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This is a copy of the final published version of the article that appeared in Health, 5 (2). pp. 175-178, 2013. It is available online at:

<http://dx.doi.org/10.4236/health.2013.52024>

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# Teaching reproductive endocrinology in Iran: Pilot assessment of hospital-based clinical modules for medical students at Tehran University of Medical Sciences\*

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Received 12 December 2012; revised 14 January 2013; accepted 20 January 2013

## ABSTRACT

This pilot study evaluated effectiveness and acceptance of a new hospital-based reproductive endocrinology curriculum among Iranian medical students. A voluntary, anonymous questionnaire was used to compare two teaching methods as applied to junior medical students at Tehran University of Medical Sciences. Students were randomly assigned to one of two clinical teaching settings; no student experienced both modules. Coursework for the pilot (experimental) group ( $n = 19$ ) utilized a teaching approach comprising lectures, genetics laboratory, pelvic ultrasound, small group sessions, and opportunities to observe advanced reproductive technologies such as in vitro fertilization, ICSI, and embryo transfer. A control group ( $n = 34$ ) received reproductive endocrinology instruction by the 'traditional curriculum', consisting mainly of lectures. Students were sampled at baseline and again at the conclusion of their reproductive endocrinology session. Pre- and post-test data were analyzed for both groups; post-test differences between groups were also compared. No significant differences in mean age or gender mix were identified between the two study groups. Overall, the questionnaire did not identify any significant inter-group differences for any parameter investigated. Although student acceptance rate appeared similar for both educational modules, the ratio of students having a "favorable regard" for

reproductive medicine declined only among students randomized to the control group (41.2% vs. 32.3%). This report offers the first data on teaching reproductive endocrinology to medical students in Iran. Both traditional and innovative approaches to teaching reproductive endocrinology were well-accepted by students, although negative post-test responses were more common among students in the control group. While periodic quality assessments for existing clinical teaching methods are necessary, introduction of alternative teaching approaches is also important. Additional studies are planned to evaluate the impact this initiative may have on results on standardized tests measuring reproductive endocrinology knowledge, as well as election of further specialization in training.

**Keywords:** Medical Students; Clinical Education; Reproductive Endocrinology; Iran

## 1. INTRODUCTION

To date, there has been little published on how best to advance the state of teaching in Iran with respect to medical students and how they acquire basic knowledge in reproductive endocrinology. In common with medical schools elsewhere, our programs embrace high-intensity learning where considerable material requires mastery in a relatively short time. To keep pace with changing times, the medical school curriculum requires frequent reappraisal considering the limited academic calendar available to cover this information [1-3]. At present, learning opportunities specifically dedicated to reproductive en-

\*None of the authors report any conflict of interest.

doocrinology and infertility are still evolving in Iran. Here, reproductive medicine lectures are often placed within the general obstetrics and gynecology syllabus with no practical application of material specific to the advanced reproductive technologies being routinely provided. Using a traditional teaching methodology mainly composed of didactic classroom lectures is one way to accomplish this, although bringing medical students into the clinical setting should augment this learning experience. Recent research in Iran has shown how innovative teaching approaches in related disciplines can positively impact learning at the residency training level [4], as well as peer/community settings [5]. Yet, the belief among medical school leadership that students would find early clinical exposure to reproductive medicine unhelpful may explain why such an approach may not yet have found widespread application in Iran. Given the paucity of published data on this topic, the current pilot investigation was launched to measure acceptance and effectiveness of a new hospital-based reproductive endocrinology curriculum among Iranian medical students.

## 2. METHODS

Following affirmative review from the department chair for medical student educational affairs at Tehran University of Medical Sciences, approval was granted for this voluntary, anonymous questionnaire cohort study in association with a new teaching initiative which also received independent approval.

### 2.1. Structure of Study

This pilot assessment was designed as part of a quality audit for the new clinical teaching module for reproductive endocrinology, offered during an ambulatory clinic rotation for infertility and endocrinology disorders during a mandatory gynecology clerkship. Students were randomly allocated to one of two groups for reproductive endocrinology instruction. Students in the experimental module ( $n = 19$ ) were assigned to Vali-e-Asr Hospital, an academic teaching affiliate of Tehran University of Medical Sciences. Students in the control group ( $n = 34$ ) received a series of lectures and traditional exposure to infertility clinics. In both study arms, the duration of each module was one week.

