



The Gynecology and Obstetrics Fundamentals of Residency Internship Training (GO FOR IT) Trial

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Abstract

Background: Boot Camps, condensed format courses that emphasize procedural skills and medical knowledge, are a common, but unproven approach to helping prepare fourth-year medical students (M4) for residency.

Methods: This multicenter quasi-experimental static group educational study involved M4 students from 8 ACGME accredited residency programs. Participants were assigned to either the intervention (GO FOR IT) or control groups based on availability to attend a training course in April 2013. Course activities included lectures and simulation-based procedural skills practice. End-of-study competency assessments were conducted June 15–July 2, 2013. The primary study outcome was the composite score of 13 assessments, including objective-structured clinical exams, technical skills performance checklists, and knowledge assessments.

Results: Thirty-two of 42 (76%) possible students enrolled in the study, of which 11 were assigned to the GO FOR IT group and 21 to the control group. The median composite end-of-study assessment score was 73% in the GO FOR IT group as compared to 41% in the control group ($P < .001$).

Conclusions: Participation in an intensive 2-week postresidency-match M4 elective resulted in significantly greater scores in the assessment of clinical and procedural skills and medical knowledge as compared to the usual activities students pursue at the conclusion of medical school.

Although the science and practice of medicine evolves daily, the basic model of the 4-year medical school curriculum in the United States has seen little change since the Flexner Report.¹ The transition from medical school to residency has become an increasingly difficult one for today's medical graduates. Of primary concern is the fourth year of medical school (M4), which has been described as a year lacking

direction and missing an opportunity to better train students to transition into their internship year.² Numerous general surgery residency programs have addressed the perceived laxity of the M4 year with a "boot camp" for senior M4 students entering a surgical specialty.³⁻⁶ Participants have described these camps as the most beneficial portion of medical school in preparation for their internship year, reporting an increase in their

Table 1

Medical knowledge learning outcomes and associated teaching methods.

Learning Topics	Teaching Method(s)*
Gynecology	
Evaluation and management of abnormal first-trimester pregnancy, including ectopic	DL
Pathophysiology, evaluation and management of reproductive tract malignancies	DL
Evaluation of acute pelvic and lower abdominal pain	CBL
Pathophysiology and evaluation of abnormal uterine bleeding	DL, CBT
Indications and alternatives for hysterectomy	W
Obstetrics	
Physiologic adaptations of pregnancy and the puerperium	CBL
Evaluation and management of third-trimester bleeding	CBL
Pathophysiology and management of preterm labor	CBL
Electronic fetal heart rate interpretation	CBT
Indication and interpretation of antenatal fetal testing	DL, CBT
Conduct of postpartum care, including breastfeeding and contraception	W
Pathophysiology and management of gestational hypertensive disorders	CBL
Management of diabetes mellitus during pregnancy	CBL
Management of common antepartum complications	CBL
Management of spontaneous abortion	CBL
Counseling for aneuploidy screening	CBL
Evaluation and management of postpartum hemorrhage	CBL
Pathophysiology and management of postpartum fever	CBT
Office practice	
Content and conduct of routine well-woman care	DL
Evaluation and management of urinary tract, vaginal, vulvar, and sexually transmitted infections	DL, CBT
Contraceptive methods, indications, contraindications, and complications	DL
Evaluation and screening of breast disease	W
Options and counseling for undesired pregnancy	W
Evaluation and management of the abnormal Pap smear	DL, CBT
*Key for teaching methods: DL = didactic lecture; CBT = computer-based training module; W = live webinar. All topics were presented in a 30-minute learning session. Self-directed CBTs were optional and of variable length.	

self-confidence about being a surgical intern, an enhanced self-perceived dexterity, surgical skills, and ability to safely manage patients.⁶⁻⁸

Limitations of these preliminary investigations are their narrow focus on skills sets necessary for a general surgery residency and their reliance on learner self-assessment as a primary outcome, which do not provide objective evidence to support whether such interventions truly impact the competency of M4 students preparing for an OB/GYN (Obstetrics and Gynecology) internship. The objective of this study was to determine the impact of participation in an intensive 10-day postresidency-match M4 elective, compared to usual activities, on clinical, procedural, and knowledge competencies assessed at the time of matriculation into an OB/GYN internship.

