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MOBILIZATION OF HEALTHCARE TEAMS IN MANAGING OUTBREAKS: CRITICAL FUNCTIONS AND STRATEGIES

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Abstract:
Healthcare teams play a crucial role in managing outbreaks effectively. This essay explores how healthcare teams mobilize to manage outbreaks and discusses their critical functions in responding to public health emergencies.

By examining the collaborative efforts of healthcare professionals, policymakers, and researchers, this essay highlights the importance of coordination, communication, and expertise in controlling and preventing the spread of infectious diseases.

Keywords: Healthcare teams, outbreaks, management, critical functions, coordination, communication, expertise, infectious diseases

1.2 1. Introduction to Outbreak Management

Although influenza mortality has declined significantly worldwide since the pandemic, a notorious exception has been the 2017–2018 season, in which rates increased significantly in the USA and the number of deaths exceeded those recorded in five decades. On average in high-income countries, seasonal influenza kills 5 times more people than road traffic accidents, and the 2009 pandemic was milder in this respect. As well as triggering excess mortality among the elderly, the A (H3N2) virus especially affects adults (Pablo Caeiro & I. Garzón, 2018). This article reviews the critical functions and strategies for mobilizing healthcare teams in the complexity of managing influenza outbreaks, applicable to a range of high-consequence communicable diseases. Lafond defines public health emergency preparedness as the ability of the health system to prevent, detect, respond to and recover from events that threaten the health and safety of populations in the terrain. Large outbreaks require the rapid ramping up of diagnostic, treatment and support capacities,

which will only be possible on the basis of preparation. The healthcare system is often the first locus where epidemic pressures begin to manifest. Its emergency plans should include proposals to increase care capacity, monitor healthcare workers, and an approach to mental health care. All these procedures must be updated in advance, tested and integrated into the other plans of the health care system. Appropriate supports and upgrades must be provided to healthcare workers. Many of the lessons derived from the response to the 2009 pandemic in the EU underline the need to reinforce multipartite coordination and communication structures at all levels. In addition to the skills and equipment mentioned above, there are specific critical functions that are typically mobilized in outbreaks of high-consequence communicable disease.

1.1. Defining Outbreaks and Their Impact on Public Health

Outbreaks are similar to epidemics but have a smaller geographic distribution, they are not usually statewide, national, or global. On the other hand, pandemics come from outbreaks on a broader geographic scale or level, such as national or international. Outbreaks also imply widespread disease and/or death, but are often more threat based (not acute), i.e., "outbreaks of lung cancer in factory workers highlighted the risk of long-term exposure to toxic substances." Outbreaks can lead to pandemics. The manner in which outbreak interventions are conducted is often of equal or greater importance than the outbreak itself. Outbreaks have the potential to disrupt society, governmental stability, commerce and public perception of safety. Political and economic factors may play a large part in what preventative and responding measures are taken in an outbreak response beyond the practical aspects of managing the disease (Pablo Caeiro & I. Garzón, 2018). Various complications might arise that can hinder the control and command structure of an outbreak. There have also been numerous cases of hospitals or other health care facilities not having proper procedures in place to quickly determine the most appropriate means of action in an outbreak.

1.3 2. Formation and Structure of Healthcare Teams

When an infectious disease outbreak, such as a pandemic or epidemic, occurs, it is absolutely critical to mobilize healthcare professionals to protect public health and save lives. The term 'healthcare workers' typically represents a variety of professionals who may or may not have direct contact with patients or clients, but in the context of outbreak response, healthcare staff who have direct contact with patients and clients are often referred to as 'healthcare teams' or 'clinical healthcare teams'. This article will use the term 'healthcare teams' in the context of these staff. During outbreaks, healthcare teams constitute the primary and often first line of defence in caring for patients or clients, implementing strategies to reduce the spread, and assisting on control and response strategies (R. Jordan et al., 2022). As such, when healthcare teams are not adequately supported to carry out their critical functions, it can significantly threaten the ability to manage an outbreak, and increase risks, such as secondary infectious diseases. Essentialist (critical) functions contribute to the ability of healthcare teams to effectively prevent and control outbreaks and manage exposed individuals, are based on recognition of shortages or availability of healthcare workers. Developed strategies are proposed, such as organization, training, work environment, and quality of clinical practices, and are supported by evidence to ensure healthcare teams can effectively prevent and control outbreaks.

