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# EDITORS' NOTE

## *Virginia Journal of Medicine*

Dear Readers,

As the leaves begin to turn, we are proud to share the Fall 2025 edition of the Virginia Journal of Medicine, a publication that continues to grow in reach and purpose.

In this issue, we bring together voices from across the country, showcasing original research, narrative reflections, and thought-provoking commentaries from the University of Virginia and partner institutions. From the molecular breakthroughs that transformed chronic myeloid leukemia treatment, to timely explorations of free expression in medical education; each piece reflects a unique facet of medicine's evolving landscape. Our narrative medicine selections offer deeply personal perspectives on empathy, hope, and the patients who leave a lasting imprint, while our clinical and research contributions span from surgical innovation to improving health equity through community-based outreach.

This edition also marks a milestone for the Virginia Journal of Medicine: the realization of our vision for a multisite platform that fosters connection among medical learners and physicians nationwide. We are deeply grateful to our authors for entrusting us with their work, to our reviewers and editorial team for their insight, and to our readers for continuing to engage with the ideas and stories that shape our shared profession.


As always, we remain guided by the tenants that inspired this journal's relaunch: to amplify emerging voices, encourage dialogue across disciplines, and celebrate the intersection of science, humanity, and progress.

Ever guided by one enduring principle: *Salus. Scientia. Progressus. Pro Omnibus.*

Warmly,



Catherine Lyons



Aaron D. Smith

Co-Editors in Chief, VJM



# FROM CHROMOSOME TO CURE: THE STORY OF CML AND IMATINIB

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## ABSTRACT

Chronic Myelogenous Leukemia (CML) stands as a landmark success in cancer research, exemplifying how interdisciplinary scientific advances converged to transform a once-fatal disease into a treatable condition. This review traces the pivotal discoveries that led to the development of imatinib (Gleevec®), the first targeted therapy for CML. The journey began with the identification of consistent chromosomal abnormalities in CML cells, leading to the discovery of the Philadelphia chromosome—involving a reciprocal translocation between chromosomes 9 and 22. Concurrently, breakthroughs in retroviruses revealed vital molecular players such as reverse transcriptase and oncogenes transduced from proto-oncogenes, laying the groundwork for understanding cancer at a molecular level. These insights culminated in the identification of the BCR::ABL1 fusion gene at the translocation site, encoding a constitutively active BCR-ABL1 tyrosine kinase. Rational drug design enabled the creation of a selective inhibitor targeting this kinase, resulting in the development of imatinib. The CML story illustrates how decades of research across genetics, virology, cell biology, molecular biology, biochemistry, and pharmacology led to a revolutionary therapy.

## INTRODUCTION

Eureka moments in science have often led to new discoveries, groundbreaking treatments, and revolutions across entire scientific disciplines. Chronic myelogenous leukemia (CML) presents a scientifically and historically fascinating example of how multiple eureka moments and milestone discoveries from genetics, cell biology, virology, biochemistry, molecular biology, and pharmacology came together for the development of the “miracle” drug Gleevec® (imatinib; Novartis), which has since turned a deadly cancer into a manageable chronic disease.

In this review, we explore CML’s history, highlighting how discoveries and collaborations across multiple scientific fields over the course of forty years culminated in the development of the highly effective, targeted treatment: Gleevec® (imatinib).

### What is CML?

CML is one of the most common forms of cancer affecting the blood (leukemia) and originates from myeloid lineage cells in the bone marrow (myelogenous). CML represents approximately 15% of leukemias and predominantly affects middle-aged individuals 45-55 years old.<sup>1</sup> The five-year relative survival rate for those diagnosed between 2012-2018 is 70%, which is over triple the rate in the 1970s. Common symptoms include fatigue, weight loss, fever, night sweats, and bone pain.<sup>2</sup> Given early diagnosis, prompt treatment, and consistent disease management, most patients live an average life span.

### THE PHILADELPHIA CHROMOSOME AND THE BCR::ABL1 ONCOGENE

The major breakthroughs in CML research are presented in Figure 1. CML is a model example of how derangements and mutations at the molecular level give way to disruptive phenotypic manifestations such as cancer. CML stands out, as it is a cancer in which a specific chromosomal presentation—the Philadelphia chromosome—is consistently present. In fact, the Philadelphia chromosome has been found in over 95% of cells from patients diagnosed with CML.<sup>3</sup>

The Philadelphia chromosome involves a reciprocal t(9;22) translocation event that creates a hybrid BCR::ABL1 oncogene where the ABL1 gene on chromosome 9 is fused to the BCR region of chromosome 22. This oncogene codes for a hyperactive tyrosine kinase that promotes upregulated and uncontrolled myeloid cell growth and proliferation.<sup>3</sup> Chromosomal translocations—such as that found in CML—play a role in several other cancers, including Burkitt’s lymphoma.<sup>4</sup>

### The Chromosome Story

Peter Nowell and David Hungerford were the two scientists primarily responsible for discovering the Philadelphia chromosome in 1960. Their original published scientific report on its discovery largely spearheaded CML’s discovery-to-treatment journey.<sup>5</sup>

An observant child and quick learner, Peter Nowell’s report cards often included positive evaluations of his creativity, curiosity, and interest in science, with one of his third-grade teachers remarking on how Nowell “might well go far with science.”<sup>6</sup> Along with his many scientific accomplishments, Nowell was known among colleagues and the scientific community as a teacher and mentor. His lab was often open to many interested visitors, from schoolchildren to intellectual giants in the field. His mentorship and professorship spoke to his personally held value of the importance of supporting young, curious minds to foster the next generation of bright scientists and innovators.<sup>6,7</sup>

Like Nowell, David Hungerford shared Nowell’s spirit of curiosity. Hungerford was born in Brockton, Massachusetts. He graduated from Temple University and earned his doctorate in zoology at the University of Pennsylvania. He was employed at the Fox Chase Cancer Center and had developed an expertise in chromosome analysis.<sup>5</sup>

While studying leukemias, Nowell sought out a collaborator who specialized in chromosomal analysis. He found David Hungerford, who was in the process of finding a topic for his doctoral thesis.<sup>8</sup>

Soon after, David Hungerford and Peter Nowell joined forces. Nowell focused on obtaining and culturing cells and Hungerford examined images of the cultured cells’ chromosomes. Nowell’s accidental discovery of hypotonic

exposure followed by Giemsa staining allowed for the visualization of metaphase chromosomes.<sup>9</sup> Hungerford is credited as the first person to notice and photograph the chromosomal abnormality that is now known as the Philadelphia chromosome.<sup>8,10</sup>

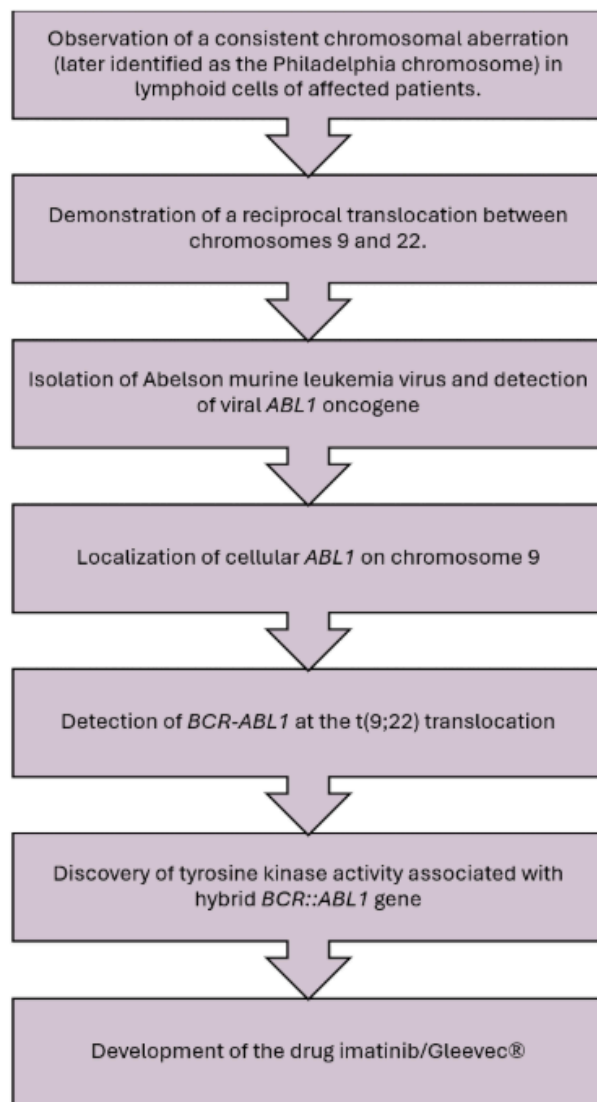
The Hungerford-Nowell pair initially studied cells of acute myelogenous leukemia (AML) patients before ultimately and fatefully stumbling on CML cell studies. Karyotyping of AML cells revealed no aberrant chromosomes. However, when Hungerford viewed cells from CML patients using Nowell’s earlier accidental technique, there appeared one miraculously consistent finding: an abnormal piece of DNA that would later be known as the Philadelphia chromosome.<sup>9</sup>

Though fundamentally all cancers involve some form of DNA mutation, CML is unique in that it can be consistently linked with a singular, distinctive chromosomal abnormality. It is this distinct feature elucidated by Nowell and Hungerford that set the stage for further scientific exploration and that held the key to CML’s extremely targeted and effective treatment.

### Elucidation of the t(9;22) Chromosomal Translocation

Though Nowell and Hungerford’s findings indicated that a consistent erroneous chromosomal presentation could give rise to cancer formation and progression, the exact mechanism, location, and specifics of the translocation process had yet to be fully explained. This finding was in dormancy for almost a decade until further advances in imaging and cytological studies allowed more extensive and conclusive exploration of CML’s molecular underpinnings.

### Major Breakthroughs in CML Research



**Figure 1.** Major scientific breakthroughs came together with advances in molecular biology and virology to advance the CML story.

Following Nowell and Hungerford's discovery, Janet Rowley confirmed the pair's findings using banding to visualize chromosomes. After spending sabbatical years (1962 and 1970-1971) at Oxford, Rowley returned to the US to study leukemias at the University of Chicago. Banding gave way to what previous microscopic visualization alone couldn't confirm: the location of specific regions where chromosomal gains, losses, and breakages occurred. Using banding, Rowley noted how, in CML cells—in addition to the small Philadelphia chromosome—the q arm of chromosome 9 appeared longer (Figure 2). This observation was strikingly consistent across nearly all CML cells Rowley examined. Rowley determined this lengthening was due to a piece of chromosome 22 attaching to the q arm of chromosome 9, thus discovering that the Philadelphia chromosome was a product of a reciprocal t(9;22) translocation. Her findings confirmed Nowell and Hungerford's earlier discovery and added another level of specificity required for the next step of CML's discovery-to-treatment journey.<sup>9,11</sup>

While discoveries progressed in the field of chromosome imaging and molecular biology, the field of virology and the independent discovery of reverse transcriptase and oncogenes provided the technical know-how and crucial information necessary that, when combined with earlier findings, provided the full picture to push the CML investigative journey from discovery to treatment.

## THE ONCOGENE STORY: DISCOVERING VIRAL TUMORIGENIC POTENTIAL THROUGH THE ROUS SARCOMA VIRUS

Characterizing retroviruses responsible for causing tumors in animals was the next step to linking the chromosomal and oncogenic stories of CML (Figure 1).

In another field independent of Nowell-Hungerford's chromosomal discovery, isolating Rous Sarcoma Virus (RSV) from chicken tumors opened a whole new stage for cancer biology and virology. In 1909—long before Hungerford and Nowell's discovery of the Philadelphia chromosome in 1960—a local Long Island poultry farmer noticed a strange tumor among farm chickens. She brought one of the affected chickens to Peyton Rous, who at the time was working at the Rockefeller Institute in New York. Curious, Rous successfully extracted the tumors in the same flock of chickens. Further, he prepared an extract of the tumor tissue and ran the supernatant through a filter that excluded bacteria but permitted viruses. Injecting the same breed of chickens with this filtrate caused healthy chickens to develop the tumor.

Rous's discovery showed that viruses could induce tumor formation and had the potential for tumorigenesis. This novel finding was initially ignored by the scientific community on the grounds that the finding was unlikely to be relevant to human cancer. It took several years before the significance of Rous's findings were recognized. Fifty-five years following his discovery, Rous was awarded the Nobel Prize in 1966.<sup>12-14</sup>

The same RSV Rous studied has also been instrumental in the discovery of the reverse transcriptase (RT) enzyme, which has revolutionized the field of molecular biology, virology, and oncology. The discovery of RT is attributed to Howard Temin and David Baltimore, who discovered RT separately but simultaneously and had their papers published back-to-back in *Nature* in 1970.<sup>15</sup> The discovery of RT confirmed that RNA viruses could cause cancer by altering cellular genetics. Additionally, RT-derived technologies such as RT-PCR enhanced mRNA-to-DNA analysis, enabled effective sequencing, advanced hybridization probe development, and transformed molecular cancer research and molecular biology as a whole.<sup>15</sup>

### The Discovery of Oncogenes

The discovery of retroviral RT set the stage for the discovery of oncogenes—formerly normal, benign genes located in the host genome that are dysregulated, disrupted, or deranged and thus capable of unregulated growth and cancer formation.

Rous's discovery from a simple chicken tumor opened more doors for cancer research. It was previously believed that the oncogenic *src* gene was only present in virally exposed, transformed cells, but this was challenged

by Michael Bishop and Harold Varmus in the 1970s. This gene—*c-src* for cellular *src*—is distinguished from the viral *src* gene in the RSV genome called *v-src*. *c-src*, when undisturbed in the cellular genome, regulates normal cellular processes; *v-src* however has oncogenic properties. Using the recently discovered reverse transcriptase, Bishop and Varmus designed a *src* hybridization probe by synthesizing complementary DNA from RSV RNA.<sup>16</sup> When applied to chicken DNA, the probes unexpectedly hybridized to uninfected chicken cells, as well as cells of related species. This finding demonstrated that the cancerous *src* gene was present not only in infected cells but was also a normal part of an organism's genome. Bishop and Varmus' discovery fueled the concept of protooncogenes and oncogenes, which would later factor into characterizing the BCR-ABL1 fusion gene product in CML.

Bishop and Varmus were awarded the Nobel prize in 1989 for their discovery. Bishop and Varmus' discoveries indicated that viral infection and hijacking of host DNA via reverse transcriptase could transform proto-oncogenes into cancerous oncogenes, demonstrating the process of proto-oncogene-to-oncogene activation. Furthermore, the identification of the *src* oncogene from RSV was another indication that cancer could have cellular, and not purely external, origins that surprisingly came from within an organism's own genome. Discovery of the *src* oncogene advanced the identification of other oncogenes including *MYC*, *ERBB*, and *RAS*.<sup>17</sup>

### Isolation of Abelson Murine Leukemia Virus (A-MuLV) Gives Rise to the ABL1 gene

Similar to studies on RSV, several transforming retroviruses were isolated from different species. A-MuLV, in particular, is linked to identification of the *ABL1* gene, which is translocated from chromosome 9 to 22 in CML. Herbert Abelson, a pediatrician, along with Louise Rabstein, isolated a retrovirus capable of inducing malignant transformation and tumor formation. This virus required the assistance of a helper virus, primarily the Moloney murine leukemia virus (M-MuLV), as its genome lacked coding for replicative elements, including reverse transcriptase.<sup>18,19</sup> Credit is due to David Baltimore's group at MIT for further developing A-MuLV using mouse and in vitro cell culture models. Several investigators from his laboratory including Naomi Rosenberg, Owen Witte, and Stephen Goff were involved in characterizing the system for transformation, kinase activity, and molecular cloning of the gene. Independently, the full length of the viral genome was cloned and the *ABL1* gene was further assessed for transformation function.<sup>20</sup>

The characterization of oncogene from A-MuLV was designated as *v-ABL* and the cellular protooncogene *c-ABL1* was found to be localized to human chromosome 9.<sup>21,22</sup>

### Discovery of the oncogenic fusion gene BCR::ABL1 in CML

In the 1980s, Nora Heisterkamp and John Groffen continued CML's research journey. She and her colleagues at the National Cancer Institute in Maryland picked up where Janet Rowley left off. Previously, Rowley discovered that the Philadelphia chromosome resulted from a translocation event between chromosomes 9 and 22. Heisterkamp, in collaboration with Gerard Grosfeld from Holland, identified the exact location where the two breaks occurred and consequently the fusion gene that triggered it all: the *ABL1* gene on chromosome 9 and *BCR* on chromosome 22, which together formed the oncogenic *BCR::ABL1* fusion gene.<sup>10,23</sup> In 1985, Shtivelman and colleagues confirmed and reinforced the above findings by determining that an 8kb RNA sequence commonly found in CML was indeed the infamous BCR-ABL1 fusion transcript that resulted from a t(9;22) translocation.<sup>24</sup> It was further reported that the fused *BCR::ABL1* gene alone was responsible for tumor induction.<sup>25</sup> Later, researcher Owen Witte of UCLA brought to light the presence of the *BCR::ABL1* oncogene, and its resultant oncoprotein products, in various human leukemias.<sup>26</sup>

## FROM GENE TO PROTEIN: DISCOVERING THE KINASE THAT TRIGGERED IT ALL

The discovery of oncogenes in retroviruses—which exhibited transformation in cells and tumor induction in animal models—shifted attention to understanding the underlying mechanisms.

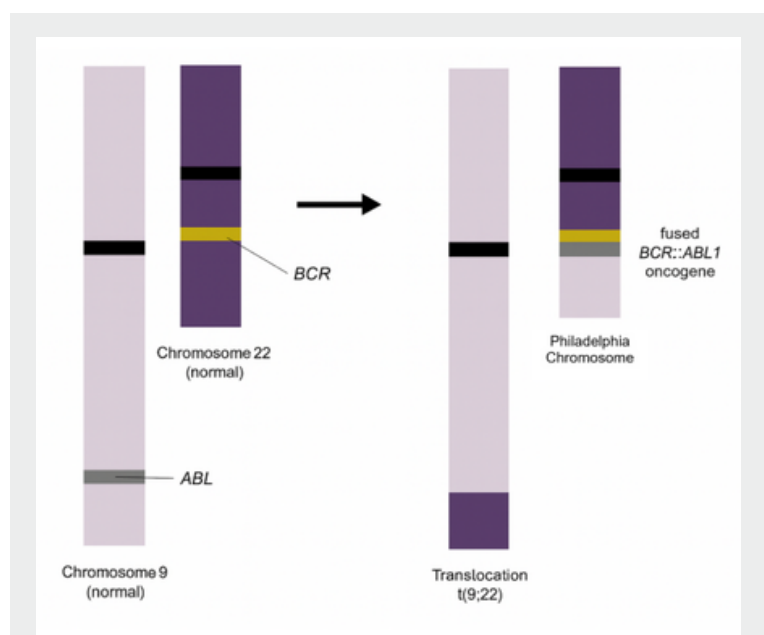
In this regard, Erikson and Collett demonstrated the *src* gene coded for a protein product with kinase activity.<sup>27</sup> In 1979, Tony Hunter and colleagues discovered tumor virus proteins that could phosphorylate tyrosine residues. This breakthrough led them to identify tyrosine kinase activity in both the RSV *v-src* protein and the epidermal growth factor receptor (EGFR). Building on this, their 1980 experiments showed that cells infected with RSV mutants containing overactive *v-src* developed cancer-like properties. These findings directly demonstrated that uncontrolled tyrosine phosphorylation by viral oncogenes could drive cellular transformation, linking tyrosine kinase dysregulation to cancer progression.<sup>28</sup>

Following this finding, researchers turned their attention to the human *BCR::ABL1* fusion gene and its protein product. Researchers Owen Witte, Asim Dasgupta, and David Baltimore discovered that the *v-ABL1* fusion gene exhibits tyrosine kinase activity. Under normal conditions, the *ABL1* proto-oncogene encodes a regulated tyrosine kinase. However, when *ABL1* is fused with *BCR* on chromosome 22, this regulation is disrupted, resulting in uncontrolled kinase activity that drives cellular transformation and tumor formation.<sup>10,29</sup>

Over nearly a century of research, discoveries ranging from oncogenic viruses and RT to oncogenes culminated in the identification of a specific protein product—the BCR-ABL1 tyrosine kinase—which would be used to specifically target CML.

