

*The Anesthesiologist
amidst a Pandemic:
Storying an Alternate
History provides
Insights to improve
the Practice of
Anesthesiology in a
VUCA World*

Maria Minerva P. Calimag

Original Artwork © Rui Alex, for the book 'Winepunk Ano Um -
A Guerra das Pipas' (anthology), Editorial Divergência, 2019

The Anesthesiologist amidst a Pandemic: Storying an Alternate History provides Insights to improve the Practice of Anesthesiology in a VUCA World

LIBRARIAT
HYPOTHESIS
HISTORIA
PERIODICAL

72

Maria Minerva P. Calimag^{1,2,3,4,a}

¹| Faculty of Medicine and Surgery

²| Research Center for Social Science and Education

³| Research Center for the Health Sciences

⁴| Department of Anesthesiology Santo Tomas University Hospital University of Santo Tomas, Manila, Philippines

a| mpcalimag@ust.edu.ph

Submitted: 31 January 2021

Revised: 21 June 2021

Accepted: 31 July 2021

Published: 18 August 2021

DOI: 10.34626 / 2184-9978_2021_1_006

Abstract. The anesthesiologist has taken the front row in airway management, especially during the ongoing COVID-19 pandemic. Many anesthesiologists succumbed to the disease when unbeknownst to them, they rushed to the patients' bedside unprotected while trying to secure their airways during the early days of the pandemic. Anchored on counterfactual history as a research tool, a form of historiography that attempts to answer "what if" questions, this case study research explores an alternate history of the Specialty of Anesthesiology so that through a science fiction storytelling account of what is yet to happen, an alternative outcome is hypothesized as a result of a change in the course of history. Through a fictional tale that allows W. T. G. Morton to travel in time, he is transported into the modern world, and an alternate history of the development of the specialty is written. In the present time, Morton realizes that the field of Anesthesiology he jumpstarted has expanded beyond his expectations, especially during the ongoing COVID-19 pandemic. By focusing on the philosophical and sociological underpinnings and on ethical evidence-based medicine, a holistic view of the Specialty of Anesthesiology is created. Through a 'minimal-rewrite' or 'plausible' counterfactual, the paper purported that even a small detail such as the writing of a detailed Case Report about the public demonstration of ether inhalation anesthesia that includes the patient's perspective at the center of the experience can contribute greatly to the more rapid growth and recognition of the Specialty. It can lead to a change in the epistemological development of the anesthesiologists' medical mind and make it more resilient to adapt to rapid changes during times of volatility, uncertainty, complexity and ambiguity (VUCA). The paper underscores how alternate history and storytelling as research tools can provide insights about probabilistic outcomes in crisis situations such as in a pandemic.

Keywords: alternate history, storytelling, anesthesiology, etherization, COVID-19 pandemic

1. Introduction

“When nothing is sure, everything is possible.”
 -Margaret Drabble, *The Middle Ground*, 1980 [1]

As the second decade of the 21st century draws to a close in 2020, the anesthesiologist finds himself at the center the COVID-19 pandemic, a time characterized by the most profound of “volatility, uncertainty, complexity, and ambiguity” (VUCA) world that has engulfed and taken a toll on humanity [2]. As the frontliners most highly skilled in managing the airway in critical care situations [3] many anesthesiologists succumbed to the disease when unbeknownst to them, they rushed to the patients’ bedside unprotected, trying to secure their airways during the early days of the pandemic. Most of the patients required invasive airway management in perioperative and intensive care settings; hence the anesthesiologists are 13 times more susceptible to being infected than the other healthcare professionals [4]. Globally, anesthesiologists trying to save patients’ lives have been dubbed “coronavirus intubation teams racing against death,” even while trying to ensure safety both for themselves and their patients [5-7]. The development of counterfactuals in history a form of historiography that attempts to answer “what if” questions, came in the second part of the 20th century when introduced in the academic world by important figures like Robert Fogel, Geoffrey Hawthorn, Niall Ferguson, and Richard Evans. Interestingly, one of the impetus in the diffusion of this branch of study came when Sir Winston Churchill, in his essay for the book, “If It Had Happened Otherwise,” analyzed what would have happened if Robert Edward Lee had not won the battle of Gettysburg [8].

Counterfactuals are rooted in opposition to the deterministic theories of history. It avers that paths in history may diverge into different direc-

tions because of the decisions and actions of individuals that affect the future in a big way [9,10]. Through this concept, the timeline of the history of anesthesiology is disrupted, leading to a butterfly effect. In chaos theory, the butterfly effect (also called *sensitivity to initial conditions*) closely associated with the work of the meteorologist Edward Lorenz in 1963 describes the behavior of deterministic nonlinear systems [11]. The chaos theory suggests that small changes like the perturbations produced by a butterfly’s wings flap several weeks earlier in Brazil could trigger a tornado in Texas as today. It proposes that nonlinear systems are sensitively dependent and profoundly affected by their initial conditions, whereby tiny variations in initial conditions can produce random, complex, unpredictable, and erratic effects. The theory as applied by sociological and psychological researchers to the study of human behavior, aims to find the general order of social systems based on the assumption that social behavior in social systems, is highly complex and the only prediction one can make is that, it is unpredictable [12].

Anchored on counterfactual history, this case study research [13] aims to portray how an emphasis on the philosophical and sociological underpinnings of the specialty of Anesthesiology and ethical evidence-based medicine can probably lead to an alternative outcome amidst the COVID-19 pandemic as a consequence of a change in the course of history [14].

2. Background

The birth of anesthesiology took place 175 years ago at the Ether Dome in Massachusetts General Hospital. William T.G. Morton (1819-1868) performed the first public demonstration of surgical etherization to Edward Gilbert Abbott (1825-1855) for a surgical operation done by John Collins Warren (1778-1856) [15,16]. However, the initial excite-

ment generated by the discovery was soon followed by a lull characterized by the long and painful process of experimentation carried out by independent practitioners. As a result, anesthesiology was said to have entered the Artisanal Era, apparently lacking the cardinal features of a profession [17].

Anesthesiology began as a craft or trade akin to surgery and dentistry whereby individual artisans functioned primarily as technicians who practiced and refined their skills independently. It lacked the systematic scientific underpinnings and the technical facility necessary to be considered a professional undertaking [18]. Traditionally, individuals in selected crafts learn in a structured environment from trained senior artisans to develop the cognitive, psychomotor, and affective skills required for qualification in their occupation or field of specialization. This was the situation of anesthesia providers in the era immediately following the discovery of ether anesthesia. Anesthesiology was accepted as an essential part of medicine only after 40 to 50 years [17] and as a distinct specialty 95 years later in 1941 [19]. In the United States, the early history of anesthesiology was blemished by trivial disputes about who should be credited for the “discovery” of surgical anesthesia. Experimentation disregarded scientific principles and lacked the patient-centered ethos of ethical practice. Horrifying accounts of unsafe practices such as the administration of asphyxial concentrations of nitrous oxide abound. Sorely lacking in anesthesiology were important elements of professionalism that include: guidelines and standards of care, basic and clinical sciences innovations, structured training programs, and a means to disseminate information and promote the specialty through professional organizations [20].

