



Baseline Clinical Skill of Medical Students Entering the Obstetrics and Gynecology Core Clinical Clerkship

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Accepted: 1 October 2020 / Published online: 23 October 2020
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Abstract

Purpose Determine baseline clinical skills of medical students entering the Obstetrics and Gynecology (OB/GYN) clerkship with prior clinical curricular exposure.

Background Students are introduced to clinical correlates sooner in the preclinical curriculum to facilitate adult learning. There are few studies determining clerkship-specific clinical skills readiness in OB/GYN, a specialty with historically limited previous exposure.

Methods An anonymous 15-question clinical readiness survey (1–5 Likert scale) was administered to medical students during their OB/GYN Orientation at the University of Texas Health Science Center San Antonio over four academic years, 2014–2018, to determine baseline OB/GYN clinical skill knowledge and confidence. Statistical analysis included Spearman rank correlation and Kruskal-Wallis tests, with significance defined as $p < 0.05$.

Results The survey was completed by 346 students (77% participation). Overall, students felt most confident in knot tying skills (17%) and closed gloving technique (7%) and least confident in knowledge of labor curve (86%), Leopold's maneuvers (88%), and Montevideo units (MVU) (90%). Confidence in performing closed gloving (4% vs. 11%, $p < 0.01$) and tying knots (8% vs. 27%, $p < 0.01$) was significantly higher during rotations later in the academic year. Students who expressed a higher level of interest felt more prepared for the clerkship ($r_s = 0.21$, $p < 0.01$).

Discussion Results indicate that confidence in obstetric-specific clinical skills is relatively low throughout the academic year; however, baseline surgical skills show improvement. It is important for teaching faculty to know baseline clinical skills of the medical student with earlier clinical exposure to enhance adult learning and optimize clinical competency. In medical students receiving earlier clinical exposure, confidence in baseline obstetric-specific clinical skill is relatively low throughout the academic year. Confidence in general surgical skills demonstrates improvement over the academic year.

Keywords Undergraduate medical education · Clinical skills · Clerkship readiness

Introduction

Over the past decade, American medical schools have begun to incorporate principles of adult learning theory into undergraduate medical education (UME) curricula to better meet students' learning needs. Malcolm Knowles popularized the concept of adult learning using the term “andragogy.” Using three of Knowles' five principles of andragogy: (1) adults are

independent and self-directed learners (2) who value learning that integrates with the demands of their everyday life (3), and are interested in immediate, problem-centered approaches [1, 2], modifications have been implemented into many preclinical medical school curricula. As a part of this effort, medical students are being introduced to clinical correlates earlier in the preclinical curriculum and clinical skills training begins the first year of medical school. Active learning, problem solving, and small group work are favored over traditional-style large lectures. Students value opportunities to engage with patients and practice history and physical exam skills (vs. passive lecture-based learning) [3] so these opportunities are made available early in the curriculum of most US medical schools. Starting 2012, the University of Texas Health Science Center at San Antonio introduced a new preclinical

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curriculum focused on integrating basic and clinical science knowledge with early clinical experiences to provide students with a better understanding of disease process and management.

In this model, students work through weekly case-based scenarios with clinical faculty from the beginning of medical school. This works to foster clinical reasoning skills, incorporate basic science into everyday practice, and helps students to understand some of the nuances of practicing clinical medicine. There is a clinical skills longitudinal course threaded through the first and second year of medical school where students learn and practice medical history taking and physical examination techniques utilizing standardized patients. Students study the female reproductive tract and perform breast and pelvic exam skills utilizing GU teaching assistants in the fall of year two in our curriculum.

In his principles to guide teaching practice, Schon asserts that “learners’ current knowledge and experience are critical in new learning situations and need to be taken into account” in learning how to practice as a professional [4] a principle that becomes important as students transition into clinical clerkships.

A limited number of studies have examined outcomes of these types of curricular changes in preclinical years. Training in clinical skills prior to exposure to the clinical clerkship has been shown to improve both student comfort level and early performance on clinical clerkships, as assessed by student performance evaluations [5, 6]. This has been demonstrated for the Internal Medicine clerkship; however, results for other clerkships are less clear. For example, communication and technical skills increased in the Surgery clerkship after early clinical skills training but only technical skills increased in the Pediatrics clerkship. Interestingly, there were no statistically significant changes seen in skill performance for the Obstetrics and Gynecology, Family Medicine, or Psychiatry clerkships [6] with early clinical skills training.

