

# How do demographic variables affect pregnant women's perceptions of obstetrics forceps: a cross sectional study

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## Research article

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# Abstract

## Background

Women's attitudes towards obstetric forceps likely contribute to declining use and opportunities for residency training, but formal documentation of women's attitudes towards obstetric forceps is currently limited. A clearer understanding should help guide our attempts to preserve its use in modern obstetrics and to improve residency training. Our objective is to document women's attitudes towards obstetric forceps and the influence basic demographic variables have on those attitudes.

## Methods

A cross sectional study was performed. We developed a one-time anonymous structured 5-question survey that was given to all low-risk patients presenting to our medical center for prenatal care between October 2018 - December 2018. The questionnaire asked for the patient's self-reported age, race, education level, and insurance type. The five questions were as follows: (1) Do you think forceps should be use to deliver babies, (2) Are forceps safe for the baby, (3) Are forceps safe for the mother, (4) Do you think forceps can help to lower the cesarean section rate, (5) Do you think training physicians should learn to place forceps on a live-model. We calculated the means and proportions for the responses according to the overall group and various subgroups. Statistical analysis included Kruskal Wallis, Mann-Whitney tests as appropriate. Results were also adjusted by regression using a Generalized Linear Model. The power calculation showed the sample size required was 384.

## Results

A total of 499 patients returned the questionnaire. The response rate was 56.8% (499/878). The findings suggest that patient perceptions towards forceps are generally negative. Women with white ethnicity, college education or higher, and private insurance did have more favorable views than their counterparts, but the majority still had unfavorable views. Age was not shown to have a significant effect on maternal attitude.

## Conclusion

Women's views towards forcep use at the University of Kansas Medical Center are negative and may be contributing to the decline of forcep use. Improving patient perception of forceps would require multiple different strategies rather than a single focused easily-implemented message. If forceps training continues, such training will rely on a minority of women who will accept forceps use in their delivery.

## Background

Obstetric forcep deliveries have been declining over the past decade,<sup>1,2</sup> and it is unclear whether we can do anything to reverse this trend. The risk-averse nature of our profession, the medical-legal climate, patient preferences for Cesarean delivery, and reduced opportunities for training in operative vaginal delivery overall means that a forceps operative delivery may become a thing of the past in today's modern obstetric practice.

Residency programs in obstetrics and gynecology (OBGYN) have tried to combat the decline in forceps training with several efforts. Current strategies have included simulation training, increasing the availability of skilled instructors,<sup>3</sup> and prioritizing forcep training before vacuum training.<sup>4</sup> While simulation training has helped with training efforts, the fidelity of these models is not enough to build confidence for real-world clinical practice. The latter efforts have improved training opportunities, but they are still less applicable to hospitals with low operative delivery volumes.

A prior editorial accurately suggested that the major issue surrounding forcep training is not the instructor's intent but the public's reluctance over the use of forceps.<sup>2</sup> If the "optics" surrounding a forceps delivery are unfavorable, then both doctors and patients will prefer to avoid them. If patients were to perceive forcep deliveries more favorably, it could broaden the training opportunities available for residents. This could limit the decline of this skillset, as residents who gain competency during their training are more likely to continue using them throughout their career.<sup>5</sup>

Interestingly, while it is assumed that the public perception of forceps is generally negative, actual documentation of pregnant women's attitudes/feelings towards forceps is limited in medical literature. There are studies which have looked at women's postpartum experiences after operative vaginal delivery, but antepartum opinions are less documented.

The aim of this study is to query pregnant women's attitudes and the sociodemographic variables which influence their views about obstetric forceps at our medical center. We believe that the results of this study will contribute towards identifying strategies for improving patient perception towards forceps deliveries, with the end goal of improving resident training and proficiency.

