The International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) Basic Training Course: Evaluation in China

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Abstract

Background

The aim of this study is to evaluate effectiveness of ISUOG (International Society of Ultrasound in Obstetrics and Gynecology) basic training course in Chinese sonographer, which has not been reported yet.

Methods

ISUOG basic training course includes 30 lectures and was held in 3 days in 2019 in Beijing, China. We included the questionnaires answered by the trainees both before and after the course in each day. There were 9 lectures presented in the first day, 12 in the second and 9 in the last. The theoretical tests were provided by ISUOG, including 22, 21 and 21 multiple-choice questions respectively in 3 days. Pre and post-training theoretical test scores were compared by Wilcoxon signed-rank test. The changes of the theoretical test scores and the rates of “very satisfied” and “very useful” from trainees of different professional titles were compared by Wilcoxon signed-rank test and Chi-square test.

Results

Questionnaires from 481 trainees who have experience of ultrasonic scan in Ob/Gyn and also had done the survey both before and after course were collected, with 274 in the first day, 94 in the second and 113 in the last. The differences of the correct-answer-number got from the before-test and after-test were with statistically significance(all \( P \)-values <0.05). The trainees who got better scores after the training were 219(79.9%), 73(77.7%) and 82(72.6%) in each day, and the changes of scores were without significant difference between doctors of different titles( all \( P \)-values >0.05). After every day’s training, the rates as “very satisfied” evaluated by trainees were 81.4%, 87.2% and 91.1% respectively, and the rates as “very useful” were 80.3%, 88.3% and 91.2%. The rate of “very useful” evaluated by trainees of primary title was higher than that of high title, with \( P \)-values of 0.01.

Conclusion

Our results indicated that ISUOG basic training course in China got good feedback and could assist Chinese sonographers in some degree.

Background

Ultrasonography is considered safe but highly operator dependent, and its certification of personnel and compliance with protocols are important\(^1\)\(^-\)\(^2\). Ultrasound is performed and interpreted by a wide range of healthcare providers in the specialty of obstetrics and gynecology (Ob/Gyn), which still lacks standardized training\(^3\)\(^-\)\(^4\). The International Society of Ultrasound in Obstetrics and Gynecology (ISUOG) is the leading international society of professionals in ultrasound for Ob/Gyn, which encourages best practice, teaching and research in the field of imaging in women’s healthcare\(^5\)\(^-\)\(^6\). ISUOG published lots of practice guidelines and consensus statement in ultrasound for Ob/Gyn\(^7\)\(^-\)\(^11\). ISUOG’s training are now well established to allow scientific validation of these educational initiatives and determine their effectiveness around the world\(^4\)\(^-\)\(^6\). However, the validation of ISUOG basic training courses in China has not been reported yet.

ISUOG China Task has conducted its work from the Department of Ultrasound in Beijing Obstetrics and Gynecology Hospital, Capital Medical University, Beijing, China since 2018. The first series of ISUOG basic training course, including 30 lectures in Chinese version, was conducted within 3 days in Beijing, China in 2019. The aim of the study was to assess the effect of ISUOG basic training course in Chinese version based on the trainees’ feedback.

Methods
1) Basic training

This series of ISUOG basic training course took place in three days in Beijing, China in 2019. The numbers of the lectures presented were 9 in 13th June, 12 in 20th September and 9 in 21st September (lecture topics are listed in the Additonal file 1: Table S1). All the lectures were related to the ultrasound in Ob/Gyn, including assessing normal and abnormal findings in singleton & twin pregnancies, assessing the placenta & amniotic fluid, basics of a gynecological ultrasound, distinguishing between normal and abnormal appearances of the fetal anatomy, examining the ovaries & adnexae, principles of Doppler ultrasound, etc. Each lecture took about 30 to 40 minutes. The training of the first day took place the day before ISUOG China Symposium in a conference center which could hold about 700 participants. The training of the last two days started in another conference center, which could hold about 400 participants. The courseware was from ISUOG, translated into Chinese and presented by lecturers who are chief physicians from tertiary hospitals in China and the members of the Expert Committee of ISUOG China Task Force. The training was free for all the participants and held in Beijing.

2) Participants

We included the trainees who have experience of ultrasonic scan in Ob/Gyn and also had answered the questionnaires both before and after course in 3 days respectively. All the participants, who were provided the note of informed consent presented in the front of the questionnaires, answered the e-questionnaires using cellphone or other electronic instruments. Besides, we noticed them both the advantages and disadvantages of attending the study before and at the beginning of the test to make sure all the participants could make their own decision whether joining the study or not. All participants’ cellphone numbers were used as their unique identification codes.

3) Questionnaire

The questionnaire was answered before and after the course in each day and the theoretical test questionnaire was provided by ISUOG, including 22, 21 and 21 multiple-choice questions in each day. All the questions only have one correct answer each. The content of these questions involved basic theoretical knowledge in Ob/Gyn ultrasound, including anatomy, biometry, and pathology, as well as the techniques for performing ultrasound. Meanwhile, information and questions for satisfaction evaluation were also collected.

