How to adapt first trimester ultrasound education to tunisian trainees

Comment adapter la formation en échographie du premier trimestre aux résidents tunisiens?

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RÉSUMÉ

Objectifs: Evaluer l'impact d'un programme de formation sur la qualité des mesures de la clarté nucale réalisé par un échantillon de résidents en gynécologie obstétrique.

Méthodes: Etude longitudinale, prospective et analytique, réalisée sur un échantillon de 31 résidents en gynécologie obstétrique.

Cette étude était organisée en trois étapes (E1,E2,E3) :

Au cours E1, chaque candidat avait réalisé 10 échographies du premier trimestre. Toutes les mesures étaient évaluées par 2 examinateurs selon les principes du contrôle qualité adopté dans les systèmes d'accréditation. E2 consistait en une séance de formation interactive. Au cours de E3, chaque candidat réalisait à nouveau 10 échographies qui étaient corrigées par les mêmes examinateurs. Par la suite, nous avons comparé les résultats obtenus avant et après la séance de formation.

Résultats: Au cours de E1, le score de Hermann était de 4,1 [0-8] avec

38% des clichés classés insuffisants. La principale difficulté rencontrée par les participants était l'obtention du plan de coupe sagittal strict. Ce dernier était objectivé uniquement sur 2,9% des clichés rendus. Il n'y avait pas de corrélation entre la qualité des mesures et le niveau d'études des participants . Au cours de E3, nous avons constaté une amélioration significative des réglages techniques ainsi que du score de Hermann moyen (5,4 Vs. 4,1 ; p<0,001) avec une diminution considérable des examens classés insuffisants (15% Vs. 38% ; p=0,002).

Cependant, cette amélioration était insuffisante: uniquement 37% des participants avaient significativement améliorés leurs scores. De plus, il n'avait pas d'amélioration significative des médianes des mesures de la clarté nucale (0,71 MoM Vs. 0,72MoM ; p =0,45).

Conclusion : Le programme de formation évalué au cours de ce travail permet de guider le résident dans son auto évaluation quotidienne. Cependant, la principale critique à faire à ce projet demeure l'absence de séance de travaux pratiques.

Mots-clés

Audit - feedback - autoévaluation - clarté nucale - contrôle qualité - formation

SUMMARY

Objectives: To evaluate the impact of a targeted training program on the quality of NT measures performed by OBST/GYN trainees. Methods: **Prospective study.** Step1: each trainee achieved 10 T1US . All were evaluated by 2 experts. Step 2: interactive training session where participants received a detailed feedback report. Step3: each candidate performed again 10 T1US. The results obtained before and after the training session were compared.

Results: Step1: Herman score was 4.1 with 38% of unacceptable exams. There was no correlation between the score and the level of the training curriculum. Main difficulty was about obtaining sagittal plane. Step2: self-assigned score before the session overestimated image quality (4.5 Vs. 4.1, p=0.03). At the end of the session, It decreased to 3.1. Step3: a significant improvement of technical settings, mean score (5.4 Vs. 4.1; p <0.001) , percentage of acceptable images (85% Vs. 62%, p = 0.002) and sagittal plane (6.4% Vs. 2.9%; p = 0.003). Only 37% had significantly improved their scores.

Conclusion: The training program evaluated in this study guides the trainee in his daily self-evaluation. This preliminary study can already open discussion on the education and quality control of the T1US in our country.

Key-words

Audit; self-evaluation; feedback; nuchal translucency; quality control; screening; education;

First trimester ultrasound (T1US) has become one of the most important exams for pregnancy monitoring since the 90s [1,2]. The measurements performed at this term are used to program and adjust the hole prenatal care. Their mastery by all obstetricians improves the management of pregnancies and may allow the generalization of aneuploidy screening currently routinely prescribed in many developed countries. It is obvious that the only guarantee of reproducibility is the quality control of these measurements. In this sense, the T1US learning has to be achieved during the trainee curriculum and needs to evolve throughout the years of specialization. In Tunisia, there is no specific educational program in T1US, neither a control quality system for nuchal translucency (NT) measurements.