## Methods

This was a cross-sectional study. We included any woman receiving prenatal care and eligible for vaginal delivery. Those that were unable to read English were excluded. There were no specific requirements for gestational age range at the time of survey. A one-time anonymous questionnaire on paper format was given to patients at the University of Kansas Health System general obstetrics prenatal clinic between October 2018 and December 2018. This questionnaire was developed for this study. The surveys were handed to patients at the time of check-in to their prenatal appointment. Patients completed the survey in the privacy of their clinic room without any help or instruction from study coordinators or their clinical provider. Surveys were then collected and placed in a confidential folder by the medical assistants who

were turning over the room. The institutional review board of the University of Kansas considered this study exempt from IRB approval as it is a quality improvement project for the residency program.

We surveyed PubMed for a prior study with a validated survey regarding pregnant women's attitudes towards forceps, but we did not encounter any. We developed a questionnaire which asked for the respondent's self-reported age, ethnicity (White, Hispanic, African American, or other), education (did not finish high school, high school, college, masters, or doctorate), and insurance type (self, private, or government). These were considered the common demographic variables for this project. The questionnaire included five questions which were as follows: (1) Do you think forceps should be used to deliver babies? (2) Are forceps safe for the baby? (3) Are forceps safe for the mother? (4) Do you think forceps can help to lower the cesarean section rate? (5) Do you think training physicians should learn to place forceps on a live-model? For questions 1, 4, and 5 (Q1, 4, 5) the responses were yes (1) or no (0). A Likert scale was provided for questions 2 and 3 (Q2, 3) with the responses ranging from never (1) to always (5).

Survey data was analyzed by calculating the average response for each question and then comparing those averages. Favorable responses were considered a 4 or 5 on the Likert scale, and 1 on the yes/no questions. Unfavorable responses were considered a 1 or 2 on the Likert scale and 0 on the yes/no questions. A neutral response was considered a 3 on the Likert scale. Data was then subgrouped by common demographic variables such as age, ethnicity, education and insurance status for further analysis. Overall group comparisons were analyzed by Kruskal-Wallis tests, then pairwise comparisons were conducted using Mann-Whitney tests. Since multiple pairwise tests were performed, a Bonferroni correction was applied to adjust the significance values. To adjust for confounding, a General Linear Model regression was performed. Ethnicity, age, education, and insurance status were included as independent variables in the model. The responses to the 5 survey questions were alternately used as dependent variables. All statistical analysis was performed using SPSS software (IBM).

To determine sample size, we assumed that approximately 50% of the population would have a favorable attitude towards forceps. We set our confidence limit for 95%. The sample size required was 384.

## Results

A total of 878 surveys were distributed, and 499 women returned the paper questionnaire. The survey response rate is 56.8%. The demographic characteristics of the respondents can be seen in Table 1. The women who completed the survey ranged from 17–44 years old with 63.1% being White. The insurance and education levels were reflective of the general population within a tertiary hospital. Of the 499 women who began the questionnaire, the percentage that answered question one was 89% (n = 444/499), question two was 94% (n = 468/499), question three was 93% (n = 466/499), question four was 86% (n = 430/499), and question five was 90% (n = 449/499).

Table 1  
Demographics

Demographics	Subgroup	Patients, n = 499	Percent
Age	< 20	13	2.6%
	20–29	242	48.5%
	30–39	233	46.7%
	> 40	11	2.2%
Ethnicity	White	315	63.1%
	Hispanic	54	10.8%
	African American	95	19%
	Other	30	6%
	Missing	5	1%
Education	No High School	21	4.2%
	High School	163	32.7%
	College	199	39.9%
	Masters	75	15%
	Doctors	27	5.4%
	Missing	14	2.8%
Insurance	Self	51	10.2%
	Private	285	57.1%
	Government	141	28.3%
	Missing	22	4.4%

In general, respondents had an unfavorable view of forceps. Less than half answered that forceps should be used to deliver babies (40.4%). Most respondents felt that forceps were unsafe for the baby and the mother (Q2 score average 2.5, Q3 score average 2.7). Half of the respondents believed that the use of forceps could help reduce the Cesarean section rate (50%). Slightly more than half did feel that training physicians could learn forceps on live models (55%).

