Study of the Relationship Between Simulation and Clinical Internships for Nursing and Technical Health Professions Students

https://doi.org/10.3991/ijet.v17i15.31827

Abdelilah Merabti[1](✉), Abdelrhani ElAchqar[1], Tarik Sqalli Houssaini[2], Fatiha Kaddari[1]

[1] Dhar El Mahraz Faculty of Sciences of Fez, Sidi Mohamed Ben Abdellah University, Fez, Morocco

[2] Faculty of Medicine, Pharmacy and Dental Medicine of Fez, Sidi Mohamed Ben Abdellah University, Fez, Morocco

abdelilah.merabti1@usmba.ac.ma

Abstract—Paramedical training field allows the integration of practical and theoretical knowledge, the mobilization of knowledge offers the possibility to test the skills necessary for the exercise of the profession. Nursing education is organized based on the principle of alternating between theoretical learning in classrooms, and practical learning in the form of simulation sessions in laboratories and internships in healthcare institutions. Indeed, through our article we study the relationship between these two teaching/learning practical methods applied in nursing and technical health professions students' education. Our study is of the descriptive correlational type, we carried it out through a survey that we conducted with a sample of 289 students, using a questionnaire developed via the Google Forms platform; the data we collected were analyzed using the descriptive statistics method, in frequencies and percentages, presented in the form of figures and simple and bi-variate (Contingency) tables. The main results of this study showed that (a) 59.17% were moderately satisfied with the alternation between simulation sessions and internships; (b) 48% stated that simulation as a method of learning sometimes reflects the reality of internships; (c) 52% announced that it is often possible to transfer the learning acquired through simulation into practical gestures during clinical internships, and (d) 90.66% stated that simulation learning could not replace internships. As a result, this study has concluded that nursing training is based on practical teaching / learning which materializes in simulation activities and clinical internships which are strongly correlated.

Keywords—simulation, internship, relationship, teaching, learning, practice, nursing student

1 Introduction

Nursing education prepares students to become responsible professionals, who are ready to react in difficult situations and to take decisions that may be vital for the patient. Moreover, nurses will increasingly work in an interdisciplinary way thus their responsibilities will increase. This is why it is important that during training the student must acquire knowledge, experience and above all the necessary skills that will make him/her a responsible professional [1].

In this context, simulation has appeared for some time as a tool for improving the care's quality and safety, by offering the possibility of endlessly repeating common or rare situations. The final objective is to improve care and respect the ethical principles [2].

Simulation therefore makes it possible to reproduce a clinical situation, in whole or in part, in a supervised context in order to enable learners to better understand and manage a similar situation during internship [3], that is considered the first opportunity for the student to discover and confront the professional reality, for which he is destined. The internship also allows the student to learn through professional practice, in order to acquire capacities that teaching, which is only a simulation of reality, could not provide [4].

Although simulation is beneficial for nursing student learning, internships are also fundamental. They allow the construction of professional skills providing an accompaniment in a work situation. The role of the educational institute is to provide the theoretical knowledge necessary for the acquisition of transferable skills, which can be exploited in internship experiences. Therefore, what is learned in the institute is not of the same nature as what is learned on the field. Indeed, both participate in the construction of professional knowledge [5].

Our study is carried out to describe the relationship between simulation and internships for nursing and technical health professions students. Indeed, this present work is structured in five main parts: introduction, literature review, methodology, results and discussion.

2 Literature review

Throughout the world, the training of health professionals, especially nursing students is based on the principle of alternating theory and practice. Practical teaching is of crucial importance, it takes the form of simulation sessions in educational institutes, and of internships in healthcare institutions, as a complementarity has been demonstrated in the literature between these two teaching/learning methods.

According to Gineyt [6], simulation is a pedagogical tool that is highly recommended in the nursing curricula, because it helps develop the students' skills. Because of its professionalizing character, both the students and the trainers consider simulation very positive especially in nursing education. Initial feedback from some French nursing schools confirms its value in mobilizing knowledge, facilitating the acquisi-

tion of skills, reducing anxiety, promoting the exercise of clinical judgment, etc. in controlled and safe environments set up by the training staff.

According to Pastré, Mayen, Vergnaud [7], the interest of a simulated situation is time. Indeed, during a simulation, it is always possible to stop, to rectify an error, to give feedback on a particular practice, to complete the action, to help the student with a gesture and to ask questions. This way, simulated situations allow more learning, because they are characterized by a certain flexibility and by a degree of freedom. Unlike the real situation where there is no time to stop the nurse and question him/her peacefully, and then wait for the answer, because the nurse's efforts are mainly directed to the needs of the patients all the time. In addition, the nurse cannot rectify the mistakes made by the trainee during the care, because these consequences are irreparable.