The main objectives of this work were to introduce a targeted training program for Obst/Gyn trainees and to evaluate its impact on the quality of NT measurements.

METHODS

A longitudinal, prospective and analytical study, conducted over a period of 7 months (March to September 2014). The study was conducted under the auspices of the Tunisian college of Obstetrics and Gynecology and the World Association of Trainees in Obstetrics and Gynecology, in collaboration with the Obstetrics and Gynecology department of Mongi Slim hospital, La Marsa. Moreover, the protocol was submitted to the education committee of the Faculty of Medicine of Tunis and the ethics committee of the Mongi Slim hospital. All patient gave informed verbal consent.

We focused on a sample of OBST/ GYN trainees. The recruitment of candidates was based on the voluntary mode. We sent emails to all Tunisian Obst/Gyn trainees, registered in at least the second semester of curriculum. The 30 first responders were retained to take part in the training program. The latter was builded in three steps. All candidates had signed an informed consent and formal commitment to achieve the three steps.

Methods of Step1

This first step was launched at the end of the recruitment phase on April, 1st 2014.

Candidates had to achieve 10 consecutive T1US during their respective classic training activities. Each candidate had to submit 02 images per patient (respectively for CRL and NT measurements), and to complete an information file for each exam. The latter detailing information relating to the candidate (level of curriculum, prior training in obstetric ultrasound or T1US, number of T1US performed per week...) and information relating to the exam (date, ultrasound machine reference, body mass index (BMI) of the patient, gestational age, duration of the exam, use of transvaginal probe or of the mobilization of the fetus by the left hand...).

The different images were numbered and reviewed anonymously by 2-university obstetricians expert in Obstetrical ultrasound without double Correction. Both examiners were qualified in fetal ultrasound by the University Of Paris Descartes 05.

The correction process was based on 2 components:

- A qualitative quality control : based mainly on the Herman score [1,2], as well as the evaluation of technical criteria. Indeed, in addition to scoring images by Herman score, the correctors have studied for each image the following technical criteria: zoom, depth, use of transvaginal probe. Thus, a "yes" or "no" were rated according the quality of the adjustment.
- A quantitative quality control based on the calculation of medians according to Nikolaides et al. [3] .For each candidate NT measurements were expressed as multiples of the median (MoM) using the following formula: ' Log10NT = - 0.3599 + 0.0127 CRL - 0.000058 CRL2'

A correction grid was completed for each candidate detailing the scoring of each item listed.

In addition, the reviewer had written customized remarks detailing the major errors made by the candidate and the possible ways to avoid them.

All data were entered on Excel 2014 software, and for each candidate we calculated:

Herman score of each image.

The number and percentage of images with an unacceptable Herman score (0 or 1) , an insufficient Herman score (2 or 3) ,an acceptable Herman score (between 4 and 7) and an excellent Herman score (8 or 9)

The median Herman score for each candidate and for all submitted images

The median NT measurements for each candidate and for all submitted images

Methods of Step 2

This step consisted in an interactive theoretical training session targeting the gaps and the common errors noticed during the 1st step. The session lasted 120 minutes and was recorded.

We started to file the images submitted during step 1 to the relevant candidates.

Subsequently, we asked everyone to make his self-evaluation using the Herman score.

The course, projected as 2013 PowerPoint slides, was organized into three chapters:

The first chapter dealt with the importance of T1US in the aneuploidy screening, and detailed the different quality control systems used in developed countries.

In the second chapter we detailed Herman scoring method, then a sample of images were projected and discussed with all candidates. The third chapter consisted in the presentation of the results of the quality control of the images submitted during step 1. At the end of the course, the candidates conducted a second self-

evaluation of the same images. Finally, each candidate received a detailed feedback report on his first series of images.