### 2.2. Study Sample and Allocation

All participants were in their fifth year of medical school, with appraisals occurring during the 2010-2011 academic term. Students in the experimental group participated in a reproductive genetics laboratory, pelvic ultrasonography clinic, and observed procedures carried out in the IVF laboratory. The techniques of controlled ovulation induction, *in vitro* fertilization and embryo

transfer were described (and subsequently demonstrated) to the students in a clinical context with the assistance of patients who had specifically consented to participate in medical student teaching. The module also presented information concerning reproductive medical ethics emphasizing the role of pre-treatment patient counseling. Rather than structured lectures in large classrooms, informal small group reproductive medicine discussion sessions were offered each day. A laboratory component offered opportunities to observe intracytoplasmic sperm injection, assisted embryo hatching, human embryo cryopreservation/thaw, and extended blastocyst culture. To show how these various elements integrate practically with clinical practice, medical students observed faculty during patient consultations in the office for new and follow-up appointments. Students in the control group received a series of standard lectures covering the same material. Although audio-visual teaching aids were occasionally used in the control module, instruction occurred mainly in the classroom during the one week session.

### 2.3. Assessment Methods and Statistical Analysis

Student data were obtained from an anonymous seven-item questionnaire based on a previously published methodology [6], and refined by a multidisciplinary educational team here. The questionnaire was administered to all participants at study entry and again at the conclusion of their reproductive endocrinology module. Likert-scaled questions were used to measure student acceptance of their assigned module, student attitudes toward this field, and the level of familiarity related to the practice of reproductive medicine in general. Students were also queried about the module's likely impact on their own selected area of professional practice in the future. Fisher's exact test was used to compare baseline vs. post-module questionnaire data, as well as post-module results between groups. Matched pair analysis by McNemar's test was also performed. A  $p < 0.05$  was considered statistically significant.

## 3. RESULTS

Completed pre- and post-module questionnaires were returned from all 53 medical students enrolled in this study (19 in the experimental group plus 34 in the control group). There were no significant differences in mean age between the two study groups; the gender mix was similar across the two groups as well. Overall, the questionnaire did not identify any significant differences between groups in the seven parameters investigated. More students in both groups responded affirmatively that reproductive endocrinology was "important in the university medical curriculum" at the conclusion of their

module, although this score was highest among students who completed the experimental session.

Additionally, the proportion of students having a “favorable regard” for reproductive medicine declined among students randomized to the control group (41.2% vs. 32.3%). This question provided different data for students undergoing reproductive endocrinology instruction in the experimental module, where a sharp increase in “favorable regard”, fewer undecided responses, and fewer students answering negatively about their perception of this area of study. When asked about exposure to technical procedures in ART, post-module questionnaire data from students in the control group reveal a higher negative response rate compared to student post-module responses in the experimental group (38.2% vs. 15.8%). The findings identified from the aggregate, tabulated data were similar to matched pair analysis using McNemar’s test. A summary of all student responses is provided in **Tables 1** and **2**.

#### 4. DISCUSSION

Students receive an uneven exposure to reproductive endocrinology during medical school in Iran, and this field remains among the most rapidly changing areas for which a standard national curriculum has not yet been developed. Given the frequency of women’s clinic encounters relating to pregnancy or establishing conception [7], medical students require a familiarity with basic reproductive endocrinology even if this is not their chosen area of professional practice. While a decade’s experience has supported exposure to clinical reproductive endocrinology in other medical education settings [8], thus far in Iran a traditional classroom-based format of reproductive biology lectures has prevailed as the preferred

teaching method. This began to change in 2010, with the launch of a pilot reproductive biology practicum for students at Tehran University of Medical Sciences. The new educational package was designed to demonstrate application of the advanced reproductive technologies in a “real-world” clinical environment. New advances in fertility medicine were reinforced by small group sessions covering the importance of medical ethics, epidemiology, biostatistics, and experimental design, as described by others [9].

Our investigation reports on student acceptance of this new module—believed to be the first of its kind in Iran—which provided early exposure to the full range of assisted fertility therapy. While these pilot data show a comparable acceptance for this educational initiative compared to the default (traditional) curriculum, the frequency of negative responses was higher among medical students in the control group. For students in the experimental group, their post-module questionnaire responses were characterized by higher positive scores, reduced ambiguity about reproductive medicine, and reduced negative responses. These findings represent previously unreported observations concerning medical education in Iran.

