

Healthcare Leadership in the COVID-19 Pandemic: From Innovative Preparation to Evolutionary Transformation

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Purpose: In pandemics, centralized healthcare leadership is a critical requirement. The objective of this study was to analyze the early development, operation, and effectiveness of a COVID-19 organizational leadership team and transformation of healthcare services at West Virginia University Hospitals and Health System (WVUHS). The analysis focused on how Kotter's Leading Change eight-stage paradigm could contribute to an understanding of the determinants of successful organizational change in response to the COVID-19 pandemic.

Methods: The fifteen core leaders of WVUHS COVID-19 strategic system were interviewed. A qualitative thematic analysis of the interviews was used to evaluate key aspects of leadership dynamics and system-wide changes in healthcare policies and protocols to contain the pandemic. Outcome measures included the degree to which WVUHS could handle and contain COVID-19 cases as well as COVID-19 death and vaccination rates in West Virginia compared with other states.

Results: The leadership team radically and rapidly revamped nearly all healthcare policies, procedures, and protocols for WVUHS hospitals and clinics, and launched a Hospital Incident Command System. As a result of this effective leadership team and strategic plan, WVUHS surge capacity was adequate for COVID-19 cases. In addition, West Virginia was an early frontrunner in COVID-19 vaccination rates as well as lower death rates.

Conclusion: WVUHS's leadership response to the COVID-19 pandemic followed Kotter's eight-stage paradigm for Leading Change in organizations, including the establishment of a sense of urgency, formation of a powerful guiding coalition, creation of a vision, communication of the vision, empowerment of others to act on the vision, plan for and creation of short-term wins, consolidation of improvements and production of more changes, and institutionalization of new approaches. This approach was effective in limiting the spread and impact of COVID-19 within the hospital network and across the state, with many lessons learned along the way.

Keywords: hospital incident command system, organizational change, hospital management, leading change, COVID-19

Plain Language Summary

Our study captures the rapid early development and operation of an effective organizational leadership team at West Virginia University Hospitals and Health System (WVUHS) for addressing the Coronavirus Disease 2019 (COVID-19) pandemic. This analysis, supported by structured interview data from the core leaders of this team, outlines the measures taken by key personnel at WVUHS from the earliest reports of COVID-19 to the current

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vaccination program and the planned cessation of the new programs and services developed to combat the pandemic. We also considered how the measures taken by the WVUHS team were consistent with the eight stages of Leading Change presented by John P. Kotter. We believe that our study makes a significant contribution to the literature because there have been few descriptions of the “inner workings” of the development of leadership teams to rapidly and effectively transform hospitals to address the COVID-19 pandemic. The early measures taken by WVUHS to address the COVID-19 pandemic met with notable success and, therefore, can provide valuable information for healthcare leadership. Our findings provide support for Kotter’s Leading Change stages as a useful guideline for organizations, including healthcare facilities, that need to transform their operations to meet a challenge, such as a pandemic.

Introduction

In pandemics, centralized healthcare leadership is a critical requirement. Through foresight, necessary resources for healthcare organizations and essential facilities and services can be rapidly prepared, thereby minimizing the disease’s spread and impact. The Coronavirus Disease 2019 (COVID-19) pandemic began as a small event in Wuhan, China, in late 2019, but by January 2020 infectious-disease specialists warned of an imminent highly contagious and potentially fatal pandemic that could overwhelm healthcare systems.¹ This gave astute public health and medical communities an opportunity to prepare for the difficulties ahead.

A wide variety of challenges have faced the healthcare community regarding the nature, rate, and control of SARS COVID-19 viral transmission, the progression of the illness, specific population vulnerabilities, treatment methods, and possible viral variants.² The discovery of viral airborne transmission led to the critical importance of implementing universal use of face masks, physical distancing, and quarantines, once infected, in addition to dedicated hand hygiene. Specific groups needed particular precautions due to vulnerability, including the aged and patients with underlying medical conditions. More recently, challenges have emerged related to prevention of COVID-19 including vaccination development, distribution, and acceptance.² Therefore, leaders of healthcare facilities have had to stay abreast of continual medical and epidemiological developments in order to respond rapidly and effectively to prevent the spread of COVID-19 within their own facilities and communities, avoid becoming overwhelmed by COVID-19 patients, continue to treat

non-COVID-19 patients, and utilize continually evolving state-of-the-art treatment and prevention protocols.

