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Original Research

The Impact of the *Dobbs* Decision on Access to Gender Diverse Care at a Midwest Academic Health Center

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ABSTRACT

Introduction. The *Dobbs* decision returned the regulation of abortion to individual states. In the Midwest, several legislative efforts have included restrictions on both abortion and gender-affirming care. Clinics that provide abortion services sometimes offer gender-affirming care. Given this intersection, recent laws restricting abortion may have unintended consequences for access to gender-affirming care in the Midwest.

Methods. Authors of this retrospective study analyzed medical records of patients seen at a Midwestern health center. We included patients aged 18 or older who attended a new patient visit at either the gender diversity clinic (GDC) or the general gynecology (GYN) clinic between July 1, 2021 and June 30, 2023. We used generalized estimating equations to assess changes in wait times and distance traveled pre- vs. post-*Dobbs*. Differences in new patient volume were analyzed using Poisson regression.

Results. We reviewed 5,260 charts, 4,552 from the GYN clinic and 708 from the GDC. Following *Dobbs*, the GYN clinic experienced a 6% increase in new patients, while the GDC saw a 21% increase ($p < 0.001$). The average wait time for a GYN appointment increased by two days, whereas the wait time for GDC appointments decreased by 21 days. The average distance traveled by new GYN patients decreased by 6.3 miles ($p < 0.001$), while distance for GDC patients increased by 2.5 miles ($p = 0.738$).

Conclusions. Patients continue to seek gender-affirming care in the post-*Dobbs* landscape. Despite an increase in patient volume, wait times for gender diversity appointments decreased, likely reflecting expanded appointment availability around the time of the *Dobbs* decision.

INTRODUCTION

In the Midwest, abortion care frequently is provided at free-standing family planning clinics. In addition to abortion and contraception services, these clinics offer primary care, sexually transmitted infection (STI) testing, and transgender hormone therapy and gender-affirming care.[1] On June 24, 2022, the *Dobbs v. Jackson Women's Health Organization* decision by the U.S. Supreme Court returned abortion regulation to individual states, effectively overturning the constitutional right to abortion.[2,3] In the aftermath of *Dobbs*, family planning clinics in states where abortion remained legal saw a sharp increase in patient volume.[4] As a result, these clinics likely had to adjust the availability of care for patients with non-abortion-related needs, including gender-affirming services.

General gynecology (GYN) clinics provide comprehensive women's health services, addressing concerns from menarche to menopause, including pregnancy, menstruation, and preventive care. Some GYN clinics also may provide pregnancy-related services, including abortion, while others do not. In certain clinics, providers may offer gender-affirming care, such as hormone therapy, surgical consultation, and preventive services, but this is not typically expected or guaranteed. GYN clinics are not always welcoming environments for gender-diverse individuals. For example, a waiting room full of pregnant patients may feel unwelcoming or dysphoric for a transgender person.

In contrast, gender diversity clinics (GDCs) are designed to offer affirming care to gender-diverse patients and provide a wide range of services in one location. These clinics typically feature providers experienced in caring for the gender-diverse community and have established networks for in-house or local referrals, including electrolysis technicians, voice coaches, and cosmetic or gender-affirming surgeons.

After *Dobbs*, several Midwestern states enacted legislation restricting or banning abortion, and in some cases, transgender care. In 2019, the Kansas Supreme Court upheld the right to access abortion up to 22 weeks gestation.[5-7] However, as of 2017, only four clinics in the state publicly offered abortion care.[7] Following *Dobbs*, Kansas became a referral hub for patients from surrounding states with near-total abortion bans, including Missouri, Texas, Oklahoma, Nebraska, and Arkansas. In Missouri, House Bill 126 banned abortion except in medical emergencies.[8] In Texas, Chapter 170A implemented a near-total ban on abortion.[9] The number of pregnant individuals traveling out of Texas for abortion care has increased tenfold.[10] Kansas clinics have anecdotally reported a significant rise in patients from Texas. Oklahoma's 1910 law classifies performing or aiding an abortion as a felony.[11] Arkansas enacted a similar trigger law banning nearly all abortions.[12] In Nebraska, LB574 bans abortion after 12 weeks and, as of October 2023, restricts puberty blockers and prohibits gender-affirming surgeries for minors.[13]

We hypothesized that as family planning clinics adjusted to increased abortion-related care demands, they became less available to provide gender-affirming care, prompting patients to seek services elsewhere. To our knowledge, no existing literature has evaluated this trend. This study aimed to assess whether abortion restrictions in the Midwest indirectly affected access to gender-affirming care. Specifically, we examined changes in wait times and distance traveled for new patient visits to a GDC at a large academic health center before and after the *Dobbs* decision. We compared these patterns with those seen at the same institution's general GYN clinic, anticipating that gender-diverse patients may now be traveling farther and waiting longer to access care.

METHODS

We conducted a retrospective cohort study of patients accessing gender diversity care at The University of Kansas Health System. The

study included patients aged 18 or older who were seen for a new patient appointment in the GDC between July 1, 2021 and June 30, 2023. This two-year period was selected to enable a year-long comparison of pre- and post-*Dobbs* data within an academic calendar. New patient appointments at the GYN clinic served as the control group (Figure 1).

We evaluated and compared wait times and clinic distance (defined as the distance from a patient's home to either the GDC or the main campus GYN clinic) for both clinics during the pre- and post-*Dobbs* time frames. All eligible patients seen at either clinic during the study period were included in the analysis.

Patient charts were identified using the Healthcare Enterprise Repository for Ontological Narration (HERON), a query tool that accesses de-identified data from the electronic medical record.[14] A retrospective chart review was conducted to collect the following variables: demographics (age, insurance, race, ethnicity, marital status), home ZIP code and county, date of initial intake (phone or office contact) for scheduling, date of the new patient appointment, and visit type (in-person or telemedicine).

Statistical Analyses. We summarized patient characteristics using descriptive statistics (frequencies, means, medians). Differences in travel distance (miles) and wait time (days) by clinic type and time frame (pre- vs. post-*Dobbs*) were assessed using generalized estimating equations. Models controlled for visit type (telemedicine vs. in-person) and included an interaction term for clinic type × *Dobbs* period.

We also summarized the number of patients seeking care at the GDC by county during each time frame. These data were used to create a choropleth map, displaying quintiles of patient prevalence to visualize geographic changes in access to care before and after the *Dobbs* decision.

Lastly, we assessed changes in monthly and annual new patient volume at both clinics using Poisson regression analysis.

All statistical analyses were conducted using SAS Version 9.4 (SAS Institute, Cary, NC, USA). Mapping analyses were performed in ArcGIS Pro 3.1 (ESRI, Redlands, CA, USA). The study was approved by The University of Kansas Medical Center Institutional Review Board (IRB).

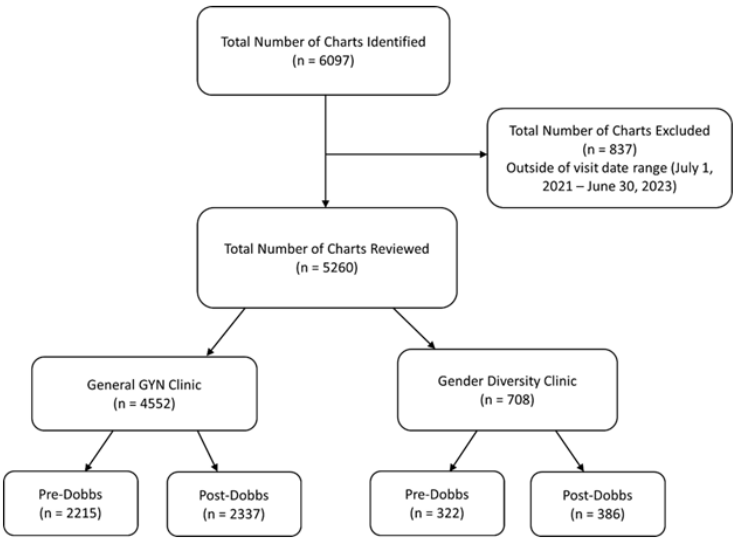


Figure 1. Flow diagram of study participants included in data analysis.

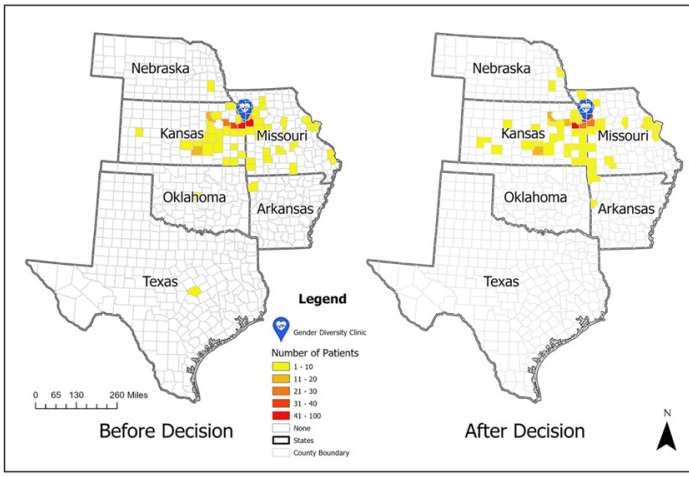
RESULTS

We identified 6,097 patient charts for review. Of these, 837 were excluded for not meeting the date range inclusion criteria, leaving 5,260 charts for analysis. Among them, 708 were from new patients seen at the GDC, and 4,552 were from the GYN clinic.

The average age of patients at the GDC was 29 years, 10 years younger than the average age of 39 years in the general GYN clinic (Table 1). Patients at the GDC primarily were Caucasian and single, whereas the GYN clinic had a more racially diverse and more frequently married patient population. Most visits to the GDC were via telemedicine, while visits to the GYN clinic were primarily in-person.

Insurance distribution was similar between clinics for private insurance. However, the GYN clinic had a higher proportion of patients with public insurance (16% vs. 13%), while the gender diversity clinic had more self-pay patients (5% vs. 3%).

There was no statistically significant change in distance traveled to the clinic for patients in the GDC before and after the *Dobbs* decision (β = 2.5; 95% CI, -11.9 to 16.8). In contrast, patients at the GYN clinic traveled an average of 6.3 fewer miles post-*Dobbs* (β = -6.3; 95% CI, -12.0 to -0.5). An interaction model, controlling for visit type, found a statistically significant decrease in distance traveled of 6.4 miles for GDC patients compared to GYN patients (β = -6.4; 95% CI, -6.8 to -6.4). Figure 2 illustrates the geospatial distribution of patients seeking gender-affirming care before and after *Dobbs*.



State	Pre-Dobbs Count	Post-Dobbs Count	Percent Change
Nebraska	1	10	+900%
Kansas	181	233	+29%
Missouri	130	138	+6%
Oklahoma	1	0	- 100%
Arkansas	2	3	+50%
Texas	1	0	- 100%

Figure 2. Geospatial distribution and percent change in patients attending a visit at The University of Kansas Medical Center gender diversity clinic before and after *Dobbs*.

Table 1. Characteristics of patients seeking gender diversity and general gynecology care at a Midwest academic center.

	Gynecology Clinic N = 4,552			Gender Diversity Clinic N = 708		
Demographic Variable	**Total Population N = 4,552**	**Pre-Dobbs n = 2,215**	**Post-Dobbs n = 2,337**	**Total Population N = 708**	**Pre-Dobbs n = 322**	**Post-Dobbs n = 386**
Age, mean (SD)[a]	38.9 (15.2)	39.1 (15.4)	38.7 (15.0)	28.5 (10.7)	29.5 (11.0)	27.8 (10.4)
Insurance, n (%)[a,b,c]						
Private	3,698 (81.4)	1,825 (82.4)	1,873 (80.1)	583 (82.3)	274 (85.1)	309 (80.1)
Public	733 (16.1)	341 (15.4)	392 (16.8)	90 (12.7)	40 (12.4)	50 (13.0)
Self-Pay	121 (2.7)	49 (2.2)	72 (3.1)	35 (4.9)	8 (2.5)	27 (7.0)
Race, n (%)[c]						
African American	724 (15.9)	342 (15.4)	382 (16.4)	34 (4.8)	17 (5.3)	17 (4.4)
American Indian/Alaska Native	21 (0.5)	14 (0.6)	7 (0.3)	7 (1.0)	1 (0.3)	6 (1.6)
Asian	129 (2.8)	71 (3.2)	58 (2.5)	17 (2.4)	7 (2.2)	10 (2.6)
Native Hawaiian or Other Pacific Islander	10 (0.2)	6 (0.3)	4 (0.2)	2 (0.3)	2 (0.6)	0 (0.0)
Caucasian	2,913 (64.0)	1,416 (63.9)	1,497 (64.1)	589 (83.2)	265 (82.3)	324 (83.9)
Not otherwise specified	710 (15.6)	344 (15.5)	366 (15.7)	52 (7.3)	27 (8.4)	25 (6.5)
Not reported	52 (1.0)	22 (1.0)	23 (1.0)	7 (1.0)	3 (0.9)	4 (1.0)
Ethnicity, n (%)[c]						
Hispanic or Latino	597 (13.1)	291 (13.1)	306 (13.1)	37 (5.2)	11 (3.4)	26 (6.7)
Not Hispanic or Latino	3,883 (85.3)	1,888 (85.2)	1,995 (85.4)	654 (92.4)	301 (93.5)	353 (91.5)
Not reported	72 (1.6)	36 (1.6)	36 (1.5)	17 (2.4)	10 (3.1)	7 (1.8)
Marital status, n (%)[c,d]						
Single	2,086 (45.8)	1,029 (46.4)	1,057 (45.2)	419 (59.2)	218 (67.7)	201 (52.1)
Married	1,980 (43.5)	949 (42.8)	1,031 (44.1)	126 (17.8)	63 (19.6)	63 (16.3)
Not reported	32 (0.7)	15 (0.7)	17 (0.7)	99 (14.0)	6 (1.9)	93 (24.0)
Divorced	309 (6.8)	150 (6.8)	159 (6.8)	41 (5.8)	26 (8.1)	15 (3.9)
Life partner	54 (1.2)	26 (1.2)	28 (1.2)	23 (3.3)	9 (2.8)	14 (3.7)
Widowed	91 (2.0)	46 (2.1)	45 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
Visit type, n (%)[c,e]						
Clinic	3,766 (82.7)	1,790 (80.8)	1,976 (84.6)	35 (4.9)	20 (6.2)	15 (3.9)
Telemedicine	786 (17.3)	425 (19.2)	361 (15.5)	673 (95.1)	302 (93.8)	371 (96.1)

[a]p <0.05 for pre- vs. post-*Dobbs*, Gender Diversity Clinic.
[b]p <0.05 for pre- vs. post-*Dobbs*, Gynecology Clinic.
[c]p <0.01 for Gynecology Clinic vs Gender Diversity Clinic.
[d]p <0.01 for pre- vs. post-*Dobbs*, Gender Diversity Clinic.
[e]p <0.01 for pre- vs. post-*Dobbs*, Gynecology Clinic.