The different techniques and tools of simulation can be used in a complementary way in order to prepare an environment that is very close to the reality of professional practice, to work in a team and to better understand the crisis situations management during internships. Simulation allows the acquisition of knowledge, skills and behaviors and its ultimate aim is to improve healthcare quality provided to patients during internships [8].

Concerning the internship, Belghezli and al. [9], defined it as a strong and valuable time of nursing education, whose aim is to allow students to put into practice their knowledge acquired in simulation, according to their level of learning and in compliance with professional rules and values. Also, Tanicala [10] stated that the skills developed in internship enable the student to become a health professional, who practices responsibly and accountably in complex care settings. In practical terms, the appeal of internships lies in the inability of other pedagogical methods, whether in the classroom in form of theoretical courses or in the simulation laboratory, to reproduce the reality of care settings and the complexity of both health problems and human interactions.

The relationship between simulation and internships has been widely studied in the literature, indeed, Moisy [11] pointed out that the nursing student spends 50% of his training in the internship sites, and 50% in the educational institute. Firstly, the student has to enrich his theoretical knowledge by learning new techniques and by using his reflection in simulation courses. Secondly, he has to develop skills of how to communicate with the patients and of how to work in a team, and finally the student needs to develop his practical knowledge in order to learn how to provide care in the internship sites. Also, Simoneau, Ledoux, Paquette [12] stated that simulation prepares, facilitates and completes the internship. It reduces the level of stress, increases self-confidence and can alleviate the supervision difficulties encountered by nursing students. For Pastré and al. [7], they stated that the use of simulation as a didactic approach necessarily poses the problem of the relationship between the professional reference situation and the simulated situation. Given that the aim is to learn an activity, it is necessary that the learning carried out in the simulation leads to the mastery of the activity concerning the professional situation of reference. So on the one hand the simulation influences the internship and on the other hand, the internship influences the simulated situation; therefore, they are in a reciprocal correlation, which results in

the enhancement of the students learning. The authors add that in nursing education, it is not possible to use only simulated situations because the student will never be confronted with real situations, therefore with the professional life. Simulated situations make it possible to prepare for the real world. The acquired skills will be evaluated when confronted with real internship situations.

In this sense, Issenberg and al. [13] pointed out that simulation can be used to complement internships, but that it cannot really replace clinical training in real care sites with real patients. Similarly, the Canadian Society for Medical Laboratory Science (CSMLS) [14] noted that simulation can supplement, shorten or enhance internships, but it cannot replace them entirely, as the internship is another form of simulation. In addition, the report of the Center for Innovation in Nursing Education of the University of Montreal [15] noted that, simulation is a promising method that can replace part of the internships and better prepare the next generation of nurses. The Order of Nurses of Quebec [16] stated that theoretical courses and simulation sessions must be linked to internships either for preparation, execution or for feedback on clinical experiences. This type of activity contributes to enriching the internships and makes it possible to get the most out of the training without however replacing the internships, which are carried out in real care situations.

The positive relationship between simulation and internships has been strongly demonstrated in the literature. Moreover, Mouhaoui, Moussaoui, Yaqini, Khaleq, Louardi [17] stated that simulation courses allowing the training of nursing students on practical gestures are of great support. Indeed, using sophisticated mannequins, the learners are put in front of different complex real situations, which allow them to explore their levels of learning and their abilities to face these situations, while avoiding the possible dangers that can be encountered by real patients during the same activities carried out in the care institutions. The success of the different methods of patient care strongly correlates with the training on the reproduced situations during the simulation sessions. In the same sense, Appelshaeuser [18] stated that semi-directive interviews were carried out with a group of health professionals and students. They declared that simulation is a tool that can promote the students en try in to the professional life, because it makes students better equipped to face real situations during internships, by raising their self-confidence levels and by approaching them more and more to the reality of the internship. In addition, a health professional declared that he considers that when the student performs well in simulation, he will perform well in the internships. Also, Hucq [19] stated that simulation develops self-efficacy and inter professional collaboration skills among internship students. Skills acquired in school during simulation sessions are, according to the author, of paramount importance to the professional life of future health professionals.

On the other hand, Boivin [20] revealed that one of the constraints raised when teaching clinical skills in nursing is to develop the student's ability to move from theory to professional practice. The transfer of student learning is difficult to achieve in the nursing environment. Despite the theoretical courses and the simulation sessions, the student seems to be still hesitant in internship sites, when he had to apply the theoretical notions learned previously, because there is a big difference between the conditions of both simulated and real situations. According to the teachers super-

vising the internships observations, when providing care to patients, students forget elementary details and sometimes their interventions seem to be inadequate. Also, Lalonde and al. [21] stated that there are several important dimensions in learning through internships that are absent in simulation lab learning. Firstly, an important feature of internships is exposing students to healthcare professionals in real situations, so that they develop an understanding of their professional role within a healthcare team. The effects of simulation on the process of professional socialization are not yet well known, and it is still unknown whether simulation can fulfil the students' needs for professional socialization. Another important feature of internships is exposing students to real patients. Despite the use of mannequins and standardized patients, contact with a real patient remains absent in simulation-based learning.