The subgroup analyses are reported in Table 2. Ethnicity was the first characteristic we explored. There were 315 White patients, 54 Hispanic patients, 95 African American patients, and 30 patients with Other ethnicities who returned the questionnaire. White ethnicity patients had the most favorable responses, but White patients' responses still showed an overall negative attitude towards forceps. Some notable

differences were that Other ethnicity respondents had the lowest score on Q1 (17%), showing a large majority that believed that forceps should not be used to deliver babies. African-American respondents had the lowest score on Q4 (36%), believing that forceps could not lower the Cesarean rate. Hispanic respondents had the lowest score on Q5 (37%), believing that trainees should not be learning on live-model patients.

Table 2  
Subgroup Results by Ethnicity, Age, Education, and Insurance

Question	Overall	Subgroup A	Subgroup B	Subgroup C	Subgroup D
Ethnicity	<b>All (n = 499)</b>	<b>White(n = 315)</b>	<b>Hispanic(n = 54)</b>	<b>African American(n = 95)</b>	<b>Other(n = 30)</b>
Q1	0.40 (n = 444)	0.49 (n = 278)	0.35 (n = 54)	0.25 (n = 84) <sup>a</sup>	0.17 (n = 24) <sup>a</sup>
Q2	2.48 (n = 468)	2.6 (n = 298)	2.26 (n = 54) <sup>a</sup>	2.31 (n = 86)	2.28 (n = 25)
Q3	2.65 (n = 466)	2.8 (n = 298)	2.53 (n = 53)	2.36 (n = 85) <sup>a</sup>	2.76 (n = 25)
Q4	0.50 (n = 430)	0.56 (n = 271)	0.42 (n = 50)	0.36 (n = 81) <sup>a</sup>	0.42 (n = 24)
Q5	0.55 (n = 449)	0.6 (n = 287)	0.37 (n = 52) <sup>a</sup>	0.53 (n = 83)	0.48 (n = 23)
Age	<b>All (n = 499)</b>	<b>&lt; 20 (n = 13)</b>	<b>20–29 (n = 242)</b>	<b>30–39 (n = 233)</b>	<b>&gt; 40 (n = 11)</b>
Q1	0.40 (n = 444)	0.23 (n = 13)	0.41 (n = 222)	0.41 (n = 202)	0.43 (n = 7)
Q2	2.48 (n = 468)	2.15 (n = 13)	2.53 (n = 231)	2.45 (n = 214)	2.5 (n = 10)
Q3	2.65 (n = 466)	2.00 (n = 13)	2.65 (n = 229)	2.71 (n = 214)	2.4 (n = 10)
Q4	0.50 (n = 430)	0.33 (n = 12)	0.51 (n = 219)	0.50 (n = 193)	0.5 (n = 6)
Q5	0.55 (n = 449)	0.25 (n = 12)	0.56 (n = 225)	0.57 (n = 205)	0.29 (n = 7)
Education	<b>All (n = 499)</b>	<b>Below High School(n = 21)</b>	<b>High School(n = 152)</b>	<b>College(n = 190)</b>	<b>Post-College(n = 94)</b>
Q1	0.40 (n = 444)	0.29 (n = 21)	0.36 (n = 147)	0.44 (n = 179)	0.47 (n = 86)
Q2	2.48 (n = 468)	2.29 (n = 21)	2.33 (n = 152)	2.59 (n = 190)	2.57 (n = 94)
Q3	2.65 (n = 466)	2.32 (n = 19)	2.53 (n = 152)	2.73 (n = 190)	2.83 (n = 94)
Q4	0.50 (n = 430)	0.33 (n = 18)	0.41 (n = 139) <sup>d</sup>	0.53 (n = 176)	0.62 (n = 87)