Table 2. Distance from clinic and wait time by clinic pre- and post-*Dobbs* at a Midwest academic center and results from generalized estimating equation models.

	GYN Clinic			Gender Diversity Clinic			
Variable	Pre-*Dobbs*	Post- *Dobbs*	β (95% CI)[a]	Pre-*Dobbs*	Post-*Dobbs*	β (95% CI)[b]	β (95% CI)[c]
Distance traveled in miles, mean (SD)	37.3 (117.7)	29.7 (79.1)	-6.3 (-12.0, -0.5)	73.3 (111.9)	74.7 (84.1)	2.5 (-11.9, 16.8)	-6.4 (-6.8, -6.0)
Wait time in days, mean (SD)	42.9 (38.1)	45.4 (39.8)	1.9 (-0.4, 4.1)	55.0 (50.4)	33.9 (27.6)	-21.2 (-27.0, -15.3)	1.9 (1.8, 2.0)

[a]Beta coefficient and 95% confidence interval calculated from generalized estimating equation model controlling for visit type (telemedicine vs. in-person) evaluating the change in each outcome by *Dobbs* among patients seeking care in the general GYN clinic. Pre-*Dobbs* = reference group.
[b]Beta coefficient and 95% confidence interval calculated from generalized estimating equation model controlling for visit type (telemedicine vs. in-person) evaluating the change in each outcome by *Dobbs* among patients seeking care in the gender diversity clinic. Pre-*Dobbs* = reference group.
[c]Beta coefficient and 95% confidence interval for interaction term (*Dobbs**clinic) in generalized estimating equation model controlling for visit type (telemedicine vs. in-person). Pre-*Dobbs* = reference group.

A breakdown by state showed an increase in patients seeking gender-affirming care post-*Dobbs* in Kansas (181 to 233), Missouri (130 to 138), Nebraska (1 to 10), and Arkansas (2 to 3). Conversely, the number of patients from Oklahoma and Texas dropped from 1 to 0 in each state.

Regarding appointment wait times, there was no statistically significant change in either clinic. The GYN clinic saw a small, non-significant increase in wait time (β = 1.9; 95% CI, -0.4 to 4.1), while the GDC showed a non-significant decrease (β = -21; 95% CI, -27.9 to 15.3; Table 2). However, the interaction model, again controlling for visit type, revealed a statistically significant increase of two days in wait time for the GDC compared to the GYN clinic (β = 1.9; 95% CI, 1.8 to 2.0).

Poisson regression analysis demonstrated statistically significant differences in new patient volume between clinics before and after *Dobbs*. The GYN clinic experienced a 6% increase in new patients (from 2,215 to 2,337), while the GDC saw a 21% increase (from 322 to 386; p <0.001).

DISCUSSION

Post-*Dobbs*, we observed a significant increase in patients establishing gender-affirming care, in contrast to more modest volume changes in the GYN clinic. While wait times in the GDC decreased by 21 days, this change was not statistically significant. However, a repeated measures model found a two-day increase in wait time relative to the GYN clinic, coinciding with a 21% increase in new patient volume. This small increase likely reflects expanded clinic capacity rather than access delays. To meet demand, the GDC increased from six half-days covered by four providers to nine half-days covered by six providers post-*Dobbs*.

Importantly, the distance traveled by patients to the GDC did not increase significantly. Its location on the Kansas–Missouri border near Kansas City likely contributed to sustained accessibility. Post-*Dobbs*, there was a 29% increase in Kansas-based patients and a 900% increase from Nebraska, with no patients from Texas or Oklahoma-suggesting reduced access or increased legal barriers in those states.

Transgender and gender-diverse individuals already face significant barriers to care, which are exacerbated in regions where gender-affirming services are limited or legally restricted.[15] Many Midwest clinics have ceased providing these services following legislation like Missouri's SAFE Act (SB 49), which bans gender transition procedures for minors and excludes coverage under Medicaid.[16,17] Such laws compound access challenges for an already marginalized population.[18]

Abortion and gender-affirming care are increasingly linked in legislative discourse.[18] Since *Dobbs*, over 500 anti-LGBTQ+ bills have been introduced in 40 states, many targeting gender-affirming care.[19] In Alabama, similar legal rationale from *Dobbs*, that gender transition care lacks historical precedent, has been cited to justify bans.[20]

Figure 3 highlights the overlap of restrictive laws targeting both types of care. These policy trends risk reducing availability of essential services and may contribute to the creation of regional care deserts.

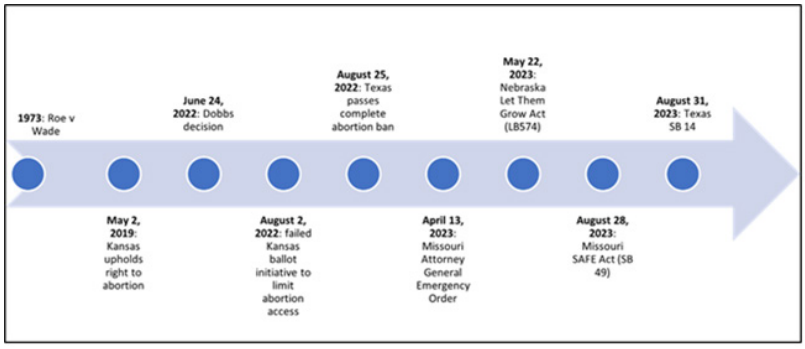


Figure 3. Timeline of select bills restricting or banning abortion and gender affirming care.

Limitations. This single-center, retrospective study has limitations, including potential selection bias and reliance on estimated zip code distances rather than actual travel routes. Only patients who scheduled and attended visits were included, potentially excluding those unable to access care. Additionally, the observed wait time changes are difficult to interpret considering increased provider availability post-*Dobbs*, which may have contributed to the rise in new patient volume.

CONCLUSIONS

Providers have reported that many new patients seeking gender-affirming care relocated or transferred care to Kansas due to safety concerns post-*Dobbs*. Kansas City, a region that has resisted legislative bans, may be perceived as a "safe haven" for gender-affirming care.[21-23] However, this shift raises concern for patients unable to move. As legal restrictions limit provider's ability to provide comprehensive health care by state, care deserts may emerge, especially for marginalized groups such as transgender patients.

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Keywords: abortions, legal; gender-affirming care; gynecology; sexual and gender minorities

KANSAS JOURNAL of MEDICINE

Brief Report

Knowledge Gaps of Professionals Regarding Infant Safe Sleep Recommendations: Qualitative Evaluation of Topics Learned

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ABSTRACT

Introduction. To reduce Sudden Unexpected Infant Death (SUID), the Kansas Infant Death and SIDS Network offered a series of two-day Safe Sleep Instructor (SSI) certification trainings. These sessions aimed to educate health care and related professionals on the American Academy of Pediatrics (AAP) evidence-based safe sleep recommendations.

Methods. A secondary analysis of qualitative data was conducted using responses to a single open-ended question on the post-training assessment. Participants were asked to list three specific things they learned during the training. All Fiscal Year 2023 participants (N = 67) responded. Two trained coders independently analyzed responses using *a priori* codes derived from the 2022 AAP Safe Sleep Recommendations and key concepts from the Safe Sleep Instructor training. Inter-rater reliability was assessed using Cohen's kappa.

Results. A total of 205 comments were collected from 67 participants, who self-identified as nurses, social workers, home visitors, early childhood professionals, parent educators, and others. Cohen's kappa indicated substantial agreement ($\kappa = 0.87$; 95% CI, 0.77-0.87; $p < 0.001$). The most frequently cited AAP-related topics were temperature regulation (13%, n = 27) and the recommendation for a separate sleep surface (10%, n = 21). Additionally, 12% (n = 24) of responses aligned with key training concepts, while 11% (n = 23) were categorized as "other." No clear patterns in knowledge acquisition emerged within specific professional groups (e.g., nurses).

Conclusions. The presence of pre-training knowledge gaps related to safe sleep practices highlights the importance of comprehensive, evidence-based educational programs for professionals involved in perinatal and infant care.

INTRODUCTION

Healthy People 2030 reported an infant mortality rate of 5.4 deaths per 1,000 live births in 2021, with a target of reducing this to 5.0 per 1,000 by 2030.[1] Sudden Unexpected Infant Death (SUID)[2] contributes significantly to these mortality rates and encompasses all sudden and unexpected infant deaths, whether from explained causes such as injuries or accidents, or from unknown origins. In Kansas, SUID was the second leading cause of infant death from 2017 to 2021, accounting for 20.8% of all infant deaths.[3] Despite ongoing efforts, the persistence of these numbers highlights the need for more targeted and effective interventions.

One such intervention is broader dissemination of the 2022 American Academy of Pediatrics (AAP) *Recommendations for Reducing Infant Deaths in the Sleep Environment* (hereafter referred to as the Safe Sleep Recommendations).[4] These evidence-based guidelines, updated every five years, are grounded in the triple risk model.[5] This model suggests that the risk of SUID is highest when three factors overlap: intrinsic vulnerability (e.g., prematurity or genetic predisposition), exogenous stressors (e.g., tobacco exposure), and a critical period of development (typically one to four months of age). The AAP's Safe Sleep Recommendations focus primarily on modifiable exogenous factors.

To promote implementation of these guidelines, the Kansas Infant Death and SIDS (KIDS) Network offers a two-day Safe Sleep Instructor (SSI) certification training. The program covers the current AAP Safe Sleep Recommendations and provides strategies for educating professionals, parents, caregivers, and individuals involved in perinatal care.[6] Previous evaluations of this training have shown significant increases in participant awareness of SUID risk-reduction strategies.[7,8] However, less is known about broader knowledge gaps not captured by standard pre/post-training knowledge assessments.

To address this, authors of this study analyzed qualitative data from the SSI training evaluation to identify pre-training knowledge gaps related to the 2022 AAP Safe Sleep Recommendations. The aim was to assess new learning across both the evidence-based content and the communication strategies taught, with the goal of informing future improvements to the training curriculum.

METHODS

Participants. Eligible participants were individuals who attended the SSI training sessions held on September 29-30, 2022 and May 18-19, 2023, and completed the post-training survey.

Instrument. The post-training survey, developed by the program evaluation team and reviewed by content experts, included 10 multiple-choice knowledge questions (reported elsewhere) and open-ended items. This study focused on responses to one open-ended question designed to assess new knowledge gained during the training. The format allowed participants to provide unrestricted feedback on specific areas of learning. Demographic data were limited to self-reported occupation; no additional demographic information was collected.

Procedures. The University of Kansas Medical Center Institutional Review Board (IRB) determined that this secondary analysis of deidentified data did not constitute human subjects research. Participants completed the post-training survey on the second day of training. KIDS Network staff entered deidentified responses into REDCap® (Research Electronic Data Capture®), a secure, web-based application hosted at The University of Kansas Medical Center.[9,10] Evaluation staff downloaded the qualitative data and forwarded it to two trained coders for analysis. Coders independently applied predefined (*a priori*) codes to

the responses. These codes were based on two sources: (1) the 2022 AAP Safe Sleep Recommendations[4] and (2) key training concepts from the SSI certification, which support effective communication of AAP guidelines. The AAP guideline on sleep location was divided into three separate categories: location, separate surface, and location plus separate surface, resulting in 24 categorical variables (Table 1; available online at journals.ku.edu/kjm).

Statistical Analysis. Categorical variables were reported as frequencies and percentages. Cohen's kappa was used to assess inter-rater agreement for coded categories (SPSS Version 26, IBM® Corp). After reliability was calculated, discrepancies in coding were flagged, and coders resolved them during a one-hour video conference.

RESULTS

Participants (N = 67) self-identified as at least one of the following, with many selecting multiple roles: home visitor (n = 65; 25.4%), nurse (n = 54; 21.1%), early childhood professional (n = 47; 18.4%), social worker (n = 33; 12.8%), parent educator (n = 26; 10.2%), and other (n = 31; 12.1%). The "other" category included roles such as administrator, community engagement coordinator, clerk, community health worker, daycare/childcare provider, trainer, family resource specialist, law enforcement officer, obstetrical navigator, and professional training specialist.

