# Preparing for the PICU: A Qualitative Study of Residents as They Prepare for Their First Pediatric Critical Care Rotation

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## Abstract

Learning critical care medicine in the pediatric intensive care unit (PICU) can be stressful. Through semistructured interviews ($n = 16$), this study explored the emotions, perceptions, and motivations of pediatric medicine (PM) and emergency medicine (EM) residents, as they prepared for their first PICU rotation. Qualitative data were collected and analyzed using the grounded theory method. Three resultant themes emerged: (1) residents entered the PICU with a range of intense emotions and heightened expectations; (2) they experienced prior history of psychologically traumatic learning events (adverse learning experiences or ALEs); and (3) informed by ALEs, residents prepared for their rotation by focusing heavily on their most basic level of physiological needs and adopting a survival mindset prior to the start of the rotation. These three themes led to a substantive, or working, theory that ALE-associated events may affect how residents approach upcoming learning opportunities. Consequently, adapting a trauma-informed approach as a component of medical education may improve resident learning experiences in the PICU and beyond.

**Keywords**
- graduate medical education
- pediatrics
- emergency medicine
- psychological trauma
- burnout
- professional

## Introduction

Learning pediatric critical care medicine is a vital rite of passage for many residents. Unfortunately, it can also be a stressful and complex experience.[1] The pediatric intensive care unit (PICU) cares for patients with a high level of acuity in an elaborate and technologically driven environment.[2] Residents who complete their PICU rotation often suffer from increased prevalence of depression, emotional exhaustion, and depersonalization, also referred to as burnout.[3] Despite these challenges, the PICU remains a unique and fertile setting that is often required for resident education in pediatric mediine (PM) and emergency medicine (EM), respectively.

Many innovative learning resources, such as asynchronous e-learning, flipped classroom models, reflective learning, and high-fidelity simulation have been developed to support PICU learners.[4] These interventions have focused primarily on teaching medical knowledge content or clinical

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skills to learners, rather than on addressing residents' emotions, perceived level of preparedness, motivations, or degree of necessary support. While theoretical models of workplace learning can be applied to resident PICU education,[5] few studies have sought to invite the learner's perspective by asking them what they need to succeed in the PICU. To create curricula that best support resident education and wellness, which are two inextricably intertwined core tenets of workplace-based learning,[5] it is critical to understand the experiences, perceptions, and needs residents bring to their first PICU rotation.

Recent studies illustrate the importance of learner-centered needs assessments.[6] One study investigating surgical instruction in the operating room (OR) uncovered major disparities between what attending physicians think residents need to learn and what knowledge residents actually believe they are lacking.[7] Outside of the OR, studies have found that attending physicians lack insight into residents' valuation of their night float rotation,[8] comfort with autonomy,[9] and satisfaction with provided feedback.[10] These studies offer evidence across disciplines that what residents need and desire from their learning experiences requires further study. In addition, little is known about how residents prepare for and what expectations they have prior to their first PICU rotation. These are important gaps in existing literature that need to be filled.

In this study, we used the grounded theory method (GTM) to examine PM and EM residents' perceptions prior to their first PICU rotation. GTM is a qualitative research strategy that demands constant comparison of multidimensional, contextual data for the purpose of developing substantive or midlevel scientific theories. Through an inductive and iterative approach, GTM can be utilized to investigate complex processes and generate hypotheses that fuel further investigations. Pragmatist GTM is a type of GTM that focuses primarily on producing knowledge that participants would consider useful.[11–13]

## Study Aims

By exploring past relevant learning experiences and present rotation preparedness, our goal was to identify residents' learning expectations and anticipated educational challenges. In addition, we sought to holistically explore residents' perceptions, emotions, motivations, and levels of support, to reveal any potential unmet needs residents possess prior to their PICU rotation. Developing educational empathy is a necessary first step toward designing learner-centered interventions that can improve education and wellness in the PICU. Further, exploring learners' needs prior to a critical care rotation may have implications for other learning experiences throughout their training.

## Materials and Methods

### Study Design

We designed a qualitative study using GTM within a pragmatist paradigm.[11–13] The Oregon Health & Science University Institutional Review Board (IRB) approved this study (IRB no.: 20134) with a waiver of written consent.