In England, John Snow [21], an anesthetist who was well versed in experimentation, epidemiology, and the scientific literature, died prematurely and left a leadership void for many years. Anesthetists

in England were more interested in developing devices and instruments than in promoting fundamental advances in research that could lead to discovering new drugs and applications. Hence, the vast majority of notable advances in the science of anesthesiology were achieved by basic scientists [22,23]. Several physiologists, notably Pierre Jean Marie Flourens, François Magendie, and Claude Bernard, focused their life-work on anesthetic gases’ mechanisms and sites of action. Contemporaneously, pharmacologists and chemists, including Joseph Friedrich von Mering, Hans Meyer, and Charles Overton, synthesized novel drugs and investigated the properties that enabled chemical compounds to function as anesthetics. Surgeons, obstetricians, and dentists contributed the bulk of clinical advances in the field. All these would begin to change in the late nineteenth century.

In 1981, a group of clinical epidemiologists at McMaster University (Hamilton, Ontario, Canada), led by David Sackett, published the first of a series of articles in the *Canadian Medical Association Journal* advising physicians how to appraise the medical literature, thus ushering the era of Evidence-based Medicine with its emphasis on the hierarchy of evidence for improved outcomes in clinical practice [24].

By 2000, the Patients First campaign for safety, standards, and staffing across the clinical practice to ensure patients are put first in the delivery of care has commenced [25,26] after the landmark publication of *To Err Is Human: Building a Safer Health System* by the Institute of Medicine on December 1, 1999 [27]. The Patient First program outcomes include: 1) increased patient understanding of their condition for better decision-making through informed consent; 2) increased patient awareness of healthcare risks and to minimize the potential for adverse events; 3) increased patient health literacy and ability to self-manage their health issues. This underscores the ethical prac-

tice of the Specialty of Anesthesiology [28].

3. Material and Methods

This paper posits a point of divergence when after many failed attempts to make a fortune out of his discovery of ether anesthesia, W. T. G. Morton wondered about the future of his discovery, and he started to dream about an optimistic outcome. Then, through an uncanny twist of fate, Morton experiences a time slip and time travels to October 2021 during the height of the COVID-19 pandemic and back. Thus, the timeline of the Specialty of Anesthesiology is rewritten. It is a mix of both counterfactual history, where the focus is on negating an event, and alternate history, where the focus is on hypothetical scenarios that flow from the negation of the event [12]. It capitalizes on the concept of time travel through a time slip whereby a person who has no control and no understanding of the process seem to travel through time by unknown means and is either left marooned in a past or future time and must make the best of it, until by a process as unpredictable and uncontrolled; he is eventually returned.

Utilizing a case study approach, this paper focused on the Specialty of Anesthesiology and proposed the minimal-rewrite rule, which holds that the most useful counterfactuals require the fewest changes to the actual world [29]. Furthermore, the set-theoretic approach [30] proposed by English [31] on the INUS Condition Counterfactual will help show how, by making explicit the logic underpinning the minimal-rewrite rule in this case, a better outcome to the practice of anesthesiology, especially during the early days of the pandemic crisis can be achieved [32].

When introducing a counterfactual antecedent, the researcher must identify all possible outcomes including alterations before the proposed antecedent condition that might affect the outcome. Hence the ‘minimal-rewrite’ or ‘plausible’

counterfactuals is preferred to ‘maximal-rewrite’ or ‘miracle’ counterfactuals in this study [33]. Levy [33] proposed that “counterfactual analysis ideally posits an alternative world that is identical to the real world in all theoretically relevant respects but one, to explore the consequences of that difference.” Moreover, Lebow [34] stated that “one cannot sustain the primary counterfactual without specifying the ‘enabling counterfactuals’ that are necessary for an antecedent to exist and for postulated causal processes to operate.’ The discovery of ether anesthesia by William T.G. Morton and the COVID 19 pandemic provides the ideal critical junctures so that one can readily imagine a different path being selected at a key historical moment [35-40].

Mahoney & Barrenechea [32] developed a set-theoretic, and possible worlds approach to counterfactual analysis in case-study explanation. Through a combination of storytelling, and alternate history utilizing English’s argument based on the INUS condition counterfactual [31], this case study explored how situation A representing the artisanal era of Anesthesiology ushered in by the discovery of ether anesthesia by William T.G. Morton (a necessary though insufficient nonredundant antecedent), situation B with an emphasis on the philosophical and sociological underpinnings of Anesthesiology [41-43] if William T.G. Morton had written a case report with emphasis on the patient experience, i.e., putting the patient first (posited here likewise as a necessary insufficient nonredundant intervening antecedent), and situation C emphasizing the role of evidence-based medicine through the ethical conduct of research in the practice of anesthesiology (a necessary though insufficient nonredundant intervening antecedent), then the anesthesiologist and his role in total patient care especially during crisis situations as in a pandemic would lead to improved outcomes. Taken together, they are sufficient al-

though unnecessary because other sets of factors may also lead to improved outcomes (Figure 1).

own lives with their own hands. But they should wait before undertaking so delicate an enterprise until they have passed the age of 40.

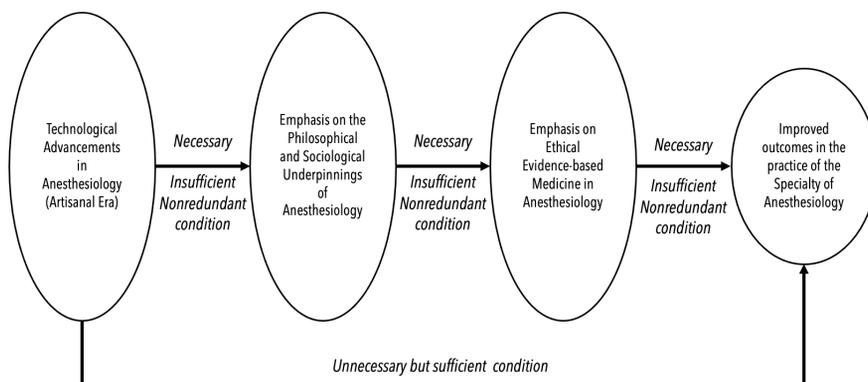


Figure 1. Stylistic summary of English's Argument based on the INUS Condition Counterfactual

An INUS condition states that causal relationships are not deterministic (If A and B and C occurs, then the outcome will occur) but probabilistic (If A and B and C occurs, then the outcome is more likely to occur) so that the presence of the causes increases the probability of the occurrence of the outcome [44]. Putting patients first through an emphasis on the philosophical and sociological underpinnings of Anesthesiology and the ethical conduct of evidence-based research would ensure the possibility of the outcome, that issues important to patients are included in all quality initiatives, including the development of protocol guidelines that can be discussed with patients; particularly important for patients undergoing anesthesia or undergoing prolonged airway management such as COVID 19 patients in critical care units [45,46].

4. The Uncanny Time Counter

Benvenuto Cellini (1500-1571) wrote in the opening chapter of his book, *The Autobiography of Benvenuto Cellini* first published in Italy in 1728 [47],

All men who have accomplished anything worthwhile should set down the story of their

It is the last hour of August 8, 1859, and Dr. William Thomas Green Morton will be 40 years old in less than an hour. As darkness engulfed him in deep slumber, he had a strong yearning to see how his contribution to the practice of painless surgery would shape the future of a specialty. His biography written by Nathan Rice came out on February 14, 1859, and he felt that something was missing [48,49]. “I want to write my autobiography. There is something about writing one’s own memoirs,” he thought. “Yes, Nathan did not capture my reflections!” he exclaimed.

Then the uncanny time counter went into a slip. “Was it all a dream?” Amidst the darkness, a light called out to him, and he wakes up. Something is amiss, he checked the calendar and the time, it is 10:15 AM, October 4, 2021, Monday. He hurriedly went out and encountered not too many people who are all wearing face masks and face shields. “What happened? Where am I?” The streets seemed familiar and still in a daze he realized that he is in Boston. He rushed into the Central Library in Copley Square. The librarians there should be able to help him fill in the gaps.