Participants provided between one and six comments each, resulting in a total of 205 comments for coding and analysis.

Cohen's kappa was 0.82 (95% CI: 0.77-0.87; p <0.001), indicating substantial inter-rater agreement. The most frequently cited categories were temperature (13%), SSI training components (12%), and "other" (11%); the latter included items that did not align with established coding definitions.

By role, nurses (8/54; 15%), home visitors (12/65; 18%), and early childhood professionals (5/47; 11%) most frequently reported learning about temperature regulation. Social workers (6/33; 18%) most often reported gaining knowledge about separate sleep surfaces. Parent educators (3/26; 12%) most frequently cited learning about firm, flat, non-inclined sleep surfaces as well as separate sleep surfaces.

DISCUSSION

The purpose of this study was to assess the extent of new knowledge acquired by SSI trainees, focusing on both evidence-based guidelines and strategies for effectively communicating those guidelines. By analyzing participant comments and reported learning patterns, the authors gained insight into how well the training enhanced understanding of infant safety practices. Identifying knowledge gaps is essential for developing effective curricula to improve learning outcomes. Findings from this study suggest that comprehensive training programs focused on evidence-based recommendations for reducing the risk of SUID remain necessary.

Awareness of 2022 AAP Recommendation Updates. Few participants referenced specific updates from the 2022 AAP guidelines, such as the use of a non-inclined sleep surface, as newly acquired knowledge. Several trainees, however, identified long-standing recommendations (e.g., same room but separate bed) as new information, despite their inclusion in earlier guideline iterations.[11,12] This lack of awareness underscores the importance of training programs that not only highlight updated content but also reinforce foundational recommendations to address persistent knowledge gaps.

Key Training Concepts. In addition to specific AAP recommendations, 14% of participant responses focused on key training concepts. These included practical tools such as the "ABCs of Safe Sleep" mnemonic and strategies for tailoring educational content to different populations. These findings highlight the dual importance of evidence-based knowledge and practical communication strategies in ensuring that professionals are equipped to apply and convey safe sleep guidelines effectively.

Addressing Knowledge Gaps Among Professionals. While no clear patterns emerged across occupational groups, the highest proportions of nurses, home visitors, and early childhood professionals identified temperature-related guidance as new learning. This suggests that even professionals routinely engaged in infant care may lack awareness of specific recommendations. The finding reinforces the importance of including detailed, nuanced content in trainings to ensure that all professionals, regardless of background or experience, receive comprehensive, accurate information to share with families and caregivers.

Implications for Public Health. These findings have important implications for public health efforts aimed at reducing SUID. Despite widespread dissemination of AAP guidelines, previous studies have shown that professionals continue to model and recommend practices, such as prone positioning, that increase SUID risk.[13] The present study similarly reveals knowledge gaps among experienced, multidisciplinary professionals. The fact that all participants reported learning something new related to infant sleep underscores the value of ongoing, structured training. Ensuring that professionals are well-informed and confident in communicating safe sleep recommendations is essential for supporting families and mitigating SUID risk.

Strengths. This study has several strengths. The use of qualitative data provided valuable insights into the types of knowledge gained, insights that may not be captured through quantitative assessments alone. The inclusion of participants from multiple disciplines enabled identification of learning needs across professional roles, helping to inform more tailored training strategies. Additionally, the use of a structured codebook based on *a priori* codes grounded the analysis in established, evidence-based guidelines. Substantial inter-rater reliability (Cohen's kappa = 0.82) further supports the consistency and credibility of the coding process.

Limitations. Several limitations should be noted. The study was conducted in a single geographic location, which may limit generalizability. The relatively small sample size and reliance on self-reported data introduce the potential for bias, including social desirability and recall bias.[14] Additionally, the lead evaluators' affiliation with the KIDS Network could have influenced data interpretation. To mitigate this risk, neither of the independent coders had prior involvement with the KIDS Network or the evaluators.

CONCLUSIONS

This study contributes to the ongoing evaluation of the SSI certification trainings by identifying knowledge gaps among trainees. These findings underscore the need for continued initiatives that effectively communicate evidence-based guidelines to professionals across the continuum of care. Such trainings are essential for all levels of providers, including experienced nurses and frontline perinatal professionals, to ensure a thorough understanding and consistent implementation of safe sleep practices. Ongoing research and evaluation are important to ensure that child safety practices remain aligned with the most current guidelines and recommendations.

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Brief Report

Bridging the Gap from Classroom to Clerkship to Career: Informal Surgical Mentorship for Pre-Clerkship Medical Students

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ABSTRACT

Introduction. Mentorship is important in medical education, yet its specific impact on pre-clerkship medical students interested in surgery remains underexplored. We hypothesized that a formal but unstructured surgical mentorship program would increase students' interest in surgery and improve their self-perceived readiness for the third-year surgical clerkship.

Methods. In this before–after study, pre-clerkship students at The University of Kansas School of Medicine were paired with volunteer surgical faculty mentors. An initial one-on-one meeting was required, while the frequency and structure of subsequent meetings were left to the participants. Surveys assessing student confidence and perceptions of the program were administered via Research Electronic Data Capture® (REDCap®) before the program and again six months later. Changes were analyzed using the Wilcoxon rank sum test for independent groups ($p < 0.05$).

Results. Of the 47 students enrolled, 31 (66.0%) completed the pre-program survey, and 24 (51.1%) of these completed the post-program survey. After six months, students reported significantly greater confidence in their preparation and knowledge for the third-year surgical clerkship, surgical skills, and understanding of surgical career pathways. More students also identified potential residency letter writers. However, 87.5% of respondents reported inconsistent mentor-mentee meetings.

Conclusions. A formal yet unstructured surgical mentorship program significantly improved pre-clerkship students' confidence in pursuing a surgical career and preparing for the surgical clerkship. Despite inconsistent meeting frequency, the program enabled meaningful mentorship without requiring rigid scheduling or extensive time commitments from participants.

INTRODUCTION

Mentorship is a cornerstone of surgical education, offering both mentees and mentors the opportunity to navigate medical careers collaboratively. In surgical training, mentorship has been shown to improve career satisfaction and reduce stress and burnout.[1-3] During residency, it enhances diversity, scholarly productivity, and long-term professional fulfillment.[4] Among medical students, mentorship may increase match rates into surgical residency programs[5] and provides valuable, tailored guidance on applications.[6] Early mentorship relationships are foundational for building resilience and long-term success in medical training.[5,7,8]

Despite these benefits, many students struggle to find mentors during their pre-clerkship years (the first two years of medical school).[9,10] Existing research on medical student mentorship programs primarily focuses on the clerkship years (the last two years of medical school), with limited attention to pre-clerkship students.[7,11] With the United States Medical Licensing Examination® (USMLE®) Step 1 now scored pass/fail, students may feel increased pressure to commit to a specialty early and pursue experiences that strengthen their competitiveness for surgical residencies.[12]

To address this gap, we developed a mentorship program designed to connect pre-clerkship students with general surgeons and subspecialists. The primary goal was to assess the program's impact on students' attitudes toward surgery, perceived readiness for the surgical clerkship, and potential career pathways. A secondary aim was to evaluate the program structure for areas of improvement.

METHODS

Surgical faculty from a single academic institution was invited to participate as mentors. All pre-clerkship students were invited to apply and rank their preferences for specific surgical subspecialties. Mentor-mentee pairings were based on student preference and mentor availability. The institutional review board (IRB) approved the study as exempt, and written informed consent was waived.

All student participants completed a pre-program survey and were required to attend an initial one-on-one meeting with their assigned mentor. Subsequent interactions, including additional meetings, shadowing, and research opportunities, were left to the discretion of each mentor-mentee pair. A post-program survey was administered six months later; however, the duration of the mentorship relationship was not fixed, allowing pairs to continue or conclude their interactions beyond that timeframe.

The survey included 31 Likert-scale questions developed by the research team to assess five domains: (1) interest in surgery, (2) self-perceived readiness for the third-year surgical clerkship, (3) perceived knowledge of surgical skills and techniques, (4) confidence in achieving surgical career goals, and (5) perceived importance of mentorship in surgical education (Table 1). These outcome domains align with previous studies that showed improved clerkship performance and increased surgical residency application rates.[7,11]

No existing validated instrument fully captured the intended constructs; therefore, the survey was developed based on a literature review and expert input from surgical faculty. Student focus groups provided feedback to refine question wording, improve clarity, and eliminate ambiguity. Data were collected and managed using Research Electronic Data Capture® (REDCap®) hosted at The University of Kansas Medical Center.[13,14]

To minimize participant burden, mentors were not surveyed. No identifying information was collected to preserve anonymity, including linkages between pre- and post-surveys, which precluded the use of paired statistical tests. Consequently, the Wilcoxon rank sum test for independent groups was used to assess differences in Likert-scale responses. Fisher's exact tests were used to compare categorical responses, and Mann-Whitney *U* tests were used for continuous variables. All analyses were performed using R (version 4.2.1), with statistical significance set at $p < 0.05$. No *a priori* power analysis was conducted.

Table 1. Surgical mentorship program survey responses.

Characteristic	Pre-Program, N = 31[a]	Post-Program, N = 24[a]	p-Value[b]
Q1: What is your current year in medical school?			0.180
First Year Medical Student	27 (87.1%)	17 (70.8%)	
Second Year Medical Student	4 (12.9%)	7 (29.2%)	
Q2: I am sure I want to pursue a surgical specialty for residency.			0.877
Strongly Agree	10 (32.3%)	9 (37.5%)	
Agree	10 (32.3%)	6 (25.0%)	
Disagree	0 (0.0%)	1 (4.2%)	
Strongly Disagree	0 (0.0%)	1 (4.2%)	
Undecided	11 (35.5%)	7 (29.2%)	
Q3: I feel confident that I am on the right track to match into a surgical specialty for residency.			0.803
Strongly Agree	2 (6.5%)	4 (16.7%)	
Agree	13 (41.9%)	10 (41.7%)	
Disagree	2 (6.5%)	2 (8.3%)	
Strongly Disagree	0 (0.0%)	1 (4.2%)	
Undecided	14 (45.2%)	7 (29.2%)	
Q4: I feel prepared for the 3rd-year surgical clerkship.			0.001
Strongly Agree	0 (0.0%)	4 (16.7%)	
Agree	1 (3.2%)	8 (33.3%)	
Disagree	11 (35.5%)	4 (16.7%)	
Strongly Disagree	2 (6.5%)	1 (4.2%)	
Undecided	17 (54.8%)	7 (29.2%)	
Q5: I feel my knowledge base is sufficient for the 3rd-year surgical clerkship.			<0.001
Strongly Agree	0 (0.0%)	3 (12.5%)	
Agree	0 (0.0%)	4 (16.7%)	
Disagree	14 (45.2%)	4 (16.7%)	
Strongly Disagree	7 (22.6%)	1 (4.2%)	
Undecided	10 (32.3%)	12 (50.0%)	
Q6: I feel I have a strong grasp of surgical skills.			0.020
Strongly Agree	0 (0.0%)	2 (8.3%)	
Agree	0 (0.0%)	5 (20.8%)	
Disagree	14 (45.2%)	4 (16.7%)	
Strongly Disagree	6 (19.4%)	3 (12.5%)	
Undecided	11 (35.5%)	10 (41.7%)	

Table 1. Surgical mentorship program survey responses. *continued.*

Characteristic	Pre-Program, N = 31[a]	Post-Program, N = 24[a]	p-Value[b]
Q7: I feel prepared to perform basic instrument suturing in the operating room (OR).			0.146
Strongly Agree	2 (6.5%)	4 (16.7%)	
Agree	6 (19.4%)	4 (16.7%)	
Disagree	8 (25.8%)	6 (25.0%)	
Strongly Disagree	9 (29.0%)	3 (12.5%)	
Undecided	6 (19.4%)	7 (29.2%)	
Q8: I feel prepared to practice sterile technique in the OR.			0.020
Strongly Agree	4 (12.9%)	7 (29.2%)	
Agree	8 (25.8%)	12 (50.0%)	
Disagree	8 (25.8%)	1 (4.2%)	
Strongly Disagree	5 (16.1%)	2 (8.3%)	
Undecided	6 (19.4%)	2 (8.3%)	
Q9: I feel prepared to properly gown and drape in the OR.			0.047
Strongly Agree	4 (12.9%)	7 (29.2%)	
Agree	6 (19.4%)	8 (33.3%)	
Disagree	9 (29.0%)	1 (4.2%)	
Strongly Disagree	5 (16.1%)	3 (12.5%)	
Undecided	7 (22.6%)	5 (20.8%)	
Q10: I can currently name someone who would write a letter of recommendation for me for my residency application in a surgical specialty.			0.027
Yes	4 (12.9%)	10 (41.7%)	
No	27 (87.1%)	14 (58.3%)	
Q11: I am satisfied with my academic performance.			0.710
Strongly Agree	9 (29.0%)	6 (25.0%)	
Agree	17 (54.8%)	14 (58.3%)	
Disagree	1 (3.2%)	0 (0.0%)	
Strongly Disagree	0 (0.0%)	1 (4.2%)	
Undecided	4 (12.9%)	3 (12.5%)	
Q12: I feel comfortable interacting with surgeons.			0.235
Strongly Agree	7 (22.6%)	9 (37.5%)	
Agree	15 (48.4%)	11 (45.8%)	
Disagree	3 (9.7%)	1 (4.2%)	
Strongly Disagree	0 (0.0%)	0 (0.0%)	
Undecided	6 (19.4%)	3 (12.5%)	
Q13: I understand how to network with surgeons.			0.024
Strongly Agree	1 (3.2%)	5 (20.8%)	
Agree	8 (25.8%)	8 (33.3%)	
Disagree	8 (25.8%)	4 (16.7%)	
Strongly Disagree	2 (6.5%)	0 (0.0%)	
Undecided	12 (38.7%)	7 (29.2%)	

