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Qualitative analysis of reflective writing examines medical student learning about vaccine hesitancy

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Abstract

Introduction: Increases in vaccine hesitancy continue to threaten the landscape of public health. Literature provides recommendations for vaccine communication and highlights the importance of patient trust, yet few studies have examined medical student perspectives on vaccine hesitancy in clinical settings. Therefore, we aimed to explore medical student experiences encountering vaccine hesitancy, mistrust, and personal biases, with the goal of informing medical student education.

Methods: A health disparities course including simulated clinical scenarios required students to complete a written reflection. We sorted reflections written in 2014-2016 to identify common topics and used inductive thematic analysis to identify themes relevant to vaccine hesitancy by group consensus.

Results: Our sample included 84 de-identified essays sorted into three non-exclusive topics: vaccine hesitancy (n=42), mistrust (n=34), and personal bias (n=39). We identified four themes within medical students' reflections: 1) Building a Relationship, including emphasis on patient-centred approaches; 2) Preparedness and Need to Prepare for Future Encounters, including highlighting gaps in medical education; 3) Reactions to Encountering Hesitant Patients, including frustration; 4) Insights for Providing Information and Developing a Plan with Hesitant Patients, including approaches to presenting knowledge.

Conclusion: Reflections in the context of simulated encounters and discussion are useful in students identifying their preparedness for vaccine discussion with patients. Student reflections can assist educators in identifying missing educational frameworks for particular scenarios such as vaccine hesitancy. Without a structured framework regarding addressing vaccine hesitancy, students draw upon other skills that may contradict recommended practices.

Keywords: *Medical Education, Vaccine Hesitancy, Reflective Writing, Bias, Mistrust*

Practice Highlights

- Reflective writing can be a useful tool in medical education toward addressing vaccine hesitancy.
- Medical student reflective writing can be used to demonstrate curricular gaps.
- Medical students expressed feeling unprepared to care for vaccine hesitant patients.
- Without a framework for vaccine communication, students may draw on other inappropriate skills.

I. INTRODUCTION

Increases in vaccine hesitancy and refusal threaten public health (He et al., 2022; Hough-Telford et al., 2016; Kempe et al., 2020; Santibanez et al., 2020), especially with the COVID-19 pandemic introducing a need for quick and widespread uptake of a new vaccine (Hamel et al., 2022; Ognyanova et al., 2022). Patients, especially parents, are increasingly seeking alternative forms of health information, such as online sources that can include misinformation (Broniatowski et al., 2018; Hara & Sanfilippo, 2016; Jenkins & Moreno, 2020; Meleo-Erwin et al., 2017). Patient trust in their clinician and the health care system delivering the vaccine strongly influence vaccination decisions (Goldenberg, 2016; Kennedy et al., 2011; Larson, 2016). Trust remains the most important barrier to acceptance and uptake of the COVID-19 vaccine, with mistrust of government, medicine, and science presenting major barriers to vaccine uptake (Ognyanova et al., 2022). Vaccine hesitant patients may bring preconceptions and concerns from their own research to in-clinic vaccine

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communication. Thus, it is important for clinicians to be well-prepared to work with vaccine-hesitant patients and parents.

Existing recommendations for clinicians encountering vaccine hesitancy emphasise centring patient views and voice instead of a medical, academic perspective (Holt et al., 2016; Koski et al., 2019). Approaches including motivational interviewing, presumptive language around vaccine recommendations, and persistent vaccine reminders without pressuring or dismissing patients have been shown to be effective in addressing vaccine hesitancy in medical practice (Dempsey et al., 2018; Gagneur et al., 2018; Hofstetter et al., 2017), while correcting misinformation and offering evidence to patients have been found to be counterproductive (Holt et al., 2016; Koski et al., 2019). These pre-COVID recommendations remain the same for addressing COVID-19 vaccine hesitancy, and lack of physician preparedness for encountering these patients is still an important issue (Centres for Disease Control and Prevention, 2021). Physicians may have misconceptions about patients' reasons for vaccine hesitancy, often assuming lack of understanding or information on the safety, effectiveness, and necessity of vaccines (Hough-Telford et al., 2016), rather than recognising the more central roles of trust and validation of concerns. If physicians do not learn approaches for centring patient voices in vaccine communication, these pre-conceived biases may present a barrier to vaccine uptake and patient-physician trust.