Methods of Step 3:

During this final step, each candidate performed again 10 T1US during his classic training activities. The same reviewers using the same methodology described in Sep 1 examined the images. Subsequently, we compared the results obtained before and after the training session.

Data were collected on a standard spreadsheet (Microsoft Excel). Statistical analysis was performed using XLSTAT version 2014.4.09 (Addinsoft, New York, NY, USA) and quantitative variables, not following a normal distribution , are expressed as median (first–third quartiles) values and those following a normal distribution are expressed as averages ± standard deviation. Qualitative variables are given with the number and percentage for each category. We used the chi-square test to compare qualitative variables. We used parametric z test and t Student test to compare quantitative variables. $p< 0.05$ was considered statistically significant.

RESULTS

Thirty-one candidates were included and started step 1. Four haven't reach the step 3 and one has presented an incomplete final rendering.

The majority of the trainees (48%) were in the 7th semester of training curriculum in obstetrics and gynecology. 45 % had a specialized certificate in obstetrical ultrasound. All candidates had attended several conferences dedicated to obstetrical ultrasound, but none had previous targeted training in T1US.

Step 1

310 T1US were collected. The mean time needed to submit a complete file with 10 T1US was 45 days. Fifty three exams (53/310) were performed under poor conditions (large number of consultants with short time allocated to each exam, noisy room , too bright , poor quality of the ultrasound machine...) . 71% of T1US were performed under good conditions.

Patient's BMI was greater than 30 kg/m² in 18% of the cases.

The mean duration of the T1US was 17 min [2-60]. 5% of exams were performed in less than 5 min and 4% in more than 30 min. Candidates who have achieved their scans in less than 5 min declared a large number of consultants.

The global evaluation of the collected images noticed 35 scans with measures of CRL outsiden the interval 45-84mm. We decided to consider these images in the qualitative quality control.

Indeed, the purpose of the first evaluation was to identify the main difficulties commonly

encountered by trainees and to familiarize them with the use of technical settings and Herman score. However, and given that the formula of Nikolaides et al. does not apply to a measure of the CRL outside this interval, we excluded those scans for the quantitative control and considered only 275/310 images.

The first general ascertainment was about the lack of technical settings . In fact, the focus level was correctly placed in only 11% of the images and zoom was sufficient and properly centered in only 30% of the images. 42 (14%) T1US were performed using transvaginal probe. Five candidates had used this technique in order to improve their measurements when none has used the mobilization of the fetus by the left hand.

Considering the 310 exams, the mean Herman score was 4.1 [0-8] with a rate of 38% unacceptable exams. Table 1 shows the results of the qualitative evaluation of the images submitted during step1. The main difficulty encountered by participants was about obtaining the sagittal section plane. The latter was present only on 2.9% of the images. There was no correlation between the obtained mean score or the rate of unacceptable scores and the level of the training curriculum.

The mean median measure of NT was 0.72 MoM [0.2-2.6]. An underestimation of NT measurements was recorded on 256 images (median <0,9MoM). On 16 exams, there was tendency to overestimation (median >1.1MoM). Only 35 measures were included in the interval 0.9 -1.1 MoM for gestational age.

Table 2 details the results of the quantitative quality control for each candidate.

We have not objectified significant correlation (p=0.16) between the deviation of NT measurements from 1 MoM and the number of unacceptable Herman scores.

Furthermore, we have objectified a negative correlation

Table 1: Results of the qualitative evaluation of ultrasound exams during the first step of the study according to Herman score.

Herman score criteria	Studied criteria	Number of images responding to the studied criteria	Percentage of images responding to the studied criteria (%)
Major criteria	Sagittal	9	2,9
	Skin line	83	26
	Calipers placement	76	24
Minor criteria	Image size	134	43
	Amniotic membrane	214	69
	Head position	252	81

Table 2: Quality Control Details for each candidate during the first stage of the study.