Several articles have described healthcare facility COVID-19 preparations, from hospitals in Asia,^{3,4} Europe,⁵ and the US,^{6–9} to medical departments and services particularly impacted by COVID-19, including critical care,^{10,11} anesthesiology,^{12,13} labor and delivery,¹⁴ surgery,^{15,16} and radiology¹⁷ departments, as well as telehealth¹⁸ and capital allocation.¹⁹ The guidelines and protocols these facilities implemented were generally consistent with the Center for Disease Control and Prevention’s (CDC) recommendations,^{20,21} which were designed to reduce hospital and community spread of COVID-19. However, descriptions of the development of leadership teams for rapidly and effectively transforming hospitals to address the COVID-19 pandemic are rare. A few hospitals reported implementing a “hospital incident command system” (HICS).^{7–9} HICS is a hospital-management system created for large-scale crises by creating an integrated organizational structure to provide timely decision-making and coordinate communication within and between healthcare facilities. HICS clarifies responsibilities for assigned roles with transparent reporting channels.²²

This study was designed to conduct a preliminary exploration of the early development and operation of a pandemic leadership team implemented at West Virginia University Hospitals and Health System (WVUHS) 24-hospital and multi-clinic state-wide network, with an additional focus on how well their leadership dynamics followed Kotter’s eight-stage paradigm for Leading Change²³ in organizations. Kotter argued that, to make the fundamental changes needed to successfully adapt to novel situations, organizations must perform the following actions: establish a sense of urgency, form a powerful guiding coalition, create a vision, communicate the vision, empower others to act on the vision, plan for and create short-term wins, consolidate improvements and produce more change, and institutionalize new approaches.

Methods

Independent individual interviews were conducted by the first author with each of the fifteen core leaders of WVUHS’ COVID-19 strategic system between October 26 and December 29, 2020, based upon a structured set of questions ([Appendix 1](#)). The leaders were informed that the purpose of the project was to learn how the COVID-19 response unfolded at WVUHS with a focus on how to improve handling of healthcare crises,

including pandemics, in the future. Therefore, they were encouraged to be factual and substantiate their responses with explicit details to minimize subjective opinion or bias. The interviews were recorded and archived with the participants' permission. In order to capture the dynamic organizational and management process, an exploratory qualitative thematic analysis reflecting each of Kotter's eight stages²² was completed and representative interview quotes were selected to illustrate central themes. Effectiveness was assessed by the leadership team's ability to rapidly develop and implement a system-wide COVID-19 response plan as well its ability to contain viral spread and impact within the hospitals and community, including WVUHS patient capacity and COVID-19 vaccination and death rates. The study design was approved by WVU ethics review board.

Findings

A systematic thematic analysis of the interviews of the fifteen core leaders of WVUHS's COVID-19 response team revealed universal consensus regarding the transformational process of preparing WVUHS for the pending pandemic as well as ongoing containment of COVID-19 spread through the hospital system and community. The themes emerging from the interviews were organized using Kotter's eight-stage paradigm.

Establish a Sense of Urgency

All participants agreed that WVUHS leaders established an early sense of urgency well before COVID-19 was considered a pandemic or had been diagnosed in the United States (Box 1). Within weeks of the first reported case of COVID-19 in Wuhan, China in late 2019, WVUHS leaders began to prepare for a potential pandemic. The Emerging Infection Disease Team met in January to assess vulnerabilities and hazards and ensure their hospital system had plans and protocols to manage the crisis. All ICU directors gathered to assess the threat and develop an initial emergency management strategy. Early in February, the first COVID-19 cases were diagnosed in the US,²⁴ at which time WVUHS leadership realized that a revolutionary change in leadership was urgently needed to prepare the hospital and clinic network for a surge in COVID-19 cases among the people they serve. These critical leadership decisions were made over a month before the first confirmed case of COVID-19 in West Virginia on March 17, 2020.