While valuable recommendations for addressing vaccine hesitancy in the clinical setting exist, current efforts center around informing practicing clinicians on these approaches and providing more educational resources to patients (Centres for Disease Control and Prevention, 2021). These may not represent a sufficient, long-term solution. Furthermore, resources available for healthcare workers may be inaccessible or overwhelming for physicians independently seeking tools (Karras et al., 2019). Incorporating vaccine hesitancy-centred curriculum into medical education may be the optimal, long-term solution to the lack of physician preparedness for these encounters, especially in the face of future pandemics and introduction of new vaccines. With curriculum renewal efforts incorporating early clinical experiences, students could encounter patients for whom vaccines are recommended, including vaccine hesitant patients, early in medical school. It would provide a better educational experience for students and a better health care experience for patients if students receive education to prepare them for these conversations. However, few studies have examined medical student perspectives on vaccine hesitancy in the clinical setting. Existing studies have found mixed findings around medical students' reflections on their preparedness for encountering vaccine hesitant patients and highlight the need for expansion of related curriculum in medical education (Brown et al., 2017; Kernéis et al., 2017). While COVID vaccine hesitancy literature lacks exploration of medical student perspectives and preparedness, recent studies have highlighted an additional barrier of vaccine hesitancy among medical students in some settings (Lucia et al., 2021). These findings provide additional motivation for including vaccine hesitancy-specific curriculum in medical education.

Understanding medical students' reactions to vaccine hesitancy is critical in preparing students to address vaccine hesitancy while maintaining patient trust. In the present study, which used a scholarship-of-teaching approach, we aimed to expand on existing research on medical student preparedness for encountering vaccine hesitancy to examine written reflections on mistrust and personal bias in clinical encounters more broadly and use a larger sample of student narratives. We analysed students' structured reflections regarding assigned reading, simulated patient encounters, peer discussions, and faculty-facilitated discussions to evaluate medical students' learning during a health disparities curriculum. Structured reflection on simulated encounters has been shown to be a useful tool for understanding student perspectives (Koski et al., 2018); this approach can inform development of medical curriculum for addressing vaccine hesitancy and may be a useful teaching tool as well for students to practice, discuss, and reflect on their own biases in an educational setting. Therefore, the purpose of this study was to explore medical student reflections on encountering vaccine hesitancy, patient mistrust, and personal biases, with the goal of informing medical student education.

II. METHODS

In this qualitative study, we analysed written reflections from a third-year medical student Skills to Impact Health Disparities course, to evaluate their learning about interacting with vaccine-hesitant patients and parents. This study was determined to be exempt by the relevant institutional review boards, including a waiver of informed consent.

From 2006-2018, a medical school at a U.S., Midwestern university required a one-day core session with the goal of developing learner skills to impact health disparities. Small groups of approximately six students went through five to six standardized patient scenarios, each designed to generate discussion and reflection about clinician bias that can unintentionally influence patient care. During

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the learning activity, each student spent 3-5 minutes interacting with a standardized patient who presented a challenge designed to provoke a level of discomfort in the learners to allow for discussion and reflection. One of these six scenarios included a parent with a history of vaccine refusal for their child expressing concerns about a recommended vaccine.

Following each case, students engaged in a 15-minute, non-facilitated discussion based on a list of focused questions. After all cases, students joined another group of six students for a 75-minute faculty-facilitated debrief. In addition, students were required to complete a brief critical reflection based on a theme of the core day activity using the LeAP framework (Aronson et al., 2012). This framework is modelled on a clinical framework, the SOAP note (Chief complaint, Subjective, Objective, Assessment, and Plan). Students were asked to consider a specific experience that led to concern or questions; describe the experience as fully as possible; reconsider the experience by getting other perspectives; synthesize learning; and make a plan to address future similar challenges. Students could choose to reflect on simulated or real clinical experiences.

