

Learning gestures and ethical issues in oncology and nuclear medicine

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ABSTRACT

Purpose: The purpose of this study is to show the importance of learning gestures in three medical procedures (chemotherapy, brachytherapy, and bone scan). It allows us to assess complications, lack of benefit, and ethical questions to which resident physicians are confronted in their training. **Materials and Methods:** The study is based on a questionnaire divided into two parts distributed to 70 resident physicians and 90 patients: 60 physicians radiation oncologists and 10 nuclear physicians completed the first part of 24 items. It concerned the learning of medical practices. The second part of 18 items was completed by 90 patients (30 patients in the chemotherapy unit, 30 patients in the brachytherapy unit, and 30 patients in the nuclear medicine department; it was related to patients' information prior to the completion (performance) of the gesture. **Results:** The training of medical residents physicians took place mainly during the first year on conscious and well-informed patients, with the exception of brachytherapy taught later in the second year. It was preceded by a theoretical education in 56.7%, 43.3%, and 100%, respectively, in case of chemotherapy, brachytherapy, and bone scan unit, but the previous observation by a senior had failed in 16.7% in case of chemotherapy and in 36.7% in case of brachytherapy unit. Despite the almost constant presence of a senior, four incidents were associated with the first acts of chemotherapy and brachytherapy unit and one incident with the bone scan unit. These incidents had been generated, respectively, from 23.4%, 26.7%, and 20% of resident physicians surveyed (in chemotherapy, in brachytherapy, and in bone scan) and had a consequence of a loss of opportunity for patient, in 20%, 13.3%, and 40%, respectively. Most patients were informed before the completion of the medical procedure, and cause ethical problems. Alternative ways of learning were known by most of the resident physicians in training. **Conclusion:** Despite a relatively low rate of incidents associated with a loss of opportunity for the patient, our study has highlighted a high rate of observation and supervision prior to the first medical procedure, and the importance of ethics for the resident physician throughout his medical training.

Key words: Bone scan, brachytherapy, chemotherapy, complications, ethics, learning, loss of benefit

INTRODUCTION

Medical ethics is a set of rules of conduct for health professionals required for their patients. The doctor/patient relationship is the cornerstone of medical practice and medical ethics; thus, it facilitates the transmission of scientific knowledge and care. Indeed, good information and communication between doctor and patient, a

prerequisite for its consent for any practitioner is an ethical obligation, ethical, legal, and regulation.^[1-3] In hospital practice, the acquisition of professional competence in oncology and nuclear medicine can effectively address the various pathologies that arise in resident physician in his field of practice. This skill requires knowledge undoubtedly taught previously in service. Although, the means to facilitate learning computer self-learning and take a place of increasing the training of residents in their medical curriculum. However, many complications related to learning actions persist and require medical observation of the movement and its supervision by a senior, to acquire better skill by suite.^[4-6] To investigate the impact of learning doctors in training residents on the quality of patient care, we conducted a study in the Faculties of

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Medicine and Pharmacy of Casablanca and Marrakech, whose objective is evaluate how learning three medical procedures (chemotherapy (CTH), brachytherapy, bone scan (BS)) and appreciate the complications, the loss of opportunity for the patient, and the ethical questions faced by future specialists in training medical.

MATERIALS AND METHODS

It is a cross-sectional study conducted in 2011. Two types of surveys were completed [Figure 1].

For physicians

A survey was conducted among residents of Faculties of Medicine and Pharmacy of Casablanca and Marrakech. Three technical gestures were chosen: CTH, brachytherapy (Curie), and BS. Thirty doctors from the CTH unit, 30 doctors from brachytherapy unit, and 10 doctors from nuclear medicine department responded to the questionnaires, which included eight items for each gesture technique with several types of questions open or closed.

Nine items were explored:

- The item 1 explores the function of doctor interviewed (resident, specialist, and teacher)
- The objectives of items 2 and 3 were to obtain for each gesture the information about the time of the ideal and effective training and learning methods of the first gesture (instruction, observation of a senior prior terrain, and nature of the framework)
- The item 4 explored the problems encountered during the implementation of the action (incidents, failures, and error diagnosis). The item 5 specifies the required number of steps to develop a good practice

First step: questionnaire for the patient

1. Sex: F M
2. Age: years
3. Diagnosis:
4. Number of cycles:
5. Have you been properly informed before performing the gesture: yes no
6. Are you agree that the gesture be made by: a young doctor experienced doctor
7. Did you give your consent before the execution of the gesture: yes no
8. Have you experienced adverse events: yes no