### Study Setting

The study was conducted in an urban, academic children's hospital with level-1 trauma center designation, located in the Pacific Northwest. In our 20-bed quaternary PICU, critical care attendings cover 24 hours per day, fellows intermittently complete day or night shifts, and a nurse practitioner provides clinical oversite and interdisciplinary liaising 4 days per week. The house staff is comprised of two third-year PM residents, one second-year PM resident, and one second-year EM resident. First year residents do not rotate through the PICU.

Before their first PICU rotation, EM and PM residents acquire relevant experiences in the medical and neonatal ICU, respectively, and may participate in critical care scenarios within other areas of the hospital. Their PICU rotation lasts 3 to 4 weeks. In the PICU, residents serve as first-call physicians for up to eight medical and surgical patients per day, or all patients overnight and on weekends. Residents work Sunday through Saturday, averaging 1 day off per week, and complete 24- to 28-hour shifts in every 3 to 4 days.

Care provided in the PICU includes both medical and postoperative congenital cardiac surgical care. During the week, the patient census is divided between an attending physician managing the cardiovascular service and another attending physician managing the medical-surgical patients. Toward the end of the day, they both hand off their patients to an attending physician who stays in-house overnight. On the weekend, only one attending cares for the entire unit. Residents, on the other hand, manage and round on all patients, every day, while accompanied by each patient's respective multidisciplinary team members, including pharmacists, dietitians, consultants, surgeons, nurses, and family members.

### Sampling and Data Collection

Between July 2019 and March 2020, we invited second-year EM and PM residents to participate in one-on-one, 30-minute, semistructured interviews, within a week prior to their first PICU rotation. We chose this convenience sampling strategy to capture the perspectives of our current residents; however, this also allowed us to recruit the most diverse and representative sample possible from the two groups. The lead author (A.J.K.) recruited participants via e-mail, assuring that their involvement was voluntary, confidential, and would not affect their evaluations. A.J.K. performed and audio recorded all interviews. When interviews could not be completed in-person, due to the novel coronavirus disease 2019 (COVID-19) pandemic social-distancing requirements, they were performed through Cisco Webex, a secure online video-conferencing platform.

The interview guide was informed by the research aim and discussions among education experts from both pediatric critical care and EM. Content included exploratory prompts related to residents' interest in critical care, rotation preparedness, identification of learning resources, wellness plans, desired content acquisition, preferred learning processes, expectations for interprofessional learning, and understanding of PICU teamwork. As data collection and



 

**Ask about general PICU expectations:**

1. How are you feeling about your upcoming PICU rotation?
2. Have you spoken to people about the PICU? What have they told you?

**Ask about resident's approach to learning in the PICU:**

1. What do you want to learn in the PICU? Why?
2. What do you think you're going to learn?
3. Have you identified any PICU learning resources? What are you going to do if you need to know something while you're in the PICU?

**Ask about perceived challenges and barriers to learning in the PICU:**

1. What do you think will be the biggest challenges of your PICU rotation?
2. What will be your barriers to learning?
3. What strengths does one need to excel in the PICU?
4. What are your strengths or past experiences that'll support you in the PICU?

**Ask about understanding of team roles and logistics in the PICU:**

1. Walk me through a typical day in the PICU. What are your roles? What are the other team roles?
2. How does the EM resident function as part of the team in the PICU? (*ask if they are PM*
3. Say you were walking through the PICU, and a nurse pulls you aside to tell you a patient is having increased respiratory distress. What would be your course of action?

**Ask about preparation for the PICU and the extent of personal support:**

1. What have you done to prepare for your PICU rotation?
2. Have you discussed your PICU rotation with anyone outside of work?
3. Do you know people outside of work who work in medicine or critical care?

**Fig. 1** PICU resident study interview protocol. EM, emergency medicine residents; PICU, pediatric intensive care unit.

analysis occurred simultaneously, additions to interview protocols were made in response to emerging data and to test developing theories (►**Fig. 1**). After 13 interviews (9 PMs + 4 EMs), no new concepts emerged. We conducted interviews with one more PM resident and two more EM interviews to confirm thematic saturation of these data.