In addition, studies have shown that preclinical faculty, clerkship faculty, and medical students differ in the expectations for level of medical student preparation in basic clinical skills for clinical clerkships. In general, preclinical faculty and medical students have higher expectations for basic skills preparation than clerkship faculty [7]. This may reflect knowledge of changes to the preclinical curriculum, which include earlier exposure to clinical content and experiences. If this is the case, it is important for clerkship faculty to know the baseline clinical skills of the medical student who has been exposed to earlier clinical experience.

Previous studies assessing preclinical skills have assessed general clinical skills, such as non-focused physical examination, history-taking, and oral patient presentation [3, 5, 6]. The few studies that have focused on a specific clerkship have been limited to the Pediatrics clerkship^{8,9}. In a cohort study reviewing medical student performance from a Pediatric

clerkship [8], students who were exposed to early clinical experience through an 18-month faculty mentorship program had higher NBME and MCAT scores, although clinical skills, as well as history and physical examination scores did not increase. Students who did not have early clinical experience and students with their clerkship early in the academic year showed significantly lower clinical skills scores. Exam scores of students exposed to early clinical experiences did not differ significantly based upon timing of the rotation in the academic year. The largest benefit demonstrated from early clinical exposure was in clinical skills for students in the Pediatric clerkship who rotated early in the academic year. In a survey of medical students from four medical schools conducted at the end of the Pediatric clerkship, 33% felt that their preclinical education did not adequately prepare them for the pediatric clerkship and 40% felt that they were not adequately prepared in regard to pediatric physical examination skills [9]. Although these studies assessed clerkship-specific clinical skill readiness, they did not determine the baseline skill set of the medical student entering the clerkship. Furthermore, it is unclear if these results are generalizable to other clerkship specialties, such as Obstetrics and Gynecology.

The baseline clinical knowledge and clerkship-specific skillset of medical students entering the core Obstetrics and Gynecology clinical clerkship is unknown. Many of the skills used in the obstetrics and gynecology clerkship were introduced 12–18 months prior to the student beginning the clerkship and have not been used in the interim. The clinical environment of labor and delivery and the intimate nature of exams performed during the clerkship may additionally be distressing for some students. For these reasons, it is important for clerkship directors and faculty to know the baseline clinical skills of medical students entering their specific clerkship, as this will guide teaching and learning. With curricular change offering earlier clinical exposure in the preclinical years, it is possible that the student’s baseline level does not match our historical expectations. The current study aims to determine the baseline clinical knowledge and skill of medical students entering the Obstetrics and Gynecology core clerkship.

Materials and Methods

This retrospective cohort study was approved by the Institutional Review Board at the University of Texas Health Science Center at San Antonio. The study was conducted at a large urban medical school of approximately 850 medical students. This study was conducted following institution-wide curricular revisions implemented in 2012 that resulted in earlier clinical exposure in the preclinical years. Third-year medical students were given a clinical readiness survey during orientation for the Obstetrics and Gynecology core clinical

Table 1 Demographics of medical school population

Semester	Total	Male	Female	White	Hispanic	Asian	AA	Other
Fall 2014	860	455 (52.91%)	405 (47.10%)	445 (51.74%)	168 (19.53%)	135 (15.70%)	41 (4.77%)	71 (8.26%)
Spring 2015	859	454 (52.85%)	405 (47.15%)	445 (51.80%)	167 (19.44%)	135 (15.72%)	41 (4.77%)	71 (8.27%)
Fall 2015	859	469 (54.60%)	390 (45.40%)	438 (51.00%)	176 (20.49%)	135 (15.72%)	45 (5.24%)	64 (7.45%)
Spring 2016	852	463 (54.34%)	389 (45.66%)	436 (51.17%)	174 (20.42%)	133 (15.61%)	45 (5.28%)	63 (7.39%)
Fall 2016	854	456 (53.40%)	398 (46.60%)	410 (48.01%)	165 (19.32%)	161 (18.85%)	53 (6.21%)	63 (7.38%)
Spring 2017	851	454 (53.35%)	397 (46.65%)	409 (48.06%)	166 (19.51%)	160 (18.80%)	52 (6.11%)	62 (7.29%)
Fall 2017	858	475 (55.36%)	383 (44.64%)	423 (49.30%)	168 (19.58%)	156 (18.18%)	54 (6.29%)	57 (6.64%)
Spring 2018	849	470 (55.36%)	379 (44.64%)	419 (49.35%)	165 (19.43%)	156 (18.37%)	53 (6.24%)	56 (6.60%)
Fall 2018	858	473 (55.13%)	385 (44.87%)	399 (46.50%)	168 (19.58%)	181 (21.10%)	53 (6.18%)	57 (6.64%)