The pre-test questionnaire contained both theoretical test questions and personal information. The post-test questionnaire contained theoretical test questions and two questions for satisfaction evaluation. All these were presented in Chinese and the theoretical test questionnaires were translated and confirmed by the members of Youth Committee of ISUOG China Task Force.

4) Statistical analysis

Data cleaning and statistical analysis were performed by SAS and SPSS software. The differences for numerical and categorical variables were calculated using Wilcoxon signed-rank test or Chi-square test where appropriate. \( P \)-value less than 0.05 was considered statistically significant.

Results

1) Background characteristics of trainees

Questionnaires from 481 trainees who had done the survey both before and after course as well as had experience of ultrasonic scan in Ob/Gyn were collected, with 274 in the first day, 94 in the second and 113 in the last. The flow chart of the selection of the questionnaires were presented in Additional file 2: Figure S1. Most trainees taking part in the ISUOG basic training course were female. The female trainees who both answered the pre and post-test were 249 (90.9%), 88(93.6%), 105(92.9%) for each day. Table 1 depicts the background characteristics of the trainees.
2) Theoretical test scores

The medians of the correct-answer-number got from the per-training were 14(63.6%), 13(61.9%) and 14(66.7%) respectively and there was no statistically significant difference in trainees of different titles (all P-values >0.05). After the training, the medians were 17(77.3%), 15(71.4%) and 16(76.2%) respectively. The difference of the scores between before and after course was with statistically significance (all P-values <0.05, present in Table 2). The changes of the scores were calculated by using the correct-answer-number from post-tests minus those from pre-tests, and defined as three categories, improved, unchanged and worse. The trainees who got better scores after the training each day were 219(79.9%), 73(77.7%) and 82(72.6%) in three days respectively, and the change of scores were without significant difference within doctors of different titles (see Table 3).

3) Evaluation on satisfaction

The numbers of the trainees who evaluated the training as “very useful” were 220(80.3%) in the first day, 83(88.3%) in second and 103(91.2%) in the last, while the numbers of the trainees who chose “very satisfied” were 223(81.4%), 82(87.2%) and 103(91.1%) respectively. The rates of “very satisfied” were without significant differences between doctors of different titles (see Figure 1) while the rate of “very useful” from trainees of primary title was higher than that from high titles (see Figure 2).

Discussion

1) Main findings

In this study, we assessed the effect of ISUOG basic training course in Chinese version based on the trainees’ feedback. As the difference of correct-answer-number between before and after course was with statistical significance (all \( P \)-values <0.05), our results indicated that ISUOG basic training course in Chinese version could improve the Chinese sonographers’ theoretical knowledge in some degree. Besides, the numbers of the trainees who evaluated the training as “very useful” were 220(80.3%) in the fist day, 83(88.3%) in second and 103(91.2%) in the last, while the trainees who chose ‘very satisfied’ were 223(81.4%), 82(87.2%) and 103(91.1%) respectively. This indicated the basic training course was highly accepted by the trainees.

However, changes of scores were without significant difference within doctors of different titles (all \( P \)-values >0.05) which may be related to the limited sample size. After the first two day’s training, the primary trainees seemed to have more improvement than the middle and high levels, but in the last day’s training was lower. The rate of trainees of primary title who evaluated the training as “very useful” was higher than that of high title, which indicated the basic training course maybe more useful to the young and middle-aged sonographers.

2) Comparison with previous studies

Hillerup et al\(^6\) examined the validity and reliability of the ISUOG basic training test by assessing 92 participants, including 32 medical students, 45 residents, 12 consultants and 3 fetal medicine specialists. Their study showed clinical experience did not predict theoretical test scores. Our study also showed that there was no statistically significant difference of theoretical test scores in trainees of different titles before the training as well as the changes of the scores (all \( P \)-values >0.05). As far as we know, most sonographers in Chinese mainland could do ultrasound scan by themselves only after obtaining their medical qualification. They are doctors, not just technicians. Some part of sonographers preform Ob/Gyn ultrasound used to be a obstetrician or a gynecologist, especially in the elders or with high title. Vrachnis et al\(^4\) test twenty-eight participants to evaluate effectiveness of ISUOG Outreach Teaching and Training Program delivered in Muscat, Oman and showed that it improved the theoretical knowledge and practical skills of local health personnel. Our results also showed ISUOG basic training course could improve the theoretical knowledge of Chinese trainees.
3) Quality control

A quality control team was set up during the project implementation. The questionnaire was designed under discussion with professionals related to epidemiology, statistics and ultrasound. Besides, we selected 7 postgraduate to do the pretest to ensure the feasibility of the content of the questionnaires. Also, paper answer sheets were prepared in case of network problems. In addition, we changed the orders of the questions in post-training tests as well as limited the test time to reduce the response bias. Furthermore, we informed all the participants both the advantages and disadvantages of participating in the study (passing the test could get the continuing education credit score as well as training certificate) and the disadvantages (time taken for questionnaire) to obtain the understanding and cooperation of the participants. Finally, in order to get an honest course assessment, we set the options into five levels, for example, for satisfaction assessment, they are “very satisfied”, “satisfied”, “general”, “not satisfied” and “very dissatisfied”. Statistically, only “very satisfied” would be included as “satisfied for the course” for our final results.