### Data Analysis

Three authors analyzed the data: a pediatric critical care fellow (A.J.K.); a general pediatrician and outpatient clinical instructor (B.W.S.); and a pediatric critical care nurse practitioner who coordinates the PICU rotation (S.P.K.). Additionally, an experienced education researcher and the EM residency program director (L.M.Y.) provided direct guidance from the study's conception. A.J.K. transcribed the interviews using an automatic service (*www.happyscribe.com*) and deidentified the transcripts. Using constant comparison analyses, A.J.K. and B.W.S. independently performed line-by-line open coding of four transcripts (two PMs + two EMs). They reviewed and combined their codes using a visual concept

 

map to produce the preliminary codebook, and then independently coded two more interviews to ensure stability of the coding scheme. A.J.K. coded the remaining transcripts in NVivo 12. He met regularly with B.W.S., L.M.Y., and S.P.K., all knowledgeable in qualitative research methods to discuss code and category generation and to ensure thematic saturation.

The authors met iteratively to review resultant categories. Through a series of three in-person meetings and further online discussions, consensus regarding themes and an emergent overall guiding theory was finalized. A.J.K., S.P.K., and B.W.S. reread the transcripts once more to confirm the emergent theory was grounded in the data. To enhance the trustworthiness of our findings, we performed member-checking with participants at the completion of our study. We also hosted focus groups with residents who had completed a PICU rotation, for the purpose of future improvement initiatives, where we directed them to reflect on their experience and brainstorm changes to the PICU curriculum and rotation. Finally, we presented the findings to the pediatrics department during a 1-hour public forum, and invited pediatric providers at all levels of their career to reflect on their own past PICU learning experiences and their perceptions of the resonance of our findings. Results from the focus groups and forum, although not analyzed in this study, helped to triangulate the findings from this study.

**Table 1** Participant characteristics ($n = 16$)

| Participant characteristic | Value *n* (%) |
|---|---|
| Mean age (y) | 29 |
| Range | 27–31 |
| Gender | |
| Female | 11 (68.8) |
| Male | 5 (31.2) |
| PGY2 | 16 (100) |
| Department | |
| EM | 6 (37.5) |
| PM | 10 (62.5) |
| Relationship status | |
| Partnered | 15 (93.8) |
| Single | 1 (6.2) |
| Has children under the age of 18 years | |
| Yes | 1 (6.2) |
| No | 15 (93.8) |
| Previous PICU experience in medical school | |
| Yes | 6 (37.5) |
| No | 10 (62.5) |

Abbreviations: EM, emergency medicine residents; PM, pediatric medicine residents; PGY, postgraduate year; PICU, pediatric intensive care unit; PM, pediatric medicine residents.

## Results

Of 11 PM and 9 EM residents scheduled to rotate, 10 and 6, respectively, agreed to take part. Participants were approximately 30 years of age, predominantly female, and partnered (►**Table 1**). When comparing in-person to virtual interviews, we found no differences in the richness of data obtained.

Our analyses revealed that residents harbored a range of intense emotions and heightened expectations. While they described a spectrum of prior acute and critical care training opportunities, a common history of psychologically traumatic learning experiences emerged from our data. Our analyses also uncovered how residents prepared themselves for their rotation in various ways, with a commonly described approach of adopting a survival mindset, before entering the PICU.

### Broad Spectrum of Emotions and Expectations

Residents expressed fear and anxiety regarding their upcoming PICU rotation. However, they were also quick to acknowledge their excitement for "a very good learning experience" and a sense that they would be able to endure the difficulties that lay ahead (►**Table 2**):

> "I mean, I've been through worse …. I like to think of these experiences as things that will help me learn and grow … or create a new way that will be a new strength." (PM6)

Residents anticipated difficulty with caring for critically ill children, absorbing complex knowledge, being efficient, and experiencing limited autonomy. They expected to feel physically exhausted, emotionally drained, overstressed, and intellectually depleted. Closely related to these concerns, they often appeared fixated on their upcoming 24- to 28-hour shifts which are now rare in residency training due to changing approaches to duty hour restrictions:

> "I think probably the hours are going to be very challenging, especially the 30 hour call—I'm very anxious for that. It's going to be hard to stay up for that long and be all alone here." (EM2)

Feelings of dread about being on call were often accompanied by a fear of being alone, even though residents are strongly encouraged to call fellows and attendings for support at any time.