Candidate number	Number of images Herman scoring <4	Median	Median deviation from 1 MoM
1	3	0,74	-0,26
2	1	0,72	-0,28
3	3	0,8	-0,2
4	3	0,66	-0,34
5	1	0,53	-0,47
6	1	0,66	-0,34
7	0	0,76	-0,24
8	1	0,72	-0,28
9	2	0,84	-0,16
10	4	0,59	-0,41
11	1	0,67	-0,33
12	2	0,72	-0,28
13	2	0,48	-0,52
14	1	0,49	-0,51
15	0	0,49	-0,51
16	0	0,67	-0,33
17	0	0,83	-0,17
18	1	0,7	-0,3
19	0	0,64	-0,36
20	0	0,69	-0,31
21	2	0,65	-0,35
22	5	0,75	-0,25
23	0	0,62	-0,38
24	1	0,7	-0,3
25	2	0,58	-0,42
26	1	0,64	-0,36
27	5	1,01	0,01
28	0	0,69	-0,31
29	0	0,68	-0,32
30	0	0,78	-0,22
31	0	0,78	-0,22

Table 3: Comparing the quality of the technical adjustment between the first and second step.

Paramètre correctement réglé	Pourcentage de clichés durant la 1ère phase de l'étude	Pourcentage de clichés durant la 3ème phase de l'étude	P value
focal	11%	28%	< 0,0001
Depth	39%	87%	< 0,0001
field	50,9%	78%	< 0,0001
Zoom	30%	84%	< 0,0001
Gain	58%	83%	< 0,0001

(p=0.40) between the deviation of NT measurements from 1 MoM and the mean number of T1US performed per week.

Step 2:
Twenty-seven candidates have completed their self-evaluation before and after the end of the course. Mean Herman score self-assigned before the session overestimated the image quality (4.5 Vs. 4.1, p=0.03). At the end of the session , it decreased to 3.1 (3.1 Vs. 4.1,p = 0.1). This difference was significant p < 0.001 .
Moreover, there was no significant difference between the mean Herman score self-assigned at the end of the session and the Herman score assigned by the reviewers with p=0.1.

Step 3:
A total of 266 T1US was collected during this final step. Indeed, a candidate had submitted an incomplete file (6 T1US instead of the 10 required), and 4 candidates haven't reach this last step.
There was no significant difference with the step 1 in terms of poor work conditions (18% Vs. 17%; p = 0.14) or obesity rates (19% Vs. 18%; p = 0.38).
During this step, all CRL measures ranged between 45 mm and 84 mm.
In all images, we noticed a significant improvement in technical machine settings (see of images with a Herman score> 4 (85% Vs. 62%, p=0.002) , of the sagittal plane section (6.4% Vs. 2.9%; p = 0.003), the position of the calipers (56% Vs. 24%, p =0.0004), the position of the

Table 4: Evolution of the quality of the measurements of each candidate between the 1st and the 3rd step of the study.

Candidate number	Herman score average		p	1st step Median (MoM)	3rd step median (MoM)	p
	1st step	3rd step				
N°1	2,3	6,3	< 0,0001	0,74	0,44	0,002
N°2	4,5	5,3	0,350	0,72	0,72	0,5
N°3	1,7	2	0,7	0,8	0,63	0,009
N°4	3	5,4	0,002	0,66	0,62	0,18
N°5	5,2	5,5	0,7	0,53	0,56	0,88
N°6	3,9	nr*		0,66	nr*	
N°7	5,7	5,1	0,374	0,76	1	0,03
N°8	3,8	4,5	0,338	0,72	0,9	0,039
N°9	3,1	5,9	0,001	0,84	0,6	0,265
N°10	2,2	6,3	< 0,0001	0,59	0,58	0,58
N°11	5,1	7,9	< 0,0001	0,67	0,7	0,23
N°12	3,3	nr*		0,72	nr*	
N°13	3,5	5,1	0,031	0,48	0,48	0,5
N°14	4,6	5,5	0,304	0,49	0,58	0,68
N°15	5,2	5,3	0,9	0,49	0,55	0,81
N°16	5,2	4,6	0,43	0,67	0,66	0,89
N°17	4,4	nr*		0,83	nr*	
N°18	4,5	5,8	0,1	0,7	0,65	0,37
N°19	5,5	6,5	0,19	0,64	0,7	0,94
N°20	5,2	5,1	0,9	0,69	0,59	0,14
N°21	3,7	5	0,168	0,65	0,65	0,9
N°22	2	5,3	< 0,0001	0,75	0,66	0,4
N°23	6	6,5	0,04	0,62	0,61	0,93
N°24	3,5	4,9	0,049	0,7	0,85	0,054
N°25	3,5	5,2	0,054	0,58	0,76	0,25
N°26	4,6	6,2	0,043	0,64	0,61	0,95
N°27	2,5	nr*		1,01	nr*	
N°28	6,1	4,9	0,078	0,69	0,59	0,99
N°29	4,6	5,7	0,23	0,68	0,69	0,7
N°30	5,4	5,7	0,63	0,78	0,86	0,09
N°31	6,1	5,7	0,58	0,78	0,56	0,07