Question	Overall	Subgroup A	Subgroup B	Subgroup C	Subgroup D
Q5	0.55 (n = 449)	0.21 (n = 19) <sup>c, d</sup>	0.51 (n = 144)	0.60 (n = 182)	0.61 (n = 93)
Insurance	<b>All (n = 499)</b>	<b>Private (n = 285)</b>	<b>Government(n = 141)</b>	<b>Self (n = 51)</b>	<b>N/A</b>
Q1	0.40 (n = 444)	0.42 (n = 255)	0.31 (n = 131)	0.58 (n = 43) <sup>b</sup>	N/A
Q2	2.48 (n = 468)	2.6 (n = 268)	2.22 (n = 136) <sup>a</sup>	2.6 (n = 48) <sup>b</sup>	N/A
Q3	2.65 (n = 466)	2.76 (n = 268)	2.40 (n = 134) <sup>a</sup>	2.81 (n = 48) <sup>b</sup>	N/A
Q4	0.50 (n = 430)	0.57 (n = 244)	0.35 (n = 128) <sup>a</sup>	0.6 (n = 43) <sup>b</sup>	N/A
Q5	0.55 (n = 449)	0.58 (n = 257)	0.52 (n = 133)	0.59 (n = 44)	N/A
<p>Q1, Q4, and Q5 are yes/no questions with 0 = no and 1 = yes. Q2 and Q3 are a 5-point Likert Scale question with 1 = most unfavorable and 5 = most favorable. Subgroup analysis was completed using a Kruskal-Wallis test.</p> <p><sup>a</sup> pairwise significance vs Subgroup A with Mann Whitney Test and Bonferroni correction</p> <p><sup>b</sup> pairwise significance vs Subgroup B with Mann Whitney Test and Bonferroni correction</p> <p><sup>c</sup> pairwise significance vs Subgroup C with Mann Whitney Test and Bonferroni correction</p> <p><sup>d</sup> pairwise significance vs Subgroup D with Mann Whitney Test and Bonferroni correction</p>					

Age was the second characteristic explored. There were 13 patients < 20 years old, 242 patients between 20 and 29 years old, 233 patients between 30 and 39 years old, and 11 patients older than 39 who completed the questionnaire. Although there were no statistical differences observed, there were several interesting observations. Age < 20 years showed the lowest scores on all the questions, thus showing the least favorable attitudes towards forceps. The age > 39 years mostly appeared similar to the other groups of age 20–29 years and age 30–39 years, but their response to Q5 regarding training physicians learning on live-models was much closer to the youngest age group (Q5 age < 20 score 25% vs Q5 age > 39 score 29%).

Education level was the third characteristic explored. College graduates made up the largest subgroup by education (n = 190). The other education levels included 21 patients who did not finish high school, 152 patients with a high school education, and 94 patients with a graduate school degree (e.g. masters, doctorate). The group without a high school diploma showed the lowest score on every question, and statistical significance was especially profound on Q5 (21% vs college 60%, 21% vs post-college 61%).

High school graduates showed a lower score on Q4 compared to post-college graduates (41% vs 62%). In general, as the education level of the patient advanced, the attitude towards forceps became increasingly favorable. However, even a majority of patients with graduate degrees still did not feel that forceps should be used for deliveries (Q1 score 47%). Both college and graduate degree patients did feel that resident physicians could train on live-models (Q5 score ~ 60%).

The last demographic factor analyzed was insurance status. There were 285 patients with private insurance, 51 self-pay patients, and 141 patients with government insurance (e.g. Medicare or Medicaid) who returned the questionnaire. The Government insured group had the least favorable responses towards forceps (Q1 yes response 31%). The Government insured group had statistically significant differences compared to Private insurance in Q2,Q3,Q4, and significant differences compared to Self-pay in Q1,Q2,Q3,Q4. The self-insured group curiously had a mostly favorable attitude towards forceps, believing they could be used for deliveries (Q1 yes response 58%), could reduce the Cesarean rate (Q4 yes response 60%), and that trainees could learn the skill on live-models (Q5 yes response 59%).