Box 1 Interview Quotes: Establish a Sense of Urgency

Our Emerging Infectious Disease Team first met in January 2020 to assess vulnerabilities and hazards, ensure hospital has plans and protocols in place to manage crisis

- Bill Black, Director of WVUH Critical Care and Trauma Institute, Acting Emergency Management Director

Sense of urgency, something new foreboding was upon us – we are meeting in 2 hours – getting all ICU directors together ... what was threat ... took 2 hours to sit down and put everything together ... building a house without any floor plans ... being prepared for the onslaught

- Gregory Schaefer, Associate Director of WVUH Surgical Intensive Care Unit

Saw this as potentially disastrous ... massive fear

- Stephen Hoffman, VP of Clinical Integration, WVU Health System

As scared as we were in mid-March, we took our responsibility very seriously. We serve a swarth of a million people

- Ronald Pellegrino, COO WVU Medicine and Hospitals

Mass casualties are traumatic; this is like a gradual mass casualty

- Alison Wilson, Executive Chair WVU Critical Care and Trauma Institute

Form a Powerful Guiding Coalition

This early sense of urgency led immediately to the formation of a powerful guiding coalition to respond to the serious nature of the pending COVID-19 pandemic, according to all study participants (Box 2). On February 2, 2020, the WVUHS CEO delegated his normal executive authority and assigned the leadership role of the health system for COVID-19 response to a physician leader, who immediately became the primary authority and ultimate decision-maker. The physician leader performed a rapid needs assessment to recruit the best experts for this urgent crisis. Over thirty leaders from across WVUHS were chosen to become a powerful guiding coalition which, according to the participants, was extremely effective in transforming the entire health system during preparation for the pandemic and COVID-19 surges. Unlike typical hospital crisis-management strategies, WVUHS administrators selected physician and organizational leaders with expertise and experience directly relevant to guiding the entire healthcare system through the pandemic.

A fundamental role of this coalition was establishing HICS to facilitate rapid, 24-hour communication between the leadership team and all hospital and clinic personnel. The COO of WVUHS Children's Hospital, who had

Box 2 Interview Quotes: Form a Powerful Guiding Coalition

On February 2, 2020, Albert Wright, said 'Hey we have a serious COVID problem, your new role is King of Coronavirus' ... over the first 3 days we did a quick needs assessment ... had to recruit people to believe and unify around the problem ... no egos in the room here

▪ Stephen Hoffman, VP Clinical Integration, WVU Health System

I think one of the smartest things we did was assign one individual (Dr. Steve Hoffman) as our COVID authority and ultimate decision maker. Dr. Hoffman has excelled in this role.

▪ Albert Wright, CEO WVU Hospitals and Health Systems

A critical thing that we did was to immediately set up the Hospital Incident Command System in partnership with our physician leaders ... in-house hands-on leadership was important so we could make rapid daily decisions

▪ Amy Bush-Marone, WVUH COO Children's Hospital, WVUH Incident Command Leader for COVID-19

Couple unique things – Incident Command Center – think of key details and get everyone in the same room – different than what other sites have done

▪ Daniel O'Neil, WVUH Director of Pharmacy

Incident command center got bigger and better ... sometimes it takes a crisis to get single-minded

▪ Ronald Pellegrino, COO WVU Medicine and Hospitals

extensive experience developing healthcare facilities and services, was chosen as the incident command leader. All study participants reported that the coalition had a singular focus, prompted by the urgency of the pandemic that was unfolding in their communities and healthcare facilities. Without the external corporate infrastructure that may exist in other hospital systems, the in-house team was able to closely collaborate to make rapid daily decisions based on medical advances and feedback from all healthcare services, and shared these decisions with all relevant people. All study participants agreed that any disagreements within the guiding coalition were quickly resolved through immediate, direct, constructive discussions (Box 2).

Create a Vision

In March 2020, Governor of West Virginia appointed the WVU Dean of Health Sciences to be the state's "Coronavirus Czar." On March 13, 2020, the "Coronavirus Czar" outlined the overriding vision for the revolution in healthcare at WVUHS:

Our role is to give community members the best advice on how to avoid becoming infected with COVID-19 and to try to reduce the surge, the stress on our healthcare system.

