Lingering Identity as Chronically Ill and the Unanticipated Effects of Life-Changing Precision Medicine in Cystic Fibrosis: A Case Report

Sigrid Ladores, PhD, RN, PNP, CNE, FAAN1, and Morgan Polen

Abstract
Cystic fibrosis (CF) is the leading genetic disease among Caucasians; however, advances in diagnosis and treatment have improved both quality and quantity of life for those affected. A remarkable recent discovery is the triple-drug combination, elexacaftor/tezacaftor/ivacaftor, which has been touted as a “miracle drug” for CF because of its demonstrated efficacy and safety. This case study reports on an adult woman with CF who experienced positive life-changing results from elexacaftor/tezacaftor/ivacaftor, and yet discovered that she lived in fear that its effectiveness would diminish, and her debilitating symptoms would return. Her lingering identity as chronically ill tainted her view of her new life with skepticism and pervasive anxiety. This case highlights a critical need to engage in early, regular and sensitive discussions with patients before initiating treatments that may affect their emotional and mental health and provide referrals or services to meet those emergent needs.

Keywords
cystic fibrosis, lingering identity, precision medicine, elexacaftor/tezacaftor/ivacaftor, Trikafta™

Introduction
Cystic fibrosis (CF) is the most common genetic disease among Caucasians, affecting approximately 30,000 people in the United States and 70,000 worldwide (1). Improved newborn screening, early and aggressive management plans, comprehensive clinical care, and recent breakthroughs in drug discovery have improved the quality and quantity of lives in this population. No longer perceived as a fatal childhood disease, CF is now a chronic disease with an average survival age that has doubled in the past 2 decades to 47, with more adults living with CF than children (2). These improved demographics, attributable in part to advances in precision medicine, allow people with CF to attain adult milestones not previously possible.

Description
Background
In October 2019, the US Food and Drug Administration fast-tracked the approval of a triple-combination CF medication, elexacaftor/tezacaftor/ivacaftor (brand name Trikafta™ in the United States) for individuals older than age 12 (3). Elexacaftor/tezacaftor/ivacaftor is currently 1 of 4 CF-mutation specific precision medicines available in the United States, with potential to improve the health of approximately 90% of people with CF (4). These are regarded as “game-changers” within the CF community. Positive effects reported during clinical trials and post-Food and Drug Administration approval include significant improvements in lung function and quality of life (5). Anecdotal reports of elexacaftor/tezacaftor/ivacaftor “miracles” include withdrawal from the lung transplant list due to improved pulmonary function or giving birth after multiple unsuccessful attempts at conception. However, while clinical indicators and patient-reported outcomes are inspiring, unanticipated challenges have emerged. The purpose of this case report is to describe the experiences of a woman

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successfully treated with elexacaftor/tezacaftor/ivacaftor who subsequently encountered unanticipated internal turmoil.

**Case Presentation**

Sarah (pseudonym), a 29-year-old Caucasian female diagnosed with CF at 3 months, has an extensive past medical history including multiple hospitalizations and surgeries for CF exacerbation and other acute and chronic conditions. Her genetics include homozygous DF508 mutation with mild to moderate phenotype. Sarah is married, has a toddler, and is employed part-time. She has a support network that includes extended family and friends; she is also a founder and administrator of an online support group for women with CF. She lives an active lifestyle that includes outdoor activities as well as mindful exercises for physical and mental wellness. Despite her medically complex presentation, Sarah has high lung function (forced expiratory volume in one second 107% predicted) and reports having a fairly “normal” life while managing a daily CF regimen.

**Methods**

The first author conducted an audio-recorded telephone interview with Sarah in January 2020 as part of a larger, mixed methods study on fertility preservation in women with CF. Institutional review board approval and participant consent were obtained prior to the interview. The semi-structured interview lasted 96 minutes and was transcribed verbatim. A secondary data analysis was completed to extract data specific to the phenomenon of interest, “identity,” related to elexacaftor/tezacaftor/ivacaftor, which revealed itself during the interview. Both authors reviewed the transcript for accuracy and conducted the data analysis independently. Intercoder reliability was high at approximately 90%. Data analysis was guided by Braun and Clarke’s steps to thematic analysis which include coding the transcripts followed by abstracting and collapsing the codes to develop themes and subthemes (6).

**Results**

In late 2019, Sarah took her first dose of elexacaftor/tezacaftor/ivacaftor. With already high lung function, she did not anticipate significant changes to her FEV1 but was hopeful for improvement in her overall quality of life. Two months after her first dose, her FEV1 jumped 10%, and more importantly, her chronic, spasmodic, productive CF cough disappeared. Similarly, the thick, green sputum from her cough transformed into thin, clear mucus. She could take deep breaths without coughing or chest congestion and reported how she “drank air” with ease for the first time. Her energy level was greatly increased, allowing her to keep up with her toddler daughter. While grateful for her remarkably improved physical health, Sarah also experienced a surprising existential crisis which she described as losing part of her identity.

