers : une revue systématique *Int. Infirmières. Rév.* 59 (1), p. 26 – 33.