Methods

The Gynecology and Obstetrics Fundamentals of Residency Internship Training (GO FOR IT) Trial was a multicenter educational study involving 8 Accreditation Council for Graduate Medical Education (ACGME) OB/GYN residency programs in the southeastern United States.

Study conduct was separated into 5 sequential phases. Phase 1 (collaborative and curriculum), from October 2011 to September 2012, involved formation of the GO FOR IT trial collaborative and determination of the curricular content and assessments. All ACGME-accredited OB/GYN residency programs within a 300-mile radius of the primary study center (PSC) were identified and their program directors contacted to assess interest in joining the study collaborative. Of 23 possible programs, 8 joined the collaborative. This study was approved by the Institutional Review Board of Greenville Health System (IRB#Pro00014309), which served as the PSC and Data Coordination Center (DCC). Each site also obtained study protocol approval. All site principal investigators (PI) participated in mandatory web-based and in-person training on study procedures.

Twenty-four medical knowledge (Table 1) and 12 clinical/procedural learning outcomes (Table 2) were selected from the report of the Association of Professors of Gynecology and Obstetrics/Council on Resident Education for Obstetrics and Gynecology Joint Task Force on Milestone One.⁹ De novo assessments were designed for each of the 12 clinical/procedural learning outcomes. Site PIs developed a performance checklist and standardized simulation scenario (if needed). Each assessment tool was then submitted for review to 2 other site PIs to ensure content validity. A list

GO FOR IT TRIAL

of the learning outcomes, associated teaching/ learning tools, and assessments was compiled into a website for on-demand use.¹⁰

Phase 2 (recruitment and enrollment) began in October 2012 and involved site PIs presenting information about the study to M4 students during their residency interview. Enrollment commenced on Match Day 2013. Eligible subjects were those who participated in the 2013 National Residency Matching Program and matched into one of the collaborative centers. Additionally, subjects had to be available to relocate to the PSC/DCC from April 15–26, 2013. Participants who were unavailable or unwilling to complete the end-of-study competency assessments were excluded from the study. All M4 students who matched into one of the collaborative programs

were sent electronic and hard copy documents, which included a formal invitation to participate in the study, the study brochure, and consent form. All potential participants were then contacted by phone to complete the consent process.

Phase 3 (assignment) of the study consisted of a study group assignment contingency plan due to the uncertainty of student availability. Not enough students were available to relocate to accomplish the randomization scheme, so the contingency plan was activated resulting in a quasi-experimental static group design.¹¹⁻¹³ Educational research differs from clinical research in both design and nomenclature. Quasi-experimental studies are analogous to observational studies of clinical research.¹³ A PubMed search of “quasi-experimental design” reveals well over

Table 2
Technical learning outcomes and associated teaching and assessment methods.

Learning Outcomes	Teaching Method(s)*	Assessment Method*
Clinical/Procedural skill		
Comprehensive women’s health history	CBT	Standardized patient OSCE with 55-item performance checklist completed by proctor via direct observation
Breast and pelvic exam	TT, CBT	Standardized patient OSCE with 37-item performance checklist completed by proctor via direct observation
Two-handed knot-tying	TT	Bench model with visual inspection of completed knot by proctor
Intrapartum cervical assessment	TT	Soft cervical models within blinding chamber (5 items) with assessment of both dilation and effacement
Normal vaginal delivery	TT, SS	Simulation scenario using pelvic delivery model; proctor serves as standardized patient and completes 23-item procedural checklist immediately following completion of scenario
2nd-degree vaginal laceration repair	TT	Bench model with 12-item procedural checklist completed by proctor via direct observation
Intrauterine device insertion	TT, CBT	Bench model with 12-item procedural checklist completed by proctor via direct observation
Endometrial biopsy	TT, CBT	Bench model with 12-item procedural checklist completed by proctor via direct observation
Vaginal wet-prep interpretation	CBT	6-item computer-based assessment
Technical knowledge		
Surgical instrument name and principal use	HO, CBT	30-item computer-based assessment with high-resolution photographs
Surgical suture, blade, and needle types	HO, CBT	18-item assessment with sutures, blades, and needles identified by direct visual inspection
*Key for teaching and assessment methods: CBT = computer-based training module; TT = task trainer; SS = simulation scenario; HO = hands-on use; OSCE = Objective Structured Clinical Exam. Individual skills learning sessions were 30 minutes in length and offered varying frequencies dependent on learner needs. All skills learning sessions totaled 50 hours. Self-directed CBTs were optional and of variable length.		