This is different than anything we've seen – at least in our lifetimes.²⁵

All study participants supported this vision and agreed that their fundamental responsibility was to provide care for the entire state and keep patients, staff, and the community safe by establishing priorities based on medical expertise and innovative science, not politics, finances, egos, or general guidance from governmental agencies, which did not always apply to their situation at WVUHS (Box 3). An overriding theme that emerged throughout the interviews was the critical importance that all COVID-19 policies and protocols were consistent with the biomedical ethical principles of beneficence, no maleficence, autonomy, and justice for patients, families, healthcare professionals, staff, and society as a whole.¹⁴

Communicate the Vision

According to the study participants, the initial task of the leadership team was to effectively communicate the importance of prioritizing COVID-19, as the virus would permeate every aspect of professional and personal life (Box 4). It was critical that all healthcare professionals and staff understood the urgent nature of the pandemic and were rapidly educated. Participants stated that HICS facilitated effective real-time communication among all healthcare personnel throughout the entire hospital and clinic system. An entirely new system of information management and policy procedures and operations was required to handle the COVID-19 pandemic, which needed to be

Box 3 Interview Quotes: Create a Vision

We have to look after the entire state ... for the greater good of West Virginia ... Big picture is to keep patients, staff, community safe. Prioritization is critical based on science and resources ... not politics ... tough choices. focus on keeping the system open

▪ Stephen Hoffman, VP of Clinical Integration, WVU Health System

WVU Medicine is the state's largest medical system, biggest private employer, with 22 hospitals that we own, manage or affiliate with across 3 states and dozens of clinics ... tremendous responsibility.

▪ Amy Bush-Marone, WVUH Incident Commander for COVID-19

Our focus is on medical expertise and cutting-edge science, not just the CDC

▪ Arif Sarwari, Chairman for Department of Medicine, WVU Medicine

Just always do what is right, even if it is hard or financially taxing for the institution. The universe tends to unfold as it should and if you do what is right, things usually work out.

▪ Albert Wright, CEO WVU Hospitals and Health Systems

Box 4 Interview Quotes: Communicate the Vision

I believe that when facing a situation with so many unknowns, as we were in the early phase of the pandemic, taking control of coordinated communication is essential. People crave credible transparent communication that they can trust. Even if the message is uncertain and plans are still being developed, people will stick with you if they think leadership is trying and have the best intentions for our patients/employees.

▪ Albert Wright, CEO WVU Hospitals and Health Systems

Incident command key to communication ... made shifts every 8–12 hours ... building entire system of information management and policy procedures and operations that were communicated rapidly and efficiently through HICS.

▪ Stephen Hoffman, VP of Clinical Integration, WVU Health System

We had to ensure 'buy-in' from faculty and staff ... we rapidly educated everyone, to make sure we were all on the same page

▪ Darin Rogers, VP and Chief Ambulatory Operations Officer, WVU Medicine

Did a great job getting decision-makers at the same table ... communication great from senior leadership and incident command center ... ahead of game compared to lot of departments across country

▪ Daniel O'Neil, WVUH Director of Pharmacy

communicated rapidly and efficiently through HICS. Creative communication channels, including innovative email, website, and newsletter networks were used to update all healthcare personnel regarding current status, latest medical and scientific advances regarding COVID-19 spread, risk, containment, testing, and treatment. The leadership team was accessible at all times to answer questions from employees by email, phone, or in-person at the Incident Command Center.

Empower Others to Act on the Vision

Consensus among all study participants showed that the most critical component of the WVUHS COVID-19 plan was to empower everyone, on all levels in the system, to act on the revolutionary vision developed by the leadership team (Box 5). Without such collaboration, the new policies and procedures would have no impact on patient care, COVID-19 spread, or innovative interventions and treatments. Furthermore, for guidance from the leadership team to have a real impact on the diverse patients and services within WVUHS, healthcare professionals needed a reasonable level of authority to apply and modify the COVID-19 protocols as appropriate to their departments. Most importantly, COVID-19 required a new level of collaboration, cooperation, and teamwork.