clerkship every other block (i.e., blocks 2, 4, 6, and 8). Surveys were anonymous and collected at the conclusion of the orientation session the same day they were distributed.

This process continued for four consecutive academic years between July 2014 and May 2017.

The total number of students sampled during the study period was 449.

Three hundred forty-six students completed the surveys for a participation rate of 77%

The clinical readiness survey was developed by the Clerkship Director with input from clinical educators in the

department of Obstetrics and Gynecology, including physicians and Certified Nurse Midwives. The survey was initially designed to assess whether a resource-intensive intervention (3-h hands-on session given during orientation) improved learning outcomes and student satisfaction with the clerkship. Topics were guided by the clerkship learning objectives, which were derived from the *Association of Professors of Gynecology and Obstetrics (APGO) Medical Student Educational Objectives*, 10th Edition [10].

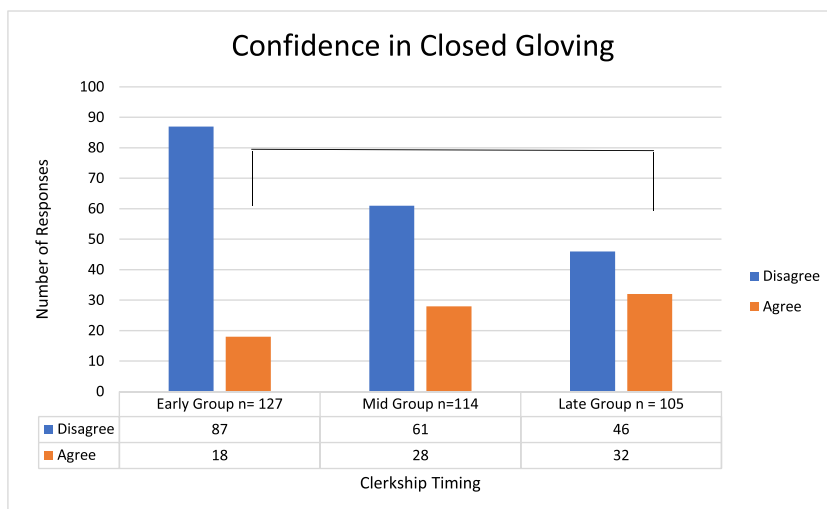
The 15-question clinical readiness survey assessed comfort and knowledge of basic clinical skills specific to the field of

Table 2 Pre-orientation student evaluation survey responses

5-point Likert scale	Strongly disagree		Disagree		Neutral		Agree		Strongly agree	
	n	%	n	%	n	%	n	%	n	%
All survey responses	2942	57%	1081	21%	700	13%	338	7%	129	2%
Interest in OB/GYN as a career	75	22%	85	25%	121	35%	48	14%	17	5%
Well prepared	145	42%	120	35%	72	21%	8	2%	1	0%
Obstetric skills										
Calculate estimated due date (EDD)	264	76%	44	13%	18	5%	14	4%	6	2%
Measure fundal height and fetal heart	207	60%	59	17%	31	9%	36	10%	13	4%
Perform Leopold’s maneuver	306	88%	30	9%	6	2%	3	1%	1	0%
Calculate Montevideo units	311	90%	27	8%	6	2%	2	1%	0	0%
Interpret fetal monitor strip	296	86%	37	11%	7	2%	6	2%	0	0%
Interpret labor curve	299	86%	38	11%	8	2%	1	0%	0	0%
Identify instruments of delivery table	190	55%	97	28%	53	15%	6	2%	0	0%
Familiarity of cardinal movements	232	67%	84	24%	23	7%	7	2%	0	0%
Gynecologic skills										
Confidence in performing pelvic exam	79	23%	151	44%	86	25%	29	8%	1	0%
Obtain and perform wet prep	200	58%	96	28%	37	11%	11	3%	2	1%
Identify organisms/causes of vaginitis	109	32%	110	32%	88	25%	36	10%	3	1%
Perform closed gloving	140	40%	54	16%	74	21%	53	15%	25	7%
Tying (1 and 2 handed)	89	26%	49	14%	70	20%	78	23%	60	17%