4500 peer-reviewed publications utilizing this study method.¹⁴

Phase 4 (intervention) commenced April 6, 2013. All subjects completed a baseline demographics questionnaire and a self-assessment of perceived competency in knowledge and procedural skills. Subjects assigned to the intervention group relocated to the PSC/DCC from April 15–26, 2013. The first day of curriculum exposure for the GO FOR IT group included a half-day baseline skills assessment followed by an individual debrief session. Each of the subsequent 8 days followed a template of three 0.5 hour didactic sessions and then 6 hours of simulation-based procedural skills practice. A novel technique for longitudinal simulation-based training developed by one of the investigators (B.C.B.), the Procedural Repetition Involving Montessori-type Experience and Rehearsal (PRIMER) Method (Fig. 1), was utilized. The last day of the GO FOR IT course included an

individual debrief session followed by a final skills assessment. During the intervention phase, there was no contact with the subjects in the control group, except to schedule activities for Phase 5.

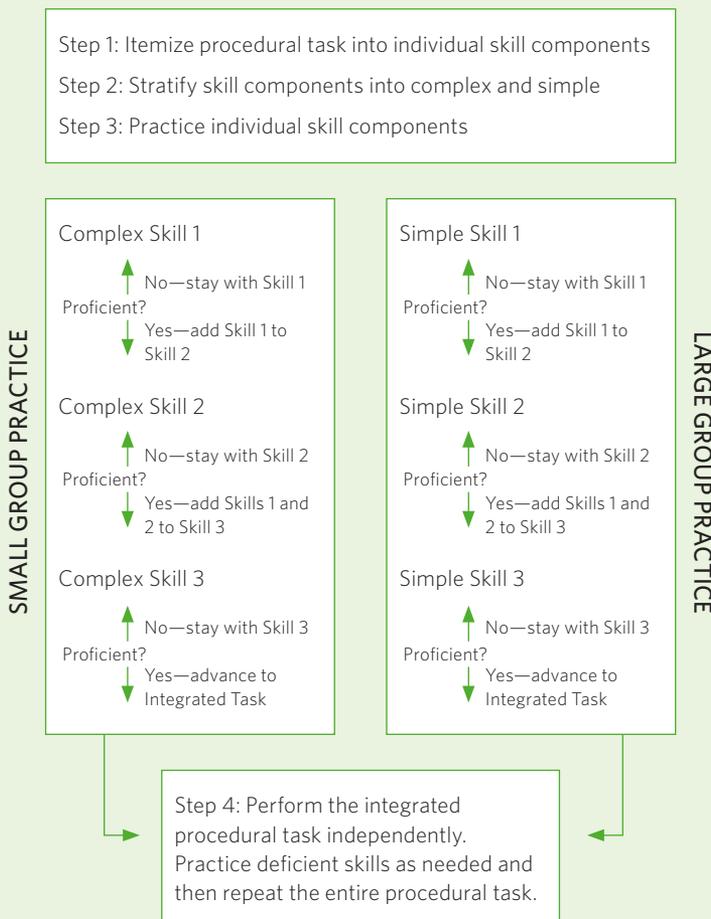
Phase 5 (assessment) spanned June 15–July 2, 2013. All subjects were required to schedule and complete the National Board of Medical Examiners (NBME) OB/GYN Subject Exam at a commercial testing center (Prometric, www.prometric.com). All subjects were also required to report to 1 of 5 collaborative centers to participate in the standardized end-of-study assessments. This assessment included Objective Structured Clinical Exam (OSCE) stations, technical skills procedural checklist stations, and technical knowledge stations (Table 2). The assessments were grouped into 7 stations, each 15 minutes in length and video recorded.