He learned about websites and read online

about the world engulfed by the COVID-19 pandemic. He then googled Massachusetts General Hospital [50], while looking specifically for the Department of Anesthesia, now named Department of Anesthesia, Critical Care and Pain Medicine. The website further states, *‘The Department of Anesthesia, Critical Care and Pain Medicine provides high-quality patient care, conducts innovative research and offers comprehensive educational opportunities.’* Do they still remember me? he muses. From the message of the Chief of Anesthesia he reads the excerpt: *‘We have our eyes on the future, while also paying homage to our rich history of discovery,’* and he breathes a sigh of relief.

Exploring further, he clicked on the tab which says, “About Us” and found the following information:

The Department of Anesthesia, Critical Care and Pain Medicine (DACCPM) at Massachusetts General Hospital offers world-class patient care, the finest education for medical students and residents, innovative research laboratories and a team of accomplished faculty. Each year, we provide anesthesia services for more than 50,000 procedures in 67 operating rooms and 25 additional locations on the Mass General campus.

Our research activities are driven by an outstanding faculty of independent thinkers and cover a wide range of initiatives, including leading-edge investigations in critical care medicine, neurosciences, biomedical engineering, patient safety and simulation. Mass General conducts the largest hospital-based research program in the United States, with an annual research budget of \$786 million.

He noted that Massachusetts General Hospital is now the #1 Research Hospital in America and the only hospital to be recognized in all 16 spe-

cialties assessed by the U.S. News and World Report. Under the heading “Our History and Milestones” he read: *‘Explore the history of the DACCPM at Mass General, including key physicians, discoveries and milestones that changed the field of anesthesia.’* Clicking on the first entry, he felt a tinge of pride. ‘1846: First Demonstration of Ether,’ it states

On October 16, 1846, the first public demonstration of ether anesthesia was performed at Massachusetts General Hospital by Boston dentist William T.G. Morton, making pain-free surgery possible. At Mass General, which opened its doors in 1821, only one operation a week was performed in the years preceding the ether demonstration. After this historic event, operations not only increased significantly, but Morton’s work spread quickly throughout the world and forever changed the surgical experience of patients.

He then googled his name: ‘William Thomas Green Morton, M.D.’ and he came across Volume 124, Issue 3 March 2016 of the Anesthesiology journal. The article is entitled: “Gentlemen! This Is No Humbug”: Did John Collins Warren, M.D., Proclaim These Words on October 16, 1846, at Massachusetts General Hospital, Boston? [51]. He asked himself: Is it time to clear the controversy? Then he thought back and with a tinge of narcissism [52,53] said to himself: “Does it really matter? Better to keep them guessing. Why mince over the small stuff when a bigger thing was born out of the event...the birth of the Specialty of Anesthesiology!” As he skimmed through all the websites, he realized that he is being reviled by some [32] and extolled by others [49] almost in the same vein. In another article, he beamed proudly when he discovers the writings in his tombstone [54]:

Inventor and Revealer of Inhalation An-

esthesia: Before Whom, in All Time, Surgery was Agony; By Whom Pain in Surgery was Averted and Annulled; Since Whom, Science has Control of Pain.

Back then, he was interested only in making a name for himself and perhaps gain a fortune out of his discovery. He can certainly not be credited for the discovery of ether, which Valerius Cordus prepared in 1540 [55]. However, he dreaded the thought that he proposed to pass it on as ‘Letheon,’ a move that tainted his image and consumed his life for almost two decades [56]. Reading through the scientific literature that is now freely available on the internet, he also realized that Dr. Crawford Long could have easily pulled the rug under his feet to claim the title: “Father of Modern Anesthesiology” when he removed a neck tumor under ether anesthesia on March 30, 1842 [57]. With his penchant for publicity, he breathes a sigh of relief as he remembered how he made sure that he performed a public demonstration at the Ether Dome. The hype that it generated certainly made the difference. Belatedly, he realizes that he should have been more magnanimous and shared freely. He knows and admits that his partnership with Horace Wells would have been profitable, and there is much speculation about ‘what if?’ they continued working together beyond 1844 [48]. He made a few more clicks with the computer mouse and further realizes that the Specialty he jumpstarted has gone far beyond his expectations.

In the present time, Morton realizes that the field of Anesthesiology has expanded. On the shoulder of the anesthesiologists now rest the duty to monitor the patient’s condition and support his vital organ functions as part of a trans-disciplinary team while diagnosing and treating acute and chronic conditions such as cancer pain, and providing care for critical illnesses. In ad-

dition, the anesthesiologist has taken the front row to manage the airway, especially during the ongoing COVID-19 pandemic. Many anesthesiologists succumbed to the disease when unbeknownst to them, they rushed to the patients’ bedside unprotected while trying to secure their airways during the early days of the pandemic [58,59].

From the webpages of the American Society of Anesthesiologists, he earnestly read stories about how anesthesiologists exhibited the perfect skillsets to lead rapid response teams during the COVID 19 pandemic with their medical expertise in pulmonary physiology, critical care, and care of the crashing patient [3], while exhibiting ‘bravery, compassion, stewardship, collaboration, and innovation.’ [60]. Moreover, he realized albeit belatedly that anesthesiologists have played major roles even in previous epidemics [61]. He read about how John Snow [33], a British anesthetist who was well versed in experimentation, epidemiology, and the scientific literature led efforts to thwart the cholera epidemic in 1848; and how Bjørn Ibsen [62], Danish anesthesiologist who provided the anesthetist’s viewpoint in the treatment of poliomyelitis during the epidemic in Copenhagen in 1952, thus ushering the birth of the intensive care units [45,62,63]. Interestingly, and with a sense of pride he also noted that TIME Magazine featured an anesthesiologist on its cover for the first time, to highlight his role in the ongoing COVID 19 pandemic [64].

“Would they be interested in my realizations 175 years after I discovered the potentials of ether anesthesia?” he wonders. Finally, he resolves to have a long conversation with the President of Massachusetts General Hospital and the Chief of Anesthesia, Critical Care and Pain Medicine...he wants to fill in the gaps and address the Department of Anesthesia or even the entire population at the Massachusetts General

Hospital during their next monthly meeting on October 16, 2021.

Arriving at the Massachusetts General Hospital, he needed to go through the screening procedures for possible COVID-19 infection before he was ushered into the Office of the President. He remembered reading how this pandemic spread through the respiratory system and how it has changed history. His closest encounter was the second wave of cholera pandemic around 1846. He learned further that confirmed cases of COVID-19 worldwide had reached more than 101.50 million people by January 29, 2021, probably more as testing in many areas is limited [65]. Anesthesiologists worldwide felt the burden as emergency rooms were filled with sick people coming in, in droves, many of whom needed intubation. Many anesthesiologists succumbed to being extremely vulnerable and helpless as the pandemic continued to rage in waves globally, and mutated strains of the virus are discovered in different parts of the world [66,67]. The medical community continues to mourn fallen comrades on the frontlines.

With their masks on and seated several seats apart, the medical staff of the Massachusetts General Hospital gathered at the Ether Dome. Today they are witnessing a rare event, and there was an uneasy all-pervading tension in the gallery. W. T. G. Morton is back, and he will address them today on the 175th anniversary of his public demonstration of ether anesthesia. They wondered at what he is going to say.