2.1. Roles and Responsibilities of Team Members

The team should be divided into at least five sub-teams. Each teammate should be familiar with one another's responsibilities, so they can efficiently hand over. If possible, an additional team member should be on-site ready to cover staff absences and assist during handover bottlenecks. This personnel should ideally be unaffected by the same incident. Regular handovers – typically

at shift changeovers – should last no longer than 10 minutes, out of consideration for the remaining staff who have their own handover duties. After patient handover, staff are encouraged to leave the hospital directly. Staff should shower in hospital upon completion of final shift for the day and before entering any hospital non-clinical area, including meal areas. If shower available in ED, staff should shower prior to handover (Lin Tallie Chua et al., 2020).

Throughout the COVID-19 pandemic, healthcare workers in hospitals have faced significant professional and personal stressors. Rates of stress, anxiety, and depression are high among frontline responders. A qualitative study of VHA frontline workers indicated that professional isolation and lack of staff engagement amplified moral injury during the pandemic and a common sentiment during the COVID-19 pandemic pointed to inadequate measures to protect staff (R. Jordan et al., 2022). This heightened vulnerability has resulted in high levels of chronic fatigue, trouble sleeping, PTSD, and burned out health care professionals. Working during a pandemic has resulted in several negative consequences for healthcare professionals, particularly frontline responders. A survey of Spanish healthcare professionals reported increased rates of fatigue, insomnia, and PTSD after six weeks of working with COVID-19 patients. The SARS epidemic in 2002 resulted in similarly negative personal health consequences for healthcare workers, increasing depression, burn out, and chronic fatigue. To provide optimal care during a disaster, and ensure dispatcher-well-being, teamwork should be considered. In a study on emergency medical dispatchers during disease outbreaks, teamwork motivation was determined to increase dispatcher preparedness and decrease adverse health outcomes. Successful collaboration can increase staff empowerment and health-focused leadership can have a lasting positive influence on the personal health of personnel.

1.4 3. Communication Strategies within Healthcare Teams

Healthcare teams play a key role in managing outbreaks. In designing teams, it is important to engage in surge-proof planning, training, and coordination of these teams. In managing outbreaks, governments and other key stakeholders call on healthcare teams who may not have experience responding to large outbreaks. Although each outbreak is unique, general lessons from past outbreaks can be applied (R. Jordan et al., 2022). A coordination meeting should be organized promptly, where key functions and strategies are reviewed. The convenience sample of outbreaks, including one in a healthcare facility, generalizes across themes that are likely to be relevant to many types of outbreaks, including extensive outbreaks of communicable diseases in the community. The main recommendations may be relevant to units dealing with different types of outbreaks. Healthcare teams play a key role in managing outbreaks. At first glance, this is obvious, as the first word in the expression ‘outbreak response’ is ‘response,’ but there are active ingredients that should be carefully considered. Four key functions should be delivered by healthcare teams: patient care, staff protection, laboratory testing of suspected cases, and data management. There are several strategies to support the delivery of these core functions. Both the functions and the strategies to deliver them can be informed by an extensive consultation to draw on the lessons learned. In designing teams, it is important to engage in surge-proof planning, addressing the potential need for (semi-) permanent unit(s) that ensure isolation and to be able to deliver comprehensive infection control. Upon confirmation of an outbreak, teams should meet to discuss the main needs and responses. Early response plans should be focused on delivering four key functions. On a regular basis, infection control capacity, including adequate isolation facilities, is insufficient to prevent an outbreak from spreading widely. In order to develop a team capable of planning and responding to outbreaks, a framework of training inputs is proposed that spans from

training on the specific functions of outbreak teams to more general topics such as risk assessment, communication, and mental health.