The primary outcome for the study was the median composite score of all end-of-study assessments (excluding the NBME subject exam). Secondary outcomes included the individual OSCE and procedural checklist scores and the NBME subject exam percentile score. All OSCE procedural checklist stations were scored immediately at the testing center by the site PI. All other stations were scored post hoc at the DCC either by video review or grading of the answer form. All scoring forms were returned to the DCC and the data entered into Research Electronic Data Capture¹⁵ and then exported to SPSS (IBM Inc., Armonk, NY) for analysis.

The sample size calculation for this study was based on a traditional two-group superiority testing approach. The primary outcome was estimated to be 80% in the GO FOR IT group and 64% in the control group with a standard deviation of 15%. The alpha was set at .05 with a desired power of 80%. Using a two-tailed test, the resultant sample size calculation was 15 subjects per group. The statistical plan for secondary outcomes utilized a similar testing approach with the alpha set at .05. The statistical analysis was blinded and based on an intention-to-treat principle. Due to group size, statistical testing required a non-parametric approach. Results are reported as median percentages with the 25th and 75th percentiles. The Wilcoxon rank sum test and Fisher's exact test were used to analyze continuous and categorical variables, respectively. A *P* value < .05 was considered statistically significant.

Figure 1

Procedural repetition involving Montessori-type experience rehearsal (PRIMER).



Results

On March 15, 2013, 42 M4 students matched into the 8 study collaborative residency programs. Eleven students met all study criteria and were placed into the GO FOR IT group; 21 students met all criteria except the ability to relocate to the PSC and were thus placed into the control group. Ten students declined to participate (Fig. 2). Ultimately, 32/42 (76%) of potential students participated in the trial. There were 4 instances of protocol deviation following group assignment. Three subjects in the control group failed to complete the baseline questionnaire and 1 subject in the control group chose not to complete the NBME OB/GYN Subject Exam.

There were no differences between the GO FOR IT group and control group in regard to age, United States Medical Licensing Examination results, or time spent in OB/GYN clinical activities in the M3 year, but the control group did report more weeks spent in OB/GYN clinical activities in the M4 year (Table 3). The control group had a higher median self-rated competency score in two-handed knot-tying and normal vaginal delivery, as compared to the GO FOR IT group, but all other self-rated competency scores were similar between groups (Table 3).

The median composite end-of-study assessment score was 73% (68%, 77%) in the GO FOR IT group as compared to 41% (35%, 45%) in the control group ($P < .001$). Similarly, the GO FOR IT group scored significantly higher than the control group on 10 of 13 end-of study competency assessments (Table 4).

Discussion

In July 2014, the ACGME implemented Milestones for the Obstetrics and Gynecology specialty, which defined an explicit set of competency-based developmental outcomes that can be demonstrated progressively by residents and fellows from the beginning of their education through graduation to the unsupervised practice of their specialties.¹⁶ This study provides objective evidence regarding the extent to which a short, intensive course of knowledge and skills training prior to medical school graduation can impact clinical competency at the very beginning of the Milestones continuum.

There are several key implications of this study. First, while the curriculum addressed medical knowledge and procedural skills competencies, the findings suggest that the curricular format had the greatest impact on procedural skills. This finding may be a result of participants having less procedural competency at baseline as compared to medical knowledge and thus more to gain through the procedural training. Alternatively, either the scope or approach used in addressing the knowledge competencies in this curriculum was not effective. Second, it is important to note that the effect on the procedural competency was sustained over 8–10 weeks between training and final testing. This finding suggests offering such training at the end of the M4 year is an alternative to delaying such training until residency. Finally, our study demonstrates how reliance on student self-perceived competency can be misleading, and a primary limitation of prior studies.

Several characteristics of this study enhance the strength of its findings. First, the multicenter design ensured a heterogeneous study population. Participants came from 18 medical schools, had a variety of clinical experiences in OB/GYN, and a breadth of academic performance on stan-

Figure 2

Flow diagram of study participants. Participant recruitment and group assignment outcomes.