3 Methods

Our work is of a correlational descriptive type, it aims to study the relationship between simulation and nursing students' internships, which we carried out during the year 2021; at the Higher Institute of Nursing and Technical Health Professions in Fez. We conducted the study among a purposive sample of 376 students among the totality, who are regularly enrolled and pursuing studies for the academic year 2020-2021 (N=636). In fact, all students in the second and third year of the Nursing Care, Midwifery and Health Techniques Departments are included in our study, because they received simulation sessions and they completed sufficient internship modules. In order to collect the data for our study, we conducted a survey using a questionnaire intended for all the students in our sample (n=376), whereas only 289 participated in our survey, i.e. a participation rate of 76.86%. The questionnaire was developed electronically via Google Forms platform, and the questions asked were of the dichotomous, multiple choice, open-ended, short answer and scale types. The analysis of the collected data was done using the descriptive statistics method, which is based on frequencies and percentages presented in the form of figures and simple and bi-variate (Contingency) tables.

4 Results

The Figure 1 shows that 42.20% of the students are satisfied, while 37% are unsatisfied with the simulation sessions they attended.

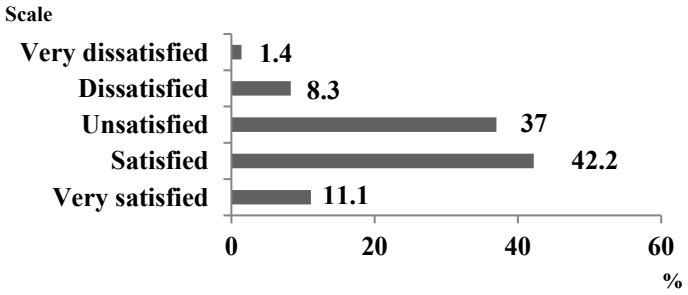

Fig. 1. Students' satisfaction with the simulation sessions

Almost half (48%) of the students surveyed stated that learning through simulation sometimes resembles the reality of internships.

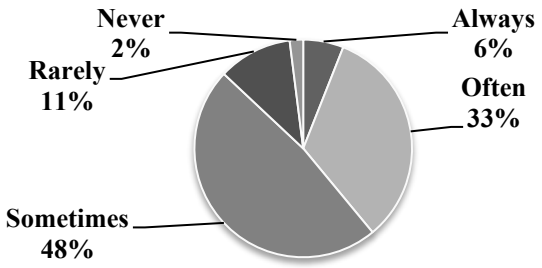

Fig. 2. Similarity between simulation learning and internship reality

The Figure 3 shows that 59.17% of the students are moderately satisfied with the alternation between simulation sessions and internships.

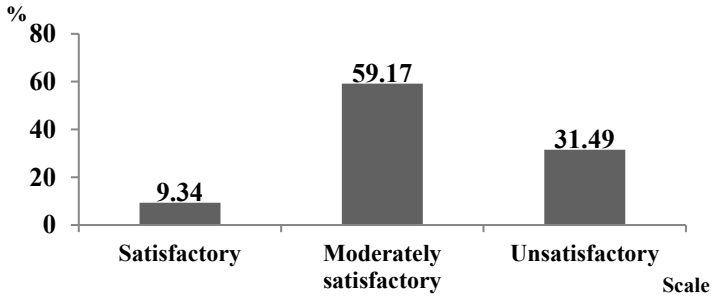

Fig. 3. Appreciation of the alternation between simulation sessions and internships

According to Figure 4, the majority of the participants (82.01%) stated that simulation training is essential for practice in internships.

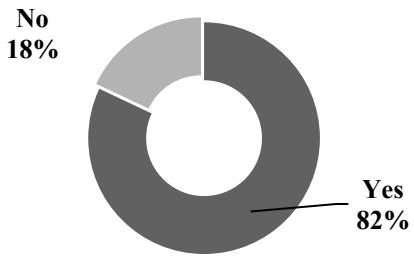

Fig. 4. Simulation training is essential to practice in internships

According to Figure 5, the majority (78.20%) of the participants declared that the major contribution of the simulation for the completion of internships is the learning of technical gestures.