Written reflective essays were available for analysis from years 2014-2016, providing qualitative data about students' observations and experiences with health disparities and health equity. All available essays (n=292) from 2014, 2015, and 2016 that were submitted as a course requirement for the Skills to Impact Health Disparities Core Day required course were de-identified and organized by year.

To ascertain the topics that the students addressed, three investigators (two involved in this study and one from another study using the larger set of all essays) read all essays. Each investigator then designated each essay to a topic from a jointly-developed list of non-exclusive topics derived from the data. After individually assigning topics for a sample of essays, the investigators met to compare their sorting and reconcile any differences before they went on to sort through another set of essays. This process continued until all essays were assigned to one or more topics. Most topic labels matched topics of the simulated scenarios that the students encountered in the course, while others related to broader issues highlighted across scenarios. With the goal of selecting reflections relevant to the issue of vaccine hesitancy, all reflections designated under the topics of vaccine hesitancy, mistrust, and personal bias were gathered for qualitative data analysis. Literature review and initial reading of essays suggested essays on encountering mistrust and bias relate to students' experiences when encountering vaccine hesitant patients, despite not all essays relating directly to vaccine hesitancy. Each essay was assigned an identifier with cohort year and an essay number. Individual essays were excluded based on group consensus on lack of relevance to vaccine hesitancy.

Inductive thematic analysis was used to identify codes and themes in the reflection data using a semantic, realist approach to identify explicit reactions from students grounded in clinical experiences to identify themes that could be directly applied to clinical practice (Braun & Clarke, 2006). Four investigators, including two involved in topic assignment (CRP, SC) and two additional investigators (MCJ, JLH), read and discussed six essays to develop a preliminary codebook, applied these codes to the same six essays, then met to discuss and revise the codebook. Subsequently, investigators coded the remaining essays in pairs using the revised codebook through four rounds of coding, making further iterative changes to the codebook and reconciling differences within pairs. The full team then met to discuss the coding, revise code descriptions, refine the grouping of the codes, and agree on descriptions of the groups. Any changes made to the codebook during the analysis process were retrospectively updated in all previous coding, so that all coding data reflected the final version of the codebook. Data were organized with qualitative analysis software (HyperResearch version 4.5.4). After all data were coded, investigators discussed and reached consensus on the themes.

III. RESULTS

A total of 90 reflections were collected from the Skills to Impact Health Disparities course across three cohorts of third-year medical students from 2014-2016 at one U.S., Midwestern university. Based on investigator consensus on lack of content relevance, six reflections were excluded from our study sample. Our final study sample included 84 de-identified reflections across three, non-exclusive topics: 42 categorized as relating to vaccine hesitancy, 34 as mistrust, and 39 as personal bias. We identified four major themes in medical students' reflections on encountering vaccine hesitancy, mistrust and personal bias: 1) Building a Relationship, 2) Preparedness and Need to Prepare for Future Encounters, 3) Reactions to Encountering Hesitant Patients, and 4) Insights for Providing Information and Developing a Plan with Hesitant Patients. Representative quotes for each theme can be found in Table 1. Supplemental Table 1 lists each theme with the codes that informed the theme.

A. Building a Relationship

In our first theme, medical students recognized the importance of Building a Relationship with hesitant parents or patients as the foundation for discussions

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about vaccines or other care about which patients expressed hesitance. They focused on approaches such as building rapport, centring the parent/patient's views during the discussion, acknowledging their efforts to gather information about their health decisions, expressing empathy, and avoiding direct confrontation of the patient's viewpoint during the discussion. Many of these observations occurred during the core day experience. For example, one student wrote:

"I learned the importance of letting the patient try to teach the doctor what they know rather than the doctor jumping in and lecturing to the patient. In the future I will try to talk less and let the patient explain more about why they oppose vaccinations to better gauge what they understand about the literature before I try to explain why vaccinations are important and the facts about vaccinations."

[Year3_61]

The students saw the importance of finding points of commonality between their perspectives and those of the patient and moving the conversation toward establishing goals that they could work together with the patient to accomplish.

One student described, "I learned that a big part of approaching this difficult conversation is establishing the correct approach: common goal, shared decision making."