Following is the transcript of The Morton Address at the Dome delivered and beamed via livestream all over the world during World Anesthesia Day on October 16, 2021, Saturday, titled: *“The Philosophy and Sociology of a Specialty: The Musings of an Anesthesiologist.”*

Dear colleagues in the medical profession,

with special mention to my colleagues in the Specialty of Anesthesiology. Earnestly yearning to see the future before I slept on the 11th hour of my 39th birthday, I now stand here before you today by an uncanny twist of fate.

Back in 1846, before my public demonstration of ether anesthesia, patients have to bear the pain of surgery, and the surgeons have to bear the stress of inflicting pain and necessary torture on a patient for surgery.

Hindsight, they say, is 20/20! Browsing through the ubiquitous affordance of technology, I read how painstakingly slow the progress of the specialty has been, taking over 95 years before it is approved as a distinct specialty in 1941 [31]. Through the years, I now see that Anesthesiology has evolved into the practice of medicine dedicated to the relief of pain and periprocedural care of patients, thanks to the anesthesiologists who shaped its history. The anesthesiologists literally keep patients alive and oblivious to the pain before, during, and after invasive surgical procedures. To him, the patient entrusts his life. By controlling the patient’s physiological processes in a state of suspended animation, the anesthesiologist cares for the patient while providing an optimal environment for the surgical team [68].

The expanded role of the anesthesiologist now includes caring for patients during recovery, postoperative pain management, providing anesthesia for nonsurgical procedures, providing pain relief during childbirth, critical care medicine, chronic pain management in collaboration with other pain management practitioners. Likewise, he plays a key role in critical care and management of trauma pa-

tients, assessing and making timely diagnoses, providing support for breathing and circulation, and ensuring that infection is prevented while instantly relieving their pain and optimizing their physiologic functions through “on-arrival” regional blocks at the emergency room [46,69].

As hospital managers, anesthesiologists developed the perioperative surgical home to improve the safe, effective, and efficient healthcare delivery during the entire patient surgical procedural experience. The focus on their role as patient safety advocates remains the bedrock of the specialty as they carry on the daily grind of activities as anesthesiologists today [70].

Many who misunderstand and underplay the role of the anesthesiologist do not realize that the anesthesiologist interacts with his patient, perhaps not in speech, but through every tear that fall, every contraction and dilatation of the pupils, every convergence and divergence of the eyeball, every heartbeat, every rise and fall in blood pressure, every breath, every discordant pattern in respiration during inhalation anesthesia, and even the patterns of horripilation and piloerection, and even the relaxation of the anal sphincter after a central neuraxial block [71,72]. Charged with protecting patients at a time when they are most vulnerable and unable to care for themselves, an anesthesiologist’s work is anything but routine. For indeed, the patient is either dead or alive based on all these significantly minuscule details. Yet, on the other hand, the anesthesiologist can bring patients down so low and bring them back from the depths through his vast knowledge of pharmacology and how drug interactions can optimize the

patient’s condition. That being said, the anesthesiologist, therefore, engages in the most intense and exhilarating of physician-patient relationships in medicine, a source of pride and, I am certain, the main reason why many successful anesthesiologists choose to stay in the field [31,73].

The role of evidence-based medicine also takes center stage during this pandemic as new evidence unfolds every day. Evidence accepted today can be debunked by new evidence tomorrow. The early reports say that the maximum casualty was seen among anesthesiologists who managed the airway. As anesthesiologists performing intubation and extubation daily, we did not think of aerosol generation so seriously in the past. Previously, we preoxygenated patients with high-flow oxygen, labeled as an aerosol-generating practice that can pollute the operating room. However, current infection control guidelines are apparently based more on a precautionary than evidential approach [74]. Recent evidence state that the level of aerosol generated from tracheal intubation, high-flow nasal oxygen, and non-invasive ventilation are low, with similar sampled aerosol concentrations to tidal breathing and speaking [74-76]. Indeed, if research evidence were as accessible then as it is today, then the era of artisanal anesthesia characterized by trial and error contributing to the specialty’s initial slow progress and lack of formal recognition would have been shortened. I, therefore, challenge all to secure our position and strengthen our foothold as anesthesiologists practicing clinical epidemiology in an evidence-based world [36].

I also see now that students of the specialty of Anesthesiology are often trapped in

the quantitative genre of research, hoping to produce the “best” evidence through randomized controlled trials. I now encourage everyone to remember that all research evidence starts with the case report (69,77). Through a detailed case report, I should have put my patient at the center of the experience of the anesthetic procedure.

To all anesthesiology students, please understand that our specialty is not all about scientism, that our epistemological beliefs will shape our humanistic orientation towards our patients [78]. Albeit belatedly, I now realize that philosophically, the specialty of anesthesiology goes beyond just putting patients “to sleep” because the true essence of the specialty is the relief of patient suffering. The center of the philosopher’s thought is man, and we must understand that our patients vary in infinitely complex ways, even if they appear the same [43].

The center of the sociologist’s thought, on the other hand, is society as he looks and understands man in the context and perspective of its society. Through his lens, he considers anesthesiology as the means of development of both the individual and society [73]. For indeed, what society would thrive if its citizens were ill and suffering?

Therefore, through philosophical and sociological imagination, we see that grossly missing from the narratives of the first public demonstration of ether anesthesia was the patient’s perspective, the first-person account of the lived experience, and the meaning that the patient makes out of the experience. *Mea culpa!* I now understand that to insist on using a single frame to understand the frailties of

the human condition is a disservice to the patients that we swore to heal and make whole. The complexity of the man and his social condition can only be understood from the patient’s viewpoint.

Moreover, we cannot disregard the need to practice research integrity, as clearly in all accounts of the first public demonstration of ether anesthesia, the authors of the articles referred to them as “experiments.” Thanks to another anesthesiologist from Massachusetts General Hospital, Dr. Henry K. Beecher, whose lifework of more than 25 years laid the foundation of ethical research [48,79]. I am truly humbled.

The pandemic highlights yet another dimension of our clinical practice. We have all experienced professional stress in anesthesiology [80]. Brought to the fore during this pandemic are the added stress and depression experienced by anesthesiologists due to increased workload when shifts are disrupted by quarantine protocols, the discomfort due to longstanding hours of work in PPE, and the fear of contracting infection to self and transmitting it to family members [81,82]. Therefore, self-care, adequate psychological support, and proper implementation of protocols are important to overcome this crisis [83].

I salute all our colleagues worldwide today on the occasion of World Anesthesia Day, most especially during these hard and trying times when faced with a pandemic. Indeed, I had developed more in terms of maturity in life and the Specialty these last 13 days than when I spent selfishly mulling over my contribution to the specialty in the last 13 years back in 1859. I dare say that had I realized and acted upon all of these realizations before and had I been

more circumspect about my dealings with others, then the respect I gained would have contributed greatly to the more rapid growth and recognition of the specialty.

But that is the wonder of time; the future is never known until it becomes the present. Certainly, the gift of time, timeliness, and timelessness are afforded only to a few, and I am fortunate that I have been allowed to come at this critical juncture in the history of the nations and the history of our Specialty and be given a chance to possibly correct the oversight of time past. I shall certainly cherish all of these learnings in my heart and write about them in my memoirs. Let the brave heart of the anesthesiologist prevail!

