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If Aviation Were in Control of the COVID-19 Response

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Having spent time in aviation, I have had firsthand experience dealing with the complexity of the industry and the many known and hidden variables that might lead to error and catastrophe. Given the magnitude of potential faults, safety statistics are remarkable. In 2019, nearly 3 million passengers flew across the US on a daily basis. They all landed safely.[1]

Parallels between aviation and health care have been drawn in the past. Complexities are of similar magnitude, as are the high stakes of life and death, should errors occur. This comparison of the two industries begs another look, particularly in light of COVID-19 and the high stakes stresses it places on professionals and systems. Think about the magnitude of pressure, workload and emotional toll our health care professionals are experiencing during this COVID-19 crisis; undoubtedly, inhumane. Addressing this multivariant, unpredictable, and potentially lethal pandemic differently might have impacted our national experience for the better. Understandably, the initial focus of planning prioritized building capacity and sourcing equipment and supplies including personal protective equipment, ventilators, and beds. Not enough attention, however, has been focused on providing health care professionals with intelligent support systems for their use to manage the extreme medical complexity and the heavy workload of SARS-CoV-2. As with highly complex flight missions, COVID-19 is a multisystem, multivariate, highly demanding, and highly stressful challenge with dire consequences, if uncontrolled.

During my years in aviation I had the experience of using systems that buffered human factors to control flight outcomes. Although skilled and highly trained professionals are essential, unbuffered human factor variance creates risk. That risk plays out not only in outcomes, but also in emotional consequences for pilots and clinicians alike, who rightly demand professional excellence of themselves. The use of real-time, intelligent support systems is designed to

mitigate that risk. I worked within the exacting and disciplined culture of hazard control that leveraged data from all relevant sources. Only those critical elements needed for each moment of the flight were presented in a precise and easy to understand display. The discipline of protocol adherence and the learning culture, using daily reconnaissance, allowed us to make instantaneous adjustments when improvements were required. All of this combined to ensure no errors would complicate flight performance, supporting us, as professionals, to excel at our highest levels without undue stress. There is no hunting through multiple screens and sifting through extraneous data points to find the essential elements needed in a particular moment. Pilots perform with exacting precision even in the most intense, unpredictable situations, such as those clinicians are facing with each COVID-19 situation.

When I later became a physician, in my early 30s, I quickly realized health care was different, painfully lagging behind aviation in its capacity to maintain exacting performance under extreme circumstances. The systems I relied on to mitigate risk and error did not exist, resulting in health deterioration and suffering, especially in high-stress situations when professional capabilities can be pivotal factors. Two professions that face similarly high stakes – life and death – and two professions with unbearably divergent tools in their hands. I left my clinical practice and have spent much of my professional life bridging that gap by placing data-driven decision-support tools in the hands of clinicians and consumers, most recently with the aviation-designed Medical Brain, built with artificial intelligence, machine learning, and medical expertise.

Critical patient information is often scattered across disconnected records and buried in isolated fields, lacking the critical relevance of complementary inputs. Our vision was to create an intelligent digital platform that links all data sources and combines the data relevant to the current

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Medical Brain, New York, New York, USA.

clinical situation together to form an accurate, updated clinical picture. Medical Brain actively searches all data sources, including critical information buried in free text, to identify risks of health deterioration and gaps and errors in care. When detected, it notifies clinicians and patients, while coordinating actions among them to remediate the situation. Medical Brain has been in use over the last few years in acute and ambulatory care settings, helping providers and their patients navigate high-risk situations. Our focus on quality and its measurement is similar to the approach employed in aviation. The aim is to reduce measurable never events – those errors that are strongly associated with negative outcomes. Never events in health care are abundant because of the high dependency on human factors embedded in clinical processes. By maintaining aviation-level quality, with alerts specificity >95% as our standard, busy clinicians experience low alert fatigue and high levels of compliance with protocols. With this approach, significant reductions in never events have been achieved, in some places reaching >90% sustained reduction measured in regular reconnaissance analysis.

And then came COVID-19. Working together with our health care clients we examined expected hazards to consider – excessive workforce stress, system and capacity shortages, and uncharted scientific territory. First and foremost, we were asked to assist health care providers to perform their extraordinarily difficult jobs by embedding continuously updated COVID-19 content in the Medical Brain. Placing reliable systems in the hands of clinicians during this time of heightened anxiety was a control mechanism that both protected clinical quality and supported clinicians to mitigate clinical risk and manage their own stresses and performance anxieties resulting from the heavy burden of treating an unknown pathogen.

In New York City, the original epicenter, we also were asked to assist hospitals and public health and government employees. Today, thousands of health care employees are communicating on a daily basis with the Medical Brain. It assists in determining COVID-19 risk, based on accurate differential diagnosis, taking into account underlying health conditions, multivariate symptom analysis, and COVID-19 exposure to determine if an employee would qualify to report to work, or if they might require home isolation and medical support. With provider stress levels at an all-time high and ongoing concerns about health and safety for themselves and their families weighing heavily on their minds,[2–7] an emotional support engine was added for on-demand conversation, coping support, and referral when needed. Here, too, accuracy was the winning factor to achieve user confidence and long-term stable use of this tool. Early risk identification is essential in preventing problems and the long-term sequelae of unsupported need. The aim is to keep our workforce healthy and functioning at the levels required to control the pandemic by providing continuous support for their physical, emotional, and professional practice needs.

We have a lot to learn from our experiences with this pandemic. When pilots complete intense missions, reconnaissance closes the loop for risk control. As James Fallows noted in his brilliant article recently published in *The Atlantic*, ''Aviation is safe in large part because it learns from its disasters.'' He asks, ''How would this look in an NTSB *[National Transportation Safety Board]* report?'' He was referring to a post-pandemic review that most likely will never happen.[8] Our health care professionals and the patients we serve deserve better.

Author Disclosure Statement

Funding Information

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