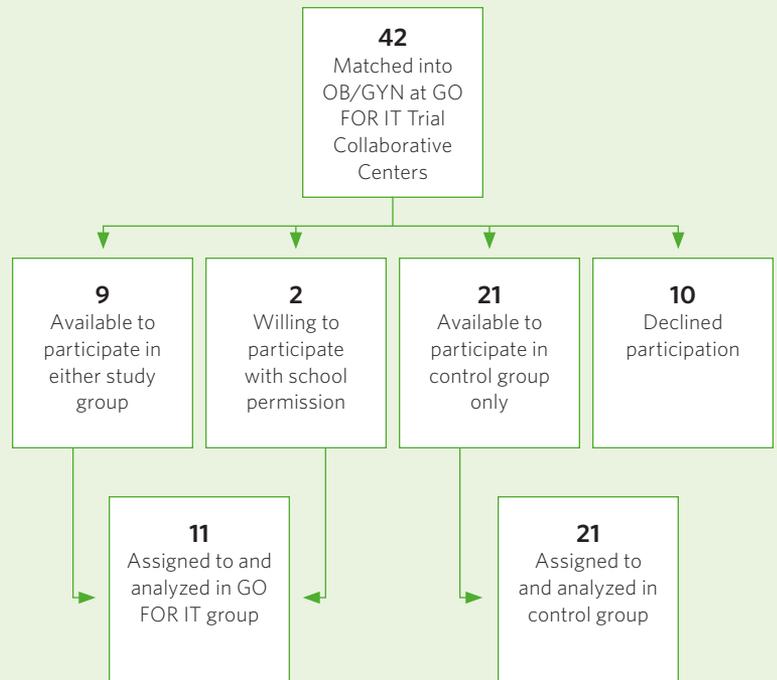


Table 3

Baseline educational characteristics of study participants.

Characteristic	GO FOR IT	Control	P Value
N	11	18	
Age (year)	26 (25,27)	26 (25, 26)	.60
Year of medical school graduation			
2013	10 (90.9)	18 (100)	.38
Prior to 2013	1 (9.1)	0 (0)	
USMLE scores			
Step 1	222 (206,237)	223 (212,228)	.64
Step 2 clinical knowledge	246 (227,259)	238 (233,249)	.34
Step 2 clinical skills			
Pass	11 (100)	17 (100)	1.00
Fail	0 (0)	0 (0)	
Time spent in OB/GYN clinical activities (weeks)			
M3 Year	6 (6,8)	6 (6,9)	.66
M4 Year	4 (4,8)	8 (8,12)	<.01
Month of final OB/GYN clinical experience			
Jul-Sep 2012	5 (45.4)	4 (22.2)	.31
Oct-Nov 2012	3 (27.3)	10 (55.6)	
Jan-May 2013	3 (27.3)	4 (22.2)	
Month of final M4 clinical experience			
Jan-Feb 2013	3 (27.3)	3 (16.7)	.23
Mar 2013	6 (54.5)	6 (33.3)	
Apr-May 2013	2 (18.2)	9 (50.0)	
Self-rated baseline clinical skills/procedural competency*			
Comprehensive women's health history	4 (3,4)	4 (3,4)	.68
Breast exam	4 (3,4)	4 (3,4)	.62
Pelvic exam	3 (3,4)	3 (3,4)	.20
Two-handed knot-tying	3 (2,3)	3 (3,4)	.01
Intrapartum cervical assessment	2 (2,3)	2 (2,3)	.34
Normal vaginal delivery	2 (2,2)	2.5 (2,3)	<.01
2nd-degree vaginal laceration repair	1 (1,2)	2 (1,2)	.36
Electronic fetal heart rate interpretation	2.5 (2,3)	3 (3,3)	.26
Intrauterine device insertion	2 (2,3)	2 (1,2)	.96
Endometrial biopsy	2 (0,2)	2 (1,2)	.44
Vaginal wet-prep interpretation	3 (2,4)	3 (3,4)	.24
All data reported as either frequency (percent) or median (25th, 75th percentile). *Median scores based on a 4-point Likert-type scale with scale anchors and values as follows: 1 = I am unable to perform the entire procedure under supervision; 2 = I am able to perform the procedure under supervision; 3 = I usually do not require supervision but maybe need help occasionally; 4 = I am competent to perform the procedure unsupervised (I can deal with complications).			

GO FOR IT TRIAL

standardized assessments (Table 3). Second, the 32 participants, representing 2.5% of the total number of students matching into OB/GYN in 2013,¹⁷ provided ample power for identifying statistically significant differences between groups. Finally, the inclusion of multiple forms of objective competency assessments strengthens the validity and generalizability of the findings.