Adjustment of the results was performed to investigate which findings were most robust. The data was controlled for ethnicity, insurance, education level, and age. The largest sub-groups were considered the reference group for comparisons. The results are reported in Table 3. Briefly, African-American ethnicity and Other ethnicity showed strong negative responses to Q1 compared to their White counterparts. Women whose ages were 30–39 years were much less likely than their peers 20–29 years to believe that forceps deliveries could reduce the overall Cesarean delivery rate (Q4). Individuals without a high school degree showed strong negative responses to Q5 compared to their college educated counterparts. Self-insured individuals had much more positive responses to Q1 compared to Private insurance individuals, and government insured individuals showed lower scores to Q2 compared to Private insurance individuals.

Table 3  
Adjusted Results by Ethnicity, Age, Education, and Insurance

<b>Question</b>	<b>Subgroup A</b>	<b>Subgroup B</b>	<b>Subgroup C</b>	<b>Subgroup D</b>
<b>Ethnicity</b>	<b>White</b>	<b>Hispanic</b>	<b>African American</b>	<b>Other</b>
Q1 (n = 416)	OR = 1	0.64 (0.3, 1.3)	0.35 (0.2, 0.7) <sup>a</sup>	0.16 (0.05, 0.6) <sup>a</sup>
Q2 (n = 438)	Adj diff = 0	-0.23 (-0.5, 0.04)	-0.14 (-0.4, 0.1)	-0.24 (-0.6, 0.1)
Q3 (n = 436)	Adj diff = 0	-0.07 (-0.4, 0.2)	-0.2 (-0.4, 0.04)	0.15 (-0.2, 0.5)
Q4 (n = 403)	OR = 1	0.72 (0.4, 1.4)	0.63 (0.3, 1.2)	0.57 (0.2, 1.4)
Q5 (n = 421)	OR = 1	0.51 (0.3, 1.01)	1.2 (0.7, 2.2)	0.86 (0.3, 2.2)
<b>Age</b>	<b>20–29</b>	<b>&lt; 20</b>	<b>30–39</b>	<b>&gt; 40</b>
Q1 (n = 416)	OR = 1	0.69 (0.2, 2.9)	0.87 (0.6, 1.4)	0.9 (0.1, 5.5)
Q2 (n = 438)	Adj diff = 0	-0.14 (-0.6, 0.4)	-0.17 (-0.3, 0.1)	0.2 (-0.4, 0.8)
Q3 (n = 436)	Adj diff = 0	-0.44 (-0.9, 0.1)	-0.03 (-0.2, 0.1)	0.01 (-0.6, 0.6)
Q4 (n = 403)	OR = 1	0.83 (0.2, 3.1)	0.62 (0.4, 0.9) <sup>a</sup>	0.75 (0.1, 5)
Q5 (n = 421)	OR = 1	0.26 (0.06, 1.03)	0.82 (0.5, 1.3)	0.27 (0.05, 1.6)
<b>Education</b>	<b>College</b>	<b>Below High School</b>	<b>High School</b>	<b>Post-College</b>
Q1 (n = 416)	OR = 1	0.87 (0.3, 2.8)	0.85 (0.5, 1.5)	1.2 (0.7, 2.1)
Q2 (n = 438)	Adj diff = 0	-0.01 (-0.4, 0.4)	-0.13 (-0.3, 0.1)	-0.05 (-0.3, 0.2)
Q3 (n = 436)	Adj diff = 0	-0.23 (-0.7, 0.2)	-0.04 (-0.3, 0.2)	0.06 (-0.2, 0.3)
Q4 (n = 403)	OR = 1	0.7 (0.2, 2.2)	0.75 (0.4, 1.3)	1.49 (0.9, 2.6)
Q5 (n = 421)	OR = 1	0.2 (0.1, 0.7) <sup>a</sup>	0.66 (0.4, 1.2)	1.13 (0.7, 1.9)
<b>Insurance</b>	<b>Private</b>	<b>Government</b>	<b>Self</b>	<b>N/A</b>
Q1 (n = 416)	OR = 1	1.05 (0.6, 2)	2.7 (1.3, 5.6) <sup>a</sup>	N/A
Q2 (n = 438)	Adj diff = 0	-0.3 (-0.5, -0.1) <sup>a</sup>	0.07 (-0.2, 0.3)	N/A
Q3 (n = 436)	Adj diff = 0	-0.21 (-0.5, 0.04)	0.12 (-0.2, 0.4)	N/A
Q4 (n = 403)	OR = 1	0.6 (0.3, 1.1)	1.55 (0.8, 3.2)	N/A
Q5 (n = 421)	OR = 1	1.28 (0.7, 2.3)	1.34 (0.7, 2.7)	N/A
<sup>a</sup> significant vs Subgroup A using a General Linear Model regression				