Table 1. Surgical mentorship program survey responses. *continued.*

Characteristic	Pre-Program, N = 31[a]	Post-Program, N = 24[a]	p-Value[b]
Q14: I am confident in my current knowledge about the field of surgery relative to my current level of study.			0.034
Strongly Agree	0 (0.0%)	6 (25.0%)	
Agree	14 (45.2%)	10 (41.7%)	
Disagree	6 (19.4%)	2 (8.3%)	
Strongly Disagree	0 (0.0%)	1 (4.2%)	
Undecided	11 (35.5%)	5 (20.8%)	
Q15: I have a good idea of my future career path.			0.095
Strongly Agree	2 (6.5%)	6 (25.0%)	
Agree	10 (32.3%)	10 (41.7%)	
Disagree	2 (6.5%)	1 (4.2%)	
Strongly Disagree	1 (3.2%)	0 (0.0%)	
Undecided	16 (51.6%)	7 (29.2%)	
Q16: I know what I need to do to achieve my desired career path.			0.055
Strongly Agree	2 (6.5%)	4 (16.7%)	
Agree	12 (38.7%)	16 (66.7%)	
Disagree	6 (19.4%)	1 (4.2%)	
Strongly Disagree	0 (0.0%)	0 (0.0%)	
Undecided	11 (35.5%)	3 (12.5%)	
Q17: I feel like a surgical specialty is a good career path for someone like me.			0.677
Strongly Agree	6 (19.4%)	6 (25.0%)	
Agree	17 (54.8%)	9 (37.5%)	
Disagree	0 (0.0%)	1 (4.2%)	
Strongly Disagree	0 (0.0%)	0 (0.0%)	
Undecided	8 (25.8%)	8 (33.3%)	
Q18: Mentorship is important to my medical education.			0.038
Strongly Agree	26 (83.9%)	14 (58.3%)	
Agree	5 (16.1%)	10 (41.7%)	
Disagree	0 (0.0%)	0 (0.0%)	
Strongly Disagree	0 (0.0%)	0 (0.0%)	
Undecided	0 (0.0%)	0 (0.0%)	

[a]n (%)
[b]Fisher's exact test; Mann-Whitney *U* test

RESULTS

A total of 30 surgical faculty members volunteered as mentors, representing general surgery, acute care/trauma surgery, neurosurgery, orthopedics, plastic surgery, surgical oncology, cardiothoracic surgery, otolaryngology, vascular surgery, urology, and ophthalmology (Table 2). In all, 47 students were paired with faculty mentors, including 13 faculty members who agreed to mentor more than one student.

Of the participating students, 31 (66.0%) completed the pre-program survey, and 24 (51.1%) completed the post-program survey. Across both surveys, 80% of respondents were second-year (MS-2) students and 20% were first-year (MS-1) students, possibly reflecting increased interest in specialty selection among MS-2 students.

Table 2. Mentor-mentee pairing by surgical specialty/subspecialty.

Specialty/Subspecialty	Faculty*	Students*	Faculty with multiple mentees*
Acute care/trauma surgery	4	9	3
Cardiothoracic surgery	1	1	0
General surgery	7	11	1
Neurosurgery	3	5	2
Ophthalmology	1	1	0
Orthopedics	1	2	1
Otolaryngology	2	2	0
Plastic surgery	5	7	3
Surgical oncology	3	3	0
Urology	2	4	2
Vascular surgery	1	2	1
Totals:	**30**	**47**	**13**

*n

Statistically significant increases in student confidence were observed between the pre- and post-program surveys in several key areas (Table 1). Students reported greater confidence in their preparedness and knowledge base for the third-year surgical clerkship ($p = 0.001$ and $p < 0.001$, respectively). They also noted improved confidence in their surgical skills and overall knowledge of the field ($p = 0.020$ and $p = 0.034$, respectively). In addition, students expressed increased confidence in identifying a potential letter writer for surgical residency and understanding how to network with surgeons ($p = 0.027$ and $p = 0.024$, respectively). There also were gains in confidence regarding sterile technique and proper gowning and draping in the operating room ($p = 0.020$ and $p = 0.047$, respectively). While responses to the statement "Mentorship is important to my medical education" shifted from "Strongly Agree" to "Agree" in greater proportions ($p = 0.038$), all other changes in survey items were not statistically significant.

Descriptive statistics from the post-survey (Table 3) revealed that none of the students reported having a surgical mentor outside of this program. Most respondents (62%) rated the experience as "valuable" or "very valuable," and 70.8% described the quality of their mentoring relationship as "good" or "very good." Additionally, 75.0% reported receiving valuable advice, and 62.5% reported an increase in their knowledge of surgery. However, 87.5% of mentees noted a lack of regular meetings with their mentor beyond the initial interaction, as defined by the mentees themselves.

Table 3. Surgical mentorship program responses following program completion (N = 24).

Characteristic	n (%)
Q1: Do you currently have a mentor in a surgical specialty that is not due to this program?	
Yes	9 (37.5%)
No	15 (62.5%)
Q2: How satisfied are you with the mentorship program?	
Very Satisfied	4 (16.7%)
Satisfied	13 (54.2%)
Neutral	4 (16.7%)
Dissatisfied	1 (4.2%)
Very Dissatisfied	2 (8.3%)
Q3: What was the quality of advice you received from your mentor?	
Very Good	4 (16.7%)
Good	14 (58.3%)
Neutral	3 (12.5%)
Poor	0 (0.0%)
Very Poor	3 (12.5%)
Q4: Did you shadow your mentor?	
Yes	5 (20.8%)
No	19 (79.2%)
Q5: Approximately how many times did you shadow your mentor?	
0-1	23 (95.8%)
2-3	1 (4.2%)
Q6: Did you regularly meet with your mentor [as defined by you, the mentee]?	
Yes	3 (12.5%)
No	21 (87.5%)
Q7: Approximately how many times did you meet with your mentor outside of clinical or surgical experiences [including the initial meeting]?	
0-1	21 (87.5%)
2-3	2 (8.3%)
>5	1 (4.2%)
Q8: The experiences my mentor provided me with were	
Very Valuable	3 (12.5%)
Valuable	12 (50.0%)
Neutral	6 (25.0%)
Worthless	0 (0.0%)
Very Worthless	3 (12.5%)
Q9: The quality of my mentor relationship was	
Very Good	3 (12.5%)
Good	14 (58.3%)
Neutral	3 (12.5%)
Poor	1 (4.2%)
Very Poor	3 (12.5%)
Q10: I can be open and honest with my mentor.	
Strongly Agree	4 (16.7%)
Agree	10 (41.7%)
Disagree	1 (4.2%)
Strongly Disagree	2 (8.3%)
Undecided	7 (29.2%)

Table 3. Surgical mentorship program responses following program completion (N = 24). *continued.*

Characteristic	n (%)
Q11: My preparedness for a career in surgery improved because I participated in the mentorship program.	
To a great extent	3 (12.5%)
Somewhat	9 (37.5%)
Neutral	11 (45.8%)
Decreased to a great extent	1 (4.2%)
Q12: I believe I understand surgery better because I participated in the mentorship program.	
To a great extent	3 (12.5%)
Somewhat	12 (50.0%)
Neutral	7 (29.2%)
Decreased to a great extent	2 (8.3%)

*n (%)

DISCUSSION

Early mentorship can be invaluable in helping medical students make informed career decisions. However, forming mentor-mentee relationships often is challenging, especially for students without established medical connections, such as first-generation or underrepresented students.[15] Additionally, having a role model in surgery is associated with a higher likelihood of pursuing a surgical career.[16] Our mentorship program aimed to address these gaps by offering pre-clerkship students direct access to surgical faculty.

After six months, students reported significant improvements in confidence and perceived readiness. More students felt prepared for the third-year surgical clerkship and reported having surgical knowledge appropriate for their level. Confidence in surgical skills, as well as in sterile gowning and draping, also increased. These findings suggest that even informal mentorship can enhance students' preparedness for clerkship expectations, consistent with prior research showing that early surgical exposure boosts confidence.[17]

Students also reported a greater understanding of surgical career advancement. Confidence in networking with surgeons increased, and more students identified potential letter writers after the program. These outcomes likely reflect mentor-mentee conversations about navigating the path to surgical residency.

While the program improved student confidence, we did not expect it to significantly impact match rates, outcomes that are influenced by multiple factors, including test scores, grades, and research, as shown in prior studies.[18] Still, most students were satisfied and found the experience valuable. These results suggest strong alignment between the program's goals and student expectations: gaining insight into a surgical career and building confidence.

Interestingly, the program did not significantly change students' intent to pursue surgery, likely due to high baseline interest. This introduces potential self-selection bias, as students already interested in surgery were more likely to enroll. Future iterations should target undecided students, as studies have shown that early surgical exposure can

increase interest in the field.[19,20]

Challenges included inconsistent mentor-mentee meetings and limited shadowing experiences. These may reflect the relatively short six-month follow-up period. Future longitudinal assessments may better capture relationship development and improvements in areas like perceived residency competitiveness or surgical techniques. Over time, we anticipate more shadowing and operating room exposure will further enhance student confidence.[21]

In contrast to highly structured programs, such as one that demonstrated improved test scores and a 100% recommendation rate after a two-week intervention for first-year students,[21] our unstructured, flexible model involving both MS-1 and MS-2 students likely yielded more modest gains. MS-2 students may have had smaller knowledge gaps, and the open-ended structure emphasized student initiative over prescribed content. While a standardized curriculum might improve consistency, we prioritized relationship-building and student ownership.

Although overall satisfaction was high, a minority of students expressed dissatisfaction or rated aspects of the program poorly. This may help explain the decline in students who "strongly agreed" that mentorship is important. Future surveys should include more detailed questions about sources of dissatisfaction and meeting logistics to guide program improvements. Although we did not survey mentors to reduce participant burden, collecting their feedback in future iterations could provide valuable insight. Additionally, our modest pre-survey (66%) and post-survey (51%) response rates may have limited the representativeness of our findings, potentially due to survey fatigue.

CONCLUSIONS

Mentorship with surgical faculty can be one of the most influential experiences for pre-clerkship students considering a surgical career. A formal, yet flexible program such as this may help bridge gaps in access and preparedness. Although long-term outcomes such as clerkship performance and match success remain to be evaluated, this program offers a meaningful foundation for future surgical mentorship initiatives.

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Keywords: education, surgery, mentorship

KANSAS JOURNAL of MEDICINE

Brief Report

Comparison of Polyethylene Thickness and Constraint in Traditional and Robotic-Assisted Total Knee Arthroplasty

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ABSTRACT

Introduction. Thicker polyethylene inserts in total knee arthroplasty (TKA) may be associated with increased wear rates, a higher risk of implant failure, and the need for revision surgery. The authors of this study aimed to compare polyethylene insert thickness in robotic-assisted TKA versus conventional manual TKA.

Methods. The authors conducted a cross-sectional study on patients with end-stage primary knee osteoarthritis who underwent TKA by a single fellowship-trained orthopedic surgeon over a two-year period. Patients with post-traumatic or inflammatory arthropathy or those undergoing revision arthroplasty were excluded. Demographics, implant manufacturer and type, and polyethylene insert thickness were recorded in an electronic database. Bivariate analyses, including *t*-tests, Mann-Whitney *U* tests, and Fisher's exact tests were used to compare robotic-assisted and manual TKA procedures.

Results. Data from 222 patients were analyzed, with 111 in each group. The mean (standard deviation [SD]) age at surgery was similar between groups: 64.3 (8.2) years for robotic-assisted and 62.3 (8.8) years for the manual group ($p = 0.398$). Polyethylene insert thickness differed significantly: the median was 9 mm (range 9-13 mm) in the robotic-assisted group versus 11 mm (range 9-16 mm) in the manual group ($p < 0.001$). The most frequently used thickness was 9 mm, used in 70.3% (78/111) of robotic-assisted cases compared to 34.2% (38/111) of manual cases ($p < 0.001$).

Conclusions. Robotic-assisted TKA was associated with significantly thinner polyethylene inserts compared to manual TKA, suggesting more precise, bone-sparing femoral and tibial cuts. These findings may support the use of robotic-assisted techniques by orthopedic surgeons seeking to optimize implant positioning and longevity.

INTRODUCTION

Total knee arthroplasty (TKA) is a common orthopedic procedure, with an overall prevalence of 1.5% in the United States.[1] Among females over 80 years of age, this prevalence rises to 10.4%.[2] As the population continues to age, the number of TKA procedures is expected to increase substantially.

Given the high cost of knee replacement, the technical learning curve, and the limited availability of implant designs, there is a continued need to develop and refine surgical techniques. Robotic-assisted TKA has emerged as a potential innovation that may enhance surgical precision and efficiency. Some studies have reported that robotic-assisted TKA improves accuracy in bone preparation,[3] while others suggest that both robotic-assisted and manual approaches yield similarly excellent patient outcomes.[4] However, a large database study indicated that robotic-assisted TKA is associated with lower one-year revision rates, reduced need for manipulation under anesthesia, fewer systemic complications, and decreased post-operative opioid use.[5]

Additional evidence suggests that robotic-assisted TKA offers improved implant positioning, better limb alignment, reduced post-operative pain, faster early functional recovery, and shorter hospital stays compared to conventional manual TKA.[6-8] Despite these promising short-term results, further research is needed to evaluate long-term functional outcomes, implant longevity, time to revision, and cost-effectiveness.