Closing his eyes on the night of October 16, 2021, he felt blessed to have been given the chance to see and experience the future. Seeing all the loss and devastation caused by the pandemic, he learns a very crucial lesson. Policies and protocols mattered. But everything starts with a change in mindset that focuses not on selfish gains but, more importantly, on advocating for a higher purpose, such as the growth of the Specialty. Hence, if given the opportunity to return to the past, he will bring back the realizations that radically altered his life in the present, hoping that any move he will make to alter the past will inevitably lead to more gratifying results for the Specialty of Anesthesiology. In addition, he promised to bring the ingenuity and integrity engendered by observant, creative minds in the rich history of anesthesiology as inspirations while resolving never to repeat the instances of scientific folly and human foibles that tarnished his reputation [32]. Before drifting into unconsciousness, he recounted the commitments he made in his *Address at the Dome*, i.e., to

write a case report about his first public demonstration of ether anesthesia and include the patient's perspective about his lived experience; address the ethical dilemma about doing human experimentation; and write his autobiography to include the reflections he gathered during his brief sojourn in the future. Thus, he promised to promote a more humanistic approach to documenting his works as an anesthesiologist.

5. From Storytelling to Discussion

Biographies about Morton that explored details of his life revealed a behavior pattern that progressed from narcissistic traits to narcissistic personality pathology [52,53]. Although he had a strong tendency towards publicity, it seems that Morton was sensitive about his lack of formal education and had used others to write his announcements and publicity for the Ether Demonstration. [84-86]. The timeline of factual and counterfactual narratives in the history of Anesthesiology in the context of present-day anesthesiologists amidst the COVID-19 pandemic is illustrated in Table I.

Table I. The timeline of factual and counterfactual narratives in the history of Anesthesiology in the context of present-day anesthesiologists amidst the COVID-19 pandemic

Timeline	Factual	Counterfactual
1846	<p>Although Morton performed the first public demonstration of ether anesthesia, he never wrote about it. Recently discovered unpublished handwritten manuscripts by Charles Thomas Jackson, MD, (1805-1880) provide Jackson’s account of the first 6 weeks of the ether discovery, from early October 1846 to mid-November 1846 [87,88].</p> <p>The event though, was first officially announced in a medical publication in a paper by Dr. Henry Jacob Bigelow on November 18, 1846 [27,28,89]. Other written works related to the event consist of early U.S. Congressional reports [90,91] (1849 and 1853) on the priority of the discovery of anaesthesia; Benjamin Perley Poore’s Historical Materials for a Biography of W. T. G. Morton, M.D. in 1856 [92], and Rice’s “official biography” of 1859 reproduced for the first time in 1996 [49].</p> <p>Other belated testimonies of eyewitnesses were written 50 years after [93-96].</p>	<p>Morton felt confident about writing a detailed case report of his first public demonstration of inhalation anesthesia with ether and henceforth started to document all his work with ether anesthesia while always remembering to include the patients’ perspectives of their lived experience [37,38] of undergoing an anesthetic procedure. His efforts will redound to promoting the humanistic mindset in the Specialty of Anesthesiology and the epistemological development of the anesthesiologist as patient advocates [78]. He also emphasized the ethical practice of the specialty with the patient at the center of the experience [48,79].</p>
1847	<p>Other authors performed their own etherization and wrote about their experiences, but all accounts did not include the patient’s experience of the procedure [33,97].</p>	
1859	<p>Morton himself arranged for biographer Nathan P. Rice, M.D. (physician, author, New York City, New York; 1828–1900), to romanticize his achievements in the 460-page book titled <i>The Trials of a Public Benefactor</i> [49].</p>	<p>Morton re-wrote his autobiography upon his return to 1859 making sure to include reflections about the philosophical and sociological underpinnings of the specialty that focuses on the ‘Patient First’ [37,38, 40].</p>
1966	<p>Federal rules requiring informed consent on studies involving human experimentation were implemented after Henry K. Beecher published an article entitled, “Ethics and Clinical Research in the New England Journal of Medicine [79].</p>	<p>Morton addressed the ethical dilemma about doing human experimentation and espoused the ethical practice of research when he returned to 1859, thus preempting succeeding efforts in this regard [79].</p>

Timeline	Factual	Counterfactual
2021	<p>The world is immersed in COVID-19, a pandemic of global proportions. Anesthesiologists serve in the frontlines because of their unique skillsets [3]. Many anesthesiologists succumbed to being extremely vulnerable and helpless as the pandemic continued to rage in waves globally, and mutated strains of the virus are discovered in different parts of the world [66,67].</p>	<p>Morton time travels to 2021 and gained many insights about how the Specialty of Anesthesiology progressed over time. He noted that Anesthesiology was accepted as an essential part of medicine only after 40 to 50 years [29] and recognized as a distinct specialty in the USA 95 years later in 1941 [31].</p> <p>He delivers <i>The Morton Address at the Dome</i> on World Anesthesia Day, October 16, 2021, 175 years after his first public demonstration of ether anesthesia.</p> <p>Seeing all the loss and devastation because of the pandemic, he learns a very crucial lesson. Policies and protocols mattered. But everything starts with a change in mindset that focuses not on selfish gains but, more importantly, on advocating for a higher purpose such as the growth of the Specialty through a humanistic paradigm that puts the welfare of the patient and of society at the center.</p> <p>In his <i>Address at the Dome</i>, he encouraged all anesthesiologists to refocus on the philosophical and sociological underpinnings of the Specialty, even while they engage in ethical evidence-based practice, so that the standards and practices of the Specialty will promote the safety of both the patient and the anesthesiologist [36,43].</p>

Many are still hyped over whether Dr. John Collins Warren did mention the phrase “Gentlemen! This is no humbug” [51]. We have to ask Dr. Morton himself. If he did not hear it, it would not have been uttered at all, or perhaps because of the raucous at the procedure’s success, only those near Dr. Warren did hear it. Note that Dr. Morton bypassed this small detail even in his *Address at the Dome*, perhaps purposely not wanting to reveal all, so as to keep us all wondering for years to come. But does it really matter?

What matters most is that a fascinating confluence of events, minds, influences, and individuals has allowed the Specialty of Anesthesiology to weather the perfect storm and pushed it to progress from a craft or trade to a profession.

The profession evolved with the establishment of professional societies, the birth and growth of academic departments and training programs, and the initiation of formal program accreditation [31].

6. Solutions and Recommendations

The present-day popularity of what-if thinking reflects our world’s foreboding sense of crisis; hence, the genre is most suited to the pandemic scenario we live through now. Countless other alternate histories responded to the upheavals of their day, thus giving voice to the conviction that history does not follow a pre-determined path. The outcome is rooted in unforeseen contingencies instead of predictable forces. This pandemic brought

to fore the need to combine evidence from the hard sciences of clinical epidemiology and the soft sciences of philosophy and sociology to curb the course of a pandemic. Mounting evidence from randomized clinical trials is grossly inefficient as they require large sample sizes, but social interventions based on intuitive knowledge can be easily done. Through establishing a culture that promotes the concept of the ‘Patient First,’ prompt implementation and execution of standard operating procedures for the Specialty through appropriate triage, precautions, treatments, and protocolized approach to the management of patients in crises, shall be beneficial to both healthcare professionals, as well the patients [40].

7. Future Perspective

We should understand that alternate history narratives conveyed through storytelling will probably proliferate in the future. We live in an era of uncertainty, which is a fertile ground for research that deal with What If’s? The ongoing pandemic plunged the world into a situation of constant flux, of continuous and unpredictable change, of a VUCA world that is volatile, uncertain, complex and ambiguous. It demands new ways of leading and managing and avoiding traditional and outdated approaches to everyday situations. Hence, cultivating a counterfactual mindset produced by our VUCA world, can potentially help us cope with it. Through a counterfactual mindset, we can alter our perspective in such a way as to understand the dynamics of rapid change [96]. Thus amidst the risks posed by the COVID-19 pandemic, it is time to appreciate the anesthesiologist’s role and contribution in and out of the operating theater as physiologist, pharmacologist, clinician, pain and palliative care specialist, critical care specialist, researcher, academician, and patient safety advocate [3].