amnios (90% Vs. 69%; p = 0.001) and the zoom (70% Vs. 43%, $p < 10^{-3}$).

Table 4 shows the evolution of each candidate: 22 (22/27; 81.48%) trainees improved their Herman score, but this improvement was significant for only 10 (10/27; 37%) trainees.

There was no significant improvement in median measures of NT (0.71 MoM Vs. 0.72 MoM; p = 0.45). The underestimation of NT measures (<0,9MoM) was noted on 213 T1US (table 4).

DISCUSSION

This is, the first Tunisian prospective study evaluating the impact of a training session on the quality of NT measurements performed by OBST/GYN trainees.

31 trainees have benefitted from this program which represent 25 % of all registered Tunisian Obst/Gyn trainees during this period. The selection of participants was based on the voluntary mode. Only those in the first semester of training have not been requested for this program.

Indeed, we have held that a minimum of six months experience in the practice of obstetrics and gynecology routine ultrasounds was required to start a target session on T1US.

In this work, we performed an initial quality control in order to target the common difficulties encountered by participants. The main results of step 1 had identified a real need of T1US education in our country. Indeed, the mean Herman score was 4.1 (0-8) with a rate of 38% unacceptable exams. The main difficulty encountered by trainees was about obtaining sagittal section plane. Moreover, there was no correlation between the obtained mean score or the rate of unacceptable scores and the level of the training curriculum. All these results enhance the need for a target education in T1US during the Obst/Gyn curriculum.

In this study, we compared the quality of NT measures performed before and after the training session. We found a significant improvement of the technical settings, of the mean Herman score (5.4 Vs. 4.1; p <0.001) , of the percentage of images with a Herman score> 4 (85% Vs. 62%, p = 0.002) and in the mastery of sagittal plane section (6.4% Vs. 2.9%; p = 0.003). However, only 37% of the trainees had significantly improved their scores. Moreover, there was no significant improvement in median measures of nuchal translucency (0.71 MoM Vs. 0.72 MoM; p = 0.45).

This may be related to the limits attributable to our study. Indeed, we evaluated trainee's images, with poor experience in T1US. Despite the fact that the program focused on the difficulties commonly encountered by the participants, it should be more adapted to trainees and include hands-on sessions. It is clear that further efforts are needed to improve this program before its release . However, this preliminary study can already start the discussion about education and quality control of T1US in our country.

In our work, we were especially interested in education in NT and CRL measurements .

Indeed, these measures are mainly involved in aneuploidy screening. The latter is commonly individually prescribed to Tunisian pregnant women and the adoption of a national screening program is under discussion.

It is obvious that the only guarantee of reproducibility is the quality control of these measurements. In Tunisia, there is no specific educational program in T1US, neither a control quality system for NT measurements. Several developed countries have accreditation and evaluation systems of professional practice in T1US based on quality control of NT measures.