Implant wear remains a key factor in TKA failure, as it contributes to periprosthetic osteolysis.[9,10] While the ideal polyethylene insert thickness is still debated,[11,12] improper sizing can lead to accelerated wear, ultimately compromising implant survival.[13-16] Robotic-assisted TKA, with its capacity for more precise bone cuts, may allow for better polyethylene insert fit, potentially reducing wear rates.

The purpose of this study was to assess differences in polyethylene insert thickness between robotic-assisted and manual TKAs. We hypothesized that robotic-assisted TKA would result in decreased insert thickness and constraint due to more accurate femoral and tibial osteotomies.

METHODS

Study Design. A cross-sectional study was conducted using patient charts from a single fellowship-trained, community-based orthopedic surgeon who performed all TKAs. Data sources included inpatient records, outpatient charts, and computer-based office notes. To avoid the influence of the surgeon's learning curve, records were reviewed in reverse chronological order, excluding early cases performed during the initial adoption of the robotic-assisted technique. The study was approved by the university's Institutional Review Board (IRB).

Inclusion and Exclusion Criteria. Eligible participants included patients of any age or race who underwent primary TKA for end-stage knee osteoarthritis using either the traditional manual technique (between January 2018 and August 2018) or the robotic-assisted technique (MAKO robot, Stryker, Kalamazoo, MI) between November 2019 and May 2020. Exclusion criteria included preoperative diagnoses of post-traumatic or inflammatory knee arthropathy, as well as all revision arthroplasties.

Study Variables and Data Collection. The primary outcome was the type of surgical procedure (robotic assisted vs. traditional manual TKA). Covariates included age at the time of surgery, laterality (left or right), polyethylene insert thickness (mm), constraint type (categorized as cruciate-sparing [unconstrained], posterior-stabilized [semi-constrained], or revision [semi-constrained]), and implant manufacturer (de-identified). All data were entered and managed using

Research Electronic Data Capture® (REDCap®), a secure, web-based platform designed to support research data management.[17,18]

Power Analysis. A power analysis was conducted using IBM® SPSS® (Statistical Package for the Social Sciences®) SamplePower (version 3) to estimate the required sample size. For comparisons between the two surgical techniques and three constraint types (six total groups), a sample size of 37 per group, or 222 total patients, would provide 80% power to detect a clinically significant 2 mm difference in polyethylene thickness between techniques. This was based on prior published data, assuming a standard deviation of 3 mm and a significance level of $\alpha = 0.05$.[15,19]

RESULTS

Data were extracted from 222 patient charts, including 111 robotic-assisted and 111 traditional manual TKA procedures. Table 1 presents group comparisons by surgical approach.

The mean (standard deviation) age at the time of surgery was similar between groups: 64.3 (8.2) years for the robotic-assisted group and 62.3 (8.8) years for the manual group ($p = 0.398$). Polyethylene insert thickness ranged from 9 to 13 mm in robotic-assisted cases and from 9 to 16 mm in manual cases. The median thickness was significantly lower in the robotic-assisted group (9 mm) compared to the manual group (11 mm; $p < 0.001$). In both groups, 9 mm was the most frequently used insert thickness, observed in 70.3% (78/111) of robotic-assisted cases and 34.2% (38/111) of manual cases ($p < 0.001$).

Laterality (left vs. right knee) was equally distributed between groups. However, implant constraint type differed significantly ($p < 0.001$): most robotic-assisted cases (92%) used cruciate-sparing, unconstrained implants, whereas all manual cases used posterior-stabilized, semi-constrained implants. No other constraint types were observed in the sample. The statistically significant difference in implant manufacturer between the two groups reflects the senior author's exclusive use of the MAKO robotic system (Stryker, Kalamazoo, MI) at his primary hospital site.

DISCUSSION

Robotic-assisted TKA enables surgeons to perform more precise femoral and tibial osteotomies,[20,21] which may allow for the use of thinner polyethylene inserts. Our study found that polyethylene components used in robotic-assisted TKA were significantly thinner compared to those used in traditional, jig-based manual TKA, supporting the hypothesis that robotic techniques are more bone-preserving. Notably, more than 70% of robotic-assisted cases used a 9 mm polyethylene insert, demonstrating both smaller and more consistent insert sizes. Thinner polyethylene inserts may correlate with reduced wear and increased implant longevity.

A significant difference in implant constraint type was observed between groups: the manual TKA group predominantly received posterior-stabilized implants, whereas most robotic-assisted procedures used cruciate-retaining designs. This difference could be seen as a limitation, as all posterior-stabilized TKAs were performed before the adoption of robotic-assisted TKA. However, the limited number of posterior-stabilized implants used during the robotic era suggests that the surgeon became increasingly confident in preserving the posterior cruciate ligament (PCL), likely due to improved bone-cut precision and preoperative knee balancing afforded by robotic assistance.

Table 1. Comparison of characteristics by surgery type.

Characteristic	Robotic n = 111 (50%)	Manual n = 111 (50%)	p-Value
Mean age at surgery (SD)[1]	64.3 (8.2)	62.3 (8.8)	0.398
Median polyethylene thickness; mm (min, max)[2]	9 (9, 13)	11 (9, 16)	<0.001
Polyethylene thickness (mm)[3]			
9	78 (70.3)	38 (34.2)	<0.001
10	13 (11.7)	16 (14.4)	
11	14 (12.6)	32 (28.8)	
12	3 (2.7)	8 (7.2)	
13	3 (2.7)	9 (8.1)	
15	0 (0)	7 (6.3)	
16	0 (0)	1 (0.9)	
Laterality[3]			
Left	56 (50.5)	58 (52.3)	0.893
Right	55 (49.5)	53 (47.7)	
Implant type[3]			
Cruciate retaining	102 (91.9)	0 (0.0)	<0.001
Posterior stabilized	9 (8.1)	111 (100.0)	
Implant Type[3]			
Company A	111 (100.0)	9 (8.1)	<0.001
Company B	0 (0.0)	102 (91.9)	

[1]Student's t-test for equality of means (equal variances assumed)
[2]Mann-Whitney *U* test
[3]Fisher's exact test

This shift in implant selection may reflect a growing trend: with the use of curved polyethylene inserts (employed in all cases), some surgeons now opt to preserve the PCL even without selecting posterior-stabilized designs, relying instead on insert geometry for stability. Although this study did not assess clinical outcomes due to limited follow-up duration, prior research has shown that robotic-assisted TKA is associated with reduced post-operative pain, shorter hospital stays, and improved early functional recovery.[5,6,8]

Potential disadvantages of robotic-assisted TKA also must be acknowledged. These include the possibility of a larger incision to accommodate tracking arrays (depending on surgical technique), longer operative times during the learning phase, and increased costs related to preoperative computed tomography (CT) imaging.

CONCLUSIONS

This study highlights evolving surgical trends associated with the use of robotic-assisted TKA, including tighter control of polyethylene insert thickness, more conservative bone resection, and a shift from posterior-stabilized to cruciate-retaining implant designs. While these findings suggest potential advantages of robotic-assisted techniques, a formal clinical outcomes study is needed to determine whether these changes translate into improved long-term results.

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Keywords: knee arthroplasty, knee joint, osteoarthritis, polyethylene, robotic-assisted surgery

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Brief Report

A Single-Center, Retrospective Comparison of Non-Pre-emptive with Pre-emptive Renal Transplantations

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ABSTRACT

Introduction. End-stage renal disease (ESRD) requires renal replacement therapy, either through pre-emptive transplantation (PET) or non-pre-emptive transplantation (non-PET). PET is associated with improved patient and allograft survival compared to non-PET; however, only 2.5% of patients in the United States undergo PET. The authors of this study report on mortality and allograft rejection rates in patients undergoing PET versus non-PET.

Methods. This single-center, retrospective study compared post-transplant complications between PET and non-PET in adults with ESRD. De-identified electronic health record data from 2017 to 2022 were analyzed. Odds ratios (ORs) for one-year post-transplant mortality and allograft rejection were calculated using unadjusted multivariate logistic regression (Model 1), adjusted for age and sex (Model 2), and further adjusted for comorbidities (Model 3).

Results. A total of 787 patients with ESRD underwent kidney transplantation: 14% underwent non-PET and 86% underwent PET. Compared to PET, the ORs for one-year post-transplant mortality with non-PET were:

- Model 1: OR 1.76 (95% CI, 0.64-4.85; p = 0.27)
- Model 2: OR 2.02 (95% CI, 0.71-5.71; p = 0.19)
- Model 3: OR 1.86 (95% CI, 0.64-5.39; p = 0.24)

For one-year allograft rejection, the ORs for non-PET versus PET were:

- Model 1: OR 1.63 (95% CI, 0.85-3.10; p = 0.13)
- Model 2: OR 1.61 (95% CI, 0.84-3.06; p = 0.15)
- Model 3: OR 1.60 (95% CI, 0.82-3.10; p = 0.16)

Conclusions. This single-center study found no statistically significant differences in one-year mortality or allograft rejection between patients undergoing PET and non-PET.

INTRODUCTION

In the United States, approximately 1 in 7 adults have chronic kidney disease (CKD), and about 800,000 individuals are living with end-stage renal disease (ESRD).[1] The most common causes of ESRD are diabetes and hypertension.[1] CKD and ESRD are debilitating conditions, leading often to serious complications such as cardiovascular disease and death.[2] CKD may progress to ESRD, at which point renal replacement therapy, either dialysis and/or kidney transplantation, is required.[1]

As of 2024, there were 5,392 individuals with ESRD in Kansas. Of these, 62% were receiving dialysis, while 38% had undergone kidney transplantation.[3] Nationally, kidney transplantation offers a projected survival benefit of 9.8 years compared to dialysis alone. However, this benefit is attenuated in older patients, those with comorbidities, and female patients.[4]

Pre-emptive transplantation (PET), a kidney transplant performed before the initiation of dialysis, is associated with better allograft survival, fewer cardiovascular complications, and improved quality of life compared to non-pre-emptive transplantation (non-PET). Despite these advantages, only 2.5% of patients with ESRD in the U.S. undergo PET.[5] This low rate is attributed to variability among transplant and nephrology centers, limited referrals from nephrologists or primary care physicians, and the complex nature of transplant evaluation.[5]

Although the benefits of PET are well-documented, the literature remains mixed regarding its impact on patient survival and allograft rejection.[6-8] Authors of this study compared one-year post-transplant mortality and allograft rejection rates between PET and non-PET in adult kidney transplant recipients.

METHODS

Study Design and Setting. This retrospective study included adult patients (aged 18 years or older) at The University of Kansas Health System (TUKHS), which performs 77% of the state's kidney transplants.[9,10] Data were obtained using the Healthcare Enterprise Repository for Ontological Narration (HERON), a de-identified data warehouse that supports clinical research.[11,12] The dataset met HIPAA de-identification criteria and was therefore exempt from Institutional Review Board (IRB) review. Data acquisition was approved by the HERON Data Request Oversight Committee.

Eligibility Criteria. Adult patients who received an initial PET or non-PET kidney transplant at TUKHS between January 2017 and January 2022 were included, based on the most recent complete dataset available from HERON. A total of 787 adult ESRD patients were identified after excluding cases with missing demographic data (e.g., age or sex). PET was defined as no dialysis for at least one year prior to transplantation. Kidney transplantation was identified using current procedural terminology (CPT) code 50360. Dialysis within one year prior to transplantation was identified using CPT codes 90935, 90937, 90945, 90947, 90966, and 90970.

Study Outcomes. The primary outcomes were one-year post-transplant mortality and one-year post-transplant rejection, comparing PET and non-PET recipients. Secondary outcomes included risk factors associated with these endpoints, including diabetes, hypertension, and cardiovascular disease (CVD).

Identification of Covariates. Patient-level variables were collected, including the presence of comorbid conditions such as diabetes, hypertension, and CVD. These comorbidities were identified using ICD-9 and ICD-10 diagnostic codes, detailed in Supplemental Table (available online at journals.ku.edu/kjm).

Statistical Analysis. Demographic data were summarized using counts and proportions for categorical variables and means with standard deviations for continuous variables. Associations between

transplant type (PET vs. non-PET) and outcomes were evaluated using multivariate logistic regression. Three models were constructed: unadjusted (Model 1); adjusted for age and sex (Model 2); and adjusted for age, sex, and comorbidities (diabetes, hypertension, and CVD; Model 3). Hosmer-Lemeshow goodness-of-fit tests for Models 2 and 3 indicated adequate model fit ($p > 0.05$). Results are reported as odds ratios (ORs) with 95% confidence intervals (CIs). Statistical significance was set at $p < 0.05$. Analyses were conducted using R software (version 3.6.0).

RESULTS

Demographic Characteristics. Patient demographic information is summarized in Table 1. Of the 787 individuals who underwent kidney transplantation, 462 (58.7%) were male, 534 (67.8%) were White, and 239 (30.4%) lived more than 100 miles from TUKHS. The overall mean age was 51.7 years. Among these, 109 patients (14%) received non-PET, while 678 (86%) received PET.

In the non-PET group, 69 (63.3%) were male, 71 (65.1%) were White, 17 (15.6%) lived more than 100 miles from TUKHS, and the mean age was 51.0 years. Among PET recipients, 393 (58.0%) were male, 463 (68.3%) were White, 222 (32.7%) lived more than 100 miles from TUKHS, and the mean age was 51.8 years.