Box 5 Interview Quotes: Empower Others to Act on the Vision

We had to recruit people to believe and unify around the problem ... Cast of thousands quickly bought in and had phenomenal effect. foundation of really good people ... all of them have been Godsend

▪ Stephen Hoffman, VP of Clinical Integration, WVU Health

I am incredibly blessed I work with folks that are incredibly understanding ... We all have the same goals aligned to provide needed services ... in such a way to protect everyone involved ... like managing a symphony, everyone has to play their part

▪ Darin Rogers, VP and Chief Ambulatory Operations Officer, WVU Medicine

Playing all an all-star team ... this was a collaborative effort but with a single-minded goal ... people willing to sacrifice for the higher goal made it easy ... molecular techs are MVPs

▪ Ronald Pellegrino, COO of WVU Medicine and Hospitals

Level of collaboration and teamwork and maintaining finger on pulse – and addressing issues in real-time – been impressed with response here – and thus far in state of WV

▪ Heather Hayanga, WVU COVID Lead for Anesthesiology

It is always amazing how people rise up during an emergency and demonstrate the best, brightest versions of them. COVID was no exception to this. It is important for leaders to support and inform, but also be wise enough to stay of the way and let superstars shine.

▪ Albert Wright, CEO WVU Hospitals and Health Systems

All study participants concurred with this perspective of the WVU Critical Care and Trauma Institute leadership:

My most memorable experience is the camaraderie that I've seen build between the different teams in the hospital ... unlike anything we've ever had before. To see this cohesive team working together is the most memorable and gratifying thing about this crisis.²⁶

All participants expressed gratitude for the healthcare personnel throughout the system, impressed by their initiative, dedication, collaboration, and compassion (Box 5).

Plan for and Create Short-Term Wins

To transform an entire healthcare system in preparation for a pandemic, short-term goals are critical. According to the study participants, the leadership team revamped all hospital protocols prior to COVID-19's arrival in West Virginia, from visitor visits and telehealth to airway management, critical care, and respiratory management (Box 6). All new protocols were made readily and easily accessible to all employees across the health system's

Box 6 Interview Quotes: Plan for and Create Short-Term Wins

We completely revamped and documented all hospital protocols and procedures before COVID-19 hit West Virginia

- Darin Rogers, VP and Chief Ambulatory Operations Officer, WVU Medicine

Wrote 100 policies in first few months ... changed everything from visitation and signs to beds and PPE

- Stephen Hoffman, VP Clinical Integration, WVU Health System

My responsibility was to make Ruby up to speed ... early focus was on multiple factors ... obtaining and regulating use of PPE, creative ways to obtain and develop our own PCR tests ... creative methods to test, contact trace and isolate to keep everyone safe ... creating teams to care for COVID patients

- Ronald Pellegrino, COO WVU Medicine and Hospitals

Specific goals on every level ... policies/protocols to keep faculty/staff from getting COVID, hospitalists to make sure bed capacity is there, risk management strategies for hospitals and university, working with Clay Marsh on COVID in nursing homes, collaboration on therapies and vaccines

- Arif Sarwari, Chairman for Department of Medicine, WVU Medicine

intranet. Many new services were implemented across all WVUHS hospitals and clinics; for example: acquisition, manufacture, and regulation of PPE and PCR tests; early identification and isolation of patients with COVID-19; creation of dedicated COVID-19 units with sufficient ICU-bed capacity; and creation of dedicated COVID-19 treatment teams. Meanwhile, other services were transformed; for example: contact tracing; visitation policies; decisions regarding elective procedures and surgery; environmental controls; infection control during intubation and surgery; protocols for labor and delivery; guidance, acquisition, and distribution of therapeutics; policies regarding telemedicine; human-resources issues; nursing-home infection control; and risk management. According to the participants, these goals were rapidly established and met. This speed was not only to reduce the spread of infection and fatalities, but also to enhance personnel's motivation to persist despite the stress of increasing COVID-19 spread into West Virginian communities and healthcare facilities.