n = 346 medical students, 2014–2017

Fig. 1 Confidence in closed gloving based upon clerkship timing



Obstetrics and Gynecology. Eight basic obstetric skills were evaluated including calculating an estimated due date (EDD), measuring of fundal height, performing Leopold’s maneuvers, interpreting a fetal monitoring strip, calculating Montevideo units, interpreting a labor curve, determining cardinal movements of labor, and identifying surgical instruments on a delivery table. Five gynecologic skills were assessed including performing a pelvic exam, obtaining vaginal specimens, identifying organisms on microscope, performing closed gloving, and tying a surgical knot. Responses were recorded using a 5-point Likert scale, ranging from strongly disagree to strongly agree.

De-identified data was entered into an EXCEL spreadsheet. The analysis was completed in Stata 16 (StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC). To determine effects of clerkship timing during the academic year, clerkship timing was clustered into “Early” for July to October, “Mid” for November to February, and “Late” for March to June. The correlation between the 5-

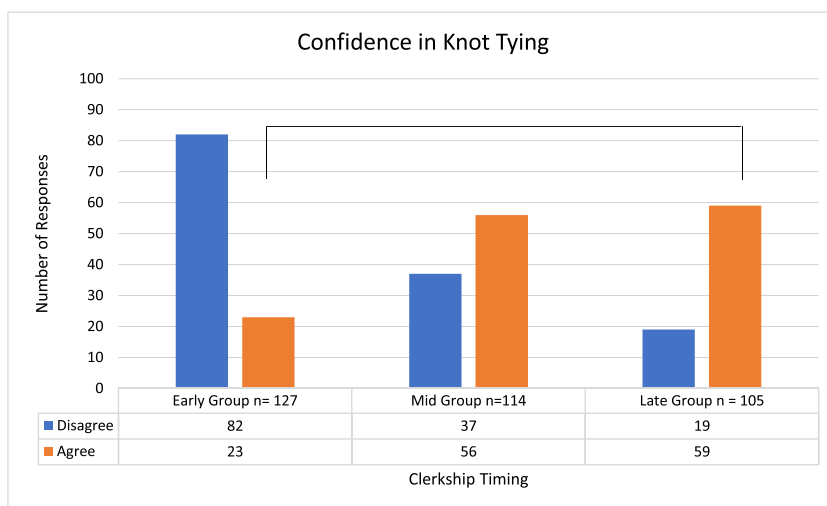
point Likert-scale responses for obstetric skills/gynecologic skills and the level of interest in OB/GYN as a career and level of preparedness for OB/GYN clerkship was examined. Data was analyzed using Spearman rank correlation and Kruskal-Wallis tests.

Results

The study was completed by 346 medical students with a participation rate of 77%. Based upon demographic data for the medical school (Table 1), students were 54% male and 46% female. Regarding race, 50% of students were white, 20% were Hispanic, 18% were Asian, 5% were African American, and 7% identified as “other.” Gender and race differences were not significant between semesters from Fall 2014 to Fall 2017.

Nineteen percent of students indicated interested in Obstetrics and Gynecology as a career (“strongly agree” and

Fig. 2 Confidence in knot tying based upon clerkship timing



“agree”). Two percent of students felt prepared for the clerkship (Table 2). As shown in Table 2, students felt most confident (“strongly agree”) with knot tying (17%) and closed gloving technique (7%). Students felt least confident (“strongly disagree”) with performing Leopold’s maneuvers (88%), calculating Montevideo units (90%), interpreting a fetal monitor strip (86%), and interpreting a labor curve (86%). Confidence (“strongly agree”) in closed gloving technique (4% vs. 11%, $p < 0.01$) and knot tying (8% vs. 27%, $p < 0.01$) was significantly higher during rotations late in the academic year (Figs. 1 and 2). Feeling well prepared for the rotation correlated with high confidence in all the measured clinical skills (Table 3).