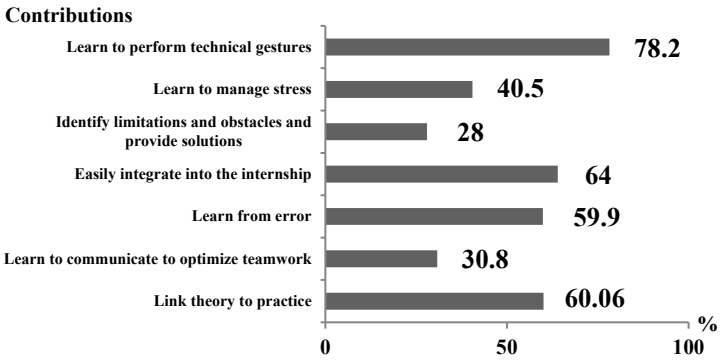

Fig. 5. Major contributions of simulation to internships completion

More than half of the participants (51%) declared that they often establish the links between the knowledge learned during simulation sessions and the internship situations.

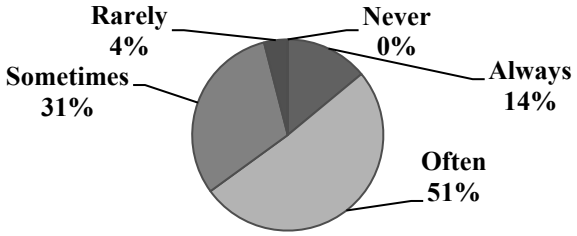

Fig. 6. Students' ability to establish links between the knowledge learned during simulation sessions and the internship situations

According to Figure 7, the majority of the participants (90.66%) stated that simulation-based learning could not replace internships.

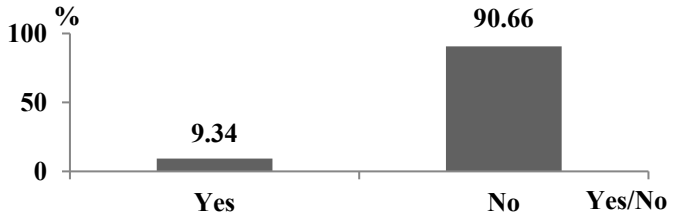

Fig. 7. Replacement of internships by simulation sessions

According to Figure 8, more than half (52%) of the participants announced that it is often possible to transfer the skills learned in simulation sessions to practical actions during internships.

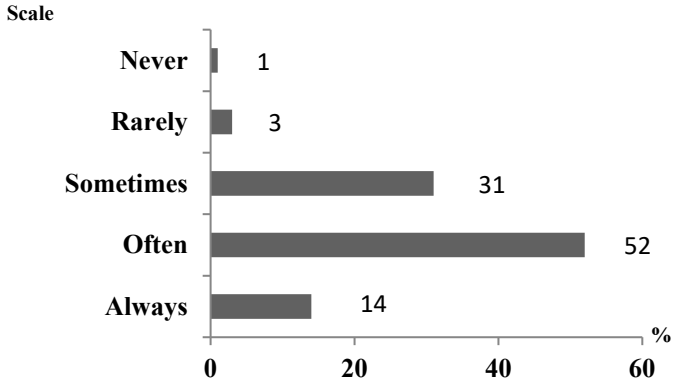

Fig. 8. Possibility of the transfer of the skills learned during simulation to practical actions in internship

According to Figure 9, 46.37% of the participants declared that simulation often has an effect on the health care delivery efficiency, and 45.33% stated that simulation often has an effect on increasing the patient comfort and safety during internships.

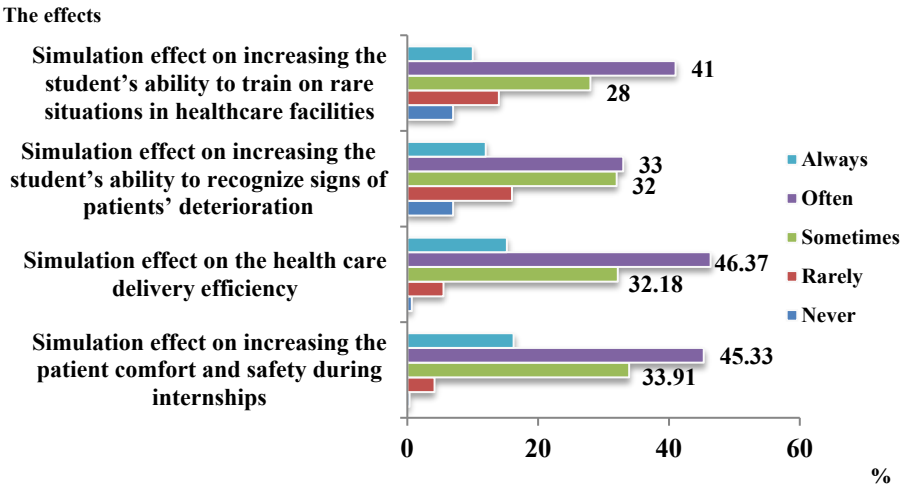

Fig. 9. The effects of simulation on the development of the internship student technical skills

According to Figure 10, the participants declared that the simulation has an effect on the development of confidence and perseverance in the internship student (69.2%). It also, has an effect on the students integration in the internship environments (83%).