8. Conclusion

Through a fictional tale that allows W. T. G. Morton to travel in time, he is transported into the modern world, and an alternate history of the development of the Specialty is written. In the present time, Morton realizes that the field of Anesthesiology he jumpstarted has expanded beyond his expectations, especially during the ongoing COVID-19 pandemic. The paper underscores how alternate history and storytelling as research tools can provide insights into probabilistic outcomes in crises such as a pandemic. By focusing on the philosophical and sociological underpinnings and the ethical conduct of evidence-based medicine, a holistic view of the Specialty of Anesthesiology is created. Through a ‘minimal-rewrite’ or ‘plausible’ counterfactual [18], the paper purported that even a small detail such as the writing of a detailed Case Report about the public demonstration of ether inhalation anesthesia that included the patient’s perspective at the center of the experience, through a change in the epistemological development of the anesthesiologists’ medical mind [78], would contribute greatly to the more rapid growth and recognition of the Specialty and its resiliency to adapt to rapid changes during times of crisis.

9. Round Table Insight

As a qualitative researcher, this research genre piqued my interest because of my penchant for history and storytelling. Delving on counterfactuals using a storytelling approach to dissect probable outcomes is something novel even for the literature in Anesthesiology. The COVID-19 pandemic has exposed the vulnerabilities of the Specialty of Anesthesiology. During periods of rapid change and uncertainty, alternate history and storytelling as research tools that bridge the historical and the narrative paradigms in the qualitative research genres can provide insights

about how to improve outcomes especially during periods of volatility, uncertainty, complexity and ambiguity (VUCA). Social constructivism avers that human actions should be examined and understood in their social context hence, a blend of narrative reflection and storytelling can serve as a bridge between the past, present, and future. The human mind is hardwired for stories. As we make our way through life, we have life experiences and engage in dialogic interactions both with ourselves and the world around us. In storytelling, all the complexities that characterize life experiences are structured and woven together into a seamless web of meaningful units. Storytelling is the earliest form of communication and for most people, it is a natural way of recounting experience, a practical solution to creating reasonable order out of life experiences. We continually produce narratives to order and structure our life experiences, as well as, being constantly besieged with narratives from the social world we live in. Through the emic and etic perspectives we create narrative descriptions about ourselves and others, and about how we make meaning of the behavior of others. Moreover, through an exploration of probable trajectories, critical junctures can serve as “points of divergence” that can easily swing events in one direction or another during the course of history. By revealing the complex relationship between determinism and the chance in shaping historical events, alternate histories can help us understand the forces that will influence our future. Most importantly, by making clear that history’s course is not predetermined, what-if narratives remind us that we all retain the free will to choose responsibly and act morally and decisively as agents of historical change.

Indeed, I am glad that I have been given the opportunity to contribute to these qualitative research genres. Moreover, this research ben-

efited greatly from the interactions and discussions at the 2nd International Meeting of ‘What if?’ World History “**Segundo Meeting Internacional de História ‘E se?..’ Universal**,” a conference on counterfactual history at the University of Porto (at the Dias da História Alternativa-Winepunk & Companhia, November 24-26, 2020).

Acknowledgments

Many thanks likewise for the helpful guidance from the editor and referees of the *Hypothesis Historia Periodical*, for indeed their deep knowledge and understanding of alternate history aided my preparation of the work and manuscript so that this paper will be a valid contribution to these research genres and the literature on the History of Anesthesiology.

References

1. Drabble M. *The Middle Ground*. Alfred a Knopf Incorporated; 1980.
2. Murugan S, Rajavel S, Aggarwal AK, Singh A. Volatility, Uncertainty, Complexity and Ambiguity (VUCA) in Context of the COVID-19 Pandemic: Challenges and Way Forward. *Int J Heal Syst Implement Res*. 2020;4(2):10–6.
3. Sherwin M. Physician Anesthesiologists Bring a Unique Combination of Skills to COVID-19 Care, in Physician Anesthesiologists battling COVID-19. American Society of Anesthesiologists. 2021.
4. Bowdle A, Munoz-Price LS. Preventing Infection of Patients and Healthcare Workers Should Be the New Normal in the Era of Novel Coronavirus Epidemics. *Anesthesiology*. 2020;(Xxx):1292–5.
5. Chen X, Liu Y, Gong Y, Guo X, Zuo M, Li J, et al. Perioperative Management of Patients Infected with the Novel Coronavirus: Recommendation from the Joint Task Force of the Chinese Society of Anesthesiology and the Chinese Association of Anesthesiologists. *Anesthesiology*. 2020;(6):1307–16.

6. Matava CT, Kovatsis PG, Lee JK, Castro P, Denning S, Yu J, et al. Pediatric Airway Management in COVID-19 Patients: Consensus Guidelines from the Society for Pediatric Anesthesia's Pediatric Difficult Intubation Collaborative and the Canadian Pediatric Anesthesia Society. *Anesth Analg.* 2020;61–73.
7. Zhang HF, Bo L, Lin Y, Li FX, Sun S, Lin H Bin, et al. Response of Chinese Anesthesiologists to the COVID-19 Outbreak. *Anesthesiology.* 2020;(Xxx):1333–8.
8. Churchill W. If Lee had not won the Battle of Gettysburg. *Wisconsin Mag Hist.* 1961;44(4):243–51.
9. Singles K. "What If?" and Beyond: Counterfactual History in Literature. *Cambridge Q.* 2011;40(2):180–8.
10. Evans R. *Altered pasts: Counterfactuals in history.* Brandeis University Press;
11. Chodos A. Butterflies, Tornadoes, and Time Travel. [Internet]. *American Physical Society News.* 2004. Available from: <https://www.aps.org/publications/apsnews/200406/butterfly-effect.cfm>
12. Lorenz E. "Predictability: Does the Flap of a Butterfly's Wings in Brazil Set Off a Tornado in Texas?" In: *American Association for the Advancement of Science.* 1972.
13. Heale R, Twycross A. What is a case study? *Evid Based Nurs.* 2018;21(1):7–8.
14. Bunzl M. Counterfactual History : A User ' s Guide. *Am Hist Rev.* 2004;109(3):845–58.
15. Viets H. Bigelow's original announcement. *New Engl J Med.* 1946;235(769–770).
16. Viets H. The earliest printed references in newspapers and journals to the first public demonstration of ether anesthesia in 1846. *J Hist Med allied Sci.* 1949;4(2):149–69.
17. Matioc AA. Artisanal Era of Anesthesiology 1846-1904.pdf. *Anesthesiology.* 2017;126:394–408.
18. Vandam L. Early American anesthetists: the origins of professionalism in anesthesia. *Anesthesiology.* 1973;38(3):264–74.
19. Ahmad M, Tariq R. History and Evolution of Anesthesia Education in United States. *J Anesth Clin Res.* 2017;08(06).
20. Wolfe RJ. *Tarnished Idol: William Thomas Green Morton and the introduction of surgical anesthesia: a chronicle of the ether controversy.* Norman Publishing; 2001.
21. Snow JD. On the inhalation of the vapour of ether in surgical operations [Internet]. *British Journal of Anaesthesia.* John Churchill, Princes Street, Soho; 1847. Available from: <http://www.ph.ucla.edu/epi/snow/oninhalationvapourether.pdf>
22. McGoldrick K. The History of Professionalism in Anesthesiology. *AMA J Ethics* [Internet]. 2015;17(3):258–64. Available from: <https://journalofethics.ama-assn.org/article/history-professionalism-anesthesiology/2015-03>
23. McGoldrick K. Reflections on professionalism: learning from the past as we look toward the future. 2009;73(11):30-32-33. *ASA Newsl.* :30–3.
24. Sackett D, Rosenberg W, Muir Gray J, Haynes R, Richardson WS. Evidence based medicine: What it is and what it isn't. *Br Med J.* 1996;312:72–3.
25. Bhangu A, Bayley E, Frayn E. The ethics of intimate examinations: teaching tomorrow's doctors. *BMJ.* 2003 Mar 1;326(Suppl S3). *Br Med J.* 326(Suppl):S3.
26. Coldicott Y, Nesheim B, MacDougall J, Pope C, Roberts C. The ethics of intimate examinations—teaching tomorrow's doctors Commentary: Respecting the patient's integrity is the key Commentary: Teaching pelvic examination—putting the patient first. *Br Med J.* 326(7380):97–101.
27. Havens DH, Boroughs L. "To err is human": A report from the Institute of Medicine. *J Pediatr Heal care Off Publ Natl Assoc Pediatr Nurse Assoc Pract.* 2000;14(2):77–80.
28. Australia D of HG of W. What is Patient First ? [Internet]. 2021 [cited 2021 Mar 23]. Available from: <https://ww2.health.wa.gov.au/Arti>