Consolidate Improvements and Produce More Change

Once the initial wave of progressive policies and procedures was implemented, a process of evolutionary transformation commenced at WVUHS. Team leaders needed to not only consolidate the initial revolutionary changes but also adapt to continually evolving medical knowledge

Box 7 Interview Quotes: Consolidate Improvements and Produce More Change

Plan was successful – fortunately plan much like constitution – living document – has to be applied to local regional state situation

- Gregory Schaefer, Associate Director of WVUH Surgical Intensive Care Unit

Bring in appropriate stakeholders, readdress to see what collateral damage could come from decision. Very few obstacles or red tape. Every plan has flaws – adaptability was key – information came out daily

- Ronald Pellegrino, COO WVU Medicine and Hospitals

Had to understand brand new virus and disease process ... digest scientific information ... tons of literature coming out ... Making sure everyone was staying educated

- Arif Sarwari, Chairman for Department of Medicine, WVU Medicine

Each hospital is different ... we can't be big brother telling everyone what to do ... we listened and adapted guidance and goals to each hospital and specialty ... had to prioritize based on rapidly developing science

- Stephen Hoffman, VP Clinical Integration, WVU Health System

Ongoing process of agreeing on evolving policies and protocols on everything, from visitation and managing beds to PPE and testing guidance

- Frank Briggs, VP of WVU Heart and Vascular Institute

Did amazing job early on, cancelling elective cases, getting ahead of the game, masks, isolating virus ... need a Command Center to put out general direction, uniform plan. But with dexterity to fit interventional [neuroradiology] surgery needs was crucial– our procedures are so different than others. None of our Interventional Radiology (IR) rooms are negative pressure – urgent stroke cases with high risk of contamination. We had to do emergency procedures on stroke patients daily with high risk of contamination.

- SoHyun Boo, WVU Associate Professor, Neuroradiology

Planning for vaccination 3–4 months in advance, purchased ultra-cold freezers, distributed among key sites ... ID staff who will be offered vaccine initially

- Todd Karpinski, WVUH Chief Pharmacy Officer

regarding COVID-19 and the lessons learned thus far (Box 7). For instance, understanding of the infectious spread changed significantly over time, leading to a variety of modifications in safety protocols (including PPE, social distancing, and contact tracing) and surgical, intubation, labor and delivery, and ICU guidelines. Similarly, discoveries regarding therapeutic interventions, from effective medications and use of ventilators to patient positioning led to revised treatment protocols. In order to prepare for vaccination programs, the study participants reported WVUHS's early purchase of super-freezers to store vaccines, decisions regarding prioritization of those most at-risk, as well as an ingenious state-wide

distribution plan, which included National Guard, local pharmacies, and nursing home staff in order to utilize 100% of the vaccines provided daily to the state.

As new protocols were implemented, feedback from clinical services and hospital management was used to both modify centralized policies and procedures and to identify differences between departments (Box 7). According to most of the participants, the evolutionary transformation often created challenges and, at times, tensions between specific medical services and the leadership team. For instance, the initial protocols developed for general operating rooms were not suitable for specialized interventional radiology procedures, which do not use negative pressure rooms and are designed for treating diseases that have very different paths of infections. Similarly, placing restrictions on all visitors was not appropriate for certain services, such as labor and delivery and end-of-life patients. All participants agreed that conflicts concerning these and other areas were always resolved through constructive discussions, leading to evolutionary transformation of COVID-19 priorities, policies, procedures, and protocols.

Institutionalize New Approaches

When the COVID-19 pandemic is ultimately controlled, most of the WVUHS policies and protocols are expected to be normalized in the direct aftermath. This will include termination of HICS and restoration of traditional administrative roles and functioning. However, several innovative programs will remain, including the expanded use of telemedicine, viral-infection controls, enhanced treatment protocols, maintenance of PPE and testing supplies, and state-of-the-art vaccination programs. Moreover, the ability and readiness to implement emergency leadership teams, such as HICS, remains in anticipation of future pandemics and other healthcare crises. Above all, the ability of all WVUHS healthcare personnel to gather and collaborate effectively in a prolonged crisis has been tested, and the results have been favorable.

Discussion

The COVID-19 pandemic has challenged healthcare systems across the US and worldwide. Executive leadership at WVUHS responded to the impending pandemic, motivated from a very early sense of urgency, by rapidly delegating authority to experts in critical fields, from infectious disease to organizational management. This guiding coalition had an overriding vision to contain the

infectious disease throughout WVUHS, while simultaneously continuing to treat serious non-COVID-19 medical conditions. To accomplish this mission, this leadership team radically and rapidly revamped nearly all healthcare policies, procedures, and protocols for WVUHS hospitals and clinics. To communicate this vision and empower the healthcare personnel responsible for implementing this strategic plan, HICS was launched. Using daily, real-time, transparent, bilateral communication channels across all levels of healthcare management, significant revisions were made and implemented based on lessons learned, rapid scientific and medical developments, surges in COVID-19 cases, and continuous feedback from clinical services, departments, and facilities. An essential, though at times painful lesson learned was how to weave the delicate balance of centralized leadership and the unique needs of each medical facility, specialty, and service.