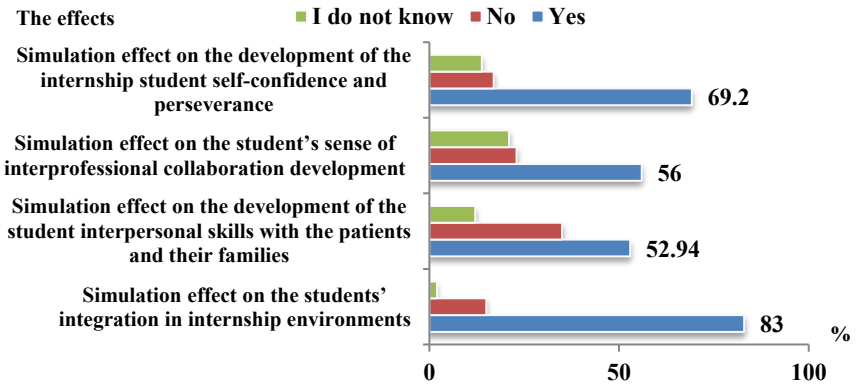

Fig. 10. The effects of simulation on the development of the student soft skills during internships

According to Table 1, the students who reported that they sometimes relate the knowledge they learn from simulation to internship situations, they sometimes transfer their learning from simulation to practice during internships (16.61%).

Table 1. The relationship between participants' ability to relate the knowledge learned through simulation to internship situations and the possibility of transferring the knowledge gained through simulation to practical actions during internships

		The possibility of transferring the knowledge gained from the simulation to practical actions in internships					
		Never	***Rarely***	***Sometimes***	***Often***	***Always***	***Total***
The participants' ability to relate the knowledge learned through simulation to internship situations	***Never***	0 (0%)	0 (0%)	0 (0%)	1 (0.35%)	0 (0%)	1 (0.35%)
	Rarely	0 (0%)	2 (0.69%)	5 (1.73%)	4 (1.38)	1 (0.35%)	12 (4.15%)
	Sometimes	1 (0.35%)	1 (0.35%)	48 (16.61%)	37 (12.80%)	2 (0.69%)	89 (30.80%)
	Often	1 (0.35%)	4 (1.38%)	30 (10.38%)	94 (32.53%)	18 (6.23%)	147 (50.87%)
	Always	0 (0%)	2 (0.69%)	6 (2.08%)	14 (4.84%)	18 (6.23%)	40 (13.84%)
	Total	2 (0.69%)	9 (3.11%)	89 (30.80%)	150 (51.90%)	39 (13.49%)	289 (100%)

Table 2 clearly explains that the participants who stated the need for simulation-based training in internship sites, indicated that simulation significantly develops their interpersonal skills with the patients and their families (44.29%), the sense of interprofessional collaboration (48.79%), self-confidence and perseverance in internships (58.82%).

Table 2. The relationship between participants' perception of the need for simulation-based training in internships and the effect of simulation on student soft skills development

		The effect of simulation on the development of students' interpersonal skills with the patients and their families.			
		No	***Yes***	***I do not know***	***Total***
The need for simulation-based training in internships	***No***	22 (7.61%)	25 (8.65%)	5 (1.73%)	52 (17.99%)
	Yes	79 (27.34%)	128 (44.29%)	30 (10.38%)	237 (82.01%)
	Total	101 (34.95%)	153 (52.94%)	35 (12.11%)	289 (100%)
		The effect of simulation on the development of students' sense of interprofessional collaboration.			
	No	14 (4.84%)	22 (7.61%)	16 (5.54%)	52 (17.99%)
	Yes	51 (17.65%)	141 (48.79%)	45 (15.57%)	237 (82.01%)
	Total	65 (22.49%)	163 (56.40%)	61 (21.11%)	289 (100%)
		The effect of simulation on the development of student self-confidence and perseverance in internships.			
	No	11 (3.81%)	30 (10.38%)	11 (3.81%)	52 (17.99%)
	Yes	38 (13.15%)	170 (58.82%)	29 (10.03%)	237 (82.01%)
	Total	49 (16.96%)	200 (69.20%)	40 (13.84%)	289 (100%)

Table 3 shows that the participants, who declared the need for simulation-based training in internships, specified that simulation often contributes to increasing patient comfort and safety (39.79%), as well as to the care delivery efficiency (38.41%).