## DEVELOPMENT OF IMATINIB (GLEEVEC®) FOR TREATING CML

It was researcher Brian Druker who believed targeting a specific protein product—in CML's case, tyrosine kinase—held the key to finding a treatment for CML. His initial steps further propelled the rational drug design process for imatinib. Motivated to minimize the toxicity of traditional cancer therapies that indiscriminately affect both healthy and cancerous cells, Druker searched for a compound to inhibit CML's specific tyrosine kinase without disrupting normal cell growth. The identification of distinct mutated genes associated with a particular cancer has provided specific targets for treatment. Drawing from the demonstration of kinase activity with



**Figure 2.** Translocation t(9;22) event that occurs in CML

oncogenic proteins, pharmaceutical industry researchers Alex Matter and Nick Lydon reasoned that kinase inhibitors would be of value in treating multiple cancers.<sup>30</sup> In this regard, Jurg Zimmermann and Elisabeth Buchdunger synthesized the first tyrosine kinase inhibitors. Further modification of these inhibitors resulted in a compound with specificity to *ABL1*.<sup>31</sup>

Druker and his team tested the compound ST1571 in preclinical studies (a compound which killed transformed CML cells while sparing healthy cells); this was eventually developed into imatinib/Gleevec®.<sup>24,32</sup> Gleevec® was later approved by the FDA and became available for clinical use in 2001. Since then, it has been considered the “gold standard” for treating CML.<sup>10</sup>

CML involves an overproduction of dysfunctional white blood cells. Following treatment with imatinib, patient white blood cell counts have consistently returned to a normal range and are relatively well-maintained provided the patient receives consistent treatment. Prior to Gleevec®, CML had an estimated 30–40% five-year survival rate. Following Gleevec®’s release, five-year survival rates nearly tripled to 89%.<sup>33</sup> Previously, the most popular treatment for CML consisted of a bone marrow transplant, which involves extensive costs, side effects, and donor-recipient compatibility challenges.<sup>33</sup> Gleevec®’s discovery replaced this invasive procedure with a noninvasive pharmacological option that is close to curative.

Gleevec®’s development and massive success kickstarted an era of genetically and molecularly targeted therapies that continues to this day. Druker’s persistent and proven belief in targeted therapies is wonderfully expressed in his own words: “If the cause has been discovered, there’s hope for a cure.”<sup>10</sup>

## DISCUSSION: CONNECTING THE PHILADELPHIA CHROMOSOME, REVERSE TRANSCRIPTASE, ONCOGENES, TYROSINE KINASE, AND GLEEVEC®

CML presents a serendipitous historical and scientific example in which multiple different disciplines came together to elucidate the specific cause of a disease and used these subsequent discoveries collectively to develop a cure. This story also underscores how foundational basic science can ultimately unlock transformative clinical advances.

What is interesting about CML is how seemingly unrelated discoveries in parallelly developing fields—chromosomal studies, virology, and rational drug design—were eventually connected to produce life-saving results. For example, studies of the RSV chicken sarcoma virus by Peyton Rous in 1910 demonstrated the oncogenic potential of viruses, along with providing a suitable model that Temin and colleagues used to discover reverse transcriptase in 1970. Reverse transcriptase was a key enzyme that opened new technologies critical to identifying and localizing the *ABL1* and *BCR* genes to the t(9;22) translocation (identified by Rowley in 1973) on the Philadelphia chromosome identified by Hungerford and Nowell back in 1960. Many of these events occurred non-sequentially, as discoveries in one area were halted by technological constraints and thus picked up when discoveries in other fields and technological advancements allowed further exploration. Ultimately, these diverse discoveries over a span of 40 years provided the foundation for the development of imatinib/Gleevec®. Rarely do we see a cancer in which there is a clear, concise, and single identifiable cause. Thus, CML provides an interesting and inspirational example in which collaboration can move a disease from cause to cure.

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# THE ROLE OF CREATIVE ARTS THERAPY IN PEDIATRIC ONCOLOGY: A LITERATURE REVIEW

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## ABSTRACT

Pediatric oncology treatment can be a distressing experience for children as they adjust to an unfamiliar hospital environment, isolation from their friends, and disruption to their normal routine. Additionally, aggressive treatments such as chemotherapy can have negative side effects such as pain and nausea. Creative Arts Therapies (CAT) can be used to help oncology patients manage their psychological and physical symptoms related to their disease and treatment. The objective of this review is to assess the most recent literature on the role of creative arts therapy (CAT) in pediatric oncology. Studies were included in this literature review if they published between 2020 and 2025 and analyzed the use of a CAT intervention in patients between 0–21 years old who have been diagnosed with cancer. In the 22 studies included in this literature review, CAT interventions were shown to have a positive clinical impact in the care of pediatric oncology patients, with improvements in anxiety, depression, happiness, pain, and nausea. In conclusion, creative arts therapies can play an important role in improving the psychological and physical wellbeing of pediatric oncology patients. The results seen in this literature review support the integration of CAT into healthcare settings to support pediatric oncology patients during their treatment.

## INTRODUCTION

According to the World Health Organization, about 400,000 children and adolescents are diagnosed with cancer each year.<sup>1</sup> Because children generally have fewer comorbidities and childhood cancers tend to respond better than adult cancers to more intense treatments, pediatric oncology patients often undergo more aggressive treatments such as higher doses of chemotherapy.<sup>2,3</sup> Due to these successful treatments, the 5-year survival rates for pediatric cancer patients in the United States is 83.5%.<sup>2</sup> However, the side effects of treatment burdens patients physically in addition to the negative effects of the cancer itself.<sup>2,4</sup> Pediatric oncology patients frequently experience pain, fatigue, nausea, and vomiting.<sup>5</sup> Additionally, interruptions to schooling, isolation from peers, and fear of disease progression contribute to the high prevalence of depression and anxiety in this patient population.<sup>5</sup> Therefore, it is essential for research to focus on finding ways to improve the quality of life of pediatric oncology patient.

Creative Arts Therapies (CAT) are used worldwide as therapeutic interventions to help oncology patients manage their psychological and physical symptoms related to their disease and treatment. CAT involve the use of arts-based interventions within a psychotherapeutic relationship with a creative arts therapist, aimed at achieving specific therapeutic goals.<sup>4</sup> Patients in the hospital setting are typically referred to creative arts therapy for pain, coping with diagnosis, isolation, anxiety, depression, and support during procedures such as chemotherapy.<sup>4</sup>

In the United States, creative art therapies are formalized professions that have their own educational and credentialing guidelines for practicing. CAT include art therapy, dance/movement therapy, drama therapy, and music therapy. Globally, there is significant variability in the training requirements for practicing art therapy. Many adult and pediatric hospitals have established CAT services that patients and their families can utilize. The various creative arts therapies can be used individually or in combination to treat patients in a medical setting. Additionally, CAT interventions can be administered through one-on-one sessions with patients at bedside or in a group setting.

Significantly more research has been published assessing the use of CAT interventions in adult oncology compared to pediatric oncology. Within pediatric oncology, music therapy and art therapy are the most well studied types of CAT.<sup>2,3,6</sup> DMT and drama therapy have been studied for their effectiveness in alleviating symptoms in individuals with mental health disorders, but their use within pediatric oncology has not been widely researched<sup>12,13</sup>; therefore, this review aims to address this gap by analyzing the most recent studies in these areas. Overall, the objective of this review is to assess the most recent literature on the role of creative arts therapy in pediatric oncology.

## METHODS

Keywords and search strings were utilized to identify the relevant literature on databases including PubMed, APA PsycInfo, Ovid, and ScienceDirect. Our search was limited to articles published between 2020 and 2025 in line with our study aim of analyzing the most recent contributions to the literature. All forms of creative arts therapies—including art, music, DMT, and drama—were encompassed in the inclusion criteria. Other inclusion criteria were that participants were between the ages of 0–21 years old and articles needed to be published in English. Additionally, participants must have been diagnosed with cancer at the time of study completion and must have participated in some form of CAT encounter prior to study completion. Articles that focused on parents or siblings of children undergoing cancer treatment and review articles were excluded. A total of 22 studies were included in our sample.

Of the 22 studies, 19 were quantitative, 1 was qualitative, and 2 were mixed methods. Additionally, the intervention was music therapy in 7 studies, art therapy in 8 studies, drama therapy in 3 studies, dance/movement therapy in 1 study, psycho-art-drama therapy in 1 study, and a combination of music, art, and dance/movement therapy in 2 studies. Given the wide spectrum in

educational and credentialing requirements for practicing internationally, having the therapy sessions taught by certified CAT therapists was not used as an inclusion criterion. However, a majority of the studies had their therapy sessions taught by professionals in their respective fields, such as certified music therapists, art therapists, dance therapists, and psychologists. Studies conducted in various countries were represented, including 4 in the USA, 2 in China, 4 in Turkey, 4 in Iran, 2 in Iraq, 2 in Italy, 1 in Sweden, 1 in Slovakia, 1 in Tunisia, 1 in Spain.

## RESULTS

### Mental Health in Pediatric Oncology Patients

It can be especially difficult for cancer patients, especially young children, to verbalize their fears and anxieties about their disease and treatment. Six of the studies assessed the impact of creative arts therapy on improving situational or chronic anxiety levels in pediatric oncology patients. They used widely accepted and validated survey tools, including the State-Trait Anxiety Inventory (STAI),<sup>7,14,15</sup> Spence Children's Anxiety Scale (SCAS),<sup>16</sup> Hamilton Anxiety Rating Scale (HAM-A),<sup>17</sup> and Hospital Anxiety and Depression Scale (HADS).<sup>18</sup> Techniques utilized in art therapy interventions that were successful in reducing situational and chronic anxiety included drawing,<sup>7</sup> group art-play therapy,<sup>16</sup> mandala coloring,<sup>14</sup> mindfulness-based stress reduction (yoga, meditation) combined with music therapy,<sup>17</sup> and jewelry making with beads.<sup>15</sup> Following a 5-day drawing program in which 30 children therapeutically exploring the meanings of their drawing through shared storytelling with the researcher, participants' scores improved on the STAI state anxiety scale, indicating decreased anxiety after the intervention compared to prior ( $P = .001$ ).<sup>7</sup> In another study, 40 patients with mild-to-moderate anxiety on the STAI pre-test showed a significant reduction in anxiety both upon completion and one month following a 6 day mandala coloring intervention ( $P = .001$ ).<sup>14</sup>

Many pediatric oncology patients feel anxiety related to their cancer treatment, such as when going to the hospital or when waiting to see their doctor.<sup>19</sup> Additionally, they also feel anxiety regarding common procedures such as needle sticks for injections or IVs.<sup>19,20</sup> Three studies used the procedural anxiety and treatment anxiety subscales of the PedsQL 3.0 Cancer Module to evaluate whether CAT interventions led to reduction in these scores.<sup>20-22</sup> Two studies found a significant reduction in treatment anxiety in patients who received music therapy during or after hospitalization,<sup>21,22</sup> and one of these studies also found a significant reduction in procedural anxiety.<sup>22</sup> Another mixed-intervention (dance/movement, music, and art) study did not find a significant difference in treatment anxiety between groups that received CAT and the control group.<sup>20</sup> However, this study did find improvements in procedural anxiety in the group that received CAT prior to chemotherapy compared to the control (adjusted effect size = 0.58,  $P = .01$ ).<sup>20</sup>

Music therapy or drama therapy prior to invasive procedures such as bone marrow biopsy or lumbar puncture can be helpful in reducing preoperative anxiety. Most pediatric patients experience preoperative anxiety and require sedation prior to peripherally inserted central catheter (PICC) placement to reduce discomfort and maintain steady arm positioning throughout the procedure.<sup>8</sup> In a study by Zhang et al.,<sup>8</sup> only 2 of 46 participants (4.35%) in

**Art Therapy** involves creative art making, such as painting, pottery, and collage-making, to help patients express themselves through nonverbal communication.<sup>4</sup> It can be especially difficult for cancer patients, especially young children, to verbalize their fears and anxieties about their disease and treatment.<sup>6</sup> Drawing about their hospitalization or drawing freely without a prompt can help patients gain more insight into their own emotions and help them process their anxieties.<sup>4,6</sup> Therapists can then ask patients to explain the art and then therapeutically explore the themes and meanings within the artwork.<sup>7</sup>

**Music therapy** incorporates activities such as listening to music, singing, playing instruments, and songwriting.<sup>4,8</sup> Music therapists may use musical elements such as rhythm and intensity to mirror the patient's current emotional state and then gradually adjusted to help reduce physiological arousal and promote a calmer state.<sup>8</sup>

**Dance/Movement therapy (DMT)** helps participants physically express and process difficult feelings and physical distress through methods such as stress-reducing grounding techniques, choreographed dance, and physical role playing.<sup>9</sup> Multisensory dance movement psychotherapy (MSDMT) is a form of DMT utilized during painful procedures to distract patients from the pain through movement, music, touch, and meditation.<sup>9</sup>

**Drama therapy** uses theatrical methods to help patients express their feelings and solve problems they face. In group sessions, participants act out scenes derived from personal experiences, such as cancer diagnosis, allowing them to better understand their inner experiences.<sup>10</sup> Drama therapy commonly utilizes a role reversal technique, in which individuals observe another participant acting out their experience. This helps them gain insight into their own challenges from a new perspective. By taking on various roles during enacted scenes, participants explore identities other than that of "the patient" which can help them feel empowered to assume different roles in their everyday lives.<sup>10</sup> Following a cancer diagnosis, patients often hide how they truly feel from loved ones, and as a result, they feel isolated and misunderstood.<sup>10</sup> Drama therapy allows participants to express themselves openly with others going through the same struggles.

the music therapy group required sedative medications during PICC placement compared to 45 of 49 participants (91.84%) in the control group. Additionally, the total PICC placement time was significantly shorter in the music therapy group compared to the control (35 minutes vs 60 minutes; ( $P < .001$ )). Medical staff interviewed by Giordano et al.<sup>23</sup> overwhelmingly viewed music therapy positively and agreed that it is effective in its ability to distract patients prior to procedures. As participants underwent multiple procedures, they required shorter music therapy sessions before entering the operating room. This further supports the idea that music therapy reduced preoperative anxiety, especially in patients undergoing numerous procedures such as cancer patients.<sup>23</sup>

Additionally, drama therapy, through the use of puppets and props, can help familiarize patients with medical devices and procedures ahead of time. In one study, physiological measures of fear and anxiety, including heart rate, blood pressure, and respiratory rate were measured at baseline, prior to the procedure, and after the procedure in the drama therapy group and the control group. Patients who received drama therapy had lower heart rate, diastolic blood pressure, and respiratory rate before and after medical procedures compared to the control.<sup>24</sup> Creative arts therapists can play an important role in the preoperative healthcare team, helping to decrease preoperative anxiety, and, therefore, facilitate smoother procedures.

Three studies reported increased levels of happiness after children participated in music therapy or drama therapy interventions.<sup>8,25,26</sup> They measured emotional states by having participants identify their emotion using a faces scale, with facial expressions representing emotions such as anger, happiness, and sadness. One music therapy study conducted post-intervention interviews with 27 children and 23 of their parents and utilized thematic analysis to assess the impact of music therapy on participants.<sup>26</sup> The study found that music therapy made it easier for children to express their emotions and parents recognized positive emotional changes in their children.<sup>26</sup> In a descriptive single case study, of 4 children who participated in a 4-session drama intervention, the children described themselves as “happy” and “peaceful” compared to “sad” and “angry” before the intervention.<sup>25</sup> Two studies reported increased feelings of calm and relaxation in patients after music therapy or dance/movement therapy interventions.<sup>9,27</sup> A study of adolescents who received music therapy prior to chemotherapy described themselves as “less scared” and more “calm” and “at peace” with chemotherapy.<sup>27</sup>

Additionally, hospitalization can be a very distressing experience for children as they adjust to an unfamiliar and intimidating environment, being away from home, and disruption to their normal routine.<sup>28</sup> Children may experience symptoms such as irritability, self-blaming, sleep and eating disturbances, and misbehavior with family and medical professionals.<sup>28</sup> In 2 studies, psychodrama alone or combined with art therapy were shown to help pediatric oncology patients reduce these symptoms related to hospitalization.<sup>29,30</sup>

Factors such as isolation from friends and family, physical discomfort, and fear of not recovering contribute to depression in pediatric oncology patients.<sup>5</sup> Out of the 6 studies that assessed depression, all of them found a significant reduction in depressive symptoms after the CAT intervention. One randomized control trial (n=30 intervention, n=30 control) administered the Hospital Anxiety and Depression Scale (HADS) and the Memorial Symptom Assessment Scale’s Psychological Subscale (MSAS-P), two well-established screening tools that have shown convergent and divergent validity, before and after a 2-session individual mandala drawing and painting intervention.<sup>18</sup> Results showed a statistically significant decrease in the HADS depression score in the mandala group compared to the control ( $P < .01$ ) and a statistically significant decrease in symptom frequency, severity, and distress, as measured through the MSAS-P, compared to the control group ( $P < .001$ ).<sup>18</sup> Four other studies utilized group therapy formats with different therapeutic modalities including watercolor painting,<sup>31-33</sup> art-play therapy,<sup>16</sup> sculpture,<sup>32</sup> and handcrafting (woodworking).<sup>33</sup> A 6–8 session group painting and sculpture intervention led to a significant reduction in depression scores, as measured by the Center for Epidemiological Studies Depression Scale for Children (CES-DC). The total score on the CES-DC ranges from 0 to 60, with a score of 15 or greater suggesting depressive symptoms and higher scores indicating higher levels of depression. In this study of 14 children, the average CES-DC score decreased from 27.71 at baseline to 15.36 at follow up ( $P < .001$ ). Participants reported overall feeling less sad, less scared, and better slept.<sup>32</sup> Compared to the control, participants of a one-month painting and handcrafting group therapy intervention experienced significant reduction in depressive feelings (Cohen  $d = 0.80$ ,  $P = .003$ ), increased energy (Cohen  $d = 1.48$ ,  $P < .001$ ), and improved enjoyment of and participation in social activities (Cohen  $d = 0.645$ ,  $P = .016$ ).<sup>33</sup> Similarly, a qualitative thematic analysis examined 100 randomly selected patient charts, who had received cumulatively 1160 dance/movement therapy (DMT) sessions, and found that DMT helped patients develop strategies to cope with hospitalization (N = 663, 58%) which was measured through increased socialization, reduced depression, and reduced feelings of stress and fear as reported by DMT clinicians in the patient charts.<sup>9</sup> Creative art therapies facilitate communication between patients, therapists, and families. Children with cancer often feel isolated in the hospital, and lack of socialization can contribute to depression. Therefore, increased socialization with the CAT therapist or with other children in the group therapy format may help reduce depression in this population.