3.1. Importance of Clear and Timely Communication

One of the most important functions of a healthcare facility in the event of a communicable disease outbreak is to have a well thought out, prepared set of actions to take in order to mobilize the healthcare team and get critical functions and strategies put into place as quickly as possible. The effectiveness of the response to an outbreak will depend on: how quickly changes to normal operations can occur, decisions that are made, and how well those decisions and changes are executed (N Medford-Davis & Bobby Kapur, 2014).

If taken by surprise, a successful catch-up will generally be more difficult to achieve than executing a response plan. As such those with healthcare facility responsibilities who may be called on to act need to be well prepared in order to facilitate a rapid response. Similarly, the better prepared a facility is when an outbreak occurs the more effective the response can be. Exercises, planning, and preparation efforts all help ensure a facility can quickly get the most appropriate practices running. A well prepared facility will be able to address several key functions and services immediately when a health facility response is triggered (Tabbaa, 2010). It will ensure that there is agreement on what decisions have to be made and who can make them, that there are well-developed channels of communication, a well defined process for how incoming information is to be treated, and a clear prepared and quickly implementable plan.

1.5 4. Logistical Planning and Resource Allocation

Critical Functions: Logistical Planning and Resource Allocation

The most widespread epidemics that break geopolitical boundaries are often classified as pandemics. Even local epidemics, particularly in urban environments, can be highly complex adaptive problems, especially when caused by emerging diseases. The outcomes of epidemics are influenced by a wide and interconnected range of factors, rather than just the biological characteristics of the infectious agent and the quality of the response to it. Both the extent of the outbreak and the human response are mediated by social, economic, environmental and demographic factors. Furthermore, both the dynamics of the outbreak and of the control interventions are also influenced by spatial factors.

Over time, a growing complexity of social interactions and mobility patterns is expected to further increase the risks of the rapid spread of infectious diseases across the globe. Although being connected and populated, the urban tesserae can pose immense logistical problems in the implementation of countermeasures such as quarantine and package delivery. As a result, enhanced strategies, technologies and organization that should take into account such aspects have to be developed (D. VanVactor, 2011). Activities such as comprehensive data collection and analysis, the development of specialized, high-precision computational epidemic models, and the execution of tabletop and full-scale simulations of outbreak scenarios are necessary to assess the possible development of a range of epidemic events, to evaluate the effectiveness of different intervention strategies and to identify optimal resource allocation policies.

4.1. Ensuring Adequate Supplies and Equipment

Significant planning, preparation, and foresight were required to ensure that healthcare workers could complete their valuable work. Four categories of these strategies are described in this section. First, steps taken to ensure that healthcare sites had the supplies and equipment needed to treat possible and known cases were described. Second, strategies and examples of how healthcare professionals were allocated to appropriate locations when medically treating known or possible cases were presented. Next, strategies that healthcare professionals could utilize to reduce the

likelihood that they contract or spread the disease were reviewed. The section ended with a description of how healthcare workers were educated and communicated with about COVID-19.
Patient care cannot be effectively provided if healthcare settings have inadequate supplies and equipment. This need to ensure that sterile, functional equipment was available to provide the necessary medical care in response to an outbreak was realized. Multiple strategies were used to ensure that healthcare settings in Muscat, Oman were supplied. Hospitals needed to work together to ensure that a regional stockpile of supplies was maintained. To do this, a hospital committee for ensuring the continuous availability of personal protective equipment (PPE) was formed, which included medical, nursing, and biomedical engineering representatives from each hospital (Balkhair et al., 2020). Early in the outbreak, potential shortages of essential medical equipment were anticipated. In response, a register of all essential medical equipment and pharmaceuticals was compiled. This register was used to note these supplies and track their stock availability, average consumption, predicted supply, potential for reuse, and need for repair. Biomedical engineering staff continued to service malfunctioning equipment, but only equipment on the registry was guaranteed to be repaired within a working day. If a working model of any non-essential equipment was available, it was removed from the ward and replaced with essential equipment. With an anticipated need for additional oxygen supply, oxygen delivery points were created throughout the hospitals, ICU beds in particular. Further venturi-type masks were recommended to reduce the need for continuous flow oxygen, as opposed to simple face masks. Stethoscopes were recommended to be used only in ICU settings and kept safely in the patient's room.