## Discussion

This study suggests that patient perceptions towards forceps are generally negative. Patients of all demographics were more likely to believe that forceps should not be used because they are unsafe for mom and baby. In addition, many patients did not believe forceps could lower the cesarean delivery rate. Consistent with the overall perception, about half of patients believed that training physicians could be allowed to learn to place forceps on a live volunteer. The subgroup analysis of demographic variables showed that White ethnicity and higher education levels tended to have more favorable attitudes, while extremes of age or government insurance status tended to produce unfavorable attitudes.

We felt that these attitudes were not that surprising and could be explained by several possibilities. One simple reason is that patients are simply reflecting the same ambivalences apparent within obstetrical providers in current practice. When used incorrectly, forceps can clearly lead to neonatal trauma. As documented elsewhere, the rates of forceps deliveries have decreased compared to vacuum deliveries.<sup>1,2</sup> Concern about litigation has been documented, but the decreased use also appears to be partly due to practitioner's preference.<sup>6</sup> Sometimes this preference reflects decreased training opportunities. For example, some residency programs only choose to teach vacuum deliveries rather than forceps. In other instances, providers may have trained in residency but have since abandoned the practice.

Another reason for the unfavorable attitude towards forceps could be a recognized trend in patients and providers increasingly favorable attitudes for Cesarean delivery overall.<sup>7</sup> While most women aim for spontaneous vaginal delivery, there is a clear minority of women who would choose elective Cesarean outright.<sup>8,9</sup> In general, Cesarean deliveries appear to be desired by both patients and providers rather than engage in a difficult operative vaginal delivery, whether vacuum or forcep. There are even current reports which wonder if training for vacuum operative vaginal deliveries will also become scarce.<sup>10</sup> Both of these trends may mean that most women feel that operative vaginal deliveries are the lesser option compared to a Cesarean delivery. Unfortunately, this survey did not compare those two options directly, but it would be an interesting follow up study.

A minority ethnicity did show less favorable attitudes towards forceps, and these are worth exploring briefly. African Americans consistently show poorer outcomes in pregnancy compared to their white counterparts.<sup>11,12,13</sup> They also experience bias and prejudice in the medical system.<sup>14,15</sup> Historical cases such as the Tuskegee syphilis experiment have created reasons for distrust of medical professionals within the African American community.<sup>16</sup> These reasons may all be working to create even more unfavorable impressions towards the obstetric forceps, a tool which already comes with significant debate about its use.

Hispanics and Other ethnicity may have shown unfavorable attitudes due to larger representation of immigrants within those ethnic groups. For example, immigrants in the Netherlands reported issues of communication, autonomy, and respect.<sup>17</sup> An Australian sponsored study looked at 5 host countries with significant immigrant populations and also found issues with communication and discrimination.<sup>18</sup> In

the United States, cases of anti-immigrant bias are no less common and can be seen in Hispanic, Asian, and other ethnicity groups.<sup>19</sup> These examples of problematic communication likely contribute to distrust of medical professionals or the health care system by these ethnicity groups.<sup>16,20</sup>