### Physical Symptoms in Pediatric Oncology Patients

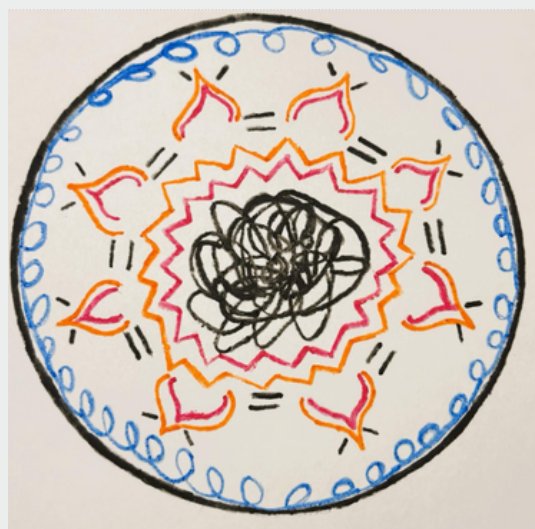
Pediatric oncology patients commonly experience pain related to their disease and treatment. Three studies noted that pediatric or adolescent patients who underwent music therapy reported reduced perception of pain.<sup>8,22,27</sup> Patients who received music therapy during PICC catheterization experienced a less significant increase in pain response during the procedure compared to the control group ( $P < .001$ ).<sup>8</sup> Pain was measured using a self-reported pain scale of 0 to 5 (not painful to very painful).<sup>8</sup> A randomized control trial that integrated music therapy with mindfulness-based stress reduction techniques, including yoga and meditation, found that this combined intervention significantly reduced pain in participants with osteosarcoma ( $t44 = 4.558$ ,  $P = .000$ ), whereas the control group showed no significant change in pain levels ( $t45 = .452$ ,  $P = .652$ ).<sup>17</sup> Pain was assessed by having the children rank their pain on the Wong-Baker Faces Pain Rating Scale (WBRS) before and after the intervention.<sup>17</sup> A retrospective chart review of dance/movement therapists' notes reported improved pain management in 263 of 267 (98%) Multisensory

dance movement psychotherapy (MSDMT) visits.<sup>9</sup> Three studies did not find a significant difference in pain between patients who received creative arts therapies and the control groups.<sup>20,21,34</sup> Within the broader literature, music therapy is the most extensively studied CAT regarding its impact of music therapy on pain in pediatric oncology, with evidence supporting its effectiveness in pain reduction.<sup>2,11</sup> In this review, 4 of the 5 studies that assessed the impact of music therapy on pain found similar results. The other music therapy study did find a decrease in pain in the music therapy group, but it was not statistically significant compared to the control.<sup>21</sup> Additionally, the two other studies that did not find a significant difference in pain between the intervention and control groups used a CAT intervention that consisted of a random combination of dance/music, art, and music therapies, and participants completed varying numbers of sessions. The variation in treatment duration and CAT received can make it difficult to assess if some types of CAT are more beneficial for pain than others. Future research is needed that assesses separate DMT and art therapy interventions to determine if they are effective at reducing pain in pediatric oncology patients.

Another frequently reported symptom in pediatric oncology patients is nausea. Cancer patients can develop nausea and vomiting in anticipation of the emetogenic effects of chemotherapy even before chemotherapy administration because the body is conditioned to expect these side effects. Anticipatory nausea and vomiting are difficult to treat because they do not respond to antiemetic medications. Therefore, recent research has focused on finding alternative non-pharmaceutical treatments. Two studies reported a significant decrease in anticipatory nausea following music therapy interventions,<sup>22,27</sup> with one study also noting a reduction in treatment-induced nausea.<sup>27</sup> One study with 10 participants found significant improvement in anticipatory nausea over 4 sessions with a decrease in symptoms from one session to the next ( $P < .001$ ).<sup>27</sup> Another study with 20 participants measured nausea using the nausea subscale of the PedsQL 3.0 Cancer Module which includes questions related to treatment-related, anticipatory, and general nausea. Results showed a significant reduction in nausea scores after the 4-session music therapy intervention compared to before the intervention ( $P = .009$ ). However, 2 other studies that measured nausea using the nausea subscale of the PedsQL 3.0 Cancer Module did not find a significant reduction in nausea scores after a music therapy intervention or a combined dance/movement, music, and art therapy intervention.<sup>20,21</sup> One limitation of these studies is that they did not specify whether the patients were getting antiemetic medications in addition to the CAT interventions. Additionally, the inconclusive findings and small sample sizes in the reviewed studies highlight the need for further investigation involving larger samples.

## CONCLUSIONS

In the 22 studies included in this literature review, CAT interventions were shown to have a positive clinical impact in the care of pediatric oncology patients, with improvements in anxiety, depression, happiness, pain, and nausea. These results support the integration of CAT into healthcare settings to support pediatric oncology patients during their treatment. However, due to the limited number of studies, small sample sizes, and variability in research methods, further research with large, randomized control trials is warranted. Additionally, more research is needed to determine if certain delivery formats (individual vs group), intervention durations, or types of CAT are more effective than others. Most research on CAT in pediatric oncology has focused on music and art therapies, and more research is needed to further understand the role of DMT and drama therapy in this setting. In the United States, many pediatric hospitals and treatment centers have established CAT services available to pediatric oncology patients. Increasing awareness and educating healthcare providers on the potential benefit of CAT programs can help providers connect their pediatric oncology patients to the services they need to improve their psychological and physical wellbeing as they progress through treatment.



**Supplemental Image:** Artwork created by Eliza Morton during a mock session with Board-Certified Art Therapist Kelly Burns. The art created is the visual representation of possible physical pain Eliza experiences. By creating her own art about physical pain, Eliza can begin to understand what it is like for patients to create art about their own physical pain, and what is like to try and process and communicate difficult feelings associated with their pain. At the center of her artwork lies a dense black fog, symbolizing the difficult to define, consuming nature of pain. The red and orange zigzag lines represent the acute, stabbing sensations of pain. Masking the inner chaos, the outermost layer is made of soft blue loops which represents how those living with ongoing pain may feel depressed and emotionally fatigued over time.



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# EXPLORING PERCEPTIONS OF FREE EXPRESSION AND RATES OF SELF-CENSORSHIP AT US MEDICAL SCHOOLS

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## ABSTRACT

**Introduction:** Discourse surrounding free expression on college campuses has garnered attention as institutions strive to reconcile free speech with inclusivity and respect among diverse student populations. Recent incidents have demonstrated the growing tension surrounding free expression within medical schools, which is an unexplored area of research. This study assesses free expression on medical school campuses by exploring students' attitudes regarding campus discourse and experiences expressing their views.

**Methods:** This study included 500 full-time medical students enrolled in US medical schools. Ten medical schools agreed to participate in the survey after a nationwide collaboration request. Qualtrics survey links were then distributed by the respective student affairs deans to all class levels. The survey assessed demographic variables including age, sex assigned at birth, gender, race/ethnicity, political orientation, and religious identity. Dependent variables were assessed using Likert-scale-based questions exploring perceptions of campus culture regarding free speech, comfort discussing controversial topics, and attitudes toward protest actions. Principal component analysis was used to condense the dependent variables, and Spearman rank-order correlations and Kruskal-Wallis H tests were employed to examine associations with the independent variables.

**Results:** 51.0% of participants identified as politically liberal. Many reported self-censorship on campus, with 65% avoiding discussions of core beliefs with classmates and 67.2% with faculty. Reasons for self-censorship included concerns about residency competitiveness (54.8%), fear of social repercussions (63.4%), and fear of institutional reprimand (44.2%). Despite this, 74.6% believed they had the right to self-expression without fear of retaliation. Additionally, correlation analyses revealed that participants who identified as politically conservative reported greater comfort discussing controversial topics compared to liberal participants ( $r_s = .401$ , 95% CI [.321, .475],  $p < .001$ ).

**Discussion:** These findings open a conversation regarding ideological diversity and free expression at US medical school campuses. Further investigation is necessary to determine the etiology of these correlations and assess the role of institutional policies.

## INTRODUCTION

Discourse surrounding free expression on college campuses has garnered attention in recent years as academic institutions strive to reconcile the principles of free speech with the need for inclusivity and respect among diverse student populations.<sup>1-5</sup> On medical school campuses, contentious topics such as abortion, transgender adolescent care, and diversity policies are at the forefront. Recent incidents have demonstrated the growing tension surrounding free expression within medical schools, which is a subject that has not been studied. At the University of Michigan Medical School, incoming students petitioned to replace a keynote speaker at the white coat ceremony due to her anti-abortion stance, prompting a public walkout.<sup>2,6</sup> Similarly, at the Medical College of Wisconsin, school officials moved an in-person symposium on racial diversity policies to a virtual format, fearing the event would provoke student backlash.<sup>2,7</sup>

The implications of these dynamics for medical education are profound. Medical professionals must be equipped to engage with a variety of perspectives to provide care for diverse patient populations. Research indicates that both individuals with liberal or conservative political affiliations exhibit a willingness to discriminate based on ideological differences when evaluating scholarly work, further contributing to an environment that can stifle diverse viewpoints.<sup>8-9</sup> As political polarization and the coarsening of public discourse seep into medical education, fostering an atmosphere of open dialogue becomes paramount.<sup>10</sup>

Examining students' experiences and the interplay between identity and censorship is crucial for recognizing both strengths and barriers to open discourse. Such understanding can inform initiatives to create optimal learning environments for future physicians who will navigate complex societal issues. This multi-institutional cross-sectional exploratory study assesses medical students' attitudes and experiences with free expression on campus.

## METHODS

This study was granted exemption from human subject research by the University of Central Florida (UCF) Institutional Review Board (IRB).

### Survey Development and Dissemination

A literature review revealed no existing research on free expression in medical education. UCF Primo and Google Scholar were used to conduct a comprehensive literature search on free expression and self-censorship in medical education. Primo aggregates results from major academic databases (e.g., PubMed, MEDLINE, and Academic Search Premier), while Google Scholar supplemented the search with additional sources not always captured in traditional databases. The literature search combined key terms related to expression and censorship with terms describing educational settings (Appendix A). The most widely used instruments for assessing free expression among students have been specifically designed for undergraduate populations, which were created by the Heterodox Academy (HxA) and the Foundation for Individual Rights and Expression (FIRE).<sup>11-12</sup> This study

adapted survey items to reflect the academic and professional environment of medical education. It utilized established survey question formats from the aforementioned organizations to inform the Likert-scale items measuring self-censorship, comfort discussing controversial topics, and attitudes toward speech restrictions. Survey questions were primarily adapted from FIRE's 2024 College Free Speech Rankings Report,<sup>12</sup> with acceptable reliability for the questions included in this survey (Cronbach's alpha > 0.75). The survey was refined using cognitive interviews with medical students from the University of Central Florida College of Medicine and evaluation by the research directors of HxA and FIRE.

Following nationwide Student Affairs collaboration requests, 10 medical schools agreed to participate. Survey submissions were capped at 500 participants due to budgetary and IRB constraints. The survey opened on August 1st, 2024, and closed on September 23rd, 2024, once the response limit was reached. Informed consent was obtained on the first page of the Qualtrics survey before participants could access any questions. Surveys were distributed directly to medical students by their student affairs deans. No additional verification procedures were used to confirm eligibility beyond this targeted distribution, as only current medical students were invited to participate.

Survey data collection and de-identification were managed by a university-affiliated research staff member. This process removed all personally identifying information prior to data analysis, ensuring anonymity and preventing the study authors from accessing participant identities. The survey received a total of 622 submissions, which included test entries from Qualtrics "preview" mode and partially completed responses. After excluding these, the first 500 fully completed and consented responses were included in the final analysis.

### Sample Population

Five hundred full-time medical students enrolled in US allopathic and osteopathic medical schools participated in the survey and were compensated with a \$5 Amazon gift card upon completion. The demographic data collected included age, sex assigned at birth, gender, race/ethnicity, political orientation, and religious affiliation. Additional items assessed educational attainment before matriculation and work experience, as well as current medical school characteristics, including degree type (MD or DO), institution location, year of study, class size, and level of peer interaction.

### Survey Content and Data Analysis

The survey was designed to assess medical students' experiences with and perceptions of free expression on their medical school campus (Appendix B). Questions explored perceptions of their peers' political leanings, whether students felt encouraged to engage with diverse perspectives, and if they had withheld opinions due to concerns about peer or faculty judgment, institutional repercussions, or potential impacts on residency competitiveness. The instrument examined how students navigate expressing opinions in different settings, such as with professors, peers, and on social media. It measured attitudes toward campus protests, perceived administrative support for free speech, and beliefs about whether classrooms should protect students from controversial ideas. The survey concluded with items gauging students' general beliefs about freedom of expression and their likelihood of withholding opinions compared to their earlier educational experiences.

The Statistical Package for the Social Sciences<sup>15</sup> (SPSS) was used to summarize the demographic characteristics of the study participants and their responses to survey questions. To compress 32 Likert-scale-based survey items into a few interpretable components, a principal component analysis (PCA) was performed using the Dimension Reduction Factor SPSS tool. The number of retained components was determined using the Kaiser criterion (eigenvalues > 1) and inspection of the scree plot. An Oblimin rotation was applied to facilitate interpretation of factor loadings. The first two components, Comfort Discussing Controversial Topics (CDCT) and Stop Speech (SS), were retained because they were clearly interpretable and meaningful, explaining a cumulative 32.70% of the total variance. Component scores for each participant were extracted and used as dependent variables in subsequent analyses examining their associations with self-reported political views and religious identification.

The CDCT index consisted of items where participants agreed or disagreed with statements such as "I feel comfortable discussing" topics, including the upcoming election, abortion restrictions, transgender adolescent care, affirmative action, COVID-19 policies, and midlevel scope of practice. The SS index assessed participants' views on the acceptability of various protest actions against a campus speaker, including shouting them down, preventing others from attending events, and using violence.

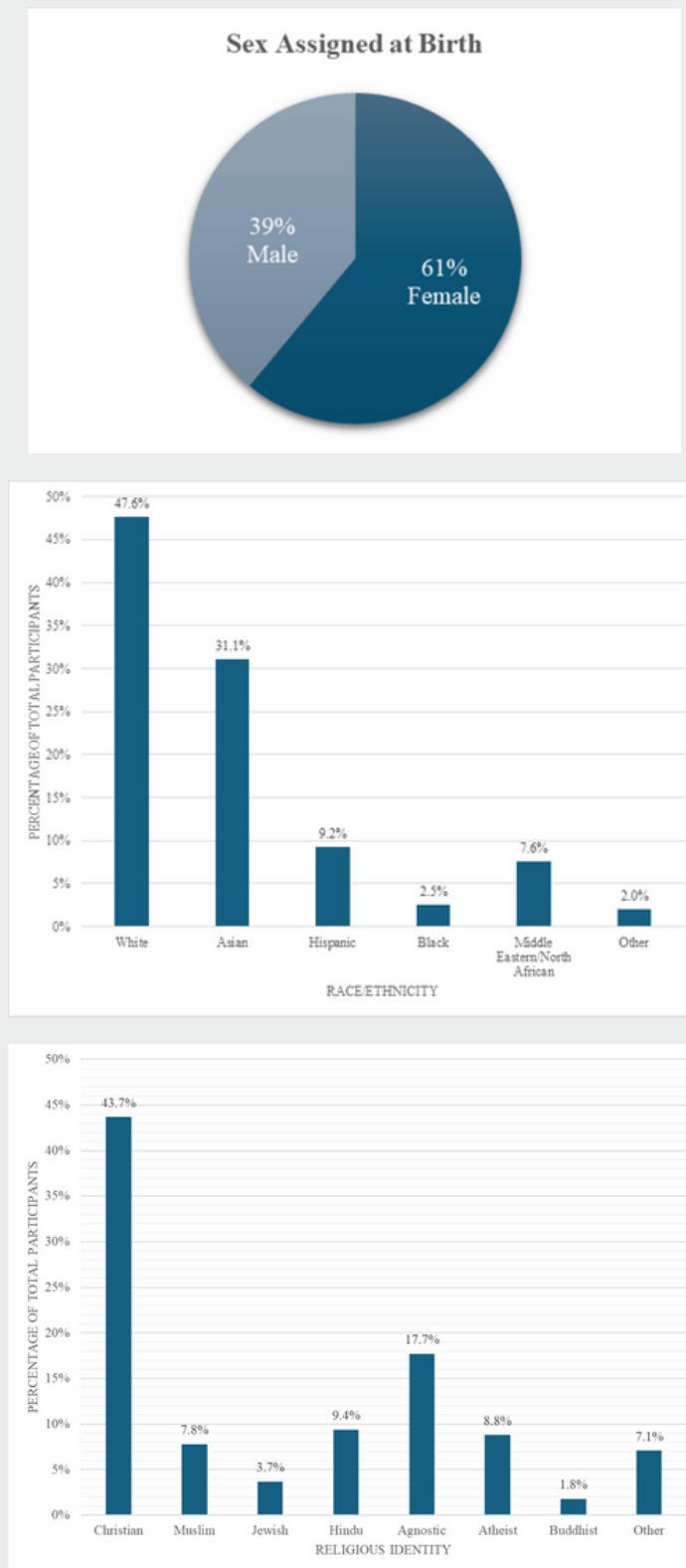
Spearman rank-order correlations were then conducted to examine the relationship between political orientation and CDCT and SS indices. Political orientation was measured on a 5-point scale, with 1 indicating very liberal and 5 indicating very conservative views. The CDCT index ranged from lower values, reflecting less comfort discussing controversial topics, to higher values, indicating greater comfort. Similarly, the SS index ranged from lower values, representing a lower likelihood of supporting protest actions against campus speakers, to higher values, reflecting greater support for such actions. Kruskal-Wallis H tests were used to examine the relationship between religious identity and the CDCT and SS indices. Shapiro-Wilk tests between the independent variables (ordinal political orientation and nominal religious identity) and dependent variables (CDCT and SS indices) demonstrated non-normal distribution; thus, non-parametric tests were chosen to test these relationships.

# RESULTS

## Demographics

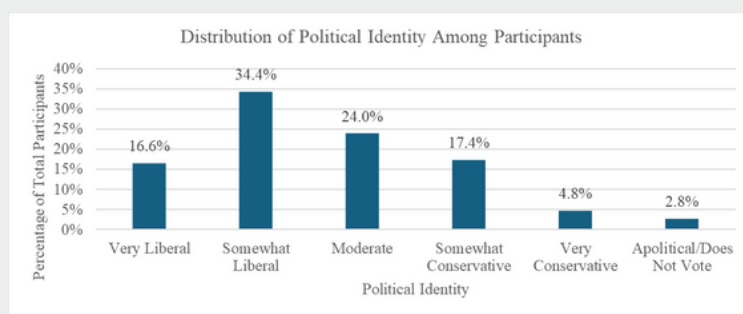
The survey sample was predominantly composed of young adults, with a median age of 25 years and a range of 20 to 44 years. Among the respondents, 61% identified as female, and the racial/ethnic composition was primarily White (47.6%), followed by Asian (31.1%), Hispanic (9.2%), Black (2.5%), Middle Eastern/North African (7.6%), or other (2.0%). Regarding political affiliations, 51.0% of participants identified as liberal-leaning, 24.0% as moderate, 22.2% as conservative-leaning, and 2.8% as apolitical. Regarding religious identity, 43.7% were Christian, 3.7% Jewish, 7.8% Muslim, 1.8% Buddhist, 9.4% Hindu, 17.7% Agnostic, 8.8% Atheist, and 7.1% other. The majority of respondents attended medical schools in the Southern (59.8%) and Central (31.8%) regions of the United States, with roughly equal representation across all medical school class years.