It must be acknowledged that this investigation was unable to establish a statistically significant difference in the seven assessment parameters between study groups. This represents an important limitation of the study, although further research is planned to include larger samples. In summary, this pilot study offers evidence for a consistent level of student acceptance for a new clinical module for reproductive endocrinology among Iranian medical students. Given the myriad vital subjects (other than reproductive medicine) which form a comprehen-

**Table 1.** Comparison of self-reported views on aspects of reproductive endocrinology among medical students in Iran before and after completing a pilot module, as measured by questionnaire in the 2010-2011 academic term.

Parameter		Experimental group (n = 19)			Control group (n = 34)		Post-test group difference	
		Pre-test	Post-test	<i>p</i> <sup>1</sup>	Pre-test	Post-test	<i>p</i> <sup>1</sup>	
Is reproductive endocrinology important in the university medical curriculum?	Yes	7(36.8)	10(52.6)		11(32.4)	15(44.1)		
	Unsure	7(36.8)	6(31.6)	0.07	12(35.3)	9(26.5)	0.62	
	No	5(26.3)	3(15.8)		11(32.3)	10(29.7)		
Do you have a favorable regard for reproductive medicine clinical practice?	Yes	7(36.8)	12(63.2)		14(41.2)	11(32.3)		
	Unsure	7(36.8)	3(15.8)	0.23	12(35.3)	10(29.4)	0.47	
	No	5(26.3)	4(21.5)		8(23)	13(38.2)		
Have you had adequate opportunities to develop clinical skills in reproductive endocrinology?	Yes	6(31.6)	10(52.6)		15(44.1)	17(50)		
	Unsure	9(47.4)	5(26.3)	0.38	12(35.3)	11(32.4)	0.90	
	No	4(21.5)	4(21.5)		7(20.6)	6(17.6)		

Notes: all data presented as n (%). There were no statistically significant differences in age or gender between experimental vs. control groups. <sup>1</sup>by Fisher’s exact test (matched pair analysis confirmed by McNemar’s test).

**Table 2.** Comparison of self-reported views on exposure to reproductive endocrinology and potential career choice among medical students in Iran before and after completing a pilot module, as measured by questionnaire in the 2010-2011 academic term.

Parameter		Experimental group (n = 19)			Control group (n = 34)			Post-test group difference
		Pre-test	Post-test	<i>p</i> <sup>1</sup>	Pre-test	Post-test	<i>p</i> <sup>1</sup>	
Have you had adequate opportunities to develop clinical skills in pelvic ultrasound and reproductive genetics?	Yes	5(26.3)	11(57.9)	0.15	12(35.3)	13(38.2)	0.91	0.49
	Unsure	8(42.1)	5(26.3)		12(35.3)	13(38.2)		
	No	6(31.6)	3(15.8)		10(29.4)	8(23.5)		
Have you had adequate exposure to technical procedures in ART?	Yes	5(26.3)	7(36.8)	0.59	13(38.2)	11(32.4)	0.43	0.22
	Unsure	8(42.1)	9(47.4)		11(32.4)	10(29.4)		
	No	6(31.6)	3(15.8)		10(29.4)	13(38.2)		
Have you had sufficient time to integrate your understanding of reproductive endocrinology into practice?	Yes	8(42.1)	9(47.4)	0.84	11(32.4)	12(35.3)	0.82	0.76
	Unsure	6(31.6)	4(21.1)		7(20.6)	9(26.5)		
	No	5(26.3)	6(31.6)		16(47.0)	13(38.2)		
Would you consider reproductive endocrinology as your chosen professional career in medicine?	Yes	5(26.3)	9(47.4)	0.41	13(38.3)	10(29.4)	0.82	0.48
	Unsure	7(36.8)	6(31.6)		12(35.3)	14(41.2)		
	No	7(36.8)	4(21.1)		9(26.4)	10(29.4)		

Notes: all data presented as n (%). There were no statistically significant differences in age or gender between experimental vs. control groups. <sup>1</sup>by Fisher's exact test (matched pair analysis confirmed by McNemar's test).

sive medical education, further research is needed to establish "how much time is enough" with respect to each constituent part.

## 5. AUTHORS' CONTRIBUTIONS

BHR was principal investigator, MN and MG carried out the on-site investigation and collected data, SAS assisted with background research and study design, GSC was chief statistician, ESS supervised the study and developed the manuscript.

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