Second step: questionnaire for the medical doctors

1. The function of doctor:
2. Time of effective and ideal training of gesture:
3. Learning methods:
4. Problems encountered during the execution of the gesture:
5. Number of gesture necessary to accomplish a good practice:
6. You feel that there is a loss of opportunity for the patient? yes no
- If yes precise:
7. You feel that there is a loss of opportunity for the patient?
- If yes precise:
8. The patient was informed that you were in the period of LEARNING?: yes no
9. Do you know the methods of virtual learning? yes no
- If yes precise:

Figure 1: Questionnaire on learning gestures and ethical problems in oncology and nuclear medicine

- Items 6 and 7 explored the notions of loss of chance for the patient and ethical issues encountered during the learning period
- The item 8 clarified the notion of prior information of the patient and
- The item 9 specified if the doctor was aware of how virtual learning and interest.

For patients

An anonymous survey was conducted among patients who received three technical gestures. Thirty patients in the chemotherapy unit, 30 in the brachytherapy unit, and 30 in the nuclear medicine department responded to the questionnaires, which included eight items for each gesture with technical questions open or closed.

- Items 1 and 2 specified the sex and age of the patient
- Items 3 and 4 specified the nature of their illness and the number of medical procedure has undergone
- Items 5, 6, and 7 specified the notion of patient information before performing the medical procedure, the doctor's experience to make this gesture and the patient's informed consent before performing the gesture (patient conscious and aware or not)
- The item 8 explored the incidents encountered during the implementation of the medical procedure.

Statistical analyses

Data were entered into excel and analyzed by the software Statistical Package for Social Sciences (SPSS) 16.0. Qualitative data are presented as percentage. Quantitative data are presented as mean \pm standard deviation. We conducted a simple descriptive analysis of the variables studied in three groups (CTH, brachytherapy, and BS), and a second time in a univariate analysis only groups of CTH and brachytherapy, excluding the BS group for reasons of small effective, using statistical tests on the threshold of 5%, i.e., the Chi-square (χ^2).

RESULTS

Description of the patients included in the study

Ninety patients were included in the study. The average age of our patients was 38 years (SD = 3.1), and the male/female ratio was 24/66. Of the 90 questionnaires distributed, the medical procedure was represented by breast cancer patients on CTH (33%) and BS units (43.3%), and cervical cancer in brachytherapy unit (56.7%). The number of medical action was more important in the case of chemotherapy with an average of 3.5 (versus 2 and 1.2 in case of brachytherapy and BS). In brachytherapy and bone scan units, 100% of the patients were fully informed before performing the gesture, versus 53% in the chemotherapy unit.

Whatever the medical procedure, all patients in our study preferred that the act to be performed by an experienced physician who made this gesture more than 20 times before.

In all cases, a patient's informed consent (verbal and non-formal) was obtained before performing the medical procedure, since the patients were aware, informed and knowledgeable implication of the sequence of steps of the gesture.

Adverse reactions have been encountered only in case of CTH and were represented mainly by alopecia, vomiting, asthenia, and fever in 33.3% [Figure 2].

Description of physician residents included in the study

A total of 70 physicians were included in the study. Medical doctor included were more represented by residents representing 70% of physicians included versus 18.6% for specialists and 11.4% for teaching doctors. The highest percentage of resident physicians participating was recorded in the fourth year of residency training (25.7%) and lowest in the first year (11.4%).

Any medical practice involves performing professional technical acts described diagnosis or therapy. Learning about CTH and BS took place mainly during the first year of residency training, while brachytherapy was performed during the second year.

Learning of brachytherapy was performed later during the formation of resident physician; it should take place as early as possible during the first year to 100% of physicians oncologists surveyed. Some doctors have expressed that it is desirable before performing a medical procedure to have acquired a theoretical learning courses, it was absent in only 6.7% for CTH unit [Table 1].

The preliminary observation of the medical senior of the first gesture was noted in 66.7% of cases in the chemotherapy unit, 90% in case of brachytherapy and in all cases of BS, while in 2 cases in the brachytherapy unit, doctors had to perform the medical procedure alone without the assistance of a senior.

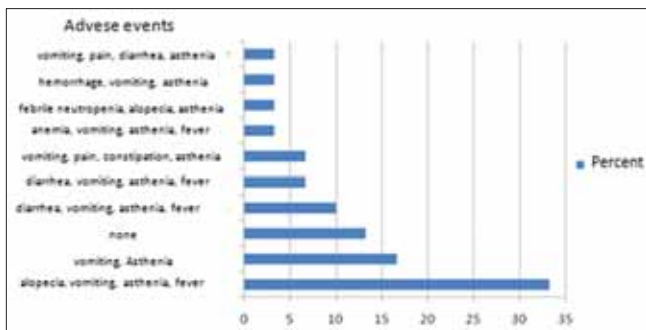


Figure 2: Distribution of post chemotherapy side effects

Learning the three acts was performed on patients awake and aware. No action has been learned from cadavers or models. 73.3% of physicians from the CTH unit received coaching for their first act versus 93.3% in brachytherapy unit, while all the doctors interviewed in nuclear medicine have received assistance during their first year of training. Incidents for CTH represented 13.3% of the cases and were limited to a miscalculation of doses in two cases, anaphylactic shock in one case, and a protocol error in one case. Treatment modalities of these complications consisted of a renal replacement therapy in the Intensive Care Unit (ICU) or hospital based CTH-induced toxicity.