**Figure I – Participant Demographics**



**Figure Description:** Demographic data including sex, race/ethnicity, and religious identity for the 500 participating students from US medical schools.

**Figure II – Distribution of Participant Political Identity**



**Figure Description:** Distribution of political identity among 500 participating students from US medical schools.

## Comfort Expressing Ideas

When asked about the political climate among classmates, 58.2% of respondents perceived the majority of their peers to be left-leaning. Regarding self-censorship, 65% of students reported avoiding discussions of their core beliefs with their classmates, and 67.2% felt uncomfortable addressing their core beliefs with faculty. More than half (57.8%) reported feeling uncomfortable discussing their political opinions in class discussions, and similarly, fewer (43.8%) felt comfortable discussing their views with peers in informal campus settings. Even more expressed discomfort in sharing these views on social media (64.2%) and publicly disagreeing with professors on controversial topics (72.4%). Regarding their rationale, 54.8% reported withholding their opinions due to concerns regarding residency competitiveness, while 63.4% refrained from sharing their views out of fear of social repercussions from peers, and 44.2% withheld opinions due to fears of reprimand by their institution. Despite these reservations, a majority (74.6%) believed in their right to self-expression without fear of retaliation.

## Perception of Speech

When considering safe spaces for dialogue, 58.4% felt that classroom discussions should protect students from disturbing ideas, while a nearly identical 38.8% disagreed with this notion. Concerning administrative support for controversial speech, only 25.4% believed their administration would likely defend a speaker's rights, while 51% rated such support as somewhat likely. Regarding administrative support for freedom of expression, only 43.2% of students felt their administration protects freedom of expression.

Attitudes toward suppressive actions against speakers revealed further insights: 25% deemed it acceptable to shout down a speaker sometimes, often, or always, while 35.4% considered it rarely acceptable, and 39.6% stated it was never acceptable. Regarding blocking students from attending campus speeches, 9% considered them acceptable to some degree (sometimes, often, or always), 25.2% found them rarely acceptable, and 65.8% deemed them never acceptable. Importantly, 92.8% regarded the use of violence to prevent speech as never acceptable.

## Student Expression Across Political and Religious Lines

Correlation analyses revealed patterns regarding students' comfort levels in discussing controversial topics and participating in specific protest actions depending on their political affiliations and religious beliefs. A moderate positive correlation emerged between conservative political orientation and the CDCT index, indicating participants who identified as more politically conservative reported greater comfort discussing controversial topics compared to liberal participants ( $r_s = .401$ , 95% CI [.321, .475],  $p < .001$ ). In contrast, a moderate negative correlation was observed between conservative political orientation and the SS index, suggesting that more conservative participants were less likely than liberal respondents to support protest actions including shouting down speakers, blocking access to events, or using violence to prevent speech ( $r_s = -.439$ , 95% CI [-.510, -.362],  $p < .001$ ).

Regarding the effect of religious affiliation, Kruskal-Wallis H tests revealed significant differences in students' religious identity and CDCT index ( $H = 25.03$ ,  $p < .001$ ) as well as SS index ( $H = 33.85$ ,  $p < .001$ ). Buddhist participants (median, 16.5; IQR, 11.5-23.5) had the highest median CDCT index scores, followed by Christians (median, 16.0; IQR, 13.0-20.0) and Jews (median, 16.0; IQR, 12.0-20.0), indicating more reported comfort discussing controversial topics compared to Muslims (median, 13.0; IQR, 11.0-16.0), Hindus (median, 13.0; IQR, 11.0-18.0), and Atheists (median, 13.0; IQR, 10.0-18.0) (see Table II). In terms of SS index, Muslims (median, 5.0; IQR, 4.0-6.8) and Atheists (median, 5.0; IQR, 3.0-6.5) had the highest median scores, while Christians (median, 4.0; IQR, 3.0-5.0) scored the lowest (see Table II), suggesting Christian participants were less likely to support protest behaviors in comparison to Muslim and Atheist participants.

**Figure III – Why Students Self Censor**



**Figure Description:** Rationale for withholding views reported by 500 participating students from US medical schools.



**Table I - Spearman Correlations Between Political Orientation and Comfort Discussing Topics and Stop Speech Indices**

Outcome Variable	Spearman $\rho$	95% CI	p-value	Interpretation
Comfort Discussing Topics Index	0.401	[0.321, 0.475]	< .001	Moderate positive correlation
Stop Speech Index	-0.439	[-0.510, -0.362]	< .001	Moderate negative correlation

**Table Description:** Correlation analyses revealed associations between political orientation and CDCT and SS indices. Political orientation was coded on a continuous scale, with higher values indicating more conservative views and lower values representing more liberal views; therefore, liberal students served as the reference group in interpreting correlation direction.

**Table II - Kruskal-Wallis H tests on Comfort Discussing Topics Index and STOP Speech Index by Religious Affiliation**

Religious View	Comfort Discussing Topics Median (IQR) p < .001	STOP Speech Median (IQR) p < .001
Christian	16.0 (13.0-20.0)	4.0 (3.0-5.0)
Jewish	16.0 (12.0-20.0)	4.0 (3.0-5.8)
Muslim	13.0 (11.0-16.0)	5.0 (4.0-6.8)
Buddhist	16.5 (11.5-23.5)	5.0 (4.0-6.0)
Hindu	13.0 (11.0-18.0)	4.0 (3.0-6.0)
Agnostic	14.0 (11.0-18.0)	4.0 (3.0-6.0)
Atheist	13.0 (10.0-18.0)	5.0 (3.0-6.5)
Other	13.0 (12.0-18.8)	4.0 (3.0-5.8)

Kruskal-Wallis H tests were conducted at  $\alpha = 0.05$ .

**Table Description:** Median scores for the CDCT Index and the SS Index across religious affiliations. These differences were statistically significant for both indices (p < .001).

## DISCUSSION

Most respondents identified as liberal-leaning (51.0%) with fewer students identifying as moderate (24.0%) or conservative-leaning (22.2%). This finding aligns with trends observed in previous studies, which also found a predominance of liberal political orientation among medical students. For example, a 2007 study reported that 40% of students identified as liberal-leaning, 33% as moderate, and 26% as conservative-leaning.<sup>14</sup> Likewise, a 2019 study found that 47.7% identified as liberal-leaning, 33.3% as moderate, and 19.0% as conservative-leaning.<sup>15</sup>

These patterns are not unique to medical students; they reflect the broader political orientation of higher education, where liberal-leaning views are more prevalent than conservative or moderate ones among both undergraduate students and faculty members.<sup>16-19</sup> More broadly, this reflects a societal trend in which highly educated adults are more likely than those with lower levels of education to hold liberal political views.<sup>20</sup>

The reasons behind this trend remain unclear, with existing literature offering mixed explanations for the predominant liberal leanings of those in higher education. Research using the 1970 British Cohort Study<sup>21</sup> shows varied findings, with some linking political leanings to pre-existing traits,<sup>22</sup> others to socialization during university,<sup>23</sup> and even one study finding that earning a degree reduces authoritarianism and racial prejudiced beliefs.<sup>24</sup>

Some argue that prioritizing viewpoint diversity will actively work against equity-focused initiatives,<sup>25</sup> while others contend that welcoming viewpoint diversity contributes to the pursuit of knowledge and helps prepare public health leaders to work across ideological divides in service to society.<sup>26</sup>

Furthermore, in *The Perception Gap: How False Impressions are Pulling Americans Apart*, the authors argue that ideological divides and distorted perceptions of opposing political groups contribute to polarization, with media exposure exacerbating these gaps. They suggest that exposure to differing viewpoints may mitigate polarization and improve communication, which raises critical questions about the value of political viewpoint diversity in medical education. While racial and ethnic diversity<sup>28</sup> is often emphasized in academic settings, the state of ideological diversity and open discourse within medical education and its impact on medical practice warrants further exploration.

Additionally, while some existing literature suggests that conservatives are generally more hesitant to express their views in both university settings<sup>29-30</sup> and within the general population,<sup>31</sup> we found a positive correlation between conservative identification and comfort discussing controversial topics. Our results are supported by the 2025 FIRE report, which found that liberal students were more likely to feel discomfort discussing controversial issues, aligning with the negative correlation between liberal identification and comfort discussing such topics observed in our study.<sup>16</sup>

Regarding protest behaviors, our study found a negative correlation between conservative identification and support for protest actions, which is reinforced by FIRE's 2025 report, where 84% of very liberal students supported shouting down speakers, compared to much lower acceptance among conservatives. Thus, while some studies highlight conservative self-censorship, others show conservatives feel more comfortable expressing controversial opinions and oppose protest actions to silence speakers.

Moreover, while most students (74.6%) asserted that they should be able to express themselves without fear of retaliation, a considerable percentage also found it acceptable to shout down a speaker (25%) and block fellow students from attending certain events (9%). These findings raise concerns about how medical students reconcile free expression with professionalism and ideals of physicians. Perhaps students feel certain beliefs are at odds with the duties of the medical profession. In contrast, others may raise the question of whether students who are unable to engage in dialogue within a protected academic setting will be equipped to practice cultural humility and care effectively for patients whose views differ sharply from their own.<sup>32</sup>

It is also important to consider how medical students in their clinical years navigate free expression, particularly given that their clerkship grades are often determined not only by exam performance but also by subjective evaluations from supervising residents and attendings.<sup>33-34</sup> Given the substantial weight that clinical grades carry in the highly competitive residency application process,<sup>35</sup> it is reasonable to assume that students may be more reluctant to engage openly in conversations about controversial topics.

In our study, most participants reported withholding opinions due to the potential negative impact on their residency competitiveness (54.8%) and their relationships with peers (63.4%). This conflict highlights the dual pressures students face: the desire to engage in open discourse and the pragmatic considerations of professional advancement. This prompts the question of whether institutions that implement true pass/fail grading systems foster a different culture of free expression compared to those that use traditional tiered grading structures, such as honors/pass/fail or A-F systems.

Understanding the dynamics of balancing personal beliefs, peer relationships, and the competitive landscape of residency applications is essential to determining how to cultivate inclusivity, resilience, and critical inquiry that prepare future physicians to navigate our healthcare system and provide patient care. Future inquiries will involve multi-factorial analyses to further examine the factors influencing students' willingness to discuss controversial topics. This survey should also be expanded into focused semi-structured interviews to determine how specific policies and initiatives impact free expression. Longitudinal studies will be necessary to assess the effects of self-censorship and ideological leanings on physician engagement with complex social and political issues.

## LIMITATIONS

This study is the first to systematically explore medical students' perceptions of free expression and self-censorship. It was designed as a pilot study to identify patterns and generate hypotheses that can inform larger, more comprehensive research efforts. Several limitations should be noted, including the lack of response rate calculation, potential sample biases, and study design constraints. Participation was capped at 500 students, which limited the ability to detect meaningful differences within smaller subgroups and calculate a formal response rate. Without knowing the proportion of non-respondents, the risk of non-response bias cannot be assessed. The sample was disproportionately drawn from medical schools in the Southern (59.8%) and Central (31.8%) regions, with limited representation from the Northeast and West, which may have different institutional cultures. The instrument was adapted from validated undergraduate-focused surveys and refined through expert review; however, formal psychometric validation has not yet been performed. As a single-time-point survey, this study cannot assess causality. Although anonymous, the survey findings were self-reported, which is subject to recall and social desirability biases, especially when discussing sensitive topics such as political expression. While the study included key demographic factors, it did not explore all relevant influences, including socioeconomic background.

As a novel pilot study, these findings are best interpreted as exploratory. Future research should expand to a larger sample using a formally validated survey instrument and explore longitudinal designs to better understand causality and how perceptions of free expression evolve throughout training.

## CONCLUSION

This study highlights the predominantly liberal orientation among medical students and suggests a tension between students' commitment to open discourse and the professional and social risks they perceive in doing so, raising important questions about how medical education supports or suppresses ideological diversity. Further research is needed to examine how institutional policies, grading structures, and institutional culture can foster open dialogue while maintaining professionalism and preparing students to care for diverse patient populations.

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## APPENDIX A

Search terms combined the following keywords with each context term in both UCF Primo and Google Scholar:

### Keywords:

free speech, freedom of expression, free expression, discourse, dialogue, speech, censorship, viewpoint, academic freedom

### Context terms:

medical students, medical education, medical school, medicine, undergraduate, education, university

Searches used all possible combinations of the above keywords and contexts. Example: "free speech" AND "medical students"

## APPENDIX B

[Copy of survey available upon request]

# IMPACT OF A MODIFIED CLOSURE TECHNIQUE ON POSTOPERATIVE COMPLICATIONS FOLLOWING FLEUR-DE-LIS PANNICULECTOMY

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## ABSTRACT

**Background:** Panniculectomy is one of the most common body contouring procedures performed after massive weight loss. Two primary approaches are used: the conventional transverse incision and the fleur-de-lis (FDL) incision. The FDL panniculectomy addresses epigastric skin redundancy through the vertical incision but has been associated with increased postoperative wound healing complications. We present a modified closure technique that gathers superficial and deep fascia in a manner that obliterates dead space, off-loads the vulnerable t-point and imbricates rectus muscle fascia. This study investigates whether the modified closure technique reduces postoperative complications compared to the standard FDL closure technique.

**Methods:** We conducted an institutional retrospective study of 50 patients who underwent FDL panniculectomies under a single surgeon after massive weight loss. Patients received either a standard closure (n = 30) or the modified closure (n = 20). Postoperative complications were compared with Chi-Square Analysis. Multivariate logistic regression assessed the association between closure technique and overall complication risk while adjusting for comorbidities associated with wound healing complications.

**Results:** Postoperative complications occurred in 67% of patients in the standard closure group versus 40% in the modified closure group. Multivariate logistic regression demonstrated a statistically significant reduction in the odds of complications with the modified technique (OR: 0.099; 95% CI: 0.016 - 0.611; p = 0.013). Chi-square analysis showed no significant relationship between the modified closing technique and any of the different types of complications. Comorbidity-adjusted logistic regression revealed no significant association between individual comorbidities and complication rates in either group.

**Conclusion:** The modified closure technique may significantly reduce postoperative complications following FDL panniculectomy. These findings support its consideration in future surgical practice.

## BACKGROUND

Following massive weight loss through surgery, medical means, or diet and exercise, patients are often left with excess skin that can impair quality of life. Body modification procedures, such as breast lifts, panniculectomies, brachioplasties, are commonly used to address this issue, either for cosmetic enhancement or symptomatic management for intertriginous rashes, chafing, or recurrent infections. Among these procedures, panniculectomies are the third most common type of body modification procedure performed in the US.<sup>1</sup> When performing a panniculectomy, there are two primary approaches used: The transverse incision and the fleur-de-lis (FDL) approach, which is composed of both a vertical and transverse incision.

The FDL approach has emerged as a pivotal surgical intervention for patients suffering from severe abdominal deformities associated with excess tissue, often following significant weight loss. This technique combines a horizontal incision with a vertical one, allowing for the excision of excess skin and subcutaneous tissue in both dimensions, potentially resulting in a superior aesthetic appearance when compared to a classic low-transverse incision.<sup>2</sup> Recent studies underscore the increasing prevalence of this surgery as global obesity rates rise, leading to an increased number of patients undergoing bariatric surgery and subsequently seeking reconstructive options. Specifically, the American Society of Metabolic and

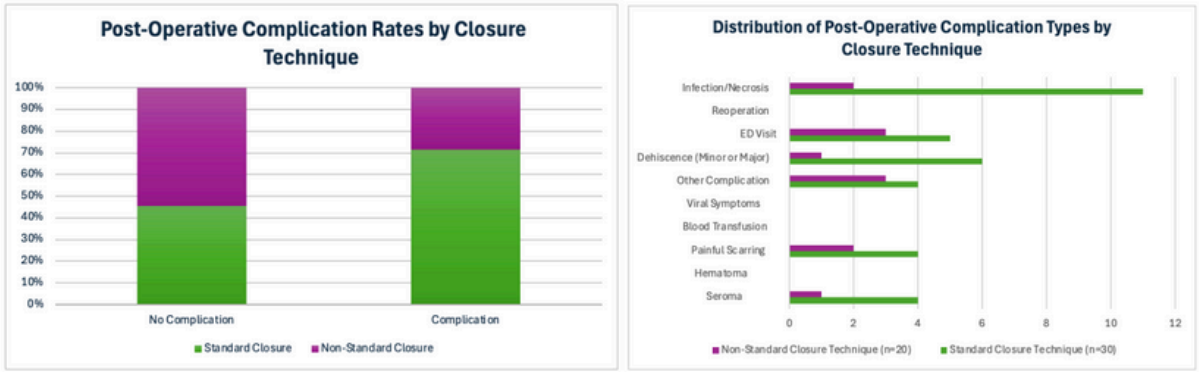
Bariatric Surgery reported that over 200,000 bariatric surgeries are performed annually in the United States alone, with many patients experiencing notable skin laxity postoperatively.<sup>3,4</sup>

Although the FDL technique is widely used, it has also been associated with a higher incidence of postoperative complications compared to the transverse approach. These complications include skin necrosis, surgical site infections, wound dehiscence, and seroma formation.<sup>5</sup> Studies demonstrate that FDL procedures have reported complication rates as high as 20%, a statistic which emphasizes the need for careful surgical planning and improved perioperative techniques.<sup>6,7</sup> Alternatively, a portion of the literature maintains that both the classical and FDL approaches have comparable outcomes. Prior attempts have been made to reduce the incidence of these complications, including the use of progressive tension sutures and incisional negative pressure wound therapy, which have shown promise in decreasing wound complications by up to 30%.<sup>8</sup>

We present a modified closure technique with a synthetic monofilament suture that gathers superficial and deep fascia within the vertical incision while imbricating rectus muscle fascia in a manner that obliterates dead space and off-loads pressure from the vulnerable T-point. This study investigates whether the modified closure technique reduces postoperative complications compared to the standard FDL closure technique.

Demographic and Clinical Characteristics of Study Population (N=50)	
Variables	
Age at Surgery	Mean = 48.72 (SD = 12.340)
Gender	
	Male 4 (8%) Female 46 (92%)
Ethnicity	
	Not Hispanic/Latino 47 (94%) Hispanic/Latino 3 (6%)
Pre-operative BMI	Mean = 30.096 (SD = 5.9645)
Did the Patient Have Weight Loss Surgery	
	Yes 43 (86%) No 7 (14%)
Weight loss Surgery Type	
	Gastric Banding 1 (2%)
	Roux-en Y Gastric Bypass 27 (54%)
	Sleeve Gastrectomy 15 (30%)
	Biliopancreatic Diversion with Duodenal Stitch 1 (2%)
Time Between Weight Loss Surgery and Panniculectomy (months)	Median = 31 (IQR = 38)
Smoking History	
	Never 29 (58%)
	Current 3 (6%)
	History 18 (36%)
History of Diabetes	14 (28%)

Table 1. Demographic and Clinical Characteristics of Study Population



Figs. 1 and 2. Postoperative Complications by Closure Technique

Bar graphs comparing postoperative complications between patients who underwent standard versus modified closure techniques following Fleur-de-Lis panniculectomy. **Figure 1** displays overall complication rates by closure type, showing a higher percentage of complications in the standard closure group, though this difference was not statistically significant (Fisher's exact test,  $p = 0.085$ ). **Figure 2** shows the frequency of specific complication types by closure group. While none reached statistical significance individually, the standard closure group experienced more complications of every type, including infection/necrosis, dehiscence, ED visits, and painful scarring.