[Year3_65]

B. Preparedness and Need to Prepare for Future Encounters

Another major theme identified in medical student reflections on encountering hesitant patients was Preparedness and Need to Prepare for Future Encounters. This theme included discussion of whether the student expressed feeling ready for the encounter or whether they thought it was successful, as well as specific plans for preparing for similar encounters in the future. One way that students discussed their own feelings of preparedness was by recognizing their own biases upon reflection of the encounter. For example, one student wrote:

"I realized my own prejudices influenced my care of my patients more than I would have liked. … It was an eye opener that I am not as impartial as I would like to be and that it takes a lot more self-reflection and awareness to be the best care provider I can be.

[Year3_16]

When discussing a need to prepare for future encounters, many students referenced plans to independently seek additional resources, especially those referenced by patients in encounters.

Other students mentioned plans to practice patient interactions related to the reflection encounter; including, "For me, practicing acknowledging a patient's views and concerns without endorsing or validating false information is paramount."

[Year1_07]

Some students also referenced plans to request feedback or advice from more senior clinicians. Additionally, several students identified gaps in their medical school curriculum that contributed to their lack of preparedness or that needed to be filled to support future preparedness. Students specifically referred to needing more resources, support, and training for encountering hesitant patients. They sometimes called for system-wide changes to address this gap in knowledge.

C. Reactions to Encountering Hesitant Patients

One of the themes identified in the students' self-reflection was related to their own and others' Reactions to Encountering Hesitant Patients. While some students expressed frustration with patients/parents who expressed hesitance about vaccines, they acknowledged that they can be passionate about the topic of vaccines in their patient care, but ultimately, patients and parents make their own decisions.

One student shared, "I have always found it quite distressing when an otherwise healthy child goes unvaccinated, given the enormous amount of evidence in favour of vaccination efficacy and its effect on public health."

[Year2_86]

Another student shared, "I knew I could not force the patient, and I knew that she ultimately was in control of what she would do."

[Year3_78]

In some reflections patient and parents were labelled, for example, as "anti-vaxxers." Some reflections described parents' and patients' bias towards the physician or clear messaging of a desire for a different doctor. In encountering standardized patients in our scenarios or in reflecting on patients seen in clinical settings, students acknowledged that these conversations were difficult, and they were able to self-assess their level of comfort with conversations.

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This was well-summarized in one reflection: “It was remarkable to me how such a strong reaction from this patient’s mother elicited an equally strong reaction in me.”

[Year2_34]

At times students recognized a point where these difficult conversations could reach a dead end. One student stated, “No matter how hard I would try, nothing seemed to work.”

[Year2_03]

Especially in this context, students reflected ambivalence towards the patient’s decision. For example:

“I personally feel that providers allowing for healthy children on their patient panels to remain unvaccinated indirectly reinforces non-vaccination as being acceptable by the medical establishment. That said, I also see and appreciate that turning a child away from one’s practice because their parents refuse to vaccinate them not only does not solve the problem at hand, but it also leaves a child at a very critical developmental age with no health care at all until an alternative provider can be found. Ultimately, I found attempting to reconcile these seemingly incompatible sides of the issue of dealing with anti-vaccination quite confusing and uncomfortable.”

[Year2_86]

D. Insights for Providing Information and Developing a Plan with Hesitant Patients

A fourth theme centred on students’ insights regarding how to provide information appropriately to patients and how to create a plan with patients who were hesitant regarding the medical recommendations given to them. Medical students suggested a variety of ways to provide information to patients who were hesitant. They noted the importance of contributing relevant facts and evidence, stressing that such information and knowledge in general needed to be presented in an understandable manner.

As one student described, “Finding the appropriate words to use in such conversations with a patient is essential.”

[Year1_44]

Students often wrote that they needed to provide reputable information to inform the patient’s decision-making. Some suggested strategies for how to present information to patients, including the sharing of stories and the use of scary information to convey the level of seriousness of the medical recommendation and advice.

One student referenced storytelling in the literature, “…the use of storytelling, the same method used by the anti-vaccination movement, [can be] a way to counteract the barrage of misinformation regarding vaccines.”