Table 3. The relationship between the participants'perceptions of the need for simulation-based training in internships and the effect of simulation on the student technical skill development

		The effect of simulation on increasing patient comfort and safety					
		Never	***Rarely***	***Sometimes***	***Often***	***Always***	***Total***
The need for Simulation-based Training in internships	***No***	0 (0%)	3 (1.04%)	23 (7.96%)	16 (5.54%)	10 (3.46%)	52 (17.99%)
	Yes	1 (0.35%)	9 (3.11%)	75 (25.95%)	115 (39.79%)	37 (12.80%)	237 (82.01%)
	Total	1 (0.35%)	12 (4.15%)	98 (33.91%)	131 (45.33%)	47 (16.26%)	289 (100%)
		The effect of simulation on the care delivery efficiency					
	No	1 (0.35%)	4 (1.38%)	17 (5.88%)	23 (7.96%)	7 (2.42%)	52 (17.99%)
	Yes	1 (0.35%)	12 (4.15%)	76 (26.30%)	111 (38.41%)	37 (12.80)	237 (82.01%)
	Total	2 (0.69%)	16 (5.54%)	93 (32.18%)	134 (46.37%)	44 (15.22%)	289 (100%)

5 Discussion of the results

According to our study, 42.20% of the students declared their satisfaction with the simulation sessions. In this sense, Jouffroy and al. [22] announced that simulation is at the origin of a high level of satisfaction among the participants, who generally describe it as an enriching experience with a high level of realism. The Order of Nurses of Quebec [16] declared that the theoretical courses and the simulation sessions must be linked to the internships in order to have a complete training. Simulation sessions enrich internships without replacing them. Therefore, the alternation in time is of great importance. Moreover, our study's results revealed that only 31.49% of the students are satisfied with this alternation, while 59.17% are moderately satisfied.

Regarding the establishment of links between what is learned in simulation sessions and during internships, more than half (51%) of the participants declared that they often establish these links. Furthermore, Boivin [20] revealed that one of the problems raised by the teaching of clinical skills in nursing is to develop the student's ability to move from theory to professional practice. In this context, 52% of the surveyed students said that they often transfer their learning from simulation to practice during internships. On the other hand, Huchon [23] stated that students do not know how to get to the point and yet transfer theory to practice. The student's transfer of learning remains difficult in the clinical nursing environments despite theoretical and simulation courses provided. The student seems to be reluctant to apply previously learned theoretical concepts in the clinical setting, because of the difference between the conditions of both simulated and real situations. Concerning knowledge transfer, Midgley [8] reported that the internship is commonly presented as an opportunity for the student to transfer the concepts learned during the simulation sessions to the in-

ternship practice. The student must intervene safely with patients, by analyzing the data of the situation and then selecting from their previous knowledge what is applicable to the context.

Our study also revealed that 82.01% of students stated that simulation training is indispensable for practice in internships. This corroborates with the idea of Coyer [24] when he affirmed that health professions students training through simulation is essential, and one of its major advantages is the absence of risk to the patient. In addition, almost all participants (90.66%) stated that simulation training could not replace internships. This was confirmed by the systematic literature review conducted by Issenberg and al. [13], who reported that simulation, could be used to complement internships, but cannot really replace clinical training in real health care institutions with real patients.

Regarding the effects of simulation on the internship students technical skills development, almost half (45.33%) of the participants declared that simulation often improves patient comfort and safety. Moreover, the High Authority of Health [25], in its methodological guide, pointed out that simulation in health is an active, innovative and effective pedagogical method, whichis based on immersive experiential learning and reflective practice that improves patient safety and translate the operational concept “Never the first time on a patient”. Thus, almost half (46.37%) of the surveyed students said that simulation often promotes more efficient care delivery, while 33% of them stated that simulation often increases their ability to recognize signs and symptoms of patient deterioration during internships. Vachon [26] clarified that simulation-based learning promotes more efficient care delivery and significantly increases the student's ability to recognize signs of patients’ deterioration, which helps improve their survival.

Our study also showed that 41% of the participants indicated that simulation often helps to train on rare situations in healthcare facilities. In this context, Drummond [27] pointed out that the probability of a student to take charge of rare situations in internship is tiny. Therefore, He cannot be trained to handle them during a hospital internship. On the contrary, simulation makes it possible to reproduce these situations as many times as necessary. This way, the student can gain experience being exposed to these rare situations, and being trained to take good care of the patients without harm. In addition, simulation prevents the student risk of psychological trauma.