### Prior Adverse Learning Experiences

Early in our study, one participant alluded to the "sad cases" that occur in the PICU. When prompted to envision how such aspects of the rotation might affect her, she answered:

> "I've had no one that's died while I've actively been taking care of them. So that I think is going to be really hard. Because that'll be the first time I've had to deal with that." (PM2)

In fact, only half of PM residents and a minority of EM residents reported ever having witnessed the death of a

 

**Table 2** The range of emotions expressed by residents prior to their PICU rotation and related exemplars

| Emotional range | Exemplars |
|---|---|
| Fear and terror related to a perceived lack of knowledge and expected physical and emotional depletion | "I've heard some of the surgical attendings are maybe a little bit intimidating." (EM4)<br>"[I'm] a little terrified about the 28 [hour calls]." (EM5)<br>"I would say maybe a little bit of dread." (EM6)<br>"So probably [I feel] both fear and excitement." (PM2)<br>"So, I've been waffling back and forth between excited and terrified." (PM3)<br>"I'm terrified *laughs*. We can start there." (PM5)<br>"I think just [due to] a lack of familiarity with the PICU, [I feel] a bit of a fear, just from a knowledge standpoint." (PM6)<br>"I guess somebody coming in acutely and I don't know what to do, is probably my biggest fear. Like in my head I imagine PICU as like just people - kids - rolling in just like sick out of their mind, and ... you're having to fix them right away." (PM8) |
| Anxiety, worry, and apprehension, related to the anticipation of caring for patients with high acuity levels in a complex environment | "A little bit nervous about it. Um, we do get some experience working with kids in the pediatric ED. But really sick kids make me nervous .... I'm just worried about not knowing what to do if a kids really sick and I don't want like any delay in care, because I don't know what to do." (EM1)<br>"I'm feeling pretty anxious ... super sick kids, ventilators and things that we don't really deal with, makes me pretty anxious." (EM2)<br>"I feel nervous about the rotation. I know that it's really time intensive and that like sick kids tend to be like sort of scarier than sick adults." (EM3)<br>"I think we all just kind of lament about how scared we are and nervous and whatever." (PM3)<br>"My body anxiety level is really high about it." (PM5)<br>"I think like most rotations that are new to me, um [I feel] a little bit of nervousness and apprehension." (PM6)<br>"I'm just worried about getting overwhelmed by everything." (PM7)<br>"[I'm] anxious just because it seems like it's a lot of go go go go go." (PM8) |
| Excitement and eagerness for a beneficial learning experience | "I'm hoping to learn a lot .... I've talked to someone who's on the rotation now and he said that you'll learn a lot and it is a good rotation, but it can be exhausting, physically and mentally." (EM1)<br>"... but I'm looking forward to learning." (EM2)<br>"Excited to learn some new stuff ... looking forward to kind of growing and ... starting to feel a bit more comfortable with that aspect of medicine." (EM4)<br>"I'm excited, because I feel like haven't had a lot of experience with kids in critical care." (EM5)<br>"[I feel] energized .... I think because it's new, I'll probably learn a lot." (PM6)<br>"I would say nervous is probably the most overarching word, but just kind of eager to get started at the same time. I think there's going to be a lot of interesting cases and lots of good learning." (PM7)<br>"I would say excitedly anxious? Like I'm excited to learn different pathophysiology in a more acute setting." (PM8) |

Abbreviations: ED, emergency department; EM, emergency medicine residents; PICU, pediatric intensive care unit; PM, pediatric medicine residents.

child. Of those who had, many recalled those fatalities as being emotionally traumatic. As one resident described:

> "I had one kid that was a really horrible code .... And the kid passed away which was really a little traumatic. And so there's a little bit, I think, of PTSD from that." (PM1)

Another resident shared his experiences during a global health elective, where witnessing the loss of infant life was intensified by his inability to provide the standard level of care:

> "Many newborns who would come in, and all they could do was [provide nasal cannula], so they would very frequently die of respiratory failure within the first day or two .... Seeing them do CPR and stuff like that, it's pretty tough obviously. Especially knowing that that wouldn't happen here .... I think there may be some sort of flashback that comes if one of those situations presents itself." (PM7)