[Year1_90]

Sharing these insights about how to present information, students also moved towards how to develop a plan with their patients with some deliberate suggestions. Some students felt they needed to be persistent in their recommendations for vaccines. Some students explained how intentional discussions on the risks and benefits of their recommendations can help in their negotiation about a care plan with their patients.

One student noted, “This draws along the line of patient autonomy, and as long as we are clear about the risks and benefits with the patient, then ultimately, it's up to the patient to make the decision about which medications she will take.”

[Year1_52]

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Medical Students' Experiences with Vaccine Hesitancy, Mistrust, and Bias	
Themes	**Exemplar Quotes**
Building a relationship	"*I felt it was most important that I listen to his story as much as I possibly could, before I spoke. So I let him talk. I said, 'tell me your concerns.'" [Year3_18]* *"My feelings during this situation were somewhat of frustration but more of just desire for the patient to feel as though I was there to care for her child above all else and to come alongside her rather than combat with her." [Year3_03]* *"One suggestion that my classmate said was to start out the conversation by validating how they are feeling more and that you understand that they are a good parent rather than jumping into facts about vaccinations which caused the patient to become defensive." [Year3_61]*
Preparedness and need to prepare for future encounters	*"I need more tools for dealing with these situations in the future." [Year1_04]* *"My plan is to educate myself more on the materials available for parents regarding immunizations." [Year3_03]* *"Ultimately it would be nice to see EMRs advance to the point where they can track a patient's problem, not just on a list, but through stages of management and onto completion, with a provider responsible for follow-up." [Year2_33]* *"I will seek feedback from my attendings and residents so that I can improve my motivational interviewing skills." [Year3_81]*
Reactions to encounter-ing hesitant patients	*"Ultimately this is a decision of the parent and I can only offer my professional advice…I learned that this topic did elicit some emotion which I was surprised about." [Year3_79]* *"I learned that I need to work on my bluntness (what I consider to be honesty), as well as increasing affirmation of patients' fears, since telling someone they are wrong (in any facet of life) typically doesn't work out that well." [Year2_34]* *"I felt uncomfortable and offended at times during the conversation. The patient clearly was not interested in negotiating vaccination, and when I tried to discuss the validity of some of the studies and articles she had read, she became very defensive." [Year2_82]* *"I dealt with a mother who had embraced the anti-vaccination movement. This is an issue that I have thought about a lot but despite my reflections, it is an issue that I do not know how to address well. This filled me with fear because I honestly didn't know what the best approach was." [Year1_90]*
Insights for providing information and creating a plan with hesitant patients	*"From the debriefing session I learned that a promising approach for the anti-vaccine population is to continue to offer the vaccines at each well-child check-up without intensive counsel on the risks/benefits of vaccines." [Year1_13]* *"I also learned about using pictures to get a visceral response from the parent which hopefully would change their mind about not getting a vaccine." [Year3_69]* *"When I encounter this scenario in the future, as I'm sure I will, I will begin by teasing out whether the patient is interested in more information, in which case I can have resources and studies available, or if they have already made up their mind and at that point I need to negotiate the visit to ensure that they continue to see me for whatever care they are willing to receive, even if that doesn't include all the preventive measures I would like." [Year2_82]*

Table 1. Medical students' experiences with vaccine hesitancy, mistrust, and bias—Themes and exemplar quotes

IV. DISCUSSION

In this qualitative study of a curricular activity designed to build medical students' skills for interacting with patients toward reducing health disparities, we explored medical student reflections on real and simulated patient care encounters related to vaccine hesitancy, mistrust and personal bias, with the overall goal of informing medical student education. This allowed for evaluation of the utility of this curriculum framework, as well as highlighting gaps in medical curriculum around addressing vaccine hesitancy. Our analysis supports that medical student reflections across the areas of vaccine hesitancy, mistrust and personal bias share thematic structure and implications for informing medical curriculum regarding encounters with patients who resist medical advice, as well as recommendations for teaching approaches to communication with patients and parents who express hesitancy about vaccines.