Regarding the effects of simulation on the students soft skills development during internships, our study revealed that more than half (52.94%) of the participants declared that simulation has an effect on the development of students' interpersonal skills with patients and their families. Darris, Quebre [28] supported this result, he reported that simulation has been used for a long time not only in developing technical and procedural skills, but also with the aim of strengthening the students interpersonal skills. In addition, according to our study, 56% of the students noted that simulation has an effect on the development of interprofessional collaboration sense among internship students. Hucq [19] affirmed this, when he mentioned that simulation is very important for the professional life of future health professionals, because it increases the competencies of self-efficacy and interprofessional collaboration of internship students. In relation to the students’ self-confidence development, a study

carried out at the University of Angers-Rene Rouchy School of Midwifery by Coyer [24] confirmed that the feeling of self-confidence for the majority of the participants increased significantly between the beginning and the end of a simulation training. Our study agrees with this result in that 69.2% of students noted that simulation develops the student self-confidence and perseverance during internships.

6 Recommendations

In order to promote nursing students establishment of links between simulation and internships, several recommendations are proposed, which can be summarized as follows: (a) Strengthen collaboration between healthcare institutions and educational institutes, to make student internships more profitable. (b) Develop a concerted internship policy between the healthcare institutions and the training institutes, which must be part of a structured partnership. (c) Rethink the recruitment of supervisors who will accompany each group of students in the two learning environments (educational institutes and internships), and (d) stimulate a national reflection on simulation and internships, in order to determine the best approach to balance these two methods to better meet the nursing education needs.

7 Conclusion

Simulation is an effective pedagogical method used in the training of nursing students. Thus, it can be used to replace a few hours of internships, which could help compensate for the lack of internship availability in the Moroccan context. In addition, this study demonstrated that simulation must remain complementary to other forms of teaching, and must focus on situations where its usefulness is clearly established. In addition, the study explained the effect of simulation on the students technical and non-technical skills development during internships, which aims to improve health care efficiency. Finally, our results need to be complemented by another study aiming to explore the effect of the care provided by the nursing students, who benefited from simulation sessions, on the improvement of their patients' health during internships.

8 References

[1] M. Gavalet, "The nursing student and competent action," Graduation work. IFSI Le Blanc, 2012.

[2] O. Nacir, "Medical Simulation and Therapeutic Education: Through teaching experiences at the Faculty of Medicine and Pharmacy of Marrakech," Thesis for obtaining the Doctorate in Medicine, Faculty of Medicine and Pharmacy of Marrakech, Cadi Ayyad University, Morocco, 2017.

[3] P. R. Jeffries, "A framework for designing, implementing, and evaluating: Simulations used as teaching strategies in nursing" Nursing Education Perspective, vol. 26, no 2, pp.

96-103, 2005. Available: http://www.hunter.cuny.edu/shp/centers/nycnect/docs/Jeffries_article_NEP.pdf [Accessed May. 9, 2021].
[4] F. Desrosiers, "Study of internship supervision practices in a college nursing competency program," thesis for obtaining the degree of Master in Education (M.E.D.) Master in College Teaching, Sherbrooke University, Faculty of Education, 2009.
[5] C. Durand, "Alternation as a learning device," Pedagogy, 2003. [Online]. Available: www.cadredesante.com [Accessed: Nov. 12, 2007].
[6] C. Gineyt, "Backstage of the didactization of knowledge in nursing sciences: simulation by filmed role-playing for learning by problem-situations," Nursing Research Association, 2015/4, no 123, pp 89-107, 2015. https://doi.org/10.3917/rsi.123.0089
[7] P. Pastré, P. Mayen, and G. Vergnaud, "Professional didactics," French journal of pedagogy, 154 | January-March, pp 145-198, 2006. https://doi.org/10.4000/rfp.157
[8] K. Midgley, "Pre-Registration Student Nurses Perception of the Hospital-Learning Environment during Clinical Placements," Nurse Education Today, vol. 26, no. 4, pp 338-345, 2006. https://doi.org/10.1016/j.nedt.2005.10.015
[9] N. Belghezli, V. A. Dalla, F. De Zorzi, J. Herald, T. Lothair, Y. Mengal, and B. Vos, "Proposal for reform of nursing training in the Wallonia-Brussels Federation," National Federation of Belgian Nurses, and Society of Belgian Nurses in Research and Training, Belgium, Working Group Report, 2012.
[10] M. L. Tanicala, "Design and implementation of nursing student clinical experiences and program effectiveness as measured by NCLEX-RN pass rates," A Dissertation Submitted for the degree of Doctor of Education, Bowling Green State University, 2006. Available: https://etd.ohiolink.edu/apexprod/rws_etd/send_file/send?accession=bgsu1146846177&disposition=inline [Accessed Feb. 5, 2021].
[11] M. C. Moisy, "The nurse, trainer of his peers: realities and perspectives," thesis, Villefranche sur Saône Nursing Training Institute, 2001.
[12] I. L. Simoneau, I. Ledoux and C. Paquette, « Pedagogical effectiveness of high-fidelity clinical simulation in the context of college nursing education," Sherbrooke Cegep, Research Report. 2012.
[13] S. B. Issenberg, W. C. Mc Gaghie, E. R. Petrusa, D. L. Gordon and R. J. Scalese, "Features and uses of high-fidelity medical simulations that lead to effective learning: a BEME systematic review," Medical Teacher, vol. 27, no. 1, p. 10-28, 2005. https://doi.org/10.1080/01421590500046924
[14] Canadian Society for Medical Laboratory Science, "National Forum on Simulation and Clinical internships," Toronto, Report. 2016.
[15] Center for Innovation in Nursing Education, Internships in nursing sciences in the 21st century, review of writings: Simulation, quality criteria and supervision, Faculty of Nursing, Montreal university, 2013.
[16] Order of Nurses of Quebec, "Recommendation on clinical internships in nursing education," Report of the expert committee on clinical internships, 2009.
[17] M. Mouhaoui, M. Moussaoui, K. Yaqini, K. Khaleq, and H. Louardi, "Medical simulation in the Maghreb: Inventory and perspectives," URGENCES 2012, Chapter 84, 2012.
[18] M. Appelshaeuser, "Simulation in health in initial training, what are the challenges for the Director of Nursing in charge of a Nursing Training Institute?," thesis, School of Advanced Studies in Public Health, 2014.
[19] C. Hucq, "The influence of clinical simulation on interprofessional collaboration and on the feeling of self-efficacy of nursing students," thesis, Faculty of Public Health, Catholic University of Louvain, 2019.
[20] M. Boivin, "Theory/practice integration in the development of clinical skills in nursing through the logbook," Master's thesis, Faculty of Education, Sherbrooke University, 1995.
[21] M. Lalonde, M. C. Malouin-Benoit, E. Gagnon, A. Michon, M. Maisonneuve, and J. Desroches, "An Interprofessional Simulation: An Exploration of Student Nursing Experi-