Thus, the category of "Adverse Learning Experience (ALEs)," where participants described multiple examples of emotionally disturbing events during their prior medical training, emerged from our research. For instance, some residents described feeling as an outsider on past rotations:

> "My MICU months, it was very enlightening how emergency medicine physicians overall are viewed .... The internal medicine doctors think the emergency medicine doctors really don't know what they're doing." (EM4)

> "Personalities that tend to be in the PICU ... tend to be a little bit more on the intense side. And personality wise, I don't always mesh super well. Being in that environment where I'm super high stress for a long time, it's tough." (PM5)

One resident felt responsible for an adult death from his trauma surgery rotation:

 

"I knew this guy was sick and he was going to die …. The fellow thought, 'Oh let's just repeat the lab.' I don't think I conveyed how sick this patient was …, so that delayed [care] a couple hours …. Then we hear overhead that he is coding …. He was in a [pulseless electrical activity] arrest for 60 minutes and he died. And you know, when the attending came, he said, 'Why wasn't I called about this?' .... And I felt like it was my fault, because I didn't convey how sick this patient was." (EM2)

These ALEs occurred within the context of the residents' medical education and appeared to inform residents' perspectives toward their upcoming PICU rotation:

"I did a PICU rotation as a medical student … and I felt fairly burned out by the end …. So I'm a little leery about the start of this PICU rotation and feeling that same sense of burnout hitting me faster." (EM3)

"When I was a second year medical student .... I remember lining up [during a code] to get ready for CPR … like, 'Oh god like what am I going to do, how do I do this?' …. I was taken away from the situation, and I remember …, the mom walking through, and just hearing her sobs …. So that whole memory … being fearful of that happening to one of my patients. Or even a medical student … and trying to protect them from that too. Impossible, right?" (PM5)

### Preparing for the Pediatric Intensive Care Unit

Residents reported scant formal preparation, such as undertaking the curriculum that was provided to them or reviewing pediatric critical care medicine topics, in the week leading up to their rotation, despite multiple and varied attempts to provide resources prior their starting date. Instead, they reported many other tasks they completed in anticipation of entering the PICU. They invited advice from peers and studied patient charts from current PICU admissions. They did not identify PICU-related learning resources, drawn instead toward UpToDate,[14] general PM- or EM-focused board review question banks, and ad hoc, crowdsourced, or do-it-yourself quick-reference cards, or study guides:

"Because I'm organized to a crazy degree …. I will take a number of pictures of key things … and then I create a note in my phone where I attach [them] …, so if I need to reference something, it's in there." (PM6)

Their degree of preparation seemed to correlate with a history of past ALEs:

"I tend to be on the side of doing more prep than usual … because it helps bring down my anxiety a little …. I have a fear of just looking really dumb …. They're going to ask me very basic things that any resident should know, but I just, we don't it see in the ED, and I think people forget that, and I've had that experience on other inpatient rotations." (EM2)

Residents also recounted organizing their personal lives for the upcoming rotation, through efforts such as updating shared calendars, priming significant others and family members for future absences, cleaning their living spaces, exercising, arranging pet care, scheduling mental health appointments, and, especially, sleeping:

"I've cleared my calendar …. I've been trying to be really good about exercising in the last couple weeks .... I've been trying to sleep a lot." (PM6)

Residents expressed concerns related to basic physiologic needs while in the PICU, saying they would "prioritize sleep and nutrition," (EM) and "sleep when I can" (PM). Based on their previous experiences and word-of-mouth, some residents adopted a survivalist approach:

"I know the challenges that the coresidents [have had] …. Being on that service, and not being able to … deal with their emotions, because they were just trying to survive, and just trying to take care of their patients who were really sick …. Seeing them in that moment and kind of watching them having to put on that guard, kind of having to put on the armor, I'm anticipating that I'm gonna have to do the same." (PM5)

Indeed, before entering the PICU, most residents seemed to prepare their "armor" for the challenges they imagined lay ahead.