- cles/N_R/Patient-First
29. Tetlock P, Belkin A. Counterfactual Thought Experiments in World Politics: Logical, Methodological, and Psychological Perspectives. In: Counterfactual Thought Experiments in World Politics. Princeton University Press; p. 3–38.
 30. Schneider C, Wagemann C. Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis. Cambridge University Press.
 31. English R. Perestroika without politics: how realism misunderstands the Cold War's end. In: Explaining War and Peace: Case Studies and Necessary Condition Counterfactuals. Taylor and Francis Ltd.; 2007. p. 237–60.
 32. Mahoney J, Barrenechea R. The logic of counterfactual analysis in case-study explanation. *Br J Sociol.* 2019;70(1):306–38.
 33. Levy JS. Counterfactuals, causal inference, and historical analysis. *Secur Stud.* 2015;24(3):378–402.
 34. Lebow R. Counterfactuals and security studies. . 2015 Jul 3;24(3):403–12. *Secur Stud.* 2015;24(3):403–12.
 35. Capoccia G. Chapter 5 Critical Junctures. 1986;1–34.
 36. Capoccia G, Kelemen RD. Institutionalism Theory, Narrative, and Counterfactuals in. *World Polit.* 2007;59(3):341–69.
 37. Collier D, Munck GL. Building Blocks and Methodological Challenges: A Framework for Studying Critical Junctures. *Qual Multi-Method Res* [Internet]. 2017;15(2):2–9. Available from: <https://papers.ssrn.com/abstract=3034920>
<https://papers.ssrn.com/abstract=3034920>
 38. Hogan J, Doyle D. The importance of ideas: An a priori critical juncture framework. *Can J Polit Sci.* 2007;40(4):883–910.
 39. Tarrow S. “The World Changed Today!” Can We Recognize Critical Junctures When We See Them?. *Qual Multi-Method Res.* 15(1):9–11.
 40. Twigg J. COVID- 19 as a ‘ Critical Juncture ’: A Scoping Review. *Glob Policy.* 2020;(December):1–5.
 41. Bajwa S, Kalra S. A deeper understanding of anesthesiology practice: the biopsychosocial perspective. *Saudi J anaesthesia.* 2014;8(1):4.
 42. Glavin R, Flin R. The influence of psychology and human factors on education in anesthesiology. *Can J Anesth.* 2012;59(2):151–8.
 43. Schou J. A Philosophical Approach to Anaesthesia. *Alix;* 1994. 104 p.
 44. Horsten L, Weber E. INUS Conditions. *Wiley StatsRef Stat Ref online* 2014 Apr 14. 2014;
 45. Patel B. Education and Training Prepare Physician Anesthesiologists for Crisis Response, in *Physician Anesthesiologists battling COVID-19* [Internet]. American Society of Anesthesiologists. 2021 [cited 2021 Jun 27]. Available from: <https://www.asahq.org/madeforthismoment/bhoumesh-patel-md/>
 46. Pease S. The Role of the Physician Anesthesiologist. *Made for this Moment, Website of the American Society of Anesthesiologists.* 2021.
 47. Cellini B. *The Autobiography of Benvenuto Cellini.* PF Collier; 1910.
 48. Beecher H, Ford C. Nathan P. Rice’s “ Trials of a Public Benefactor”: A Commentary. *J Hist Med allied Sci.* 1960;15(2):170–83.
 49. Rice N. *Trials of a Public Benefactor: As Illustrated in the Discovery of Etherization.* New York, NY: Pudney & Russell;; 1859. 93 p.
 50. Massachusetts General Hospital. *Massachusetts General Hospital* [Internet]. [cited 2021 Jan 19]. Available from: <https://www.massgeneral.org/anesthesia/aboutus>,
 51. Haridas R. “Gentlemen! This Is No Humbug” Did John Collins Warren, MD, Proclaim These Words on October 16, 1846, at Massachusetts General Hospital, Boston? *Anesthesiology.* 2016;124(3):553–60.
 52. Bause G. *Ether Day’s William TG Morton: Public Benefactor... and Antisocial Narcissist?* *J Am Soc Anesthesiol.* 117(1):1–2.
 53. Martin R, Wasan A, Desai S. An appraisal of William Thomas Green Morton’s life as a