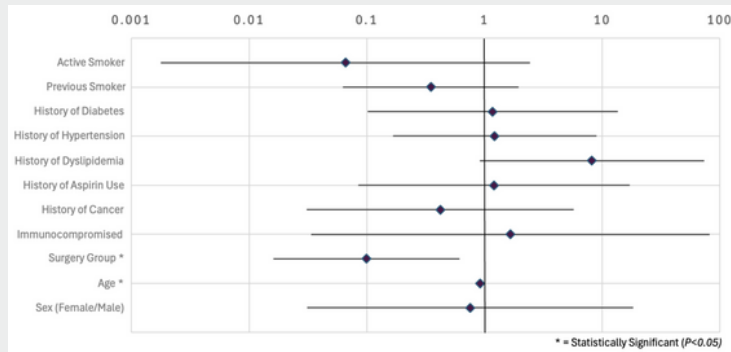


## METHODS

A retrospective chart review was conducted to identify patients who underwent body contouring procedures following significant weight loss achieved through medication, surgery, diet and exercise, or a combination of these methods. Data collected included patient demographics, comorbidities (including diabetes, hypertension, hyperlipidemia, etc.), medication history, weight loss method, body contouring procedure type, postoperative complications (including infection, dehiscence, hematomas, etc.), and other relevant clinical variables (Figures 2 and 3). A total of 316 patients were identified from procedures performed between 2019-2023 and entered into REDCap; data were subsequently exported to SPSS for analysis.

From this institutional dataset, a subset of 50 patients who underwent FDL panniculectomies performed by a single surgeon after massive weight loss were selected for further analysis. Inclusion criteria required that (1) the panniculectomy was performed by the same surgeon, and (2) the patient received either a standard FDL closure or an FDL with a modified closure technique. Of the 50 patients, 30 underwent the standard closure technique, and 20 underwent the modified closure technique.

Descriptive frequency analysis was initially performed to characterize the distribution of complication types across the two groups. Statistical analysis was then conducted to compare complication rates between the two closure techniques. A Fisher's exact test ( $p < 0.05$  considered significant) was used to assess differences in overall postoperative complication rates. Binary logistic regression was then performed to evaluate the odds of postoperative complications between closure types while adjusting for potential confounding factors in the patients, including smoking history, diabetes, hypertension, dyslipidemia, aspirin use, cancer history, immunocompromised status, age, and sex. Additional Fisher's exact tests were used to assess associations between closure technique and specific complication types: including infection, necrosis, reoperation, emergency department visits, painful scarring, hematomas, seromas, and dehiscence.



**Fig 3. Association Between Risk Factors and Postoperative Complications After Body Contouring Surgery**  
Forest plot depicting multivariable logistic regression results. Odds ratios (OR) and 95% confidence intervals (CI) are shown for the association between each risk factor and the likelihood of postoperative complications. The modified closure technique and increasing age were significantly associated with lower complication risk ( $p < 0.05$ ).

## RESULTS

Postoperative complications occurred in 67% of patients in the standard closure group (20 out of 30) compared to 40% in the modified closure group (8 out of 20). Although Fisher's exact test did not show a statistically significant difference in overall complication rates between the closure techniques ( $p = 0.085$ ), multivariable logistic regression demonstrated that the modified closure technique was associated with a 90% reduction in the odds of postoperative complications compared to those who received the standard technique (OR: 0.099; 95% CI: 0.016–0.611;  $p = 0.013$ ), after adjustment for age, diabetes, smoking, hypertension, dyslipidemia, aspirin use, immunosuppression, and cancer history (Figures 1 and 3). Multivariable logistic regression also revealed a significant association between age and postoperative complications, with each one-year increase in age associated with an 8.5% reduction in the odds of experiencing a complication (OR: 0.915; 95% CI: 0.839–0.997;  $p = 0.042$ ) (Figure 3).

Fisher's exact test showed no statistically significant association between closure type and any specific complication. However, descriptive frequency analysis revealed that the standard closure group experienced a higher count across all reported complication types, including infection/necrosis, postoperative ED visits, dehiscence, painful scarring, and seromas—compared to the modified group (Figure 2). In conclusion, our data suggests that the closure technique was the primary factor influencing postoperative complication risk.

## DISCUSSION

This study demonstrates that a modified closure technique during FDL procedures may significantly reduce the risk of postoperative complications in patients undergoing body contouring after massive weight loss. Although the overall complication rates between closure techniques did not reach statistical significance in unadjusted analyses, multivariable logistic regression revealed a 90% reduction in complication rates. This association remained robust after adjustment for common comorbidities, especially those seen in patients with a history of obesity, such as diabetes, hypertension, hyperlipidemia, etc. This suggests that closure method may play a central role in influencing outcomes following this procedure.

The expanded incision pattern of the FDL approach introduces known vulnerabilities, particularly at the t-point, where the transverse and vertical incisions meet. With previous literature reporting complication rates as high as 35% to 60%, often attributing them to poor perfusion at the t-point, increased tension, or dead space formation. In our study, patients undergoing standard closure experienced complications at a rate of 67%, consistent with published estimates. The modified closure technique, which incorporates layered fascial imbrication, tension off-loading, and dead space obliteration, helps mitigate several of these mechanical risk factors and thereby reduces morbidity. Our findings contribute novel insight into the ongoing debate surrounding optimal wound closure techniques in FDL procedures.

It's also noteworthy that this approach is associated with lower rates of each of the specific complications—including seromas, infections, dehiscence, and emergency department visits—highlighting its broader clinical utility. Though these differences were not statistically significant on a per-complication basis, the consistent directionality of findings is notable and suggests that the modified closure method may improve overall wound stability. Importantly, this technique does not require major changes to the operative workflow or specialized equipment, making it potentially scalable and adoptable across surgical settings.

Interestingly, our analysis also revealed an inverse relationship between age and postoperative complications, with each additional year associated with an 8.5% decrease in risk. While counterintuitive, similar findings have been reported in body contouring literature. Younger patients may be more likely to engage in higher levels of physical activity during early recovery, potentially increasing stress at wound sites. Alternatively, age-associated tissue characteristics, such as reduced elasticity, may paradoxically confer greater mechanical stability. Future studies are needed to further investigate this relationship and clarify its implications for surgical planning.

This study helps address a notable gap in the body contouring literature: namely, whether refinements in closure technique can meaningfully impact complication rates in FDL panniculectomies. Prior research has largely focused on patient-level factors such as BMI, diabetes, and smoking history. Our results suggest that, when operative technique is standardized and comorbidities are accounted for, closure methods may independently influence outcomes. This shifts part of the focus toward modifiable surgical strategies, rather than solely on preoperative risk stratification.

There are several noteworthy characteristics of this study. All surgeries were performed by a single surgeon, reducing inter-operator variability and ensuring consistency in all other aspects of the operative, aside from the closure method. Additionally, the inclusion of multivariable analysis allowed for the adjustment of relevant clinical confounders. However, limitations should be acknowledged. The retrospective nature of the study introduces inherent bias and limits causal inference. The sample size, particularly in the modified closure group, may have underpowered our ability to detect differences in individual complication types. Furthermore, the study population may not fully represent the broader demographic variability.

## CONCLUSION

In conclusion, our findings suggest that a modified closure technique for the FDL panniculectomy may offer a safe and effective strategy to reduce postoperative complications in patients undergoing body contouring after massive weight loss. These results provide early evidence that closure technique itself, beyond patient comorbidity burden, can be an important determinant of surgical success. Further prospective studies with larger, diverse cohorts are warranted to validate these findings and explore broader applications of closure optimization in body modification procedures.

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# EVALUATING RISK FACTORS FOR DELIVERY BY CESAREAN IN NULLIPAROUS TERM SINGLETON VERTEX (NTSV) PREGNANCIES

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## ABSTRACT

**Objective:** Here, we evaluate the nulliparous, term, singleton, vertex (NTSV) cohort as a focused model for examining non-obstetric contributors to Cesarean delivery (CD).

**Methods:** We conducted a retrospective cohort study of NTSV deliveries at a single tertiary academic center from June 2020 through June 2024. Electronic medical records provided data on patient language preference, age, insurance status, pregravid body mass index (BMI), and medical comorbidities. We excluded cases with active HSV infection, major fetal anomalies requiring CD, placenta previa or accreta spectrum, prior myomectomy, or fetal malposition. Descriptive statistics as well as logistic regression models were performed to identify CD predictors.

**Results:** Among 2,512 NTSV deliveries, 2,316 patients (92.2%) preferred English and 196 (7.8%) preferred a non-English language. Nine hundred forty (37.4%) had public insurance. Mean maternal age was 27.8 years and mean BMI 28.8. Overall, 628 patients (25.0%) underwent CD. Compared with vaginal deliveries, CD patients were older, had higher BMI, and more comorbidities. Language preference and oxytocin use did not differ by delivery mode. Primary indication for cesarean was listed as fetal, labor disorders, and maternal request. In multivariate analysis the following factors independently predicted CD: each one-unit increase in BMI, each year increase in age, public insurance status, and presence of any comorbidity. Neither non-English preference nor oxytocin use was significant.

**Conclusions:** In this single-center NTSV cohort, established clinical risk factors and public insurance status predicted increased risk of primary cesarean delivery. These findings support targeted quality-improvement efforts to safely reduce CD rates.

## INTRODUCTION

Maternal and neonatal complications of childbirth are influenced not only by clinical risk factors but also by socioeconomic determinants such as language barriers and insurance coverage.<sup>1</sup> Studying a nulliparous, term, singleton, vertex (NTSV) cohort, a population that is minimally burdened by obstetric risks but that accounts for a large share of primary Cesarean deliveries (CD), can expose non-obstetric contributors to CD. In this single-center study, we sought to identify social and demographic predictors of CD in NTSV deliveries, with primary emphasis on patient language preference and insurance status. Secondary analyses examined clinical risk factors including body mass index, maternal age, and medical comorbidities.

## METHODS

We performed a retrospective cohort study of nulliparous, term, singleton, vertex (NTSV) deliveries at a single tertiary academic center, between June 2020 and June 2024. With review of the electronic medical record, we collected maternal characteristics, including preferred language, age, insurance status, pregravid body mass index, as well as the following medical comorbidities: diabetes (type 1, type 2, A1 and A2 gestational), hypertension (chronic, gestational, preeclampsia, superimposed preeclampsia), thyroid disorders (hypothyroid and hyperthyroid), cardiovascular disorders, seizure disorders, autoimmune disease, and renal disease; and obstetric comorbidities: advanced maternal age (>35 years), intrahepatic cholestasis of pregnancy, oligohydramnios, and premature rupture of membranes. Labor characteristics included induction status, mode of delivery, and, for patients who underwent CD, the specific indication for cesarean delivery. To isolate non-obstetric contributors to CD, we excluded any case with active HSV infection, major fetal anomaly requiring CD, placenta previa or accreta spectrum, prior myomectomy, or fetal malposition.

Statistical analyses were conducted using R. Descriptive statistics summarized baseline characteristics, reported as means, standard deviations, and percentages. Group differences were assessed using chi-square tests for categorical variables and Fisher’s exact test for small cell counts. Independent t-tests were applied to normally distributed continuous variables, while the Mann-Whitney U test was used for non-normally distributed data. ANOVA compared multiple demographic groups. Univariate and multivariate logistic regression models identified predictors of CD, with multivariate models adjusting for confounders.

## RESULTS

Between June 2020 and June 2024, 2,512 nulliparous, term, singleton, vertex deliveries met our inclusion criteria. Of these, 2,316 patients (92.2%) preferred English and 196 (7.8%) preferred a non-English language, most commonly Spanish (168), followed by Mandarin (8), Nepali (5), Hindi (4), Bengali (2), French (2), Russian (2), and one each for Arabic, Portuguese, Swahili, Telugu, and Urdu. Public insurance (Medicaid or financial assistance) was used by 940 patients (37.4%). The cohort’s mean maternal age was 27.8 years, and the mean pregravid BMI was 28.8kg/m<sup>2</sup>. Overall, 628 patients (25.0%) underwent CD while 1,884 (75.0%) underwent vaginal delivery (VD). Compared with those who delivered vaginally, CD patients were older (28.2±6.0 vs. 26.9±5.7 years, p < 0.001) and had a higher pregravid BMI (31.5±10.1 vs. 27.9±8.1, p < 0.001). Oxytocin administration and public insurance status did not differ significantly by delivery mode (p > 0.05). Prespecified medical comorbidity was present in 58.4% of CD patients versus 46.5% of VD patients (p < 0.001), driven by higher rates of diabetes (8.6 vs. 4.0%) and hypertension (27.7 vs. 18.2%) among those who delivered by CD. Language preference dichotomized as English versus non-English did not vary significantly between CD and VD groups (p = 0.144, Table 1).

Among the 628 patients who underwent CD, indications were classified as fetal in 283 (45.0%), labor disorder in 281 (44.7%), and maternal request in 64 (10.2%). Fetal indications included bradycardia, category 2 heart tracings remote from delivery, category 3 tracings, and cord prolapse. Labor disorder indications included arrest of dilation, arrest of descent, and failed induction. Maternal-request indications included poor pain control, maternal exhaustion, fetal anomaly, underlying medical conditions, and religious considerations. Patients undergoing CD for labor disorders were slightly older than those with fetal indications or maternal request (p = 0.024, Table 2), but indication groups did not differ in BMI, insurance status, diabetes, hypertension, overall comorbidity burden, or language preference.

In multivariate logistic regression analysis, increased rates of CD were seen in patients with higher BMI (OR 1.047; 95% CI, 1.036-1.058), higher maternal age (OR 1.051; 95% CI 1.032-1.070), public insurance status (OR 1.384; 95% CI, 1.115-1.718), and the presence of any medical comorbidity (OR 1.360; 95% CI, 1.120-1.652). Neither oxytocin administration nor non-English preference was a statistically significant risk factor for CD. There were similar findings in univariate analysis models. Multivariate analysis was not performed for hypertension because it is highly correlated with other predictors causing collinearity issues, but there were increased rates of CD in patients with hypertension (OR 1.758; 95% CI 1.423-2.168, Figure 1) in univariate analysis.

## DISCUSSION

Consistent with prior reports, we found that diabetes, chronic and gestational hypertension, elevated BMI, and advanced maternal age were significant risk factors for CD in our NTSV cohort.<sup>2-5</sup> Although our multivariable model identified public insurance as an independent predictor of primary CD in low-risk NTSV patients, these administrative metrics likely mask richer social influences. Alternatively, payer source may influence management decisions, patient counseling, or institutional practice patterns.<sup>6</sup> Future work should explore how formal and informal support systems, such as family networks, community programs, peer-mentorship groups, and health-literacy resources, interact with socioeconomic status to shape prenatal engagement and delivery decisions. Embedding mixed-methods evaluations of patient experience will be essential to designing truly patient-centered obstetric care pathways.

**Table 1.** Clinical and Demographic Characteristics

	Vaginal Delivery (n=1884)	Cesarean Delivery (n=628)	p-value
Age, Mean (SD)	26.85 (5.69)	28.18 (6.03)	<0.001 <sup>1</sup>
BMI	27.88 (8.05)	31.49 (10.11)	<0.001 <sup>1</sup>
Pitocin (%)	1467 (77.9)	487 (77.5)	0.912 <sup>2</sup>
Medicaid/Financial Assistance	691 (36.7)	249 (39.6)	0.171 <sup>2</sup>
Diabetes	75 (4.0)	54 (8.6)	<0.001 <sup>2</sup>
Hypertension	343 (18.2)	174 (27.7)	<0.001 <sup>2</sup>
Any Comorbidities	876 (46.5)	367 (58.4)	<0.001 <sup>2</sup>
Non-English Speaker	156 (8.3)	40 (6.4)	0.144 <sup>2</sup>
Spanish	139	29	
Chinese/Mandarin	5	3	
Other	12	8	

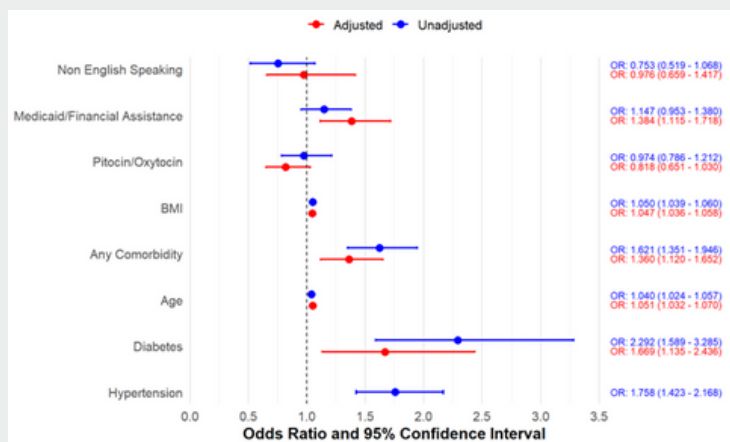
<sup>1</sup>T-test, <sup>2</sup>Chi-square

**Table 2.** Indications for Cesarean Delivery

	Fetal Indication (n=283)	Labor Disorder (n=281)	Maternal Request (n=64)	p-value
Age (mean (SD))	27.48 (5.93)	28.86 (5.84)	28.30 (7.02)	0.024 <sup>1</sup>
BMI	31.55 (9.55)	32.08 (10.69)	33.21 (10.52)	0.481 <sup>1</sup>
Medicaid/Financial Assistance (%)	116 (46.6)	103 (41.4)	30 (12.0)	0.265 <sup>2</sup>
Diabetes	30 (55.6)	21 (38.9)	3 (5.6)	0.213 <sup>2</sup>
Hypertension	84 (48.3)	74 (42.5)	16 (9.2)	0.609 <sup>2</sup>
Any Comorbidities	168 (45.8)	163 (44.4)	36 (9.8)	0.884 <sup>2</sup>
Non-English Speaker	13 (32.5)	22 (55.0)	5 (12.5)	0.256 <sup>2</sup>

<sup>1</sup>ANOVA, <sup>2</sup>Chi-square

**Figure 1.** Univariate and Multivariate Logistic Regression Analyses of impact of variables on Cesarean Rates



Non-English language preference did not independently predict CD rates. Currently, there is conflicting evidence about the association between language preference and CD rates.<sup>7,8</sup> This discrepancy may stem from limited portion of our study population who preferred a language other than English (only 8% of our study population), which is also evident in the literature.<sup>7-8</sup> Also, there is much heterogeneity of non-English language groups that was not accounted for by this study and which could dilute true language- or culture-specific effects. Lastly, “language preference” may be a limited variable as it does not encompass the patient’s ability to communicate in English. A better variable for future study would be whether an interpreter was needed to complete an interaction. Future studies should stratify by specific language categories and consider more granular measures of health literacy, English proficiency, access to interpreter services, and whether interpreter services were necessary.

Regarding other limitations, our single-center design may preclude generalizability, and retrospective data capture is subject to documentation bias. Sampling bias may have underrepresented certain under-resourced populations.

## CONCLUSIONS

In this large NTSV cohort at a tertiary academic center, non-obstetric factors, specifically advancing maternal age, higher pregravid BMI, public insurance coverage, and the presence of medical comorbidities, were each independently associated with increased rates of CD, whereas language preference and oxytocin use were not. These findings underscore the influence of modifiable socioeconomic and health determinants on cesarean rates within an otherwise low-risk population. Targeted preconception and prenatal interventions, such as weight optimization, comprehensive management of chronic conditions, and policy efforts to mitigate insurance-related disparities, may help reduce unwarranted cesarean births. Future work should evaluate the effectiveness of such strategies in improving maternal outcomes.