This study highlights the benefits of reflections on simulated clinical encounters in the context of a Skills to Impact Health Disparities course. Reflections in the context of simulated encounters and discussion were successful in encouraging students assess their preparedness for vaccine discussions with patients. Review of written reflections, like those analysed in this

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study, can assist educators in identifying missing educational frameworks for particular patient care scenarios such as vaccine hesitancy. While efforts are growing to incorporate vaccine hesitancy information into medical curricula, especially now, in response to the COVID-19 pandemic (Kelekar et al., 2022; Onello et al., 2020; Real et al., 2017; Schnaith et al., 2018), there is little focus on recommending or evaluating these efforts on a large scale in the U.S. However, recent efforts to establish innovative curriculum of this kind have shown it to be feasible and effective for improving medical student preparedness in addressing vaccine hesitancy (Kelekar et al., 2022; Onello et al., 2020; Real et al., 2017; Schnaith et al., 2018). The curriculum structure assessed in this study may offer a strong approach to teach students valuable lessons related to vaccine hesitancy and evaluate existing progress in this area.

Findings from this study also highlight gaps in existing medical curriculum for preparing students to encounter hesitant patients. We found that without a structured and deliberate learning framework for addressing vaccine hesitancy, students will draw upon other skills that may not be appropriate and may be counterproductive. Students in this study often expressed feeling unprepared, aligning with prior studies (Brown et al., 2017; Kernéis et al., 2017). However, we found that using a structured framework for reflection encouraged planning future preparation for similar encounters. This included calling for system-wide changes to curriculum and availability of resources. Additionally, discussion with peers and reflection were cited as helping students to feel more prepared for future encounters with hesitant patients.

While discussion with peers as a learning strategy was widely recognized as helpful, outcomes of these discussions varied greatly and were directly related to the student's overall reflection and plan for future preparation. This sometimes led to misguided solutions, highlighting the need for aligning education and training around similar encounters with evidence-informed recommendations. Many students referenced using an approach of centring patient views, either during the clinical encounter or after peer discussion and reflection, which aligns with recommendations (Centres for Disease Control and Prevention, 2021; Holt et al., 2016; Jarrett et al., 2015; Koski et al., 2019). However, many others referenced using only facts to correct knowledge, which is advised against in the vaccine hesitancy literature (Holt et al., 2016; Koski et al., 2019). In the context of these reflections, there would not be a space for students who came to misguided conclusions about approaching vaccine hesitancy to have this knowledge corrected based on recommended practices. Additional support and curriculum around vaccine hesitancy should be implemented alongside this framework of practice, peer discussion and reflection.

Previous research has shown that written reflections provide an effective tool for students to acknowledge their biases and the potential impact on patient care, as was seen in this study (Ross & Lypson, 2014). Physician biases related to perceptions of patient education, lifestyle, and identity have been documented and found to impact patient care and rapport (Forhan & Salas, 2013; Franz et al., 2021; Verbrugge & Steiner, 1981; Walls et al., 2015). There are concerns of physicians' dismissal of patients expressing vaccine hesitancy from their care and physicians' beliefs that patient hesitancy is due to lack of reliable information (Hough-Telford et al., 2016). Physician frustration may contribute to lack of willingness to bridge communication with hesitant patients; this has been seen even at the student-level, in this study and in previous research (Koski et al., 2018). Preparing students for these types of encounters by promoting reflection on frustrations and biases is important for addressing vaccine hesitancy.

Limitations of this study include that data were collected from a single institution. However, detailed, written reflections allowed for in-depth thematic analysis that may transfer to medical students more broadly. Additionally, reflections were from a course required for all medical students at the institution from cohorts over three years. Students' reflections were written in 2014-2016, prior to the COVID-19 pandemic. However, vaccine hesitancy is an even more relevant topic now and reasons for vaccine hesitancy as well as strategies for addressing it are largely unchanged (Centres for Disease Control and Prevention, 2021). Indeed, vaccine hesitancy to the COVID-19 vaccine highlights the need for deliberate curricular efforts. Another limitation is that our sample only includes students who chose to discuss vaccine hesitancy, mistrust and bias in their reflections. However, this allowed us to analyse a fairly large sample of student reflections for a qualitative study, aiding in robust thematic saturation and providing insights that are relevant beyond vaccine hesitancy cases.