**Lingering Identity as Chronically Ill**

The overarching theme of “Lingering Identity as Chronically Ill” emerged from the interview data. Sarah reported that her lifelong identity was inextricably tied to having CF which meant that she was the girl with frequent coughs and copious thick sputum upon awakening. However, with elexacaftor/tezacaftor/ivacaftor (Trikafta™), she “lost” these physical symptoms. Her post-Trikafta™ life did not resemble her previous life, and this realization was met with trepidation and the omnipresent question of, “Will Trikafta™ stop working, and will my life go back to the way it was?” The 3 subthemes that emerged from the narratives are: (1) Life Before Trikafta™: Waking Up Everyday Coughing; (2) Life After Trikafta™: Easy Breathing is like Drinking Air; and (3) Adjusting to a New Life and New Identity.

**Life before Trikafta™: Waking up everyday coughing.** Sarah described that she prevented CF from “controlling” her life by preemptively controlling it through rigorous adherence to medical regimens. The thick mucus in her lungs needed to be expectorated through percussion and nebulized medications each morning. Sputum blocked her airways causing fatigue and tachycardia, and she often required intravenous antibiotics for recurrent pulmonary infections. She was an avid “documenter” of symptoms, diagnostics and treatments, maintaining detailed notes about her disease progression. She explained, “I’m so used to… every single morning I wake up the last 10 plus years, and I breathe in, and there’s crackles. I sit up, and I know I’m gonna have some nasty mucus to cough up that’s been sitting overnight. I would cough up this big green, dark-green goo ball, and I hate starting my morning like that.” In December 2019, she started taking Trikafta™.

**Life after Trikafta™: Easy breathing is like drinking air.** Soon after her first dose of Trikafta™, Sarah reported: “Four days passed and I woke up… I had no crackles. I had no mucus to spit up from sitting there overnight. When I did spit up some mucus later that day, it was crystal clear. I didn’t believe myself. I thought I must be being silly… confused.” The “Trikafta™ purge,” the term coined by the CF community to describe the experience of clearing out blocked airways, sinuses, gastrointestinal system, and even reproductive tracts, was an astounding experience for Sarah. Her physical health improved to a point where she could “forget that she had CF.” She had “boundless energy” and as a result, felt that her husband and daughter were happier too: “It’s like emotionally and physically, for everybody, the quality [of life] has improved because, obviously, I’m happier. I’m in a better mood ‘cause I feel better.”
**Adjusting to new life and new identity.** Sarah experienced life-changing results from Trikafta™ and yet she struggled with reconciling her new health with her former life as chronically ill. She lived with a pervasive fear that Trikafta™ would stop working. She explained: “There’s so much that stuns you and that you identify with as a person. Your identity is now different [with Trikafta™]. I identified as someone who coughed up green mucus a lot. To not have these things . . . I am expecting to go back. I keep thinking this is gonna wear off. When is it gonna come back?” Sarah elaborated: “I’m so nervous because I feel so good, and I’m not used to living this way, and I’m so afraid I’m gonna lose it . . . Every day I think about it. Is it tonight? When is it gonna happen?”

**Lessons Learned**

Precision medications have significantly improved both quality and quantity of life for people with CF. However, since elexacaftor/tezacaftor/ivacaftor is a new drug, data on long-term outcomes are not yet available. Sarah’s experience highlights the rather unexpected product of such “miracle drugs.” The quick shift in her symptoms also resulted in an identity change leading to questions, concerns, and anxiety. Her identity pre-Trikafta™ was rooted in battling a chronic cough and labored breaths. While she relishes her new life, she worries that her pre-Trikafta™ life will return without warning, thus, her lingering identity as chronically ill remains.

The concept of “lingering identities” has been explored in other contexts, including work roles (7), infertility (8), and retirement (9). However, this is the first description of lingering identity as chronically ill resulting from precision medicine. This case report has implications related to health care that warrant further exploration.

**Implications to Healthcare**

As research yields new treatments, it is critical to examine the emotional effects of physical changes. Before initiating life-altering medications, for example, health care providers must have honest and sensitive discussions about potential impact and unanticipated effects. These patient-provider conversations must be initiated early and repeated regularly. Screenings for anxiety, depression, or adjustment disorder must be completed, and appropriate management and referrals must be made. Anxiety and depression are already common comorbidities affecting the CF patient population, thus making an existential crisis more complex. Mental health services must be in place to facilitate transition to a new identity without the pervasive fear of rebound. Perhaps the transplant care model could serve as an example in which patients are screened before and after their life-changing, life-saving surgeries to assess for any potential challenges in post-transplant adjustment. A recent systematic review describes the difficulties and needs of organ transplant recipients, specifically related to psychological concerns (10).

**Conclusion**

This report describes a woman with CF experiencing dramatic physical improvement as a result of precision medicine who was unable to fully embrace her new life. In this era of targeted therapeutics, it is crucial to examine and proactively address the emotional implications that may accompany rapid physical improvement. Only then will comprehensive and individualized care be delivered to improve overall patient outcomes.

**Authors’ Note**

Ethical approval to report this case was obtained from the University Office of the IRB. Verbal and written informed consent was obtained from the patient for their anonymized information to be published in this article.

**Declaration of Conflicting Interests**

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Morgan Polen is an adult woman with cystic fibrosis and has served as a key informant, collaborator, and stakeholder in multiple cystic fibrosis projects.