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# PULMONARY EMBOLISM WITH PATENT FORAMEN OVALE: OPPORTUNITY FOR PARADOXICAL EMBOLUS AND RIGHT TO LEFT INTRACARDIAC SHUNT

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## ABSTRACT

**Background:** In the presence of a patent foramen ovale (PFO), a deep venous thrombosis (DVT) may embolize to the lungs, brain, and systemic circulation. Emboli in the lungs raise pulmonary pressures which may back up and create a right (R)-to-left (L) intracardiac shunt through a PFO.

**Case:** An unidentified elderly male was brought to the emergency department (ED) due to altered mental status (AMS) and was found to have a left lower extremity (LLE) DVT, L middle cerebral artery thrombus, bilateral pulmonary emboli (PE), and a significant R-to-L shunt through a PFO with hypoxemia to 45% SpO<sub>2</sub> saturation.

### Clinical Practice Points:

- A PFO is a risk factor for stroke and is more likely to be the cause in younger patients with fewer conventional stroke risk factors
- Intracardiac defects such as a PFO allow R-to-L shunts in the setting of increased pulmonary pressures which is the case during a PE
- R-to-L shunts may act as an outlet to reduce pressure and volume load on the right ventricle (RV), but will worsen hypoxemia
- Hypoxemia out of proportion to clot burden should raise suspicion for a R-to-L shunt
- Pulmonary embolism severity is determined clinically - not by the size of clot on imaging

## BACKGROUND

There are an estimated 400,000 pulmonary emboli diagnosed in the United States each year, with about 110,000 resulting in death<sup>1,2</sup>. The most common source of PEs are displaced clots from the deep veins of the legs, but in up to 50% of cases, no peripheral clots are identified<sup>3</sup>. In conventional anatomy, the lungs are the final recipients of peripheral emboli, but cardiac abnormalities, namely a PFO allow emboli to bypass pulmonary circulation and embolize to the brain in what is called a paradoxical embolus. Beyond the risk of stroke, a PFO can become a right-to-left intracardiac shunt when pulmonary pressures rise which is the case in PE. This results in oxygen poor venous blood bypassing the lungs and reentering systemic circulation and thus exacerbating the hypoxemia already seen in PE. Despite these risks, a PFO is considered a normal variant and estimated prevalence is nearly 25% in the general population<sup>4</sup>.

## CASE PRESENTATION

John Doe was an unidentified elderly male brought in by ambulance after being found by his roommate unresponsive at approximately 0700. His last known well was 2200 the previous evening. A trauma alert was activated. On initial exam in the emergency department, the patient had a Glasgow Coma Scale of 3 and was noted to have LLE edema and erythema<sup>5</sup>. Within 10 minutes of arriving to the ED, the patient went into pulseless electrical activity arrest, cardiopulmonary resuscitation was initiated, and return of spontaneous circulation was obtained after six minutes. The patient was initiated on epinephrine, vasopressin, and norepinephrine. Computed Tomography Pulmonary Artery (CTPA) revealed bilateral PE at the lobar level and evidence of right heart strain (Figure 1.) Transthoracic echocardiogram with agitated saline revealed RV volume overload with decreased RV function, a PFO, and normal left ventricular ejection fraction. A R-to-L shunt was seen across the PFO, and subsequent TEE revealed an 80% shunt fraction.

Initial vital signs, labs, and imaging results are shown below.

Temperature: 95.0 F, Heart Rate: 127 Beats Per Minute, Blood Pressure: 171/120 mmHg, Respiratory Rate: 20/minute, SpO<sub>2</sub>: 63%

Table 1. Laboratory Measurements

Laboratory Measurement	Value	Reference Range	Laboratory Measurement	Value	Reference Range
pH Art	7.0	7.35 – 7.45	Troponin (ng/L)	21.2	< 5
PCO <sub>2</sub> (mmHg)	103.2	35 – 45	BNP (pg/mL)	22	< 86
PaO <sub>2</sub> (mmHg)	57.8	75 – 100	Lactate (mmol/L)	2.34	.7 – 2.1
Bicarbonate (mmol/L)	23.5	21 – 29	WBC (x 10 <sup>9</sup> /L)	25.71	4 – 11

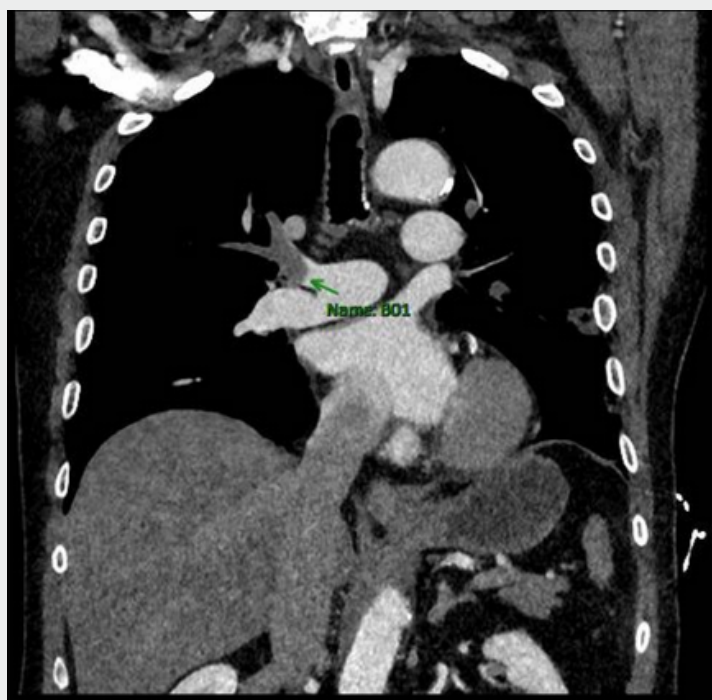


Figure 1. CTPA

The arrow "Name BO1" in the left image is pointing to an embolus in the right upper pulmonary artery.

The arrow "Name BO4" in the right image is pointing to an embolus in the left lower pulmonary artery.

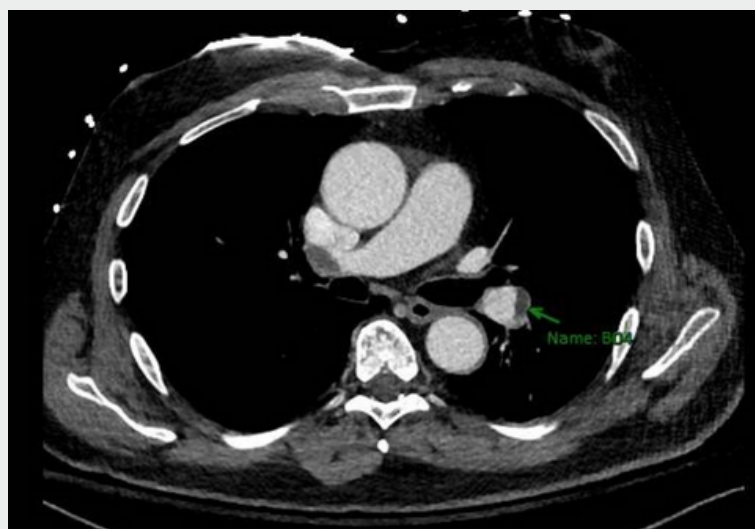
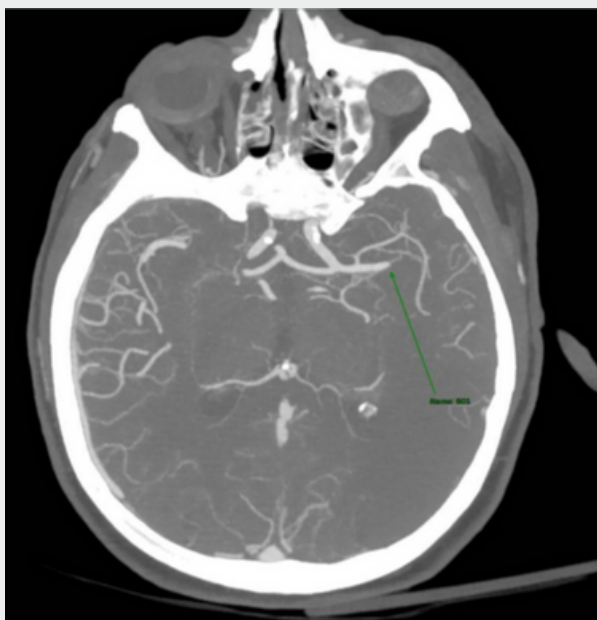


Figure 2. CTH



The arrow "Name BO1" is pointing to an abrupt cutoff in the M1 segment of the left middle cerebral artery

As part of the trauma workup, the patient received a CT Head and CT Angiogram Head/Neck demonstrating a hyperdense M1 segment with abrupt distal cutoff (Figure 2.). Due to this, a stroke alert was called. Initial National Institutes of Health Stroke Scale score was 30, with full points given for loss of consciousness, motor strength in all 4 extremities, sensory changes, language, and dysarthria. This patient's neurological exam was severely limited by his mental status (GCS 3) as well as the paralytics he had been administered earlier for intubation. The patient's last known well was greater than four hours and was thus not eligible for thrombolytic therapy. However, he was within the window for mechanical thrombectomy.

Following cardiopulmonary stabilization, the patient was taken for mechanical thrombectomy with interventional neuroradiology. Thrombolysis in Cerebral Infarction grade 3 reperfusion was established with a single aspiration attempt and the patient experienced no immediate complications from the procedure.

In the hours following thrombectomy with neurointerventional radiology, the patient became increasingly hemodynamically unstable requiring escalation of vasopressors. His hypoxemia worsened, with SpO<sub>2</sub> in the forties despite aggressive mechanical ventilation.

Interventional radiology (IR) was consulted for PE suction thrombectomy. The extracorporeal membrane oxygenation service was also consulted but declined due to patient's age and clinical status. In the IR lab, pulmonary angiogram revealed bilateral upper lobar filling defects (figure 3). Suction thrombectomy was performed and angiogram demonstrated reduced clot burden with some residual filling defects on the left. At the conclusion of the procedure SpO<sub>2</sub> was 97% with a mean arterial pressure of 77 mmHg.

During serial neurologic assessment overnight, the patient's pupils were noted to be fixed and dilated prompting repeat CTAH which noted a large L intracranial hemorrhage with midline shift and uncal herniation. The patient passed away later that night.

## DISCUSSION

### PE Discussion

PE mortality risk is stratified clinically rather than by the size of PE on CTPA, and treatment is dictated by risk. The European Society of Cardiology stratifies PE into low, intermediate-low, intermediate-high, and high risk categories. Indicators of risk include RV dysfunction, hypotension, elevated troponin, and pulmonary embolism severity index (PESI) score. Low risk patients have no indicators of risk, intermediate-low have elevated PESI score, intermediate-high also have RV dysfunction and elevated troponin, and high risk have all the above and hypotension<sup>6</sup>. There are tools for calculating clot burden on CTPA such as the Qanadli CT obstruction index, but it is primarily used as a research tool<sup>7</sup>.

Anticoagulation therapy is indicated for all risk groups without a contraindication. Common contraindications include recent intracranial hemorrhage, recent major surgery, and severe thrombocytopenia<sup>8</sup>. For intermediate and high risk patients, systemic thrombolysis, surgical embolectomy, and percutaneous catheter-directed treatment can be employed depending on the degree of clinical instability<sup>9</sup>.

Our patient had a high risk PE due to RV dysfunction and hypotension. However, our patient's case was further complicated by his PFO. His hypoxemia to SpO<sub>2</sub> in the 40s was disproportionate to his clot burden due to R-to-L shunting through his PFO. Typically, pressures in the L atrium exceed those of the right atrium (RA), resulting in closure of the PFO flap and preventing shunt<sup>9</sup>. However, if LA pressures exceed RA pressures, blood can flow through the flap R-to-L.

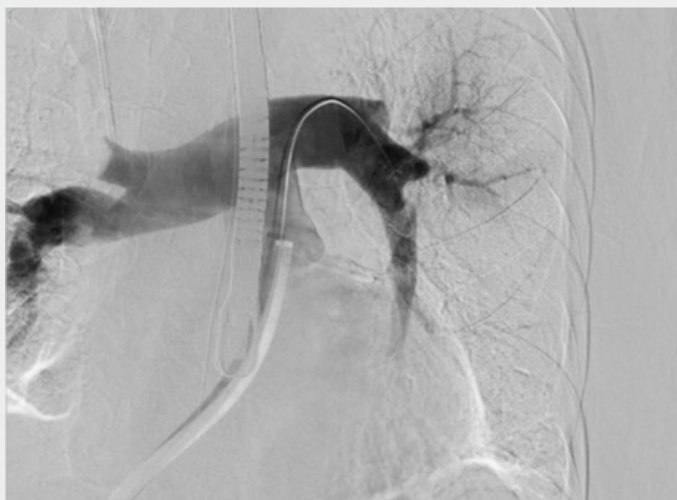
In comparison to the left ventricle (LV), the RV is thinner walled, more compliant, and less able to withstand increases in afterload. In health, these features are adequate as the pulmonary vasculature is a low pressure system with mean pulmonary artery pressure below 20 mmHg compared to systemic mean arterial pressure of 90+ mmHg that the LV is exposed to. However, in response to acutely increased afterload, the RV dilates, and stroke volume decreases significantly<sup>10</sup>. This is exactly what happens in PE – pulmonary artery vessels are acutely occluded, raising the afterload on the RV.

Pressure from the RV can be transmitted to the RA, and once RA pressures exceed left atrial pressures, a right-to-left intracardiac shunt will develop. This is beneficial in one regard as it provides an outlet to reduce pressure and volume load on the RV and lessens the typical hemodynamic derangements of PE, namely decreased LV filling and output. However, it greatly impacts oxygenation and ventilation as blood bypasses the lungs. And thus, while cardiac output may be closer to normal, oxygen delivery is greatly reduced, and hypercapnia is exacerbated. In this case the patient still had RV dysfunction and hypotension despite the PFO. These derangements improved after removing a significant portion of the clot burden in the lungs. Thus, RV afterload was reduced, enabling it to provide a sufficient preload of oxygenated blood to the LV which in turn increased output to end organs such as the brain, kidneys, and myocardium.

### Stroke Discussion

This patient was unable to undergo a full workup of his stroke due to his unfortunate hemorrhagic conversion and his eventual passing. As noted previously, PFO prevalence is about 25% in the general population<sup>4</sup>. However, in people with cryptogenic stroke the prevalence of a PFO is as high as 54%, causing some to hypothesize that paradoxical emboli are a significant contributor<sup>11</sup>. The evidence for this is inconclusive. Of those with cryptogenic strokes, the risk of a second stroke is equal for those with and without a PFO. However, those with a PFO have lower conventional stroke risk factors (age, diabetes mellitus, hypertension, smoking, etc.), implying that they should have a lower rate of recurrent stroke<sup>12</sup>. There are now validated scoring systems that predict the likelihood that a stroke was due to a PFO<sup>13</sup>. Current societal guidelines differ slightly but generally recommend transcatheter closure in patients under 60 who have previously had a PFO related stroke<sup>14</sup>. Thus, guidelines implicitly acknowledge a PFO as a stroke risk factor in selected patients.

Figure 3. Pulmonary Artery Angiography Pre (Left) and Post (Right) Thrombectomy



## CONCLUSIONS

In up to a quarter of the population, a PFO creates the opportunity for venous clots to embolize to the brain, and for an intracardiac shunt to develop should pulmonary pressures rise. A PFO raises the risk of stroke, but primary prevention is not currently indicated. Beyond stroke, PFOs can also act as a R-to-L intracardiac shunt which reduces the amount of work the RV has to perform, but also results in significant hypoxemia due to blood bypassing the lungs.

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# ACHILLES TENDON RUPTURE IN THE ELITE BASKETBALL PLAYER: A COMMENTARY ON A SERIES OF CASES FROM THE 2025 NATIONAL BASKETBALL ASSOCIATION PLAYOFFS

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## ABSTRACT

*Achilles tendon ruptures can be devastating injuries, especially for elite NBA basketball players. In the 2025 NBA playoffs, three notable All-Star players — Damian Lillard, Jayson Tatum, and Tyrese Haliburton — suffered from an Achilles tendon tear during gameplay, which is an unprecedented number of cases in a single postseason. This commentary investigates the context surrounding each of these injuries by analyzing game footage, media reports, and scheduling data to suggest potential risk factors. Common patterns seen among these cases include injury to the rear leg during forceful push-off, concurrent or recent injury, and elevated minutes played during the playoffs. We suggest multiple areas of further investigation, including overuse, inadequate rest, pain-masking medication, and shoe model. The aim of this article is to incite further discussion into the increased incidence of Achilles tendon tears during the 2024-2025 NBA season and propose modifiable risk factors that could be studied to prevent these injuries in elite basketball players.*

## INTRODUCTION

Achilles tendon tears are the most common form of adult lower extremity tendon rupture in the United States with incidence ranging between 7 to 40 per 100,000 person-years [1]. Rates of injury are increased in competitive athletes, with the most common sports being basketball, running, football, weight lifting, and racket sports [2]. Additional risk factors include age 30-40 years, male sex, obesity, prior Achilles injury, glucocorticoid or fluoroquinolone use, and systemic diseases such as diabetes and kidney disease [3,4]. Additionally, chronic degeneration often contributes to the propensity of an Achilles tendon tear, especially in the area 2 to 6 cm from the calcaneal insertion where there is reduced blood supply [5]. The mechanism of injury typically involves sudden stress or tensile load upon the Achilles tendon, such as a cutting movement in basketball [6].

Professional athletes are significantly affected by Achilles injuries due to the high demand on the lower extremities that is required to compete at an elite level. In a study looking at Achilles tendon ruptures in athletes across the four major United States sports leagues (National Basketball Association, National Football League, Major League Baseball, and National Hockey League), about 30% of athletes did not return to play, and of those who returned, many were limited by decreased play time and worsened performance [7]. In the National Basketball Association (NBA), there were 53 players identified from 1970 to 2019 who experienced an Achilles tendon rupture [8]. This includes several basketball stars such as Kobe Bryant, DeMarcus Cousins, and Kevin Durant — each of whom returned to play from Achilles tendon tears with varying degrees of success. This year in the 2025 NBA playoffs, three All-Star NBA players ruptured an Achilles during play: Damian Lillard, Jayson Tatum, and Tyrese Haliburton. The aim of this article is to describe the events around each of these players' injuries and suggest areas of investigation to improve our understanding of the risk factors associated with Achilles tendon ruptures in elite NBA athletes. Some of these areas of investigation include concurrent injury, medication pain masking, amount of playtime, and even footwear type, which has been shown in previous studies to affect the amount of tension on the Achilles tendon during activity [9].

## METHODS

*Three cases of acute Achilles tendon ruptures were identified in the 2025 NBA Playoffs. These injuries all occurred during gameplay. Each of the injuries were replayed using game broadcast video found on [www.youtube.com](http://www.youtube.com) and analyzed for time of game, mechanism of injury, location on the court, and shoe model. Internet search of media articles and official injury reports was done to investigate evidence of concomitant injury prior to rupture. Scheduling data and playtime minutes were obtained through [www.basketball-reference.com](http://www.basketball-reference.com).*

## RESULTS

### Damian Lillard

The nine-time All-Star point guard for the Milwaukee Bucks tore his left Achilles tendon on April 27th, 2025 [10]. The injury occurred at the 6:12 mark of the first quarter in Game 4 of the first round of the NBA Playoffs against the Indiana Pacers [11]. Lillard, wearing Adidas 'Dame 9' basketball shoes, was in the motion of lunging forward for a loose ball with his left foot planted behind his body. He then fell forward, immediately grabbing his posterior left ankle. At this point, Lillard had played the entirety of the game (~6 minutes) [12]. Interestingly, Lillard was diagnosed with a right calf deep vein thrombosis 1 month prior to injury, causing him to miss 14 games from March 20-April 22 [12,13]. He suffered his Achilles injury in his third game after returning to play. Lillard averaged 34.5 minutes per game in his two playoff games prior to injury, which decreased from the 36.1 minutes per game during the regular season [12].