Table 1 also shows that 13 patients (11.9%) in the non-PET group experienced kidney allograft rejection and 5 (4.6%) died within one-year post-transplant. In comparison, among PET recipients, 52 (7.7%) experienced rejection and 18 (2.7%) died.

Study Outcomes. Multivariate logistic regression was used to compare one-year post-transplant complications between PET and non-PET groups. No statistically significant differences in one-year mortality were observed between groups in any of the models:

- Model 1 (unadjusted): OR = 1.76; 95% CI, 0.64-4.85; p = 0.27
- Model 2 (adjusted for age and sex): OR = 2.02; 95% CI, 0.71-5.71; p = 0.19
- Model 3 (adjusted for age, sex, hypertension, diabetes, and CVD): OR = 1.86; 95% CI, 0.64-5.39; p = 0.24

Similarly, no statistically significant differences in one-year allograft rejection were found:

- Model 1 (unadjusted): OR = 1.63; 95% CI, 0.85-3.10; p = 0.13
- Model 2 (adjusted for age and sex): OR = 1.61; 95% CI, 0.84-3.06; p = 0.15
- Model 3 (adjusted for age, sex, hypertension, diabetes, and CVD): OR = 1.60; 95% CI, 0.82-3.10; p = 0.16

Although comorbidities, age, and sex did not significantly impact allograft rejection, non-PET showed a nonsignificant trend toward increased mortality. Full model results are presented in Table 2.

Table 1. Patient demographics categorized by non-PET and PET.

Measures	All Kidney Transplants n = 787	Non-Pre-emptive Transplantation n = 109	Pre-emptive Transplantation n = 678
Age, mean (yrs.)	51.7	51.0	51.8
Sex, n (%)			
Males	462 (58.7%)	69 (63.3%)	393 (58%)
Females	325 (41.3%)	40 (36.7%)	285 (42%)
Race, n (%)			
White	534 (67.8%)	71 (65.1%)	463 (68.3%)
Black	119 (15.1%)	21 (19.3%)	98 (14.5%)
Asian	26 (3.3%)	4 (3.7%)	22 (3.2%)
American Indian	4 (0.5%)	0	4 (0.6%)
Pacific Islander	3 (0.4%)	0	3 (0.4%)
Two Races	6 (0.8%)	1 (0.9%)	5 (0.7%)
Other	93 (11.8%)	12 (11%)	81 (11.9%)
Declined	2 (0.3%)	0	2 (0.3%)
Distance From TUKHS, n (%)			
>100 miles	239 (30.4%)	17 (15.6%)	222 (32.7%)
1-year Allograft Rejection, n (%)	65 (8.2%)	13 (11.9%)	52 (7.7%)
1-year Mortality, n (%)	23 (2.9%)	5 (4.6%)	18 (2.7%)

Note: PET, pre-emptive transplantation; non-PET, non-pre-emptive transplantation; TUKHS, The University of Kansas Health System.

Table 2. Multivariate logistic regression models with post-operative complications.

One-Year Post-Transplant Mortality						
	Model 1 (unadjusted)		Model 2†		Model 3‡	
	OR (95% CI)	p Value	OR (95% CI)	p Value	OR (95% CI)	p Value
Non-PET vs. PET	1.76 (0.64-4.85)	0.27	2.02 (0.71-5.71)	0.19	1.86 (0.64-5.39)	0.24
One-Year Post-Transplant Allograft Rejection						
Non-PET vs. PET	1.63 (0.85-3.10)	0.13	1.61 (0.84-3.06)	0.15	1.60 (0.82-3.10)	0.16

† adjusted for age & sex
‡ adjusted for age, sex, and comorbidities: CVD, hypertension, diabetes
Note: PET, pre-emptive transplantation; non-PET, non-pre-emptive transplantation; CVD, cardiovascular disease; OR, odds ratio.

DISCUSSION

Authors of this study compared one-year post-transplant mortality and allograft rejection between patients who underwent PET and those who received non-PET. We hypothesized that non-PET would be associated with higher rates of post-transplant mortality and allograft rejection. However, our findings showed no statistically significant differences between the two groups.

These results contribute to the existing literature by showcasing that patient mortality and kidney allograft rejection rates do not differ significantly between PET and non-PET recipients. A systematic review by Azegami and colleagues[13] also found no significant differences in

rates of biopsy-proven acute rejection between PET and non-PET groups. Most studies report PET rates between 9-44% and non-PET rates over 55%,[13] whereas our study showed a PET rate of 86% and non-PET rate of 14%. The predominance of PET in our sample may have contributed to the lack of significant findings.

Differences in transplant evaluation and dialysis initiation practices across centers also may influence these outcomes and deserve further investigation. For example, Cosio and colleagues[14] examined survival in deceased donor kidney transplant recipients and found that 7% of mortality occurred in patients who had not received dialysis preoperatively, while 67% occurred in those who had undergone dialysis. These conflicting findings suggest that prospective studies are needed to more definitively assess the comparative effectiveness of PET versus non-PET.

Limitations. Several limitations must be considered. The high rate of PET observed at TUKHS may reflect the structure of its integrated transplant and nephrology services, which streamline the evaluation process by coordinating care among specialists. This setup minimizes barriers to PET and may not be generalizable to centers lacking similar infrastructure.

Additionally, we could not access external medical records, so some patients classified as PET may have received dialysis at outside institutions. This could have led to misclassification, potentially underestimating the true non-PET rate. Information on donor type (living vs. deceased) also was unavailable and may have influenced post-transplant outcomes.

CONCLUSIONS

Although no statistically significant differences were found between PET and non-PET in terms of one-year mortality or allograft rejection, the clinical benefits of PET, including improved quality of life and fewer complications, remain well-supported. Efforts should focus on reducing barriers to PET access. In the meantime, treatment decisions should be guided by available resources and the expertise of the transplant team.

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Keywords: transplantation, dialysis, postoperative complications, mortality, chronic kidney failure

KANSAS JOURNAL of MEDICINE

Case Report

Premature Ventricular Contractions as an Underrecognized Cause of Chronic Cough: A Case of Misdiagnosis in a Patient with Bronchiectasis

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INTRODUCTION

Cough in adults typically is classified as acute, subacute, or chronic, with chronic cough defined as lasting longer than eight weeks.[1] Common causes of chronic cough include asthma and gastroesophageal reflux disease (GERD), while less common causes include premature ventricular contractions (PVCs) and anatomic airway abnormalities.[1,2] Although PVCs frequently are encountered, their role as a cause of chronic cough is documented but often overlooked.[2]

The most widely accepted mechanism by which PVCs cause cough involves irritation of the phrenic nerve and/or diaphragm due to the strong ventricular contraction following a PVC.[3] Another theory suggests that stimulation of cardiac vagal nerve endings directly may provoke cough or heighten cough reflex sensitivity, given the shared vagal innervation of the heart and airway.[3]

PVCs as the sole cause of chronic cough are rare.[2] In one cross-sectional study, fewer than 1% of individuals with PVCs had chronic cough solely due to PVCs, while approximately 4% had cough attributed to PVCs in combination with another cause.[4]

This case report presents a patient with a chronic dry cough initially attributed to bronchiectasis but ultimately found to be caused by PVCs.

CASE REPORT

The patient was a 71-year-old woman with a history of coronary artery disease status post coronary artery bypass grafting (CABG), hyperlipidemia, hypertension, hypothyroidism, GERD, chronic kidney disease (CKD) stage 3a, and a remote smoking history (<20 pack-years). She had been diagnosed with bronchiectasis of unclear etiology in 2003 following evaluation for chronic dry cough, hemoptysis, and dyspnea.

Initial high-resolution chest computed tomography (CT) showed bronchiectasis, most prominent in the left lower and right middle lobes. A comprehensive workup, including bronchoscopy, immune deficiency screening, autoimmune and genetic panels, was unremarkable. Pulmonary function testing (PFT) revealed mild obstruction. Management included azithromycin, inhaled bronchodilators, and airway clearance therapy. PVCs were noted on electrocardiogram (EKG), but her symptoms were attributed to bronchiectasis.

Despite ongoing therapy, her cough and dyspnea worsened over the next 15 years. A 2017 CT confirmed multifocal cylindrical bronchiectasis (Figure 1), yet PFTs remained stable. Her pulmonologist questioned whether bronchiectasis fully explained her symptoms. Ongoing PVCs, exertional dyspnea, and palpitations prompted a referral to cardiology.

Exercise testing revealed frequent uniform PVCs, including bigeminy at peak exercise (Figure 2). Echocardiography showed moderate mitral regurgitation, and 24-hour ambulatory electrocardiographic monitoring (Holter monitor) recorded an 18.8% PVC burden with frequent couplets and trigeminy (Figures 3-5). She was started on acebutolol, which improved both cough and dyspnea.

Coronary angiography confirmed significant proximal anterior descending artery stenosis, and she underwent uncomplicated CABG. Post-operatively, exertional dyspnea improved significantly, and a repeat Holter showed a reduced PVC burden (7.3%). However, a month later, she reported increased nighttime cough and palpitations, despite the lower PVC burden. Empiric treatment with intranasal fluticasone and omeprazole for postnasal drip and reflux improved her nighttime cough.

Subsequent stress testing and a 30-day event monitor showed further PVC reduction to 4%. Over the following year, her cough resolved, PVCs decreased, and PFTs remained stable. At her 2019 follow-up, she had no bronchiectasis exacerbations, jogged 2.5 miles daily, and her EKGs were normal.

By 2023, spirometry showed improved forced expiratory volume in 1 second (FEV1) without airflow obstruction. However, in 2024, her cough recurred alongside increased PVCs, as noted on a wrist-worn wearable device (Apple Watch, Apple Inc., Cupertino, CA). EKG confirmed bigeminal PVCs. Since acebutolol 400 mg was no longer effective, her dose was increased to 600 mg daily in divided doses, resulting in improved symptom control.

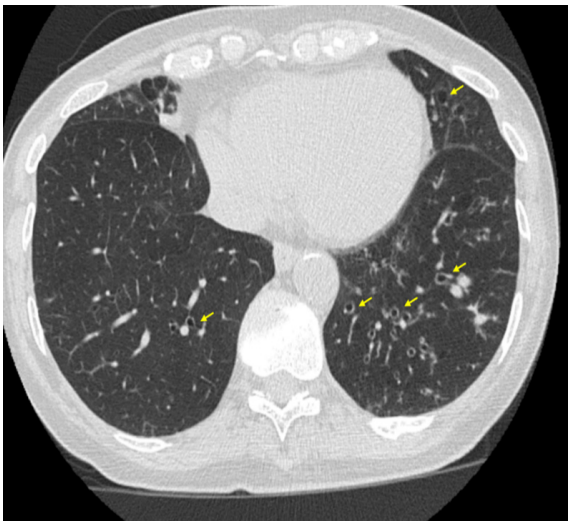

Figure 1. Computed tomography (CT) of the chest showing multifocal cylindrical bronchiectasis (yellow arrows), predominantly in the left lower lobe.

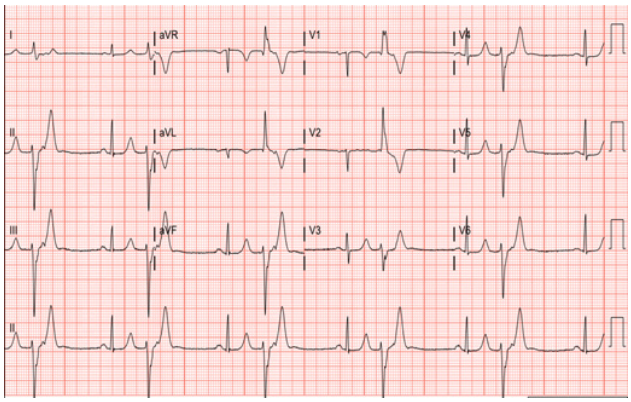

Figure 2. Electrocardiogram in 2017 demonstrating frequent premature ventricular complexes (PVCs) in a bigeminal pattern.

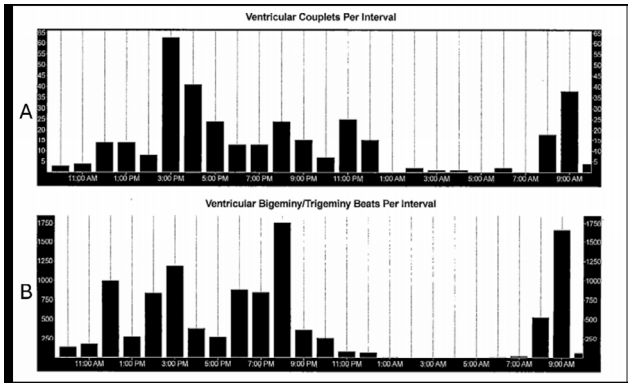

Figure 3. Ventricular events on 24-hour Holter monitor. A - Frequency of premature ventricular complex (PVC) couplets, B - Frequency of ventricular bigeminy/trigeminy.