## Discussion

In this qualitative study of residents' perceptions prior to their PICU rotation, our most striking resultant theme related to learners' accumulation of emotional and psychological trauma during their education. Additional themes included the range of intense emotions residents experienced before the rotation, and how residents primed themselves for survival at a core level of self-care. Discussing our findings through different theoretical lenses, including workplace-based learning,[5] self-directed learning,[15] and hidden curriculum,[16] helped to support our understanding of the data. However, the most compelling theory emerged once data were fully analyzed within the context of psychological trauma and trauma-informed care.[17] Grappling with our themes within this context, we were particularly struck by residents' repeated mention of prior emotionally traumatic experiences as they arrived to the PICU with heightened anxieties, being unsure of their own preparation, and working to shore up their personal lives in preparation for yet further traumatic experiences. We theorize that an accumulation of ALE-associated events can affect how residents approach future learning opportunities. Further, we hypothesize that they may benefit from educational strategies that

utilize a trauma-informed approach[17] in the PICU, similar to trauma-informed care for pediatric and adult patients.[18]

A traumatic experience is defined by the Substance Abuse and Mental Health Services Administration (SAMHSA) as a "physically or emotionally harmful or life-threatening [event] that has lasting adverse effects on the individual's functioning and … well-being." People may respond differently to various traumatic events, depending on their resilience or support network; however, victims of these kinds of experiences generally do not expect them to occur, are unprepared for them, and describe how they felt there was nothing they could do to stop them from occurring.[17] Trauma and its effects on the brain were first described near the end of the 19th century. It was referred to as "shell shock" among soldiers returning from World War I. Unfortunately, to avoid providing veterans with treatment, medical separations, or disability pensions, the British military declared that "shell shock" stemmed from weak dispositions and only manifested in soldiers perceived as undisciplined or unwilling. This implicit embargo on trauma research persisted until the 1970s, when those caring for soldiers returning from the Vietnam War encouraged its removal. In 1980, the definition of posttraumatic stress disorder (PTSD) first appeared in the Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition, and finally, in 1998, the landmark Center for Disease Control and Prevention–Kaiser Permanente Adverse Childhood Experiences (ACEs) study illustrated how overwhelmingly prevalent mental trauma was, and how it correlated with a host of negative health outcomes, mental illnesses, and learning challenges, later in life.[19,20]

Physicians may face many instances of trauma throughout their professional development. In medical school, students endure exploitation, public humiliation, threats of poor evaluations, and unwanted sexual advances.[21–23] In residency, this mistreatment continues in forms of bullying, verbal and physical abuse, discrimination, and sexual harassment.[24,25] Meanwhile, trainees must cope with patient death, vicarious trauma, moral distress, repercussions of medical errors, personal life events, and sometimes even society disruptions, such as a pandemic or war.[26–32] Furthermore, investigations into these types of experiences suggest they lead to increased rates of burnout, depression, interprofessional conflicts, PTSD, decreased levels of physician empathy, and poor job performance.[33,34] It is ironic that a discipline devoted to caring and curing, provides so little support for its trainees.

Although it has long been reported that a certain level of stress is beneficial for learning, too much stress, whether natural or artificially induced, is detrimental.[35] Furthermore, the impacts that stressful events have on future learning are unclear. Similar to a recent study published by Trowbridge et al where only 1% of residents had been exposed to a patient death prior to their second postgraduate year and the PICU was residents' most common exposure to end-of-life care,[36] we found a minority of residents had ever witnessed the death of a pediatric patient prior to their PICU rotation. Our study sheds light on how residents' past emotionally traumatic learning experiences may have the potential to negatively impact their learning in the PICU. Our participants' descriptions of ALEs may not compare in severity with those reported in the original ACEs study. However, by including them under the umbrella of ALEs, we may better examine their prevalence and outcomes, as the ACEs study did for childhood traumas over 20 years ago. We may then further characterize their subtypes, functions, and effects. Finally, we can develop more effective teaching strategies which consider and address the consequences of these traumatic educational experiences on future learning opportunities.