As shown in Table 4, students who expressed a high level of interest in Obstetrics and Gynecology as a career indicated that they felt more prepared for the clerkship ($r_s = 0.21$, $p < 0.01$). Interest correlated with high confidence in the following clinical skills: calculating an EDD ($r_s = 0.11$, $p < 0.05$), performing a pelvic examination ($r_s = 0.20$, $p < 0.001$), performing a wet prep ($r_s = 0.19$, $p < 0.001$), performing Leopold’s maneuvers ($r_s = 0.14$, $p < 0.01$), calculating Montevideo units ($r_s = 0.13$, $p < 0.05$), and interpreting a fetal monitor strip ($r_s = 0.14$, $p < 0.05$). Initial interest in the specialty did not correlate with closed gloving technique ($r_s = 0.02$, $p = 0.78$) or knot tying ($r_s = 0.07$, $p = 0.21$) (Table 4). There was no significant difference in interest in the specialty based on clerkship timing. There was a trend for students interested in Obstetrics and Gynecology as a career to take the clerkship in the middle of the academic year (Fig. 3).

Table 3 Association between feeling prepared for OB/GYN clerkship and obstetric/gynecologic skills

	Spearman’s rho	* <i>p</i>
Obstetric skills		
Calculate estimated due date (EDD)	0.21	0.000
Measure fundal height and fetal heart	0.23	0.000
Perform Leopold’s maneuver	0.28	0.000
Calculate Montevideo units	0.22	0.000
Interpret fetal monitor strip	0.18	0.001
Interpret labor curve	0.23	0.000
Identify instruments of delivery table	0.41	0.000
Familiarity of cardinal movements	0.32	0.000
Gynecologic skills		
Confidence in performing pelvic exam	0.34	0.000
Obtain and perform wet prep	0.40	0.000
Identify organisms/causes of vaginitis	0.30	0.000
Perform closed gloving	0.25	0.000
Knot tying (1 and 2 handed)	0.24	0.000
Interest in OB/GYN	0.21	0.000

$n = 346$ medical students, 2014–2017

*Spearman correlation

Table 4 Association between interest in OB/GYN and obstetric/gynecologic skills

	Spearman’s rho	* <i>p</i>
Obstetric skills		
Calculate estimated due date (EDD)	0.11	0.046
Measure fundal height and fetal heart	0.01	0.817
Perform Leopold’s maneuver	0.14	0.008
Calculate Montevideo units	0.13	0.012
Interpret fetal monitor strip	0.14	0.011
Interpret labor curve	0.04	0.410
Identify instruments of delivery table	0.08	0.119
Familiarity of cardinal movements	0.10	0.051
Gynecologic skills		
Confidence in performing pelvic exam	0.20	0.000
Obtain and perform wet prep	0.19	0.000
Identify organisms/causes of vaginitis	0.08	0.121
Perform closed gloving	0.02	0.775
Knot tying (1 and 2 handed)	0.07	0.207
Feeling prepared for OB/GYN clerkship	0.21	0.000