1.6 5. Training and Education of Healthcare Personnel

From the early days of the pandemic, it has been witnessed how vital the healthcare workforce is in the fight against an outbreak. As frontline workers and as roles in patient management, healthcare teams have been put under immense pressure. From the timely diagnosis and isolation of patients, to the efficient contact tracing, to the successful quarantine and treatment of patients; every step in outbreak management involves a well-designed plan that can only be executed with healthcare team mobilization. Safety is of paramount importance when considering training of HCW. HCW should be equipped with the necessary knowledge and confidence to carry out their work in ways that are both safe and effective. Training tools to be adapted must be informed by the rapidly evolving global understanding; a national strategy must be in place for this adaptation of knowledge into actionable training programs. Key to a coordinated response is a uniform understanding among all staff of responsibilities. Those managing the teams must ensure fluid understanding of the protocols, guidelines and safety measures. Training programs are necessary to enable staff to adopt this understanding in a consistent and safe manner. Programs must be in place to ensure all staff, not just clinical or frontline workers, are aware of the implications on them in a public health emergency (Al-Faouri et al., 2021).
In the evolving crisis, healthcare personnel should be trained to understand the disease pattern, its transmission risk and the rationale for the proposed recommendations. Trainings should be focused on patient care and on the safety of healthcare workers. Examples of these include updated guidelines, E-learning modules, real-time simulation exercises, and so on. Healthcare personnel should apply standard precautions broadly and avoid unnecessary close contact with patients with confirmed or suspected COVID-19. Training of healthcare personnel should follow an overarching national plan but be locally adapted. The motivation and leadership of healthcare managers are crucial. Training should be delivered in ways that make it accessible to all, keeping in mind the many staff who do not have English as their first language (Yee Kong et al., 2021).

5.1. Continuous Professional Development

Introduction of new learning programs in continuous professional development with upshots outlining the agenda of biosecurity rounds. Outbreaks have been a part of the world history and they will continue to emerge. The 2020 COVID-19 pandemic remains as the greatest health crisis of the century with the outbreak count surpassing 1 million (Arunachalam & Sharan, 2021). Much of the prevailing narrative revolves around health risk, job loss, economic and social recession, and general wellness. However, another concern surrounds the preparation status of health care systems and workforces, particularly the backdrop of new health contingencies such as emerging technologies, climate change and climate-induced problems, international travel growing at par with business, and potential new infectious agents. It is vital that in these days of 'global preparedness' a specific, unyielding attention must be given on ways to curb and manage pandemics and also to underscore the need for an organized system of emergency response, preparedness, mitigation, recovery, and vaccination dissemination. There needs to be balance in acquiring medication, assuring infrastructural readiness, borrowing resources from other large assets, and complying to regulations laboriously and collaboratively to solve the compounding issues of health, environment possibility, livelihood, and economy (Yee Kong et al., 2021). Efforts must be combined to design and set up a structured action plan to control the progress and form of epidemic diseases. Locating, confronting, and mitigating the outbreak must be geared with efficiency and scientific precision. However, the healthcare workforce, which is the frontline of tackling and controlling the disease, is not generally equipped with the necessary physical, educational, or training skills. In recent years, there have been cautionary attempts by leading health organizations to prepare for future health catastrophes. As the world is struggling with COVID-19, we must remember that this is not the last major epidemic and in future, health carers may need to deal with even more catastrophic events. The following aptitudes, when acquired, will competently edify and groom health obligated individuals. With the onset of such emergent milieu, medical students should be educated, combined and enabled the necessary pedagogical instruments to: Effortlessly discuss the measures to be taken to care for a patient who becomes critically ill. Discuss the moral considerations and approve a treatment plan for a patient with a life-threatening cerebral trauma. Enabling healthcare providers with a set of specific competencies to perform these tasks and providing educators with a grounding framework to design entrustable professional activities. Detainees of advanced professional skills and aptitudes in these Chambers should be intensified to concentrate on health practitioners in the early years of practice. Outbreaks like COVID-19 should make paradigm changes in the practices and enactments of medical pedagogy. A comprehensive rehearse framework concerning this edification and skill elaborateness is coded hereafter, endowed with broad definitions alongside quintessential principles and feasible forms. Amidst partisan convulsions of thought and practice due to chapters and minds separated, edifices or guidelines are aspired to proffer an all-encompassing and orthodox approach. Nevertheless, these reflections should become a concern for the collection of well-advised circuits as a whole in assembling a three-dimensional rendering to emergent situations of public health concern.