Our analysis of educational background suggested that only the least educated group, those without a high school diploma, were especially skeptical of forceps. This is likely due to lower health literacy. Lower levels of education are highly predictive of low health literacy.<sup>21</sup> In turn, prior studies have shown that lower health literacy is linked to lower levels of trust in physicians.<sup>22,23</sup>

The subgroup analysis of insurance status showed expected and unexpected findings. Prior studies show that patients with Medicare or Medicaid have lower health literacy than patients with private insurance.<sup>24,25</sup> Similarly, studies of self-insured patients have also shown lower health literacy,<sup>25</sup> and that they tend to avoid participating in clinical trials or research studies due to safety concerns.<sup>26,27</sup> However, in this study, self-insured patients had favorable views of forceps (Q1, 58% favorable) while government-insured patients had unfavorable views of forceps (Q1, 31% favorable). Demographically, both subgroups had similar ethnicity and education levels. Lower levels of health literacy about forceps would explain why government-insured patients had unfavorable attitudes, but it would not explain our self-insured patients' attitudes. This subgroup may require further study as our sample size of self-insured patients was small.

Age surprisingly did not produce expected statistical differences. Teenagers would be expected to have the lowest health literacy, and they did show the least favorable attitudes towards forceps. However, the low numbers of teenagers likely played a role in the absence of a statistical finding. We did find a statistically lower number of age 30–39 patients who believed that forceps delivery could reduce the Cesarean delivery rate (Q4, OR 0.62 [0.4,0.9]), but this was isolated and the other age categories did not support a trend. It is worth noting that age > 39 produced an unfavorable attitude similarly as teenagers towards trainees practicing on live-models in our study. Many women who are advanced maternal age consider themselves “high risk” and may seek to reduce any risk to their pregnancy outcomes.<sup>28</sup> This could easily include allowing trainees to participate in their care or delivery. More study is likely needed on the effect of age on attitudes towards medical trainees' education.

There are several strengths to this study. To our knowledge, there have been no studies conducted that document patient perception towards forceps. The demographic population of the patients who completed the survey is applicable to university settings. There were enough respondents to confidently determine if a difference existed. Additionally, the survey layout was simple and easy to understand, therefore most surveys had answers to every question. This study is subject to several limitations. We did not include parity or prior operative delivery in our survey, and both of these may impact patient perspective of forcep use. Our results might not be generalizable outside of a University setting. Community training programs may have a different set of assumptions governing clinical care and training protocols. Additionally, survey data is subject to a responder's bias, which may skew results.

## Conclusion

In summary, this study demonstrated that women's attitudes towards forceps at the University of Kansas Medical Center are generally negative and affected by several demographic characteristics. Improving patient perception of forceps would require multiple different strategies rather than a single focused easily-implemented message. More research is needed to determine if this negativity exists at other academic hospitals as well or if there is a particular subset of patients who would be most receptive to the idea of forceps continuing to be used in modern obstetric practice. It seems likely that forceps training for future generations of obstetricians will have to depend on the altruism and sacrifice of these women.

## Abbreviations

OBGYN: Obstetrics and gynecology, Q1-5: question 1-5.

## Declarations

## Ethical Approval and consent to participate:

The institutional review board of the University of Kansas considered this study exempt from IRB approval as activities were related to program improvement for the residency. Consent from the participants was not required as the surveys were anonymous.

### Consent for publication:

Not applicable.

### Availability of data and materials:

All data generated or analyzed during this study are included in this published article as supplemental material.

### Competing Interests:

The authors report no conflict of interest

## Funding:

None declared

## Authors contributions:

Our research team consistent of 3 faculty members and 2 medical students. GL originated the project, confirmed that an IRB was not needed, analyzed the data, and helped co-write the manuscript. JH input most of the data, assisted with analysis, and wrote the bulk of the manuscript. AM and NA helped create the survey, assisted with analysis, and provided editorial comments in the manuscript. JD input data, assisted with analysis, and provided editorial comments. All authors read and approved the final manuscript.

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