V. CONCLUSION

There are several meaningful implications of this study for medical education. Our findings illustrate benefits of learner reflection to build insights about communicating and building relationships to address vaccine hesitancy in medical education. Students found encounters with vaccine hesitant patients challenging, in part due to lack of preparedness, highlighting a gap in curriculum. Findings demonstrate varied familiarity with existing recommendations for addressing vaccine hesitancy,

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emphasizing the need to incorporate specific training into medical curriculum regarding specific skills gaps such as with communication. By focusing on mistrust and personal bias beyond vaccine hesitancy-specific cases, medical curriculum can better prepare students to approach these underlying issues with vaccine hesitant patients and patients expressing hesitancy to other medical recommendations in their future clinical practice. Finally, comprehensive efforts to improve vaccine hesitancy preparedness amongst learners are needed in our current climate of medical mistrust, given the prominence of vaccine hesitancy not just in paediatrics but also throughout clinical care in the context of the current COVID-19 pandemic. To improve vaccine confidence and decrease mistrust in the physician-patient relationship, medical educators must address medical student preparedness for encounters with vaccine-hesitant patients and parents through intentional learning strategies incorporated into medical school curriculum. We recommend that medical schools explore incorporating simulated patient encounters or role-play scenarios with structured reflection and discussion activities in response to encounters with hesitant patients, alongside didactic curriculum on evidence-based vaccine communication strategies, as research continues to evaluate best practices for preparing medical students to encounter vaccine hesitancy.

Notes on Contributors

Marina C. Jenkins BA was involved in the conceptual development of this qualitative analysis; analysis of reflective writings for development of themes; writing of introduction, results, methods and discussion and editing all sections and final approval of the manuscript.

Caroline R. Paul MD was involved in the original curriculum, the original sorting process of student reflective writing; the conceptual development of this qualitative analysis; analysis of reflective writings for development of themes; writing of results section and editing of all sections and final approval of the manuscript.

Shobhina Chheda MD MPH was involved in the original curriculum, the original sorting process of student reflective writing; analysis of reflective writings for development of themes; writing of results section and editing of all sections and final approval of the manuscript.

Janice L. Hanson PhD EdS MH was lead in the conceptual development of this qualitative analysis and organization of qualitative data; analysis of reflective writing; writing of results; writing of methods; and primary mentor to first author on writing of introduction and discussion; editing of all sections and final approval.

Ethical Approval

This study received exemption status from the Institutional Review Boards from the University of Wisconsin-Madison and the Washington University in St. Louis.

Data Availability

We do not have IRB permission to share our data in a data repository. The data are essays written by medical students during a required university course. While the essays are de-identified, it could be possible for someone who wrote an essay or participated in discussion groups with those who wrote the essays to identify an individual who wrote an essay.

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Declaration of Interest

The authors have no conflicts of interest to disclose.

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Thematic Codebook Derived from Medical Students' Reflections	
Themes	**Codes**
Building a relationship	Acknowledge that parents/patients have and seek information Avoid confronting patient viewpoints Build rapport Center patient views Establish goals Express empathy Find commonality Have an open mind Respect Student's or physician's boundaries Time Trust/mistrust
Preparedness and need to prepare for future encounters	Acknowledge need to prepare for future Educate self Learn from peers Practice Preparedness Recognize own bias Request feedback Successful interaction Suggest system changes
Reactions to encountering hesitant patients	Acknowledged parent/patient makes their own choice or decision Considered parent/patient dismissive of medical advice Expressed ambivalence toward patient decision Felt passionate about the topic Found these conversations difficult Labeled parent or patient Noted parent/patient's bias toward physician Noted parent/patient wanted a different doctor Perceived parent/patient as having the wrong knowledge Perceived parent/patient as resistant to vaccines Self -assessed comfort with conversations Thought conversation reached a dead end
Insights for providing information and creating a plan with hesitant patients	Contribute facts/evidence Discuss risks and benefits Negotiate a plan Persistently offer vaccines Present knowledge in an understandable way Provide reputable information Share stories Use motivational interviewing Use scary information to convey seriousness

Supplemental Table 1. Thematic codebook derived from medical students' reflections

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