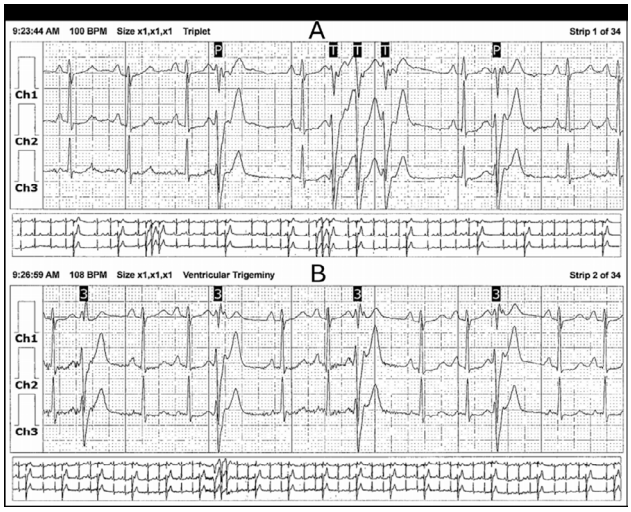

Figure 4. Ventricular events on 24-hour Holter monitor. A – Premature ventricular complex (PVC) triplets, B - Ventricular trigeminy.

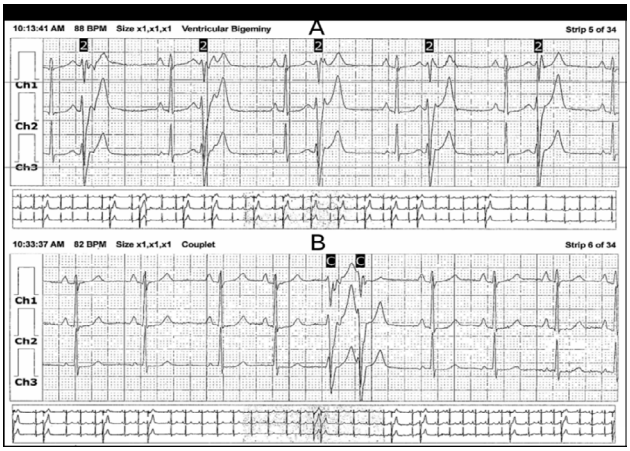

Figure 5. Ventricular events on 24-hour Holter monitor. A - Ventricular bigeminy, B - Premature ventricular complex (PVC) couplets.

DISCUSSION

Cough can both result from and contribute to cardiac arrhythmias.[3] This case highlights an uncommon but significant etiology of chronic cough, PVCs. While chronic cough typically is attributed to pulmonary or upper airway disorders, this patient's lack of response to standard therapies and the correlation between symptom severity and PVC burden suggested a cardiac origin.

The exact mechanism of PVC-induced cough remains uncertain. Proposed explanations include phrenic nerve irritation from the stronger post-extrasystolic contraction and vagal-mediated reflexes due to shared vagal innervation of the heart and airways.[3] In this case, the patient's symptom resolution with beta-blocker therapy and reduced PVC burden supports a likely causal relationship.

Notably, she lacked hallmark features of bronchiectasis, such as a productive cough, wheezing, and frequent exacerbations. Despite a diagnosis of bronchiectasis, she had a 15-year history of a dry, treatment-resistant cough with no documented exacerbations, features inconsistent with classical bronchiectasis.

Compared with the limited literature, most reported cases of PVC-induced cough were diagnosed within months to a few years.[2,5] This case stands out due to the extended duration of misdiagnosis and the presence of multiple confounding comorbidities, including GERD, postnasal drip, and mitral regurgitation. Although mitral regurgitation may contribute to cough via pulmonary congestion or airway irritation, her imaging showed no signs of vascular congestion, making this an unlikely cause.

Furthermore, her cough was unresponsive to treatments targeting GERD and postnasal drip, but improved with cardiac therapy, further implicating PVCs as the primary etiology. The recurrence of both cough and PVCs in 2024 raises the possibility of evolving beta-blocker resistance or new triggers.

This case emphasizes the diagnostic challenges posed by atypical or overlapping clinical features. Misattribution of symptoms to more common pulmonary conditions can lead to years of ineffective treatment and patient frustration. Holter monitoring and exercise testing can reveal occult arrhythmias that may otherwise go undetected.

CONCLUSIONS

PVC-induced chronic cough, though rare, should be considered in patients with unexplained cough, especially when standard treatments fail, or symptoms are accompanied by palpitations or exertional dyspnea. The temporal relationship between PVC burden and cough, along with improvement following antiarrhythmic therapy, supports a causal link in this case.

Clinicians should maintain a broad differential when evaluating chronic cough. A multidisciplinary approach, integrating pulmonology and cardiology, is essential, particularly when initial assessments are inconclusive. With increased use of wearable technology, patients may independently detect arrhythmias, offering additional diagnostic insight. Early recognition of PVCs as a potentially reversible cause of chronic cough can lead to more effective management, reduce unnecessary interventions, and improve patient outcomes.

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Keywords: premature ventricular contractions, chronic cough, misdiagnosis

KANSAS JOURNAL of MEDICINE

Case Report

Disseminated Melanoma with Extensive Gastrointestinal Tract Involvement: Incidental Detection of Metastases on Upper Endoscopy

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INTRODUCTION

Malignant melanoma (MM) is a neoplasm arising from melanocytes, which are primarily located in the skin but also can be found in the uvea, oral cavity, nasopharynx, anus, urinary tract, and vagina.[1,2] MM accounts for approximately 2% of all cancers and is the most common carcinoma to metastasize to the gastrointestinal (GI) tract, with symptomatic GI involvement reported in 1-5% of patients.[2,3] The small intestine is the most frequently affected site (51-71%), followed by the stomach (27%) and colon (22%); esophageal involvement is rare (5%).[2]

Symptoms typically are non-specific and can mimic those of other GI metastases. Common presentations include abdominal pain, fatigue, constipation, melena, hematochezia, dysphagia, small bowel obstruction, and bowel perforation.[4]

CASE REPORT

A 62-year-old male with no known medical history presented with dysphagia, poor oral intake, unquantified weight loss, jaundice, and dark urine over several weeks. Laboratory evaluation revealed a cholestatic pattern of liver injury, with a total bilirubin of 6.3 mg/dL, alkaline phosphatase of 1465 U/L, and aspartate aminotransferase/alanine aminotransferase levels of 215/164 U/L. A computed tomography (CT) scan of the abdomen and pelvis showed numerous hypoattenuating lesions throughout the liver, consistent with metastatic disease.

To evaluate the patient's progressive dysphagia, an esophagogastroduodenoscopy (EGD) was performed. It revealed a single melanotic plaque in the upper third of the esophagus, along with melanotic lesions in the stomach and duodenum (Figures 1 and 2). Histopathological analysis showed nests of melanocytes with atypical mitotic figures (Figure 3). Immunohistochemical staining was positive for S100, SOX-10, and Mart-1, and negative for pancytokeratin, findings consistent with metastatic melanoma (Figures 4 and 5).

Since no other significant intraluminal lesions were found aside from the esophageal plaque, further imaging was performed. CT revealed a mildly enhancing mass in the left tonsil and multiple enlarged cervical lymph nodes.

A subsequent dermatologic examination identified a small, black, ulcerated lesion on the patient's back, which was confirmed to be the primary cutaneous melanoma. Treatment options were discussed, but due to his frailty, the patient declined further intervention.

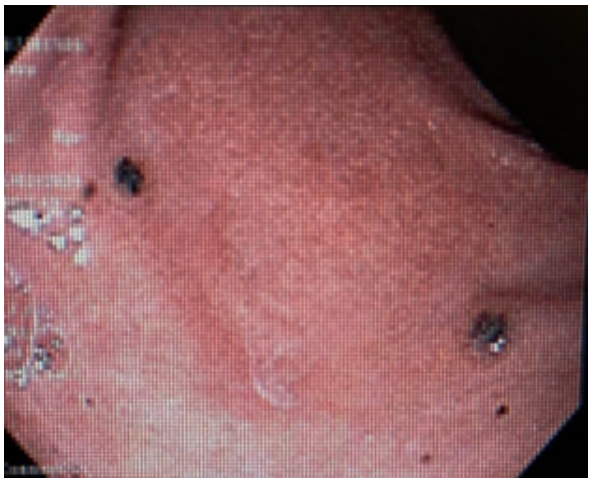

Figure 1. Melanotic lesions in the stomach found during EGD.

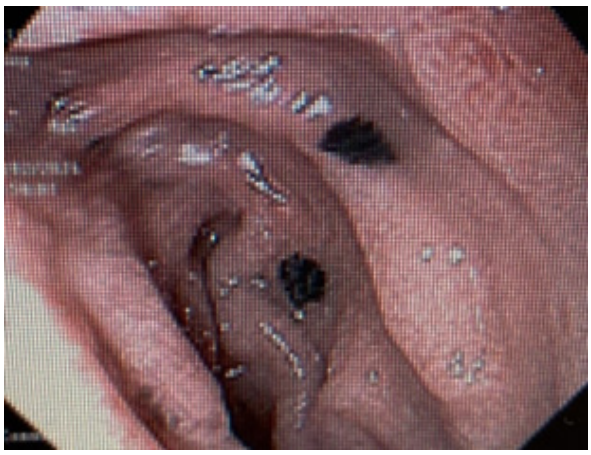

Figure 2. Melanotic lesions in the duodenum found during EGD.

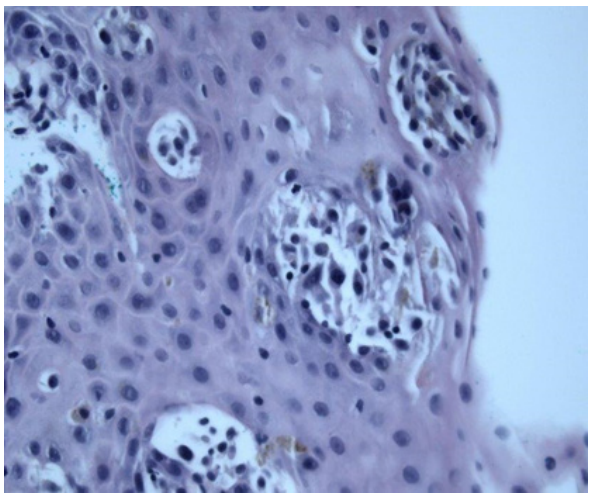

Figure 3. Histopathological analysis showed nests of melanocytes with atypical mitosis in the esophagus.

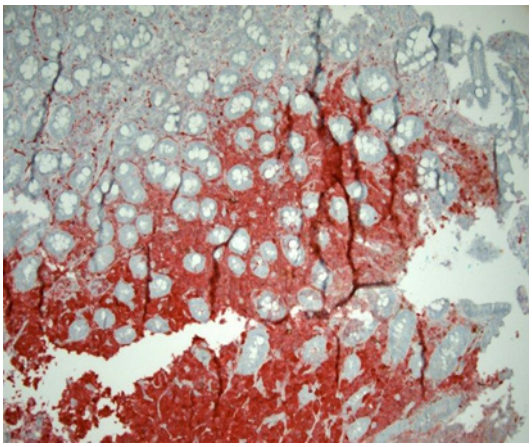

Figure 4. Immunohistochemical staining showed positivity for S100 in the duodenum.

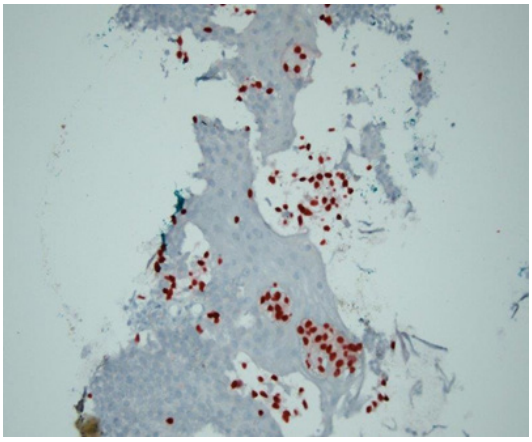

Figure 5. Immunohistochemical staining showed positivity for SOX-10 in the esophagus.

DISCUSSION

MM is a highly aggressive neoplasm with a high propensity for metastasis, which remains the leading cause of morbidity and mortality in affected patients. Visceral dissemination, particularly to the GI tract, is not uncommon but often underrecognized due to its non-specific presentation. Although only 1-5% of MM patients exhibit symptomatic GI involvement, autopsy series suggest a prevalence as high as 60%, underscoring the importance of maintaining a high index of suspicion in patients with GI symptoms and a history of MM.[2,5,6]

Among GI sites, the small intestine, particularly the jejunum and ileum, is most frequently involved. MM accounts for approximately 50-60% of all secondary malignancies to the small bowel.[3] The predilection for small bowel involvement may be mediated by high expression of the chemokine receptor CCR9 (C-C chemokine receptor 9) on melanoma cells, which facilitates migration to the small intestine via its ligand CCL25 (C-C motif chemokine ligand 25).[2,3,5] Other commonly affected GI organs include the stomach, duodenum, and colon, while esophageal involvement remains rare (~5%).[2,6] Liver metastases are among the most common visceral sites, seen in up to 77% of cases in autopsy studies, and particularly are common in uveal melanoma.[7,8]

Diagnosis of GI metastases from MM remains challenging. Symptoms often are vague and may include abdominal pain, melena, anemia, obstruction, or perforation. Imaging modalities such as CT and positron emission tomography (PET) are crucial for initial evaluation. However, standard CT has limited sensitivity (60-70%) for GI involvement.[2,4,9] CT enteroclysis may improve detection, and PET offers enhanced sensitivity and specificity. Endoscopic techniques, including EGD, colonoscopy, and capsule endoscopy, are invaluable for direct visualization and biopsy. Capsule endoscopy is particularly useful for detecting small bowel lesions but lacks biopsy capability, often necessitating balloon-assisted enteroscopy.[2,3,9]

Histopathologic analysis with immunohistochemistry remains the gold standard for diagnosis. Melanoma metastases may appear as melanotic or amelanotic, and may assume polypoid, infiltrative, cavitary, or exophytic forms.[3,6] In this case, the presence of mucosal lesions in the esophagus, stomach, and duodenum, confirmed by biopsy and immunostaining (positive for S100, SOX-10, and Mart-1; negative for pancytokeratin), established the diagnosis of metastatic melanoma.