4) Limitations of the study

This was a cross-sectional study based on real world data and we did not select the participants randomly, which could affect the data representation. Besides, although we changed the orders of the questions for the tests, there was still response bias. Furthermore, we did not apply operational test to evaluate their practical skills because of the limitation of lacking financial and operational feasibility. In one published consensus report, the use of ultrasound simulation in residency training should be encouraged\textsuperscript{12}. Further research is needed to evaluate the trainee's practical skills.

Conclusion

In conclusion, this study indicated ISUOG basic training course could assist the Chinese sonographers in some degree, especially the theoretical skill of the trainees. The basic training of this series which includes 30 lectures in Chinese version got high satisfaction. However, operational test to evaluate trainees’ practical skills is considered badly needed for further assessment of ISUOG basic training.

Abbreviations

ISUOG: International Society of Ultrasound in Obstetrics and Gynecology

Ob/Gyn: Obstetrics and Gynecology

Declarations

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Ethics approval and consent to participate

This study was performed with ethics approval (Ethics Committee of Beijing Obstetrics and Gynecology Hospital, Capital Medical University). All the participants were provided the note of informed consent presented in the front of the e-questionnaires. Besides, we noticed them both the advantages and disadvantages of attending the study before and at the beginning of the test to make sure all the participants could make their own decision whether joining the study or not.

Consent for publication
Not Applicable.

**Competing interests**

The authors declare that they have no competing interests.

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**Authors’ contributions**

JW conceptualized the study, developed the proposal, conducted the statistical analyses, wrote the report, and participated in the overall supervision of the project and revision of the report. LL coordinated the project, and participated in the overall supervision of the project and revision of the report, assisted in writing and editing the final report. YX coordinated the project and assisted in writing and editing the final report. LW conceptualized the project, developed the proposal, wrote the report, and participated in the overall supervision of the project and revision of the report.

All authors read and approved the final manuscript.

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### Tables

#### Table 1 Background characteristics of the trainees

| Variables          | 1	extsuperscript{st} day | 2	extsuperscript{nd} day | 3	extsuperscript{rd} day |
|--------------------|---------------------------|---------------------------|---------------------------|
| Trainee            | 274                       | 94                        | 113                       |
| Gender(female)     | 249 (90.9)                | 88 (93.6)                 | 105 (92.9)                |
| Trainee age*       | 42 (35-48)                | 39 (34-45)                | 39 (34-47)                |
| Level(Title)#      |                           |                           |                           |
| Primary            | 36 (13.1)                 | 16 (17.0)                 | 19 (16.8)                 |
| Middle             | 103 (37.6)                | 45 (47.9)                 | 49 (43.4)                 |
| High               | 135 (49.3)                | 33 (35.1)                 | 45 (39.8)                 |
| Working years*     | 11 (7-20)                 | 10 (5-17)                 | 11 (5-18)                 |

Note: Data are given as median (inter-quartile range)* or n (%). #Level(Title) in this study was grouped by the professional titles of doctor, while “primary” indicated the resident doctor and the graduate student, “middle” indicated the doctor-in-charge, “high” indicated the associate senior doctor and chief physician.

#### Table 2 Theoretical test scores in pre and post-test

| Date   | Trainee | Number of questions | Pre-test score* | Post-test score* | Z       | P-value |
|--------|---------|---------------------|-----------------|-----------------|---------|---------|
| 6\13   | 274     | 22                  | 14 (12,15)      | 17 (15,18)      | -11.599 | <0.001  |
| 9\20   | 94      | 21                  | 13 (11,14)      | 15 (14,16)      | -6.853  | <0.001  |
| 9\21   | 113     | 21                  | 14 (12,15)      | 16 (14,17)      | -7.257  | <0.001  |

Note: *Data are given as median (inter-quartile range)

#### Table 3 The changes of theoretical test scores in trainees of different levels
|       | Worse | Unchanged | Improved | Worse | Unchanged | Improved | Worse | Unchanged | Improved |
|-------|-------|-----------|----------|-------|-----------|----------|-------|-----------|----------|
| Primary | 2     | 3         | 31       | 1     | 2         | 13       | 2     | 4         | 13       |
|        | (5.6) | (8.3)     | (86.1)   | 6.3   | 12.5      | 81.3     | 10.5  | 21.1      | 68.4     |
| Middle | 17    | 4         | 82       | 7     | 4         | 34       | 5     | 8         | 36       |
|        | (16.5)| (3.9)     | (79.6)   | 15.6  | 8.9       | 75.6     | 10.2  | 16.3      | (73.5)   |
| High   | 20    | 9         | 106      | 4     | 3         | 26       | 8     | 4         | 33       |
|        | (14.8)| (6.7)     | (78.5)   | 12.1  | 9.1       | 78.1     | (17.8)| (8.9)     | (73.3)   |
| Z     | 1.277 |           |          |       |           |          | 0.3665|           | 0.144    |
| P-value | 0.528 |           |          |       |           |          | 0.833 |           | 0.930    |

Note: Data are given as n (%)