### Jayson Tatum

The six-time All-Star small forward for the Boston Celtics tore his right Achilles on May 12, 2025 [14]. Tatum suffered his injury at the 3:07 mark of the fourth quarter in Game 4 of the NBA Playoffs second round against the New York Knicks [15]. In his signature Jordan 'Tatum 3' basketball shoes, Tatum was reaching for a loose ball by planting with his right foot and lunging forward with his left foot. He then falls to the ground, rolls onto his back, and clutches his right ankle. Tatum had played over 39 minutes at this point in the game [16]. Prior to this injury, he missed one game on April 23 with a right wrist injury following an in-game fall [17]. In the playoffs, he averaged 40.1 minutes per game, an increase from 36.4 minutes per game in the regular season [16].

### Tyrese Haliburton

The two-time All-Star point guard for the Indiana Pacers tore his right Achilles tendon on June 22, 2025 [18]. In Game 7 of the NBA Finals at 5:03 remaining in the first quarter, Haliburton received a pass and aimed to run toward the basket [19]. Wearing PUMA 'Hali 1' basketball shoes, he started cutting with his right foot planted behind him and fell forward. Haliburton had played the entirety of the game at this point (~7 minutes) [20]. Of note, he suffered a right calf strain during Game 5 of this series on June 16, 2025. Though his status was in doubt, he was determined to play the rest of the series [21]. He was limited to under 23 minutes in Game 6, but this was confounded by the Pacers' blowout win, allowing Haliburton to get extended rest while the game was in hand [22]. He averaged 33.6 minutes per game during the regular season, which increased to 35.3 minutes per game during the playoffs prior to his calf strain [20].

## COMMENTARY

Achilles tendon injuries are often a major setback in the career of an NBA player. Many are unable to return to their prior level of play, especially those who were previously competing at the All-Star level. This leaves a significant economical impact on their careers as well, losing out on millions of dollars due to return to a lower level of performance [23]. Even worse, Achilles tendon rupture can be career ending. The incidence of Achilles tendon tears in the NBA from 1990 to 2023 averaged 1.36 per year [23]. With the incidence of Achilles' tendon injuries in the NBA players increasing to seven over the past season, including the three during the postseason in this study, it is important to consider factors that contribute to these tears.

In all three cases we analyzed in this article, the player injured his rear leg extended as he was pushing off the ground to move his momentum forward. This is consistent with the suggested pathophysiology for Achilles tendon ruptures most often being a result of sudden, forceful contraction of the calf muscles especially during eccentric loading while preparing for a rapid push-off or jump [24,25]. Figure 1 illustrates the tension applied to the Achilles tendon during eccentric contraction of the calf.

Haliburton was treating an ipsilateral calf strain at time of injury in which he attempted to play through [21]. Interestingly, Lillard and Tatum were both noted to have calf pain prior to injury, though this was only reported by

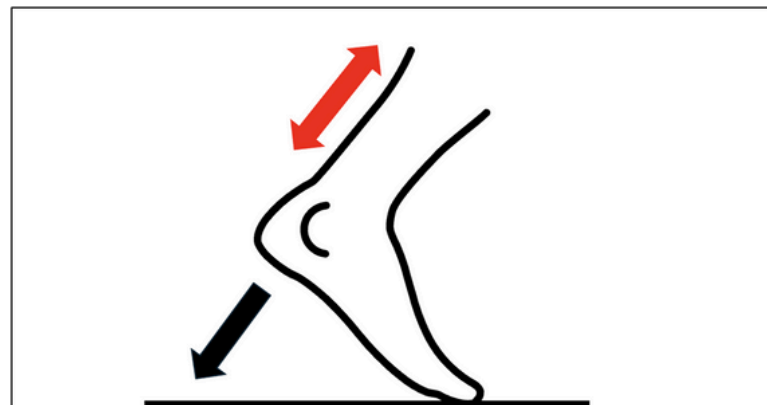


Figure 1. Representation of eccentric loading on the calf muscles and Achilles tendon during a lunging motion. The black arrow indicates the direction of the heel while the red arrow indicates the tension on the Achilles tendon during the eccentric loading.

former NBA player Gilbert Arenas on a podcast after the injuries occurred, which introduces hindsight bias [26]. Lillard had recently returned from a DVT in his contralateral calf. Tatum was recovering from a bone bruise in his right wrist suffered about 3 weeks prior to injury.

A factor that should be considered in Achilles tendon injury is ipsilateral calf injury, as was the case with Haliburton. It has been reported that nearly all cases of acute Achilles tendon rupture have histological evidence of preexisting degenerative changes [24]. In calf strains, the muscle fibers are weakened, yet continue to bear the full load of body weight with each step. This load increases with movements such as running, jumping, and cutting, which are movements that basketball players are required to make [6]. It is possible that the weakening of muscle and tendon fibers over the course of an NBA season predisposes players to Achilles tears. Additionally, the use of pain alleviating medication to help athletes play through injuries may be a factor that increases the likelihood of tendon tear [27]. While the current literature is limited, it has been suggested that pain medication can mask a person's protective inhibition from pain and hasten them to return to play before adequate tissue healing [27]. This should prompt further investigation into whether NBA players who take pain medication to aid in recovery become more susceptible to Achilles tendon tear.

The amount of playtime during the NBA season with an increase in minutes played during the NBA playoffs should also be considered. Lillard, Tatum, and Haliburton all ranked in the top 14% of all NBA players during the 2024-25 season in terms of minutes played (14<sup>th</sup>, 2<sup>nd</sup>, and 5<sup>th</sup> percentile, respectively) [28]. Tatum and Haliburton each increased their minutes played in the playoffs compared to regular season by 10% and 5%, respectively [16, 20]. Lillard did not have an increase in minutes played, though he was playing in only his third game since returning from a DVT [12]. The intensity of playoff games tends to increase as games become more critical for a team's success. Teams typically have 1-2 days rest between games, but the need for rest may increase in the playoffs as key players play for more minutes with greater intensity. Especially in the case of the three players in this study, each of them was recovering from concurrent injuries which may have impacted their lower extremity conditioning and changed their typical recovery routine. This combination of factors could have predisposed them to injury when facing the demands of NBA playoff basketball.

Overall, there is limited evidence in the literature that explains the increasing incidence of Achilles tendon tears among NBA players in the past year. There are many other factors beyond the scope of this paper that could be analyzed more in-depth. For example, players are constantly seeking opportunities to gain competitive advantages over their opponents with novel footwear technology [29].

Changes in shoe composition, height, lacing, and grip could play a role in the increasing Achilles injuries, with high-top and tightly laced shoes having been shown to decrease the amount of tension on the Achilles tendon during loading [9]. Further studies could be done to investigate if there has been a shift in the NBA players' preferred shoe designs. It is possible that NBA players have started to favor low-top shoes for enhanced mobility at the cost of increased risk of Achilles injury. Having a better understanding of the shoe's role in the mechanism of injury could help manufacturers develop more protective basketball shoes for the Achilles.

## CONCLUSION

Achilles tendon rupture is a career threatening injury in NBA players and the incidence of injury has increased over the past year. The three cases of Achilles tears in All-Star NBA players in 2025 is unprecedented and warrants further investigation into the factors that contribute to these injuries. Concurrent injury, overuse, medication pain masking, inadequate rest, length of season, and type of footwear are among several factors that could be included in future studies into predisposition of Achilles tendon tears.

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# IMPROVING DERMATOLOGIC HEALTH EQUITY: COMMUNITY-BASED OUTREACH IN THE HISPANIC POPULATION OF CHARLOTTESVILLE

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## ABSTRACT

Limited English proficiency and unfamiliarity with the healthcare system are significant barriers to dermatologic care for Hispanic populations in the United States. To address this disparity, we developed and implemented a community-based dermatology outreach program as part of the broader Latino Health Initiative in Charlottesville, Virginia. This program aimed to improve dermatologic health equity through culturally tailored education, free skin screenings, and facilitated specialty referrals. From 2022 to 2025, seventy-five community members were screened at local events, with nearly all participants receiving at least one dermatologic diagnosis. Common conditions included inflammatory dermatoses, acneiform disorders, pigmentation abnormalities, and infectious skin diseases. Over half of participants were referred to specialty care, with bilingual volunteers coordinating follow-up to prevent care gaps. Educational efforts included in-person presentations, social media outreach, and distribution of bilingual materials. Participant feedback indicated increased awareness of skin conditions and greater confidence in seeking care. This initiative highlights the importance of accessible, linguistically and culturally competent dermatologic services in reducing health disparities. Community-based outreach programs such as this serve as a scalable model for improving skin health equity among underserved populations and fostering trust in the healthcare system.

## INTRODUCTION

Language barriers and unfamiliarity with a foreign healthcare system limit access to specialty care [1]. Specifically, this barrier has been reported in the literature in the setting of the Spanish-speaking community with limited English proficiency and access to dermatology care in the United States [2-3]. Early detection and appropriate management of dermatologic conditions are essential to improving health outcomes. Community outreach programs with Spanish-language resources as well as Spanish-speaking providers is an apt solution to bridge these gaps. Here, we describe the design, implementation, and outcomes of a community-based program affiliated with a tertiary academic medical center, focusing around providing community-based screenings, education, and referrals to dermatology specialty care to improve health equity.

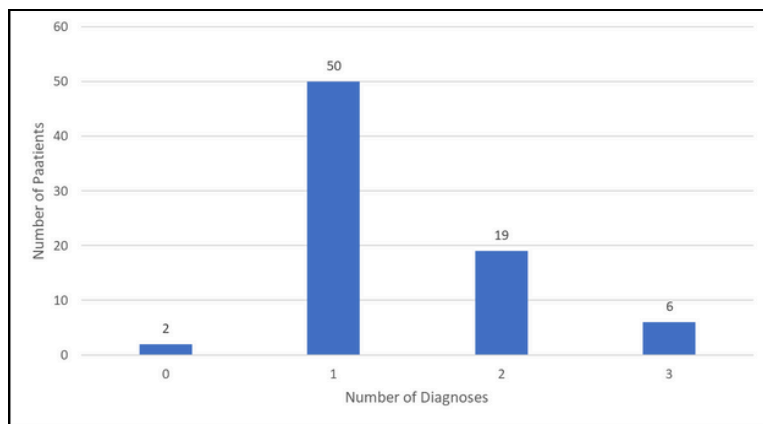
## METHODS

The dermatology-specific outreach program was in association with a larger, nonspecific healthcare initiative called the “Latino Health Initiative.” All programming targeted the Spanish-speaking community surrounding a tertiary medical center in the United States through partnerships with local churches, community centers, and community health workers. The program included dermatologic screenings at community events, educational presentations at local churches and community centers and via social media platforms, and distribution of bilingual newsletters and printed resources. Participants received recommendations for managing common skin conditions and referrals to dermatology specialists when necessary. Sunscreen samples and healthcare resource lists were also provided.

Data were collected on the number of participants screened, referrals made, sunscreen samples distributed, and engagement with virtual presentations. Qualitative feedback from participants and community partners was also gathered to assess program effectiveness and areas for improvement.

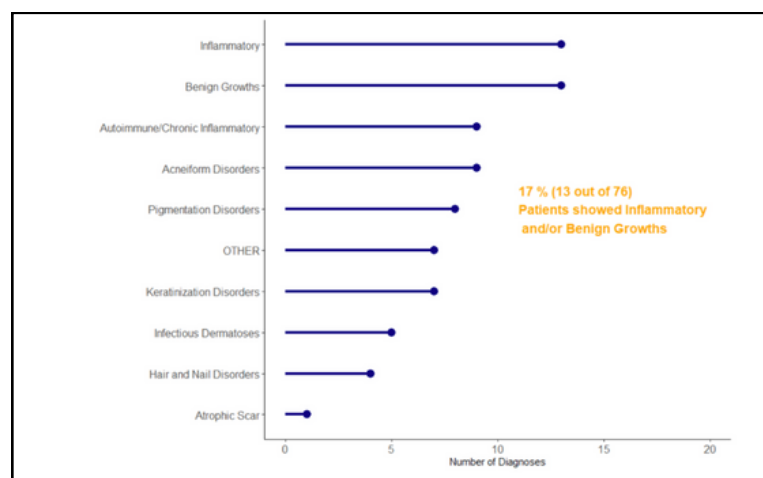
## RESULTS

From 2022 to 2025, the program conducted dermatologic screenings at multiple community events and led a larger educational initiative to increase health literacy around common dermatologic concerns in the Hispanic community. Seventy-five participants were screened, with 42 (49%) receiving recommendations for over-the-counter treatment recommendations. Seventy-five participants (97%) had at least 1 dermatologic diagnosis, and 25 participants (33%) had more than 1 dermatologic diagnosis (Figure 1). During screening, patients were diagnosed by board-certified dermatologists and dermatology residents with a variety of conditions, including inflammatory conditions, benign growths, autoimmune and chronic inflammatory disorders, acneiform disorders, pigmentation disorders, keratinization disorders, infectious dermatoses, hair and nail disorders, and atrophic scars (Figure 2). Thirty-seven (56%) community members were given referrals for specialty care when needed, and volunteers coordinated the appointment-making process to ensure that those who needed specialty care were not lost to follow-up. Further, if community members needed additional help with accessing financial aid resources, volunteers were available to aid.



**Figure 1. Summary of Diagnoses and Treatment Recommendations from Community Screenings (2022–2025). Breakdown of dermatologic findings among 75 participants screened through the Latino Health Initiative outreach program. The majority (97%) received at least one diagnosis, with 33% having multiple conditions. Nearly half (49%) were given over-the-counter treatment recommendations, and 56% were referred for further specialty dermatologic care.**

Educational presentations on dermatologic conditions and treatments were delivered to in-person audiences and virtually via Facebook Live and YouTube, with a PowerPoint available for reference ([YouTube link](#) or see Supplement). Printed newsletters and social media posts were distributed through Latinx-friendly locations and platforms (Figure 3). Feedback showed increased awareness of skin conditions and greater confidence in seeking care.



**Figure 2. Distribution of Dermatologic Conditions Identified During Screenings. This figure categorizes the types of dermatologic conditions diagnosed by board-certified dermatologists and dermatology residents during community-based skin screenings. Conditions included inflammatory dermatoses, acneiform eruptions, pigmentation disorders, benign growths, infectious dermatoses, and other chronic skin diseases.**

## CONCLUSIONS

Community-based dermatology outreach programs like that described here play a vital role in reducing health disparities and improving dermatologic outcomes in underserved populations. Through accessible screenings, bilingual education, and culturally sensitive care, the program has advanced dermatologic health equity in Charlottesville’s Hispanic community. Continued expansion and refinement will further support long-term health improvements in this population.



**FEBRERO 2023 - Volumen 4, Número 2**

**Boletín de Salud Familiar**

**FEBRERO 2023**

**Iniciativa de Salud Latina de UVA**

**Enfermedades de la Piel en la Familia Latina**

Agradecemos la contribución profesional y educativa al Dr. Arturo Saavedra, Catherine Lyons, Nicole Edmonds y Brian Florenzo

**Dermatólogo:** Médico especialista en las afecciones de la piel, el cabello y las uñas.

**Enfermedades Benignas de la Piel**

**Eczema (Dermatitis Atópica)**  
Condición crónica inflamatoria causada por la barrera de la piel anormal.

**Causas:**  
-Existen características ambientales y familiares que aumentan el riesgo de enfermedades de la piel.  
-Algunos de los componentes ambientales incluyen: calor, humedad, detergentes/jabones, ropa abrasiva, productos químicos, humo e incluso estrés.

**Soriasis**  
Condición autoinmune que causa la multiplicación rápida de las células de la piel. Puede causar daño en las articulaciones, las uñas, y posiblemente una enfermedad del corazón.

**Causas:**  
Algunos de los componentes ambientales incluyen infecciones, medicamentos y comorbilidades médicas, entre otros.

Las personas de piel clara tienen mayor riesgo de daño solar. ¡Protejanse!

**Dermatitis seborreica (la caspa)**  
La dermatitis seborreica se caracteriza por placas rojas con escamas amarillentas grasosas en zonas como el cuero cabelludo, el oído externo y el centro de la cara.

**Causas:**  
Se desconoce la causa exacta de la dermatitis seborreica. Algunos estudios muestran que las glándulas sebáceas crean un ambiente favorable para el crecimiento del hongo *Malassezia*.

La descamación que vemos con la afección probablemente se deba a una respuesta inmunitaria.

SEÑAL BARRERAS INICIATIVA DE SALUD LATINA

Charla virtual FB Live: :  
**Los Problemas de la Piel en la Familia Latina**  
Viernes 24 de febrero, 6:00pm  
envíe sus preguntas al: (434) 272-5910

**FEBRERO 2023 - Volumen 4, Número 2**

**Enfermedades de la piel en la Familia Latina**

Agradecemos la contribución profesional y educativa al Dr. Arturo Saavedra, Catherine Lyons, Nicole Edmonds y Brian Florenzo

**El cáncer de piel**

90-95% de todos los cánceres de piel (incluido el melanoma) se pueden curar si se encuentra y se tratan temprano.

El cáncer de piel es uno de los pocos cánceres que se pueden ver.

El cáncer de piel en personas con piel más oscura a menudo se detecta mucho más tarde, lo que significa que el cáncer es más difícil de tratar. **Es importante que no retrase consultar a un médico ante una duda.**

El tratamiento del cáncer de piel normalmente implica una biopsia y una escisión de la lesión.

Si el cáncer se propaga a tejidos profundos, es posible que necesite terapia adicional.

**Melasma**  
Es un trastorno común, crónico y recurrente de manchas oscuras que proviene de cantidades excesivas de melanina (lo que le da color a la piel) en la piel.

**Causas:**  
Algunos de los componentes ambientales incluyen la exposición al sol, así como la terapia de reemplazo hormonal. El estrógeno está relacionado con el desarrollo de esta afección, por lo que las mujeres en edad fértil son las más afectadas.

**Rosácea**  
La rosácea es un trastorno crónico que puede presentarse con diversas manifestaciones cutáneas u oculares. Afecta la parte central de la cara, con síntomas como enrojecimiento persistente, pápulas, pústulas o rubefacción.

**La Acanthis Nigricans**  
Hiperpigmentación (oscurecimiento) de la piel en las axilas, cuello y la ingle que se ve en diabéticos y otros problemas de la insulina.

**Causas:**  
Es causada por una reacción de la piel a una gran cantidad de la insulina en el cuerpo (así que es prevalente entre las enfermedades como la diabetes (tipo 2), la obesidad, y el síndrome de ovario poliquístico).

**Recomendaciones generales**

- Consulte a su doctor primario y/o dermatólogo ante cualquier preocupación de la piel.
- Elimine la exposición a los alérgenos, tome duchas cortas y tibias.
- Utilice crema hidratante frecuente y evite productos ásperos para la piel.
- Use protector solar de amplio espectro para proteger la piel del sol.
- Use ropa protectora y lentes de sol.
- Revise su piel cada mes y consulte ante lunares y manchas que crecen o no desaparecen.