This patient's case is notable for the timing of GI involvement, which preceded identification of the primary cutaneous lesion. Although uncommon, MM can present with GI metastasis before the primary lesion is recognized or even in the absence of an identifiable primary. This raises the diagnostic consideration of primary GI melanoma, a rare and controversial entity. Because melanocytes are not normally found in the mucosa of the stomach, small intestine, or colon, several theories have been proposed to explain primary GI melanoma, including origin from ectopic neural crest cells, Schwann cells, or APUD (Amine Precursor Uptake and Decarboxylation) Icells. However, most experts favor the theory that such lesions represent metastases from regressed or undiagnosed primary sites.[1-3,10]

In rare cases, melanoma may arise in the esophagus, accounting for 0.1-0.5% of primary esophageal tumors.[11] These are believed to originate from melanocytes present in the esophageal mucosa, potentially associated with esophageal melanocytosis.[12] Diagnostic criteria for primary GI melanoma include absence of cutaneous or mucosal lesions elsewhere, presence of a solitary tumor, and histological evidence of in situ melanoma or intramucosal melanocytes in adjacent tissue.[1,3] In our patient, the identification of a cutaneous lesion on the back, along with widespread visceral involvement, strongly supported metastatic disease from a cutaneous primary.

Therapeutic options for metastatic MM have evolved substantially with the introduction of immune checkpoint inhibitors (e.g., pembrolizumab) and targeted therapies (e.g., BRAF and MEK inhibitors). Surgical resection may provide palliative benefit or improved survival in cases of isolated GI metastases.[2,6,9] Despite these advancements, GI metastases often are associated with poor prognosis. In this case, the patient's frailty and advanced disease precluded further intervention, and he elected to pursue hospice care.

CONCLUSIONS

MM can metastasize to the GI tract, most commonly affecting the small intestine, but also the colon, stomach, and esophagus. Diagnosis relies on clinical suspicion, imaging, and biopsy for histopathologic confirmation. Although rare, primary GI melanoma remains a consideration and warrants further study to clarify its

pathogenesis. This case reinforces the importance of early recognition and a multidisciplinary approach in managing GI manifestations of MM.

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KANSAS JOURNAL of MEDICINE

Case Report

Reactive Infectious Mucocutaneous Eruption Secondary to *Mycoplasma pneumoniae*: A Case Report

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INTRODUCTION

Reactive Infectious Mucocutaneous Eruption (RIME) is a mucocutaneous reaction that primarily affects the pediatric population following a bacterial or viral illness, most commonly *Mycoplasma pneumoniae*.[1-3] This is a recently adopted term, replacing *Mycoplasma pneumoniae*-Induced Rash and Mucositis (MIRM),[4] to reflect a broader range of causes, including *Chlamydia pneumoniae*, parainfluenza virus, and others.

RIME typically presents with severe mucositis, particularly in the oral cavity (up to 94% of cases) and eyes (up to 82%), accompanied by sparse cutaneous lesions. These symptoms are generally preceded by fever, cough, and malaise about one week prior.[5]

Given the recent rise in *Mycoplasma pneumoniae* cases among children, and increased reports of RIME in some regions,[6,7] it is important to distinguish RIME from more severe conditions such as Stevens-Johnson syndrome (SJS), erythema multiforme, and toxic epidermal necrolysis (TEN). RIME differs from SJS and TEN by its prominent mucosal involvement, minimal skin involvement, and greater prevalence among adolescent males. It also carries a significantly lower mortality rate.[5,8]

The authors of this paper present the case of a patient who arrived at the emergency department with marked oral lesions and bilateral conjunctivitis, following an upper respiratory infection.

CASE REPORT

We present the case of a previously healthy 14-year-old male admitted with worsening oral mucositis and bilateral conjunctivitis following an upper respiratory infection (URI). His symptoms began 10 days prior with cough, sore throat, and nasal congestion, which progressed to painful oral lesions, conjunctival injection with a foreign body sensation, and skin lesions. Despite initial outpatient treatment with azithromycin, prednisone, and codeine, his condition deteriorated, prompting transfer from an outside emergency department for further evaluation and management.

On admission, he exhibited significant oral mucosal ulcerations, bilateral conjunctivitis with non-purulent discharge, facial and periorbital swelling, and transient urticarial skin lesions across the torso, extremities, and groin. Laboratory evaluation revealed colonization with Group C *Streptococcus* and a non–SARS-CoV-2 coronavirus. While initial nasopharyngeal polymerase chain reaction (PCR) testing was negative for *Mycoplasma pneumoniae*, subsequent serologies were positive for Immunoglobulin M (IgM) and Immunoglobulin G (IgG).

The patient was treated with methylprednisolone (0.5 mg/kg twice daily), intravenous (IV) fluids, ocular lubricants, topical ofloxacin, and pain control using IV ketorolac and morphine. Despite severe oral pain, he was motivated to avoid nasogastric (NG) tube feeding. Oral swish therapies, including viscous lidocaine and a compounded solution of diphenhydramine, lidocaine, aluminum hydroxide, magnesium hydroxide, and simethicone, enabled him to tolerate some liquid meal replacements.

His condition gradually improved, with resolution of new skin lesions, healing of oral mucosa, reduction in ocular and facial swelling, and effective pain control. He was discharged on hospital day seven to complete an eight-day steroid course and instructed to follow-up with his primary care physician and optometrist.

DISCUSSION

RIME is a rare, immune-mediated condition that typically follows a viral or bacterial infection.[1-3] Previously referred to as *Mycoplasma pneumoniae*-Induced Rash and Mucositis (MIRM),[4] the term RIME was adopted to reflect a broader range of infectious triggers beyond *Mycoplasma pneumoniae*. RIME often presents with mucositis, conjunctivitis, and a diffuse erythematous rash. The underlying pathophysiology is believed to involve an exaggerated immune response to an infectious agent, resulting in widespread mucocutaneous inflammation.

In the case of the 14-year-old male described above, the progression from a URI to painful oral mucositis and conjunctival inflammation, along with positive *Mycoplasma pneumoniae* IgM serology, strongly supports a diagnosis of RIME. Alternative diagnoses such as Herpes Simplex Virus (HSV), SJS, and TEN were considered and excluded based on clinical features and laboratory results. HSV infection would typically be confirmed by a positive PCR from a lesion swab. SJS and TEN are marked by more extensive epidermal necrosis and skin involvement than is seen in RIME. RIME also is more common in adolescent males and tends to show more prominent mucosal involvement.[5,8]

Management of RIME largely is supportive, with pain control being central to treatment. Although there is no established therapy, antibiotics, corticosteroids, and intravenous immunoglobulin (IVIG) have been used in case reports and series, but no randomized controlled trials have evaluated their efficacy.[5,8] In our patient, IV corticosteroids appeared to halt disease progression, as no new mucocutaneous lesions developed after initiation. Treatment with IV analgesics, hydration, and oral swish-and-spit solutions enabled adequate symptom control throughout the illness. His clinical improvement and increasing ability to tolerate oral intake highlight the potential benefit of supportive care

and corticosteroids in RIME.

The patient particularly was motivated to avoid NG feeding, enduring significant pain to maintain minimal oral caloric intake. With support from the dietary team, he was able to identify tolerable foods. Ultimately, inadequate oral hydration became the primary barrier to discharge. This issue may be even more pronounced in younger pediatric patients, reinforcing the need for a multidisciplinary care approach.

As with systemic treatment, there is no standardized regimen for managing ocular involvement in RIME. Our patient experienced bilateral conjunctivitis, foreign body sensation, and intermittent blurry vision. Haseeb et al.[9] propose a severity-based approach to ocular management, ranging from artificial tears to topical antibiotics, steroids, or even amniotic membrane application. While our patient improved with ocular lubrication and topical antibiotics in addition to systemic steroids, the possibility remains that further ophthalmologic interventions may have enhanced his recovery.

This case also underscores the importance of combining PCR and serologic testing in the diagnosis of *Mycoplasma pneumoniae* infection. Given that our patient presented more than seven days after symptom onset, PCR sensitivity is reduced, with estimates as low as 62% in some studies.[10] Serologic testing is thus essential for accurate diagnosis, particularly in cases of suspected RIME.

Distinguishing RIME from SJS and TEN is important for both prognosis and management. Reported in-hospital mortality rates for SJS, SJS/TEN overlap, and TEN are 4.8%, 19.4%, and 14.8%, respectively, while mortality from RIME is exceedingly rare.[8] A 2014 systematic review identified only four RIME-related fatalities, all occurring in the 1940s.[5] RIME typically does not require burn unit care, which often is necessary for SJS and TEN. Furthermore, antibiotic treatment such as azithromycin can help eliminate the triggering antigen(s) in RIME.

CONCLUSIONS

This case highlights the importance of recognizing RIME as a distinct clinical entity in the differential diagnosis of post-infectious mucocutaneous eruptions, particularly in pediatric patients. Early recognition and appropriate supportive care, including corticosteroids and symptom-specific management, can lead to favorable outcomes. The recurrence of similar cases at our institution over the past year underscores the need for standardized treatment protocols to guide clinicians in the effective management of RIME.

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Keywords: Mycoplasma Infections, Exanthema, Mucositis, Mycoplasma pneumoniae

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Case Report

Laying it all out on the Table: A Case Report

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INTRODUCTION

Propofol, a gamma-aminobutyric acid (GABA) receptor agonist and N-methyl-D-aspartate (NMDA) receptor antagonist, is a potent, dose-dependent hypnotic commonly used for the induction and maintenance of anesthesia.[1] It is favored for its safety profile; however, its most frequent complication is hypotension, particularly in volume-depleted patients. Less common complications include hypertriglyceridemia, pancreatitis, and bronchospasm.[1,2]

Propofol-related infusion syndrome (PRIS) is a rare but potentially fatal complication. It is typically associated with prolonged administration, more than 48 hours, or high doses (>4 mg/kg/hour) in mechanically ventilated patients. PRIS can lead to severe organ dysfunction, including metabolic and lactic acidosis, cardiovascular collapse, acute kidney injury, rhabdomyolysis, and hyperkalemia.[3]

A more benign but still distressing complication is propofol-induced hypersexuality, sometimes accompanied by sexual hallucinations.[2] Hallucinations, defined by the American Psychiatric Association as "perception-like experiences that occur without an external stimulus... vivid and clear, with the full force and impact of normal perceptions," commonly occur during the transition into or out of sleep.[3,4]

A systematic review on hallucinations and sexual fantasies under hypnotic sedatives found that higher doses were correlated with an increased risk of hallucinations.[5] Additionally, a case-control study showed that men were more likely than women to report vivid and meaningful dreams while under sedation ($p < 0.01$).[6]

CASE REPORT

We describe the case of a 74-year-old male who underwent direct laryngoscopy with left-sided biopsy and cervical lymphadenectomy for squamous cell carcinoma of the head and neck. He was classified as ASA II according to the American Society of Anesthesiologists (ASA) Physical Status Classification System, which assesses comorbidities and perioperative risk (ranging from ASA I: healthy patient, to ASA VI: brain-dead patient undergoing organ donation).[7]

General anesthesia was induced with endotracheal intubation using intravenous fentanyl (100 mcg), lidocaine 2% (80 mg), propofol (150 mg), and succinylcholine (100 mg). No urinary catheter was placed. The surgery proceeded without complication, and the patient was transferred to the Post-Anesthesia Care Unit (PACU) for recovery.

While in the PACU, the patient expressed concern about possible inappropriate sexual contact during anesthesia, reporting ejaculation without any physical evidence. He declined a physical examination. The attending anesthesiologist discussed the potential for altered perceptions and hallucinations as side effects of anesthesia. A report was filed with the local police department per hospital risk management protocol. Health care professionals present during the procedure, four to five staff, were interviewed and denied any misconduct; no evidence supported the patient's claims.

The following morning, the patient expressed remorse and read a written apology to his surgeon. The remainder of his hospital course was uneventful, and he was discharged home with follow-up arranged in the outpatient clinic.

DISCUSSION

Sexual hallucinations during or after anesthesia can result in allegations of sexual assault or misconduct. For health care professionals, understanding how to recognize and navigate such situations is important both to protect patient well-being and to safeguard professional integrity. Although hypersexuality associated with propofol is rare, there is limited literature addressing how to manage these experiences.

A critical review of studies examining hallucinations under sedative agents suggests that innocuous, procedure-related stimuli, combined with central nervous system depression, may contribute to the occurrence of hallucinations.[2] In this case, the patient underwent a procedure above the waist without urinary catheter placement. It is possible that surgical or anesthetic equipment placement on the torso created tactile stimuli that contributed to the perceived hallucination. Notably, prior reports have documented that the rhythmic inflation of a blood pressure cuff during sedation has led to similar misperceptions, including accusations of inappropriate genital contact.[8]

Given these risks, it is important to educate patients on the potential for hallucinations related to anesthesia and to minimize placing instruments or equipment directly on the patient's body when unnecessary. While these precautions cannot eliminate the risk entirely, they may help reduce the likelihood of misinterpreted sensations.

CONCLUSIONS

Although rare, propofol-induced sexual hallucinations can be distressing for patients and carry serious implications for health care professionals. Avoiding the use of the patient's body as a surface for equipment placement and providing preoperative education about potential perceptual side effects may help mitigate these events and their consequences.

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