For instance, SAMHSA lists "Six key principles of a trauma-informed approach: safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice, and choice; and cultural, historical, and gender issues."[17] When reporting on an increased rate of ACEs in students and physicians referred for professional lapses, Williams et al suggested applying these guidelines toward a framework entitled "Trauma-Informed Medical Education (TIME)."[37] We would propose TIME be applied beyond ACEs to incorporate physician ALEs as well, thus ensuring residents learn without being negatively clouded by any past traumas. As an example of a trauma-informed approach to education, we can imagine a resident who appears disengaged, frazzled, or unmotivated during their PICU rotation. Instead of asking "What is wrong with them?" or "Why are they doing so poorly on this rotation?" we might ask, "What has happened to this resident that prevents them from engaging in an otherwise unique and highly valuable learning experience?"[38] This theory prompted us to revise our own PICU rotation in line with SAMHSA's best practices (►**Fig. 2**).[17]

## Limitations

Our GTM revealed an emergent theme of ALEs. That such a category of traumatic experiences can exist and affect future learning is novel, though more research is needed to fully understand this phenomenon, as our study's scope of ALEs may have been limited. Future research should focus on characterizing the types of ALEs, their prevalence, and their effects on learning. Additionally, our study included residents from a single center. As institutional culture can vary, transferability may therefore be limited. However, this qualitative research was explorative and theory-generating; thus, we believe our results provide useful contributions.

## Opportunities for Future Research

Further exploration, both qualitative and quantitative, into ALEs and their effects on residents' approaches to future learning opportunity should be broadly pursued. In addition, critically evaluating the impact of adopting a trauma-informed approach to educational design on resident learning in the PICU, as well as other units in the hospital, could likely be transformational in enhancing residents learning experiences. Finally, perhaps the compendium of trauma literature

 

| The Six Principles of Our Trauma-Informed Unit |
| --- |
| Safety: We ensure that residents who rotate thought the PICU will feel physically and psychologically safe. This includes knowing they will never be left alone to manage patients in the unit by themselves; they will not be belittled, bullied, or aggressively challenged on rounds; and they will be supported and guided through an unfortunate, inevitable, and tragic death of child. |
| Trustworthiness and transparency: We will educate trainees with transparency, not only in our expectations and evaluations, but also in providing residents with crucial PICU operations, protocols, and team roles, prior to their rotation, in an effort to build and maintain mutual trust. |
| Peer support: We will offer residents recollections from our own lived experiences of trauma, to encourage their safety, hope, trust, collaboration, recovery, and healing. |
| Collaboration and mutuality: We value the importance of partnering with residents and minimizing power differences between learners and PICU staff. Therefore, we will strive to provide them the autonomy appropriate to their entrustment level and include them in important medical decision-making discussions concerning their patients. |
| Empowerment, voice, and choice: We will acknowledge each resident's past experiences and personal strengths. We understand that the experience of trauma may be significant in the lives of residents who come to learn in the PICU, but we believe in resilience and the ability for us all to heal and promote recovery from trauma. We will empower residents through shared–decision-making and encourage them to set self-directed learning goals. |
| Cultural, historical, and gender issues: We will recognize that all residents come to the PICU with different histories, support systems, values, and degrees of preparation. We will actively work to move past stereotypes and biases, for example, based on race, ethnicity, sexual orientation, age, religion, gender-identity, geography, or specialty training. We will incorporate policies, protocols, and processes that are responsive to these needs, and leverage the healing value of traditional cultural connections. |

**Fig. 2** The Substance Abuse and Mental Health Services Administration's (SAMHSA) six key principles for creating a trauma-informed organization, adapted for use in our pediatric intensive care unit (PICU) and to incorporate into our curriculum.

can offer additional avenues for addressing burnout within our medical educational setting, as a complement to the currently proposed solutions such as resilience training, mindfulness curriculums, and peer-support networks.[39]

## Conclusion

Residents varied in their preparation prior to their first PICU rotation. Nevertheless, they entered the PICU with a range of intense emotions and expectations, a history of ALEs, and adopted a survivalist mindset to prepare themselves. Notably, resident ALEs seemed to influence their overall learning plan. In addition to interventions that better direct resident learning and support their basic life needs, adopting a trauma-informed approach to resident education may improve their learning experiences as they rotate through the PICU.

### Authors' Contributions

A.J.K. conceived and designed the study, collected the data, took responsibility for the data analysis, and was the principal author. B.W.S. made major contributions to the data analysis and interpretation, and he critically revised and made important contributions to the manuscript. L.M.Y. provided major contributions to the study design and data analysis and critically revised and made important contributions to manuscript revisions. S.P.K. was the study's principle investigator and critically revised and made important contributions to manuscript revisions. All authors approved the final manuscript for submission.

### Conflict of Interest

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