This organizational leadership process was generally effective. At no time were WVUHS hospitals or clinics overwhelmed, despite national and state-wide surges. Intra-hospital and community spread of COVID-19 was contained, patients were rapidly identified and treated using state-of-the-art medical science, and medical service priorities were continually responsive to the influx of COVID-19 in the community and hospital system. All healthcare services were maintained, although elective surgeries and procedures were reduced as needed.

The effectiveness of the WVUHS COVID-19 response, as the largest healthcare system in West Virginia, can also be assessed by comparing state and national COVID-19 vaccination and death statistics. According to the CDC COVID-19 data tracker,^{27,28} as of February 6, 2021, West Virginia led all states in administration of the vaccine (5.6% of the population), at twice the national average (2.5% of the population). This success was captured in a Financial Post article on “How West Virginia, one of America’s poorest and most rural states, became a leader in rolling out COVID-19 vaccine.”²⁹ Furthermore, as of March 15, 2021, West Virginia had a total of 141 documented deaths due to COVID-19 (per 100,000 residents), whereas there were 162 deaths (per 100,000 residents) across the nation.^{30,31} In fact, at that time, West Virginia had less deaths per capita due to COVID-19 than 60% of all other states.³⁰ While there could be other explanations for these outcomes, such as West Virginia’s rural demographics, there does appear to be a relationship to WVUHS leadership’s early anticipation and relentless efforts to stay ahead of the COVID-19 pandemic during

the early months of the pandemic. Therefore, aspects of WVUHS' COVID-19 leadership dynamics may provide guidance for healthcare facilities in handling both the current pandemic and future wide-scale healthcare crises.

Conclusion

Innovative revolutionary preparations for the COVID-19 pandemic by WVUHS management led directly to evolutionary transformations, which have been generally effective in limiting the spread and impact of COVID-19 throughout WVUHS and across the West Virginia. Support was provided for the utility of Kotter's eight stages of Leading Change paradigm when healthcare institutions need to make fundamental transformations in their operating methods to negotiate novel situations. Interviews of organizational leaders were found to be a useful preliminary investigational tool for examining leadership-management processes.

These preliminary findings suggest that proactive healthcare management training in Kotter's paradigm of organizational transformation could enhance leaders' ability to rapidly develop and implement the critical steps needed to respond to large-scale healthcare crises such as COVID-19 and other pandemics. This management theory could be tested by a systematic study comparing healthcare management explicitly trained in Kotter's eight stages of organizational change, as applied to large-scale medical events, such as pandemics, to facilities without such training.

Clearly a limitation of this study was the use of interviews by the healthcare leaders at WVUHS, who may be predisposed to address their own organizational processes in a favorable light. This concern was mitigated, in part, by the stated purpose of the project, which was to learn how the COVID-19 response unfolded at WVUHS with a focus on how to improve handling of healthcare crises, including pandemics, in the future. Therefore, the leaders were told to be critical and constructive, using factual evidence to support their perspectives during the interviews. In addition, the thematic analysis of the interview responses primarily focused on concordance with Kotter's leadership paradigm, while more objective measures were used to assess the effectiveness of their approach to handling the pandemic. Future research could benefit from using more quantifiable measures of leadership dynamics and organizational changes in a healthcare crisis including input from front-line healthcare professionals, together with more precise

outcome measures. In addition, systematic comparisons among comparable healthcare systems regarding leadership dynamics in response to a pandemic could be valuable.

Humans tend to rally to address crises that threaten our communities and societies. Despite early warning signs, visionary leaders are needed to anticipate and take radical action far in advance of pending threats. This lesson must be heeded by all in the future, from healthcare facilities to the highest levels of government.

IRB

The study design was approved by West Virginia University Institutional Review Board.

Informed Consent

Written consent for recording, archiving, and publication of all interviews by the participant on record.

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