Conversely, limitations of this study should be noted. First, we were unable to utilize a randomized study design due to recruitment limitations. The quasi-experimental educational study design is analogous to a prospective cohort clinical study design, with the same concerns regarding unequal distribution of confounders between groups.¹¹ The similarity in the baseline character-

Table 4

End-of-study clinical skills/procedural skills/knowledge competency outcomes.

	GO FOR IT	Control	P Value
N	11	21	
Composite outcome score	73 (68,77)	41 (35,45)	<.001
Clinical skills OSCE ¹			
Comprehensive women's health history (49 tasks)	76 (69,86)	63 (53,69)	<.01
Breast/Pelvic physical exam (37 tasks)	78 (70,86)	62 (54,68)	<.01
Technical skills stations ²			
Two-handed square knot (%)	11 (100)	21 (100)	1.0
Intrapartum cervical assessment			
Dilation (5 tasks)	60 (40,60)	20 (20,20)	<.01
Effacement (5 tasks)	60 (60,80)	20 (10,40)	<.01
Composite of dilation & effacement (10 tasks)	60 (50,70)	30 (20,30)	<.01
Normal vaginal delivery (23 tasks)	65 (52,78)	35 (26,48)	<.01
2nd-degree vaginal laceration repair (12 tasks)	92 (83,100)	50 (42,58)	<.01
IUD insertion (12 tasks)	67 (50,75)	33 (33,50)	<.01
Endometrial biopsy (7 tasks)	57 (43,71)	57 (43,71)	.66
Medical/Technical knowledge assessments			
NBME Obstetrics & Gynecology Subject Exam ³	58 (40,89)	49 (29,75)	.41
Surgical instrument identification			
Name (31 tasks)	87 (77,97)	26 (16,29)	<.01
Primary function (31 tasks)	61 (55,71)	32 (23,39)	<.01
Composite of name and function (62 tasks)	74 (66,79)	29 (23,32)	<.01
Suture identification (7 tasks)	57 (43,71)	29 (14,43)	<.01
Surgical blade identification (3 tasks)	100 (33,100)	33 (0,50)	<.01
Surgical needle identification (8 tasks)	75 (62,75)	0 (0,0)	<.01

¹ Objective Structured Clinical Exam (OSCE) results reported as median percentage of checklist items (ie, tasks) rated as "well done."

² Technical skill procedural checklist results reported as median percentage of checklist items (ie, tasks) rated as "complete" for each subject.

³ National Board of Medical Examiners (NBME) results reported as median overall-year percentiles for each subject.

Abbreviations and Acronyms

M4 = fourth year of medical school; OB/GYN = obstetrics and gynecology; GO FOR IT = Gynecology and Obstetrics Fundamentals of Residency Internship Training; ACGME = Accreditation Council for Graduate Medical Education; PSC = primary study center; DCC = Data Coordination Center; PI = principal investigator; PRIMER = Procedural Repetition Involving Montessori-type Experience and Rehearsal; NBME = National Board of Medical Examiners; OSCE = Objective Structured Clinical Exam

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istics between groups (Table 3), however, suggests that potential confounders were actually biased in favor of the control group, with greater clinical experience in OB/GYN self-perceived competency, in several areas. Second, the study design is susceptible to exposure bias resulting from the GO FOR IT group having greater knowledge of the assessment scheme through exposure to the training models. Third, scoring of most procedural stations was unblinded. Fourth, all of the procedural checklists developed for the assessments were unweighted, diminishing the value of highly critical steps more closely related to patient outcome.¹⁸ Fifth, we failed to reach the desired number of participants in the GO FOR IT

group as assessed by power calculation. Finally, as with all simulation-based assessments, there is an unknown transference to actual clinical performance and outcomes.¹⁸

Conclusion

The results of this study suggest that OB/GYN educators should implement intensive residency preparation courses near the end of the M4 year to prepare students to enter residency with appropriate skills and knowledge. The curriculum developed for the GO FOR IT Trial is now an integral component of the M4 curriculum at the University of South Carolina School of Medicine Greenville.

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