This quality control can be qualitative or quantitative; and commonly involves experts in T1US. In this work we used similar tools of quality control, not in a sanctioning purpose, but in order to identify the major difficulties encountered by trainees. Then we encouraged participants to self-evaluation by criticizing their own images. Finally, we used these tools as objective variables to measure the evolution of each participant before and after the training program.

The qualitative evaluation of submitted images was based on the Herman scoring system [1].

This score is simple to use in daily practice, easy to memorize and can be part of a self-discipline. However, Herman score has its limitations. Thus, it is a subjective score with an inter-observer variability [1,2]. Similarly, in our study we demonstrated a significant difference between the mean Herman score self-assigned before the session and the score given to the same candidate by the experts (4.5 Vs. 4.1; p = 0.03). This difference has no clinical impact, as the final obtained score remains <5. Another concern related to Herman score is its imprecision. Indeed, an image can be noted 7 (acceptable) with calipers distant from NT [4]. Thus, and in order to overcome the shortcomings of this score, several authors have developed further quality control scores [5]. Studies comparing these more detailed scores do not show significant differences [6]. Therefore, and because we believe that these scores are hard to teach and can't be applied in daily practice, we opted for the use of Herman score. Moreover, in our study, after teaching Herman score, we found that trainees did no longer overestimated the quality of their images and no significant difference was objectified between the self assigned score and the score assigned by the experts (p=0.1).

The results obtained Step 1 argue the need for education in T1US in our country. In fact, similar results were obtained in France in 2004 with a mean Herman score 4.2 and 54% rate of unacceptable exams [7]. Since that date the French have worked hard to improve the quality of

their exams, setting up an accreditation national system and multiple educational programs in T1US. Consequently, in 2014, the rate of inacceptable exams decreased to less than 13% [8].

Moreover, in our study, there was no correlation between the obtained score and the level of the training curriculum. Thus, a 4th year trainee may have the same difficulties than a 1st year trainee for measuring a NT. The quality of NT measures depends on the specific experience and daily practice of T1US outside the experience in general obstetrics [7]. Padula et al. [9] show that in 16 weeks with a daily practice, a young trainee can become as relevant as an expert. Specific education in T1US is needed by our trainees and has to include practical sessions to better improve their measurements.

The quantitative quality control by calculating the median is a good method to evaluate the quality of NT measures. It can also be used to judge the performance of sonographers. [6] Thus, the quantitative control would avoid inter-observer variance that would exist with the qualitative tools. [6] In our study, we used this quantitative control and applied the formula of Nikolaides et al [3]. This can be discussed, because actually, the median should be calculated on a local population (Tunisians fetuses). Studies [9-11] showed significant differences in medians among different centers, Thus, we may discuss the development of a formula to identify the NT measuring median in each maternity or even better on a national level. This implies the creation of a national database for NT measures.

Solomon et al. in 2009 [12] published a French curve and compared the distribution of 19198 NT measures using the same curve with the English one [3]. The authors concluded that there is no significant difference and certainly no clinical impact on the reliability of aneuploidy screening. In France, the curve that is currently applied is the one published by Nikolaides et al. [3]. On this basis, and given that there is national data or Tunisian formulas we used the one published by the fetal medicine foundation [3]. The median obtained was 0.72 MoM, which reflects a general tendency to underestimation of NT measures compared to worldwide published data [13]. But we have to keep in mind that international published results are obtained by professionals and not by trainees (figure 1). This tendency to underestimate the measurements can be explained by the difficulty in obtaining the sagittal section plane. The latter was present only on 2.9% of the images submitted in step 1. We targeted the training session towards these weaknesses without significant results, in fact in Step3; the tendency to underestimate measures persisted with a median of 0.71 MoM and a strict sagittal plane obtained in only 6.4% images. Another explanation of the insufficient results obtained in Step 3 is the mean time accorded to each T1US (17 min in Step 1 Vs. 30 min in the UK). The trainees explained this by the large number of consultants per day.