$n = 346$ medical students, 2014–2017

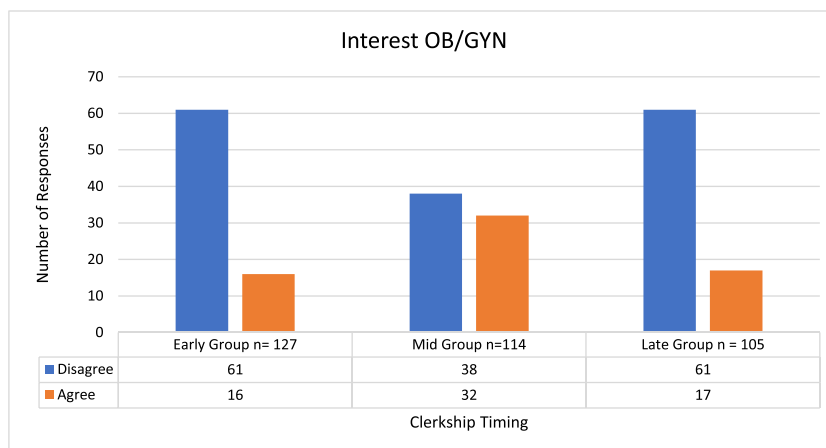
*Spearman correlation

Discussion

The aim of this study was to determine the baseline clinical knowledge and skill of medical students entering the Obstetrics and Gynecology core clerkship. This is particularly relevant as many medical school curricula are incorporating early clinical exposure. Despite this earlier clinical exposure, a majority of students do not feel prepared for the Obstetrics and Gynecology clerkship. There are many potential explanations for this. Obstetrics and Gynecology requires a unique skill set (interviewing techniques, GYN examination skills, surgical and OR skills) and exposes students to a patient population not well represented in most early clinical skills training (female gynecology patients, pregnant patients). In fact, students in our cohort feel least confident with intrapartum clinical skills. Interestingly, students interested in the specialty did report more confidence in this area. In this study, feeling well prepared for the rotation correlated with increased confidence in all the assessed clinical skills. This appears to validate the content of our survey.

There may be an opportunity for introduction of basic labor clinical correlates sooner in the curriculum for the undifferentiated medical student. Most content related to Obstetrics and Gynecology is introduced during a Reproductive Endocrinology block, which typically occurs during the second year of medical school, prior to clinical rotations. Although basic science faculty have historically taught this course, medical schools are increasingly integrating clinical faculty teaching and collaboration into the preclinical curriculum. The findings of this study may further

Fig. 3 Interest in obstetrics and gynecology as a career based upon clerkship timing. * = $p < 0.01$



inform important topics for clinical correlation to be integrated into preclinical learning sessions.

Of note, students feel most confident with general surgical skills of knot tying and closed gloving technique. This may reflect exposure to the General Surgery clerkship, as confidence increased over the course of the academic year. Additionally, students or faculty may coordinate formal or informal workshops on general surgical skills, which would be applicable to multiple surgical specialties including obstetrics and gynecology. These could be facilitated into a clinical skills laboratory setting during the preclinical years with hands-on learning sessions to spark student interest, as well as increase overall confidence in technical skills applicable to a range of procedure-based specialties (Emergency Medicine, Surgery, Obstetrics and Gynecology).

One-fifth of students expressed interest in Obstetrics and Gynecology as a career. Interestingly, we found no significant difference in initial interest in OB/GYN based upon timing of clerkship in the academic year. However, there is a trend for students who are interested in Obstetrics and Gynecology to schedule the clerkship in the middle of the academic year. Potentially students are being counseled to schedule the Obstetrics and Gynecology clerkship to avoid the beginning and end of the year time slots if they are interested in choosing the specialty for residency. Reasons for this may be to obtain some basic skills prior to rotating in a field of interest and/or to maximize clinical exposure given to learners after new residents have settled into their residency. Clinical educators may consider these findings when advising medical students of optimal timing of the clerkship.

Interest in the specialty correlates with feeling well prepared for the rotation. Of note, the clinical skills that correlated with interest in the field were those more specific to Obstetrics and Gynecology. Surprisingly, surgical skills of closed gloving, knot tying, and identifying surgical instruments did not correlate with interest in Obstetrics and Gynecology. This may be because these clinical skills are shared with general surgery and other surgical fields.

Strengths of this study include a relatively large number of participants with a high participation rate. This study also evaluated students over multiple academic years. As a weakness, this study was conducted at a single institution, which limits generalizability. However, most medical schools have implemented curricula with opportunities for early clinical exposure and all data was collected following initiation of such a curriculum.

Clerkship directors can utilize these findings in adapting their clerkships for the adult learner with earlier clinical exposure. Orientation for basic surgical skills, such as closed gloving and knot tying, may need to be modified over the course of the academic year to reflect students' increased abilities in these skills. It would be beneficial to include specific intrapartum clinical skills during orientation for the clerkship, as well as potentially earlier in the medical school curriculum. This may take the form of clinical correlates integrated into a Reproduction and Endocrinology block. Clerkship directors may also consider early exposure to a clinical skills lab to increase confidence in basic Obstetrics and Gynecology clinical skills.

Acknowledgments Stephanie Hernandez, MS, for statistical guidance.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval This retrospective study of anonymous survey data was reviewed by the Institutional Review Board of the University of Texas Health Science Center at San Antonio and designated EXEMPT.

Informed Consent n/a

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