For brachytherapy, four incidents were recorded: A vaginal tear in one case, an infection in one case, and bleeding complications in two cases. Treatment modalities have included sutures ripping, antibiotics, and hospitalization with transfusion in the case of bleeding. In BS unit, one incident was noted during the learning period and consisted of a protocol error acquisition, without consequence for the patient.

Table 1: Modalités d'apprentissage de l'examen à Learning modalities of the examination

Variable and modalities	Chemotherapy n=30 (%)	Brachytherapy n=30 (%)	Bone scan n=10 (%)
Time of learning			
When (first year)			
Yes	30 (100)	0 (0)	10 (100)
Optimal period (first year)			
Yes	30 (100)	6 (20)	10 (100)
Modalités d'apprentissage de l'examen			
Theoretical			
Yes	28 (93.3)	30 (100)	10 (100)
Observation of senior			
Yes	20 (66.7)	27 (90)	10 (100)
Field			
Yes (accompanied)	21 (70)	28 (93.3)	10 (100)
Encadrement			
Yes	22 (73.3)	28 (93.3)	10 (100)
Problems encountered during the execution			
Adverse events			
Yes	4 (13.3)	4 (13.3)	1 (10)
Echec			
Yes	2 (6.7)	3 (10)	1 (10)
Error in diagnosis			
Yes	1 (3.4)	0 (0)	0 (0)
Average number of gesture	7.5	7.1	14
Loss of opportunity			
Yes	7 (23.4)	8 (26.7)	2 (20)
Ethics problems			
Yes	6 (20)	4 (13.3)	4 (40)
Patient informed			
Yes	18 (60)	24 (80)	7 (70)
Methods of virtual learning			
Are there?			
Yes	21 (70)	28 (93.3)	8 (80)

The failure rate at the completion of the first medical procedure was, respectively, 6.7% for CTH and 10% for brachytherapy and units. The number of required gesture to acquire a good practice was on average 7.5, 7.1, and 14, respectively, in the case of CTH, brachytherapy, and BS.

23.4% of physicians in the brachytherapy unit, 26.7% of physicians in the CTH unit, and 20% of physicians in the nuclear medicine department nevertheless mentioned loss of chance. It was for brachytherapy unit as an increase in the duration of the gesture, morbidity, and poor mastery of gesture especially for difficult patients (one case of virgin patient with cervical neoplasia). In chemotherapy unit, it was an increase in post-chemotherapy complications due to an error in dose calculation or an error in the treatment protocol. In bone scan unit, it was either a bad gesture mastery of technique or lack of experience.

According gestures, most physicians in three specialties were faced with an ethical problem during their period of learning of medical procedure. Thus, 40% of physicians in nuclear medicine department had ethical problems summarized in the announcement of bad news or non-compliance with medical confidentiality. 13.3% of residents of doctors in brachytherapy unit were faced with ethical issues as non-patient information, incompetence or ethical nature (virgin patient with cervical cancer). Twenty percent of physicians residents of chemotherapy unit were faced with ethical problems in the form of error or malpractice.

In most cases and in the realization of three medical gestures, the patient was informed that the doctor was residing in a learning technique. This is explained by the young age of resident physician or by the fact that the patient is informed the young physician will receive the advice of senior physician.

Physicians in brachytherapy unit seemed better informed about alternative methods of virtual learning (93.3%). Known means were videos, graphics, and fact sheets with all steps of the technique well illustrated for each type of brachytherapy (location patterns). The advantages mentioned were the facilitation of the recognition of anatomical structures, better stress management, and the ability to drive iterative technique. 80% of physicians in nuclear medicine department were informed about alternative methods of virtual learning means were known anatomical, videos and sites of nuclear medicine and functional imaging. Expected benefits were viewing three-dimensional anatomical landmarks (hybrid imaging morphological and functional), and allow a first approach scintigraphic technique and mastery of different acquisition protocols and diagnostic scintigraphic images. For physicians in CTH unit, 70% were better informed about alternative methods of virtual learning as guides

with protocols for each location and prescription software. The advantages mentioned were uncommon revise procedures and decrease morbidity and mortality. All these factors have resulted in a reduction of loss of chance for the patient.