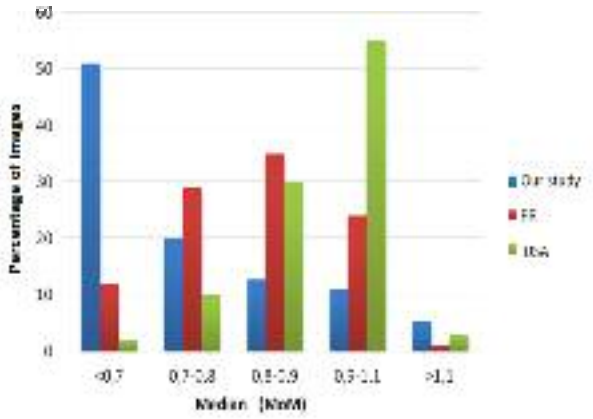

Figure 1: Results of quantitative quality control in France, the USA and in our study
FR: France
USA: United States of America

In general, the results of our work highlight the need for a specific education in T1US in our country. The question is to discuss how to adapt such a program to our Obst/Gyn trainees. In fact, ultrasound is an essential pillar of the Obst/GYN trainee activities, whether in emergencies or during daily activities. However, unlike the training of the radiology resident, there is no theoretical compulsory education in ultrasound. Learning is done while managing gynecological and obstetrical emergencies without prior preparation. Not all trainees do have an ultrasound diploma. In fact, despite the daily use of an ultrasound machines, none of our candidates knew about the machine setting. Thus, education in ultrasound cannot be based only on practice during hospital training, and a theoretical component is necessary. Universities degrees in obstetrical and gynecological ultrasound tend fill this role, providing theoretical basis for understanding the ultrasound practice. This national diplomas content is rich, with a large number of hours. However, some points seem imperfect. First, obtaining a university degree is not mandatory for the validation of OBST/GYN diploma. Second, the final exam only evaluates the theoretical skills. Finally, the proposed training courses may not include vacations dedicated to T1US. Thus, an improved track for training Tunisian Obst/GYN residents for T1US is precisely to combine the theoretical and practical learning.

In the literature, the various training programs offered by fetal medicine companies combine both quality control and training (https://fetalmedicine.org/the-11-13-weeks-scan) (https://www. cfef.org). In our work, and considering that Obst/GYN trainees are familiar with the use of ultrasound, we used a training program approaching the accreditation program offered by the french college of fetal echography (CFEF). Thus, each participant received customized remarks detailing his major errors and the possible ways to avoid them. We certainly noticed a

positive impact of this individual assessment, but we need to discuss the following points:

First, the raised accreditation programs are sanctionnels. Thus, to obtain the authorization (perinatal network number), a sonographer must necessarily follow an accreditation program and validate the quality of his images. In our study, the proposed training program had no sanctioning goal. Unfortunately, this is probably one of the reasons that led us to struggle to close the work. One solution to this lack of motivation along the way would be to reward the participants by obtaining a diploma or other bonuses to their curriculum vitae.
Second, all raised accreditation systems are aimed at graduate's sonographers and not at trainees. This justifies the fact that such programs are based on self-learning, self-assessment and self progress of each sonographer. Certainly self-criticism has been good for our participants and this is also a principle to establish in our daily practice. But comparing medians obtained, had not brought to light any significant difference. This highlights the shortcomings of such a program, which does not include practical sessions (hands-on workshop on Machine) essential for young trainees. Thus, we propose to add practical sessions to this project, during which an experienced sonographer will closely guide participants. The participant may, in the presence of the experts, using "ultrasound simulators", exercise to master the gestures required to obtain fetal images. Currently, we see the widespread use of simulators of all kinds for teaching practice of obstetrics [14-16].

CONCLUSION

The training program evaluated in this study can guide the trainee in his daily self-evaluation. By highlighting common mistakes, this method can target the difficulties encountered by participants. However, a single session is insufficient to reach the goal of quality screening measures. This preliminary study can already open discussion on the subject of education and quality control of the first trimester ultrasound in our country.

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