1.7 6. Utilization of Technology in Outbreak Management

Emergency management of the emerging infectious disease outbreak is crucial for threats to public health. Among the rising public health threats throughout the world, cases of COVID-19 have had a significant effect. The increasing count of COVID-19 cases has urged governments around the world to take cautious action to prevent the dissemination of the pathogen of SARS-CoV-2. It is essential to mobilize the collaborative efforts of the public health, healthcare, and security

communities in order to effectively deal with the emerging infectious diseases outbreak. Different healthcare teams have a different role in managing the outbreak of infectious diseases. Critical functions need to be achieved by the public health, healthcare, and security teams, specifically in surveillance, testing and diagnostics, isolating cases and quarantining contacts, treating cases, and communicating risk. Besides, to optimize the effectiveness of the healthcare teams, sound strategies need to be taken during the three phases of outbreak management (pre-outbreak phase, outbreak phase, and post-outbreak phase). Concerning the spread speed of the virus pandemic in the current globalized era, it has become even more relevant to prepare and plan for unprecedented global-scale outbreaks. Therefore, countries need to plan early and implement containment strategies immediately if a case is confirmed. Early and stringent approaches to containment, including the lockdown of cities in which the infection is known to have originated and those connected to them, will aid in preventing cases from exportation (Asadzadeh et al., 2020). In the face of the distribution of the infection to other areas, rigorous infection monitoring may assist to moderate the virus through contact tracing.

6.1. Telemedicine and Remote Consultations

The development of outbreaks is a challenging situation for healthcare teams. The COVID-19 restrictions implemented in many countries need to balance a fight against the spread of the disease and the maintenance of essential operational functions, with the related economic activities and strategic security issues. In this specific context, a security-related organization faced the risk of a COVID-19 outbreak on its operational base. Through the lockdown of the base, a health response to manage the outbreak was implemented consisting of a strong focus on early detection through a mobile diagnostic test facility. Additional patient screening was made with teleconsultations focusing on prompt similar symptom groups antigenic testings, quarantining of cases, and separating of groups of suspected cases, leading to early diagnosis and limiting the number of contagious patients. The managerial aspect and the unquestionable contribution of teleconsultation for a large-scale healthcare protocol implementation of quarantine and isolation measures are discussed (Allonneau et al., 2021). The advent of COVID-19, the second global respiratory disease outbreak in a few years, prompted the creation of a dedicated “Respiratory Protocol”. The protocol was based on remote consultation and monitoring, and agnostic orientation toward nasal and nasopharyngeal samples antigenic tests. The protocol also included a case isolation measure system, quarantine of “suspicious cases” by suspected exposure, and “telecommunication quarantine”, taking advantage of existing COVID-19 stop spreading instruction tools. The purpose of adaptive management was to orchestrate early symptom detection and early wide infectious case segregation in order to isolate a minimum number of cases in the premises of a militarily operational base. In this very specific environment, this approach prevented the epidemic spread on the base and enabled pursuing operational activities. The aim of the thorough description of the adaptive management of the outbreak is to help shape an efficient approach when a notorious health care system is unavailable or inaccessible, or to inspire organization facing similar constraints (Lehmann Mendoza et al., 2022).