ences," Nursing Research Association, 2017/4, no 131, pp. 71-84, 2017. https://doi.org/10.3917/rsi.131.0071
[22] R. Jouffroy, G. Khelifi, M. Fontaine, J. Parlavecchio, P. Carli, and B. Vivien, "Contribution of simulation to the management of vital emergencies," presented at The Congress Doctors, Vital emergencies, 2016.
[23] C. Huchon, "Reflection on the situation of return from an internship in a nursing training institute: a space for dialogue for the development of professional experience," Nursing Research Association, 2005/4, no. 83, pp. 34-99, 2005. https://doi.org/10.3917/rsi.083.0034
[24] C. Coyer, "Place and interest of high-fidelity simulation in the training of midwifery students in neonatal resuscitation," Thesis presented for obtaining the State Diploma of Midwifery, University of Angers-School of Midwives Rene Rouchy, 2013.
[25] High Authority of Health, Simulation in health and risk management. Methodological guide. SOFRASIMS, 2019.
[26] V. Vachon, "Experimentation with debriefing during nursing internships to promote the transfer of knowledge and the development of nursing clinical judgment," thesis, Faculty of Education, Sherbrooke University, 2018.
[27] D. Drummond, "Evaluation of an innovative teaching program combining educational film and simulation workshops for training in cardiac arrest in children of hospital students," Thesis for the State Diploma of Doctor of Medicine. Faculty of Medicine Paris Descartes, 2014.
[28] T. Darris, and K. Quebre, "Simulation in IFSIs in 2015: Inventory," Thesis for obtaining the university diploma of trainer in the teaching of medicine on a simulator, Paris Descartes University, 2016.

9 Authors

Abdelilah Merabti, State-certified nurse, permanent teacher at the Higher Institute of Nursing Professions and Health Techniques in Fez, PhD student in didactics of science and pedagogic engineering.

Abdelrhani ElAchqar, Vice-president in charge of academic and pedagogical affairs of the Sidi Mohamed Ben Abdellah University of Fez, Teacher and researcher in the field of chemistry and science education, educational innovation, ICT and evaluation, Member of various committees for the implementation and evaluation of education reform, Author of several scientific articles in chemistry and educational sciences.

Tarik Sqalli Houssaini, MD/PhD, is professor of Nephrolgy and vice-dean for academic affairs at faculty of Medicine, Pharmacy and Dental Medicine, Sidi Mohamed Ben Abdellah university of Fez. He is also president of the moroccan society of nephrology and president of the moroccan consultative councile for human organ transplantation.

Fatiha Kaddari, Professor of higher education, Holder of a doctorate in analytical chemistry from the University of Montpellier II, Holder of a State doctorate in science education from the University of Sidi Mohamed Ben Abdellah, Director of several theses and authors of about fifty articles.

Article submitted 2022-04-20. Resubmitted 2022-05-21. Final acceptance 2022-05-21. Final version published as submitted by the authors.