- narcissistic personality. *J Am Soc Anesthesiol.* 117(1):10–4.
54. Chaturvedi R, Gogna RL. Ether day: An intriguing history. *Med J Armed Forces India* [Internet]. 2011;67(4):306–8. Available from: [http://dx.doi.org/10.1016/S0377-1237\(11\)60098-1](http://dx.doi.org/10.1016/S0377-1237(11)60098-1)
 55. Leake C. Valerius Cordus and the discovery of ether. *Isis.* 1925 Jan 1;7(1):14–24. *Isis.* 7(1):14–24.
 56. Haridas R, Gionfriddo M, Bause G. Etymology of Letheon: nineteenth-century linguistic effervescence. *Anesthesiology.* 2019;131(6):1210–22.
 57. Chang CY, Goldstein E, Agarwal N, Swan KG. Ether in the developing world: rethinking an abandoned agent. *BMC Anesthesiol.* 2015;15(1):1–5.
 58. Kumar S, Palta S, Saroa R, Mitra S. Anesthesiologist and COVID-19—current perspective. *J Anaesthesiol Clin Pharmacol.* 36((Suppl 1)):S50.
 59. Quintão VC, Simões CM, Lima LHN e, Barros GAM de, Salgado-Filho MF, Guimarães GMN, et al. The anesthesiologist and COVID-19. *Brazilian J Anesthesiol (English Ed.* 2020;70(2):77–81.
 60. Solomon L. Pandemic Response Brings Out the Best in Colleagues, in *Physician Anesthesiologists battling COVID-19* [Internet]. American Society of Anesthesiologists. 2021 [cited 2021 Jun 27]. Available from: <https://www.asahq.org/madeforthismoment/lisa-solomon-do/>
 61. Singh A, Khanna P. Anesthetist and pandemic: Past and present. *Trends Anaesth Crit Care* [Internet]. 2020;36(August):5–8. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7416713/pdf/main.pdf>
 62. Ibsen B. The Anæsthetist's Viewpoint on the Treatment of Respiratory Complications in Poliomyelitis during the Epidemic in Copenhagen, 1952. *J R Soc Med.* 1954;47(1):72–4.
 63. Löfström J. The polio epidemic in Copenhagen in 1952—and how the anaesthetist came out of the operating room,. *Acta Anaesthesiol Scand.* 1994;38:419.
 64. Andrew S. This week's Time magazine cover spotlights coronavirus front line workers, from cafeteria employees to paramedics. *Time Magazine* [Internet]. 2020; Available from: <https://edition.cnn.com/2020/04/10/media/time-magazine-coronavirus-covers-trnd/index.html>
 65. Ritchie E, Ortiz-Ospina S, Beltekian D, Mathieu E, Hasell J, Macdonald B, et al. Our World in Data Cumulative confirmed COVID-19 cases. University of Oxford. 2021.
 66. Healy DW, Cloyd BH, Brenner MJ, Kupfer RA, Anam KS, Schechtman SA. The COVID-19 pandemic: implications for the head and neck anesthesiologist. *J Head Neck Anesth.* 2020;4(3):e26–e26.
 67. Obara S. Anesthesiologist behavior and anesthesia machine use in the operating room during the COVID-19 pandemic: awareness and changes to cope with the risk of infection transmission. *J Anesth* [Internet]. 2021;35(3):351–5. Available from: <https://doi.org/10.1007/s00540-020-02846-z>
 68. Stevenson LG. Suspended animation and the history of anesthesia. 49(4), 482–511. *Bull Hist Med.* 1975;49(4):482–511.
 69. Nileshwar ,A, Khymdeit E. Research in anesthesiology: Time to look beyond quantitative studies. 2016 Jul;32(3):395. *J Anaesthesiol Clin Pharmacol.* 32(3):395.
 70. Mariano ER, Vetter TR, Kain ZN. The Perioperative Surgical Home Is Not Just a Name. *Anesth Analg.* 2017;125(5):1443–5.
 71. Guedel AE. Stages of Anesthesia and a Re-Classification of the Signs of Anesthesia. *Anesth Analg.* 1927;6(4):157–62.
 72. Kopp V, Shafer A. Anesthesiologists and perioperative communication. *J Am Soc Anesthesiol.* 93(2):548–55.
 73. Roth R, Frost E, Gevirtz C, Atcheson C. The Role of Anesthesiology in Global Health [Internet]. Roth R, Frost E, Gevirtz C, Atcheson C, editors. *The Role of Anesthesiology in Global Health.* Springer; 2015. 435 pp. Available from:

- <https://www.uclahealth.org/anes/workfiles/about-us/The-Role-of-Anesthesiology-in-Global-Health.pdf>
74. Wilson N, Marks G, Eckhardt A, Al. E. The effect of respiratory activity, non-invasive respiratory support and facemasks on aerosol generation and its relevance to COVID-19. *Anaesth* 2021. 2021;
 75. Hamilton F, Gregson F, Arnold D, Al. E. Aerosol emission from the respiratory tract: an analysis of relative risks from oxygen delivery systems. *bioRxiv* [Internet]. Available from: <http://medrxiv.org/lookup/doi/10.1101/2021.01.29.21250552>.
 76. Brown J, Gregson F, Shrimpton A, Al. E. A quantitative evaluation of aerosol generation during tracheal intubation and extubation. *Anaesthesia*. 2021;76:174–81.
 77. Calimag M. Anesthesiology: Looking for the Art in the Science. *Philipp J Anesthesiol*. 2012;23(1):1–2.
 78. Calimag M. The Epistemological Development of the Medical Mind among Anesthesiologists: Polarity, Plurality and Perfectivity. *Philipp J Anesthesiol*. 2013;24(1):26–32.
 79. Beecher HK. Ethics and clinical research. *New England Journal of Medicine*. 274(24): 1354–1360. doi:10.1056/nejm196606162742405 republished with commentary in the series *Public Health Classics in Harkness, Jon; Lederer, Susan E.; Wikler, Daniel (2001). "Laying Ethical Foundations for Clinical Research." Bulletin of the World Health Organization*. 79(4): 365-372.
 80. Gurman GM, Klein M, Weksler N. Professional stress in anesthesiology: A review. *J Clin Monit Comput*. 2012;26(4):329–35.
 81. Ali H, Ismail AA, Abdalwahab A. Mental stress in anesthesia and intensive care physicians during COVID-19 outbreak. *Anesthesiol Pain Med*. 2020;10(5):1–6.
 82. Magnavita N, Soave P, Ricciardi W, Antonelli M. Occupational stress and mental health among anesthetists during the COVID-19 pandemic. *Int J Environ Res Public Health*. 17(21):8245.
 83. Kuhn CM, Flanagan EM. Self-care as a professional imperative: physician burnout, depression, and suicide. *Can J Anesth*. 2017;64(2):158–68.
 84. Cooper MG. Nathan P. Rice and Trials of a Public Benefactor, 1859 - Historical notes on the facsimile of 1995. *Anaesth Intensive Care*. 1997;25(3):289–91.
 85. Vandam L. Benjamin Perley Poore and his historical materials for a biography of W. T. G. Morton, M.D. In: Fisk B, Morris L, Stephen C, editors. *The History of Anesthesia— Third International Symposium Wood Library-Museum of Anesthesiology, Ill.*. 1992. p. 427–9.
 86. Vandam L. Benjamin Perley Poore and his Historical Materials for a Biography of W. T. G. Morton, M.D. *J Hist Med Allied Sci*. 1994;49:5–23.
 87. Haridas RP, Bause GS. A Newly Discovered Manuscript of Charles T. Jackson, MD: "History of the Patenting of the Application of Sulphuric Ether for the Production of Insensibility". *Journal of anesthesia history*. 2017 Apr 1;3(2):37-46.
 88. Haridas RP, Bause GS. A Newly Discovered Manuscript of Charles T. Jackson, MD, on the Preparation and Administration of Anesthetics for Humans and Animals. *Journal of anesthesia history*. 2018 Jul 1;4(3):163-70.
 89. Bigelow H. Insensibility during surgical operations produced by inhalation. *Bost med surg J*. 1846;35:309–17.
 90. US Congress. U.S. 32nd Congress. 2d session. 1853, pp. 582. 1853 p. 582.
 91. US Congress. U.S. 30th Congress. 2d session. , Report 114, pp. 46. 1849.
 92. Poore B. *Historical Materials for the Biography of W. T. G. Morton, M.D., Discoverer of Etherization, with an Account of Anaesthesia.*, Washington D.C.; 1856.
 93. Ayer W. The discovery of anesthesia by ether; with an account of the first operation performed

- under its influence at the Massachusetts General Hospital, and an extract from the record-book of the hospital. *Occident Med Times*. 1896;10:121–9.
94. Ayer W. First public operation under ether. The account of an eye-witness. *Bost Med Surg J*. 1896;1135:397.
 95. Davis R. Davis RT: Reminiscences of 1846. *Bost med surg J*. 1896;135:377–8.
 96. Galloupe I. Galloupe IF: Personal recollections of the first use of anesthetics. *Ost Med Surg J* 1897; 1368–9. 1897;136:8–9.
 97. Dieffenbach JF. *Der Aether gegen den Schmerz* (The Ether Against Pain). Berlin; 1847. 251 p.
 98. Bennett N, Lemoine GJ. What VUCA Really Means for You. *Harvard Business Review* [Internet]. 2014;(February). Available from: <https://hbr.org/2014/01/what-vuca-really-means-for-you>