DISCUSSION

Academia, in particular medical schools, show more interest in medical ethics training residents, and the development of a policy to promote information and education patient.^[7,8] The time resident physician training is an essential point for the acquisition of skills and technical skills. In our study, this time was strongly associated with learning and mastery of gesture in medical oncology with highly significance ($P < 0.001$) [Table 2]. To acquire professional competence, the young

Table 2: Influence of practice on learning gestures in oncology Modalités d'apprentissage de l'examen à Learning modalities of the examination problème éthique à Ethical issue

Variable and modalities	Chemotherapy n=30 (%)	Brachytherapy n=30 (%)	Chi ² test	P
Time of learning				
When (first year)				
Yes	30 (100)	0 (0)	60	<0.001
Optimal period (first year)				
Yes	30 (100)	6 (20)	40	<0.001
Modalités d'apprentissage de l'examen				
Theoretical				
Oui	28 (93.3)	30 (100)	2.07	0.150
Observation of senior				
Oui	20 (66.7)	27 (90)	4.81	0.028
Field (accompanied)				
Yes	21 (70)	28 (93.3)	5.45	0.019
Framing				
Yes	22 (73.3)	28 (93.3)	4.32	0.037
Problems encountered during the execution				
Adverse events				
Yes	4 (13.3)	4 (13.3)	0	1
Failure				
Yes	2 (6.7)	3 (10)	0.22	0.640
Error of diagnosis				
Yes	1 (3.4)	0 (0)	1.02	0.313
Average number of gesture	7.5	7.1	14	
Loss of opportunity				
Yes	7 (23.4)	8 (26.7)	0.09	0.765
Problème éthique				
Yes	6 (20)	4 (13.3)	0.48	0.488
Patient informed?				
Yes	18 (60)	24 (80)	2.86	0.090
Methods of virtual learning				
Are there?				
Yes	21 (70)	28 (93.3)	5.45	0.019

resident training must be helped and guided in the acquisition of skills and medical gesture technique.^[9,10] Thus, observation and supervision by a senior during the construction of the first medical procedure, were strongly associated with success and mastery of gesture by the young physician in training (with P values of 0.028 and 0.037, respectively). By cons, learning theory prior to the first gesture showed no positive association with the acquisition of gestures medical oncology. These results contrast with the relatively high incidence of complications and incidents reported in case of lack of supervision and observation by a senior, sources of loss of chance for the patient (23.4% for chemotherapy versus 26.7% in case of Curie) and ethical issues (20% and 13.3% of cases in CTH and brachytherapy unit, respectively) are not significant in our study (with P values of 0.765 and 0.488, respectively). In bone scintigraphy unit, the low rate of incident, and loss of chance were justified by observation and constant supervision of a senior at the completion of the medical act, ready to intervene in case of problems. Mastery of medical gesture was acquired after an average of 7.5, 7.1, and 14, respectively for CTH, brachytherapy, and BS gestures, respectively. This variability of averages emphasizes the high individual learning of junior doctors residents. The prior information of the patient and informed consent are essential notions of medical ethics.^[11-13] However, the information in oncology is often associated with the delivery of bad news; it may be information on the diagnosis, prognosis, or therapy. In our study, almost all patients were informed and consent was obtained prior to the completion of the medical procedure. How virtual learning allows young residents to explore a variety of medical techniques to build transformative learning experiences covering instructional design, online facilitation and evaluation staff? They can secure better planning and learning at the end to reduce morbidity associated with medical gesture.^[14] Physicians in brachytherapy and BS units seemed better informed than those of CTH unit on alternative methods of virtual learning (93.3 and 80% versus 70%). In our study, this parameter was strongly associated with learning medical procedure with a highly significant statistical difference ($P = 0.019$). However, our study has some methodological limitations:

- The number of nuclear medicine physicians is low (10 doctors), which limited univariate analysis comparing the three groups: CTH, brachytherapy, and BS units
- Our study focused on two medical schools (Casablanca and Marrakech). A multi-institutional analysis including other faculties of medicine and pharmacy in Morocco (Rabat, Fez, Oujda), will draw valid conclusions nationally country. Similarly, comparable studies with other countries of the Maghreb region, allow to study

other factors and to explain variations from one country to another.

CONCLUSION

The free and informed consent of the patient before performing a medical procedure by a resident physician, depends on the quality of the information that has been previously given, which must be accessible, clear, and appropriate.

The framing, prior acquisition of knowledge, and the use of alternative techniques of learning allow a reduction of the morbidity associated with a loss of opportunity for the patient.

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