**Actividad de Salud Comunitaria en FEBRERO 2023**

**Tarde de Salud Familiar**  
Problemas de la piel en la Familia Latina  
Jueves 23 de febrero de 2023  
6:00pm - 8:00 pm  
Iglesia de la Encarnación  
1465 Incarnation Dr, Charlottesville, VA 22901

**Servicios gratuitos y en español**  
-Clínica gratuita de la piel- Evaluación de la piel y referencia a médicos  
\*Asistencia no es necesaria para facilitar su evaluación.

**INICIATIVA DE SALUD LATINA DE UVA - (434) 272-5910**

Figure 3. Community Education and Outreach Materials. Examples of bilingual educational materials, newsletters, and social media posts used to promote dermatologic health literacy in the Spanish-speaking community. Materials were distributed at community events and shared on platforms such as Facebook and YouTube to increase reach and engagement.

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## Supplement

<https://www.youtube.com/watch?v=pe4yz0VyHgY>

# COMPASSIONATE COMMUNICATION

BY: COURTNEY HEITZLER

University of Central Florida College of Medicine

## Abstract:

This narrative medicine piece centers around the theme of compassionate communication in the healthcare field and is based on a patient encounter experienced on an internal medicine clinical rotation. The story communicates an experience in which a valuable lesson was reinforced about how compassionate communication can make broaching difficult topics more comfortable.

It's interesting how you can wake up one morning with the same routine, thinking you know just what to expect, only to discover later that day, something would happen that will be embedded in your mind forever. A lesson that will last throughout your career.

That's how this day started. I wake up, I walk the dog, put on my scrubs, grab my backpack and head out the door. On my drive over to the hospital, I run through my patient list. Who had pending labs or imaging I need to review before seeing them this morning? How could this change their plan for today? I pull into the parking lot, get out of the car and walk into the hospital. A chorus of good mornings greet me after walking into the resident room, followed by key taps and clicks as we log on for the day.

I begin reviewing the chart for Ms. X, a patient I have been following for several days. She came in with COPD exacerbation causing an increase in her home oxygen requirements. I start my chart review ritual in the same place I always do: vitals. Afebrile overnight. Blood pressure and pulse within normal limits. And finally - what I'm really eager to check - her oxygen saturations overnight. High 80s to low 90s with a few drops to the low 80s. Not much of a change from yesterday. She's still on high flow nasal cannula, last recorded at 60 liters per minute, where she's been stable for the past few days. We started weaning her high flow nasal cannula as tolerated yesterday, and it looks like at some point in the late afternoon she was doing well at 40 liters per minute. Something I make note of.

After finishing my chart review, I start my pre-rounds by seeing Ms. X today. She's an early riser and always pleasant to see in the morning. I knock on the door, and she greets me, as always, with a cheery "come in!"

"Good morning, Ms. X. How are you today?" I ask her as I approach her bedside.

"I'm doing okay this morning. Didn't sleep very well overnight. I ended up too far down in the bed and my oxygen dropped again."

The 60 liters per minute is making sense now.

"I'm so sorry to hear you had a difficult night. Was that when they went back up on your oxygen?" She looks at me puzzled and asks how many liters she's on. When I tell her she's back at 60, I see her face fall. She tells me she's confused, she didn't know her oxygen was increased overnight and thought the repositioning had been enough to increase her saturation.

We talk about this for a while and she tells me she doesn't understand why she's not getting any better. She's compliant with all her medications, from the antibiotics to the nebulizers to the IV steroids. Why isn't she responding? If we keep increasing the high flow, how will she ever be discharged home? She can't go home with high flow, so her discharge planning includes a long-term acute care hospital (LTACH), which she's been accepted to pending clinical stability. She knows she needs LTACH, she tells me, and she wants to know when she can make the next step, given her oxygen requirements have been fairly consistent the last several days, with very little changes.

I listen, explain what we've been working on, and I validate her concerns. "These are all really important questions, and I want you to have the answers you need. Let me talk with the attending, verify recommendations from pulmonology and we can all talk some more on rounds to make sure we're all on the same page." We finish our conversation and I make my way back to the resident room. One thing I've learned as a medical student, I might not have all the answers, but I do have the time to listen. It is clear today that a listening ear was what Ms. X needed to feel comfortable sharing questions and concerns so that she felt part of the discussion. I may not have all the answers, but now we have a starting point, and a better idea of her needs.

I check in with the resident, give him my updates, and we prepare to round with our attending. When we arrive at Ms. X's room, I tell Dr. Y about the conversation we had this morning. That she feels confused about her care, unsure what's going on, wondering what is holding her back from LTACH, and why aren't her lungs getting any better. We review physical exam findings, today's lab results and her new imaging, which are all stable from the previous day. Dr. Y listens, nodding along as I present.

He asks me what my plan for today is. I tell him pulmonology has cleared her to go to LTACH, where she can continue high flow nasal cannula and wean as tolerated. I also tell him I think a conversation with her about what her understanding of the situation is, her COPD and what we've been doing to manage it would be of benefit to her. Dr. Y agrees. That was his plan for today, as well. Our team enters the room and Ms. X greets us all, she's familiar with everyone on our team from the past few days in the hospital.

Dr. Y pulls up a chair with a, "Good morning, Ms. X!", and sits down next to her bedside, something that stands out to me. He begins the conversation by asking her what she has been told about her COPD, both pre-hospitalization and since she's been here. She's new to the area but had been following with a pulmonologist in her previous area consistently, and had a pretty solid understanding of COPD.

"Has your pulmonologist ever mentioned the term 'end-stage COPD' in the past?" he asks her. She thinks her pulmonologist has mentioned the term before, though she can't remember if they told her that's what she has. She says she's been thinking she's headed in that direction, if she's not already there. Dr. Y nods in understanding. He explains step-by-step what we've been doing to manage her COPD exacerbation, medication-by-medication, what we've started her on and what benefits we're hoping to see from these. He explains how we've been trying to wean her oxygen requirements as she can tolerate but haven't been able to consistently decrease because of the desaturations she experiences when we do.

"What are your goals for your care? What would you like to be able to do when you leave the hospital?" he asks.

"I have a trip booked for early next year. I want to be on it."

"I agree. We want you to go on that trip too," he tells her. I see something in her face change, something like relief washing over her. He has just reassured her that her goals are important to us, too.

He asks her if she feels ready for LTACH. She tells him she does, but she's scared. She's afraid that if she goes to LTACH she may not be able to go home. What happens when she gets to LTACH? We haven't been able to wean her oxygen successfully. What happens if she gets there and continues to have high oxygen requirements? Will she have to stay there forever? She wants to go to LTACH, for a few days at least, to give it a try. But she wants to go home, she tells us, and she feels like she can make modifications to her day-to-day life as she needs to.

Dr. Y nods gently and asks her if she's heard of palliative care. She has, she tells us, but not much, and it sounds like something a person is offered when they're dying. Dr. Y explains palliative care can help manage the symptoms associated with her COPD, make her more comfortable and improve her quality of life. She nods, clearly in thought. He asks her what she's thinking about.



“I think you guys are the first to tell me exactly what’s going on.” She goes on to say how grateful she is that he was honest with her about her condition and how, with all the information in front of her, she now feels much more prepared to make a decision. She has a better understanding of what LTACH means for her and that she has more to consider now that she understands where her health is at. She feels confident going to LTACH temporarily, knowing that she can go home. She wants to think about palliative care. Can they set that up for her at LTACH, if she decides to go that route? They can, Dr. Y assures her, they have all the resources she’ll need if that’s the decision she makes.

We wrap up the discussion and I tell her I’ll come back in the afternoon, to check in again before she goes to the LTACH. She smiles, tells me she’ll see me later, and to stay out of trouble until then. I laugh and tell her I’ll try my best.

As we make our way to the next patient’s room, I’m thinking about the interaction between Dr. Y and Ms. X. How he sat down with her, showing her he was there, we weren’t in a rush, and we were focused on her and her needs. His compassionate, yet honest, communication and the way he held space for her concerns was remarkable to witness. Goals of care conversations can be daunting and broaching the topic of palliative care may be uncomfortable for many patients. But on this day, I watched Dr. Y open a conversation that was honest, thoughtful and centered on determining Ms. X’s goals and concerns to determine how we could best work with her to manage her health. I watched her demeanor change, initially uncomfortable and even a bit fearful of the word “palliative”, to being comforted by the new knowledge and understanding her health and what options she has, empowered to make the best decision possible for herself.

What I learned today will stay with me forever. I will remember Ms. X and Dr. Y when I prepare to have these conversations with my future patients. They each taught me the importance of compassionate, clear communication and how, sometimes, broaching the uncomfortable conversations can provide the patient with the comfort and foundation they need to make empowered decisions about their health.

# LESSONS IN EMPATHY FROM UNEXPECTED PLACES

BY: BENJAMIN XIE

University of Louisville School of Medicine

## Abstract:

Medical students are often told that their greatest teachers are their patients. This reflective narrative explores my personal and professional growth during my psychiatry rotation attributed to a patient with methamphetamine-induced psychosis. Initially overwhelmed by the intensity and complexity of the patient's case, I approached the encounter carrying subconscious assumptions about the ways in which the disease would manifest. However, these assumptions were challenged. This experience became a turning point in my understanding of compassionate care, teaching me to navigate uncertainty while maintaining empathy.

Working on a hospital psychiatry consult service was a new adventure every day. Given the nature of consult service, I never fully knew what I would encounter in my next patient interaction. One patient interaction especially stood out during my time on the service: treating a patient with methamphetamine-related psychosis. I thought I had an understanding of what methamphetamine-related psychosis looked like—until I met “Veronica”. This experience was as rewarding as it was challenging, offering me insight into patient care, an opportunity for personal growth and self-reflection, and lessons for future work.

Veronica was a woman in her thirties that presented to the medical floor for complications of a wound abscess related to methamphetamine use. Psychiatry was consulted for auditory hallucinations and at the patient's request. Veronica had a well-documented history of methamphetamine use for more than seven years, but she was one month sober. She presented that day after leaving sober living to be evaluated for her wound. As I received hand-off, my mind filled with subconscious assumptions about amphetamine users: I pictured a patient who was acutely agitated and lacked insight into her disease.

During the initial interview, Veronica was calm and cooperative. She was an excellent historian, and she displayed strong motivation in the hospital to address her mental health. Her main psychiatric complaints were auditory hallucinations and persistent depressive symptoms. She revealed that her motivation for seeking psychiatric care was to be more present in the lives of her two children—ages six and eight. She added that missing her eldest daughter's birthday party was a huge turning point in her willingness to seek help. We worked together closely for a week in the hospital, during which the team oversaw her as she started an anti-psychotic and observed as she had a gradual improvement in her auditory hallucinations.

In addition to her improvement in symptoms, I noticed that our therapeutic alliance helped her build confidence in healthcare interactions. She was initially hesitant to ask for things she needed or let her emotions show. As our relationship grew day over day, she began to be more assertive about what she needed from the team including requesting a medication to help with nightmares. Additionally, she became increasingly candid about her struggles. She shared her feelings related to her auditory hallucinations, especially the fear and distress it brought on her life. Talking earnestly about her raw emotions helped both of us understand just how important it was that we got her management just right.

On a personal level, this experience was humbling and inspiring. Since the consult service was so variable, I had picked up a harmful habit of pre-planning questions I would ask the patient based on textbook scenarios. I subconsciously painted a picture of Veronica based on her disease and its classic presentation before seeing her for the first time. Within minutes of meeting Veronica, I realized this was false.

Listening to her story taught me a lot about her situation and about how to take care of patients with her condition. I felt embarrassed that my preconceived notions may have negatively impacted patient care had I not been open to who she was as a person. I also felt grateful that Veronica was so open to

establishing a therapeutic alliance with me as a medical student and allow me to learn from her. Finally, I felt redeemed that our rapport was ultimately able to aid her improvement and push her toward her goals.

During my first two years of medical school, I was constantly instructed to utilize slow, deliberate thought processes (System 2) over fast, automatic intuitions (System 1) to fight implicit bias. However, I had previously lacked any real-life training in an authentic environment. After being humbled about how incorrect preconceived notions can be, I internalized the importance of coming to patient interactions with an open mind and a willingness to be corrected.

Along the same lines, Veronica taught me the importance of open-ended questioning and non-judgmental statements. Despite my limited experience treating patients with her condition, I was able to make significant strides in her care. I achieved this simply by giving her the floor to speak about what mattered most to her. As I met her openness with non-judgmental curiosity, our words seemed to reflect and build on one another. This transformed our tentative conversation into a space of trust and discovery. While I had some textbook knowledge about her condition, I discovered that the most relevant information for treating her was the history I learned from her. Because of Veronica, I feel more prepared to engage in patient encounters with empathy and confidence.

My experience taking care of Veronica was memorable because it immersed me in patient care, challenged me to self-reflect, and taught me lasting lessons about bias and empathy. In that encounter, I realized how much of myself I bring into each patient interaction: my experiences, assumptions, and medical training. The true challenge is learning to weave that knowledge together with the patient's own history and perspective to build a strong therapeutic alliance. Through the successes and missteps of my time with Veronica, I felt myself take an important step toward finding that balance and growing into a more empathetic physician. In uncertainty, I will choose curiosity over assumption, letting empathy emerge where my story meets the patient's.



# HOPE

BY: SUMMER KIRKPATRICK

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During the preclinical phase, we learn textbook answers for how to manage chronic diseases: which medications to reach for and which to avoid, when workup is necessary and when it is futile, statistics about survival and prognosis. In practice, however, it is rarely so black and white. The hours spent attending lectures and studying for exams fail to prepare us for the intricacies of actual practice, as I discovered during my first goals-of-care discussion as a third-year student.

The patient, intubated, sedated, and in the neuro ICU, had a large subdural hemorrhage, complete with midline shift and impending herniation. Status epilepticus had prompted the initiation of antiseizure medications; however, the patient remained comatose, dependent on the ventilator. Days passed without signs of meaningful neurologic recovery. For the physicians on his care team, the next necessary steps were clear. Any medical resource you could reference—textbooks, research articles, and case studies alike—would agree that the prognosis in this clinical situation was unmistakably poor. To the care team, it was evident that the patient should be started on comfort care measures, and palliative medicine needed to be involved.

For the patient's family, however, the next steps were not so straightforward. They sat at the patient's bedside, holding his hand and singing him songs. They took turns sharing stories, painting a picture of a man full of love and still full of life. The family filled the patient's hospital room with hope: hoping for a recovery, hoping for a miracle, hoping for the doctors to change their minds.

The family became concerned that the patient's antiseizure medications were contributing to his sedation and comatose state and became adamant that the drugs be stopped. Multiple meetings were held between the family and the care team. Despite repeated discussions about the patient's poor prognosis and the risks of discontinuing treatment, the family held their ground, unwilling to relinquish the hope they had so fiercely built.

Bearing witness to these conversations stirred up conflicting emotions within me. I understood the clinical reasoning behind the doctors' recommendations to begin discussing end-of-life comfort measures. At the same time, my heart ached for the family as I related to their instinctual need to hold out hope. Conversely, when does waiting for a miracle become a poor use of hospital resources? When does the prolongation of someone's life stop serving the best interest of the patient and instead start consoling the emotional distress of the caregivers? When did hope become a barrier to withdrawing care rather than a strength of humankind?

As we discussed this case as a team, I noticed how the frustration we all felt in this impossibly difficult and heavy situation began manifesting as biases toward the patient's family. In some discussions, the family's concerns were seemingly dismissed as poor health literacy. At other times, there was an air of intellectual superiority in the workroom, thinking that we all knew what was best for this patient. We talked about the family being in denial, as if we would not perhaps feel similarly if it were our family member. As if we too would not scrounge for the last ounce of hope, grasping to hold on for the possibility of one last moment, one last miracle.

In the end, the patient's care team chose to honor the family's wishes, gradually tapering the seizure medications. This decision was not guided by a clinical algorithm or medical evidence. Instead, it was driven by a reflection of our own humanity and a desire to bring emotional comfort to the family. Months later, I still think of this patient and their family. We could not change the outcome, but I like to believe that they found solace in knowing their voices were heard and that their grief was met with compassion. Being a physician does not merely mean practicing medicine; it means practicing care and tenderness, standing at the intersection of empathy and clinical knowledge. Being a physician means recognizing when compromise is not a failure of care, but a reflection of our shared humanity. Moving forward in my medical training, I pray to retain my humility, and I pray that I continue to hold space for hope—not as a barrier to care, but as a reminder of why we care.

# THE PATIENT I TOOK WITH ME

BY: JORDAN GOODING

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In medicine, we all have those patients who stay on our minds after the allotted appointment time. During my third year of clerkships, I quickly learned that even though the day's work is over, I still would bring patients' and families' struggles home with me". It has been shown that physicians experience significant emotional distress when a long-term patient dies (Sansone, 2012). Furthermore, as physicians advance in their careers, they are less likely to have significant emotional reactions (Redinbaugh, 2003). While it is often thought that more senior faculty can aid junior clinicians in navigating the loss of a patient, fewer than 25% of interns and residents found senior staff to be a helpful resource to them while navigating the loss of a patient (Redinbaugh, 2003). All medical providers and trainees will experience loss in our careers. However, learning healthy strategies to cope with this loss is imperative for our mental health and that of the patients that we must continue to care for.

While on my neurology rotation, we admitted a patient who presented a medical mystery. All of the initial workups came back unremarkable. However, due to their initial clinical presentation, it was clear that they were gravely ill. During the several weeks that I was a part of the care team, I became close to the family, seeing them every day. I met their spouse, children, and grandchildren. Each day, they would tell me how grateful they were that we were healing their loved one. They offered heartfelt notes, and the grandchildren drew beautiful thank-you pictures for all that we were doing. One afternoon after rounds, the patient's spouse pulled me aside in the hallway. Tearfully, they thanked us for 'making our loved one better. They broke down about how thankful they were to us and how grateful they were that we were making the patient better. I left with a sinking feeling—despite the patient's daily improvements, our diagnostic workups remained negative. Each day, we would eliminate items from our differential diagnosis, though the most ominous possibilities remained. In the end, the patient died five months after admission due to their terminal illness.

This experience was formative: although we accepted daily praise from the family, we were simultaneously discussing a fatal diagnosis. It was difficult to comfort the family daily, knowing the prognosis remained poor. Although the patient passed away after I left the service, I still thought about them and how their family must have felt. While my attending did a good job discussing the possibility of this patient's outcome with us and their family, I still had to grapple with the reality of death. During that period, I found comfort discussing my feelings with fellow medical students and junior residents, who supported me and my peers well. I feel that it is imperative during situations that are emotionally draining and difficult to navigate that the care team remains as communicative as possible. The junior residents on the team initiated this by leading debrief sessions while we cared for the patient. Additionally, the junior resident took the time to check in individually with members of the team to ensure that everyone was processing the situation in the healthiest manner possible. It has always been said that medicine is a team sport; however, you never know when you will need that team the most. My advice to students coping with patient loss: lean on peers, journal your experience, and use institutional support systems. I have felt that it can sometimes be challenging to discuss my feelings about a situation at the moment. However, I have learned that a part of processing a difficult situation is to talk to people who are going through it with you. Medicine often puts us in unique experiences that family and friends may not be able to truly relate to. However, peers who are going through this with us have a unique view into the type of grief that we experience as providers. Furthermore, I feel that in the times when you truly cannot discuss your emotions with your peers, writing down your thoughts can be cathartic. Journaling often serves as an outlet for emotions that are too big to handle in the moment. Lastly, I recommend reaching out to the support systems that are in place at your Institution. I've often found that there are a variety of resources available when you know the place to look. In conclusion, patient loss is an unfortunate reality of medicine; therefore, we must learn ways to manage these emotions early in our careers so that we handle these situations with the care they deserve.

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