1.8 7. Ethical Considerations in Outbreak Response

The response to any epidemic event brings into question the legitimacy of the outbreak control activities initiated, particularly when these increasingly interfere with individual freedoms. Ethical considerations must be paramount in any response to an outbreak, including respect for autonomy, protection of anonymity and confidentiality, the least infringement to achieve the desired public health goals, reciprocity, social justice, solidarity, and trust. These principles have often not been the paramount concern during the global responses to outbreaks of severe acute respiratory

syndrome and Middle Eastern respiratory syndrome. Korea's experience of the MERS outbreak clearly illustrates how an ethical response might founder, leading to community alienation and the undermining of initial public health goals.

The first quarter of the 21st century has already witnessed at least two significant outbreaks—the SARS epidemic and the MERS outbreak. To most people, outbreaks appear to be events evoking a variety of reactions from public health experts, health care providers, and the general population. Many initial responses might not be evidence based and might even exacerbate the spread of infection. Although we can learn from each outbreak, the epidemiologic conditions often differ, and rapidly devised policies from the prior outbreak might not apply well to the next one. Whether responding to a new epidemic event or evaluating a recent response, some ethical principles and issues remain constant. Ethical values and mitigation strategies based upon them can help inform and evaluate the public health response to these events and help preparedness for future outbreaks.

7.1. Balancing Patient Privacy and Public Health Needs

Since the emergence of the Human Immunodeficiency Virus (HIV) in the early 80s, there has been a push for broad interpretation of health information privacy laws to ensure that patient's HIV status is protected from all disclosure under the law; Religious and health care installations are a possibility that such a facility contains someone with a deadly, communicable disease, but the state and local health director are unaware of the implementation and status of quarantine; Community members receive copies of the patients' medical record to prove compliance with the provision of needed treatment, this also revealing results of a preclinical experimental evaluation; A state epidemiologist calls for a list of everyone else involved with the experiment that resulted in the exposure of the hospital staff, this could place the research and the hospital at fault whose actions are prohibited by the terms of the research protocol; This patient will withdraw from the follow-up research study because the research protocol could be interpreted to require the research to reveal to community members that the patient is participating in the study.

1.9 **8. Collaboration with External Agencies and Organizations**

March 2020 brought the onset of the Covid-19 pandemic in New York City (NYC), a main epicenter in the USA, and a rapid need to organize and develop a comprehensive and coordinated response among all NYC healthcare systems. A multi-site healthcare system, combatting a pandemic, quickly realized that while having individual emergency response systems pre-established and well-tuned was crucial, formalizing clear standards and approaches, and creating a more coordinated network throughout all independent healthcare systems, especially in a multi-site system, was essential to appropriately address the magnitude and complexity of operations. Regulatory and reporting bodies, through all levels of government, subsequently released a series of guidelines, standards, and requirements, often with very little lead time before full implementation, to adjust existing work-flows and operations accordingly. This resulted in a significant need for inter-system communication networks, to share, verify, and develop protocols and responses (E. Schaye et al., 2020).

Standardization of operations and regular operation updates enabled quick and efficient implementation of protocols and procedures citywide. The use and adaptation of resources across multiple systems provided a broader understanding and skill-set of rapidly changing information. Recognition that different systems excel in different response strategies allowed a leveraging of individual strengths and the cultivation of system-specific roles within the citywide plan. The establishment of numerous committees and task forces, with representatives across all systems, enabled the sharing of philosophies, methodologies, and outcomes, with a rapid adaptation of approaches, to demonstrate the most successful results and best practice across NYC. In hindsight,

many benefits of collaboration among all private, public, community, and federal hospital systems in NYC during the pandemic response have been observed, many of which remain applicable and essential for preparedness to other novel disease crises, and for future resurgence of COVID-19.

8.1. Coordination with Public Health Departments

The public health department is typically the organization that the healthcare partner will work with most closely during an outbreak. The public health department is also the organization that bears most of the monitoring responsibility for outbreaks. This makes them a critical early contact for healthcare partners. In many states, the public health department must be notified as soon as an outbreak is identified. After receiving this initial notification, the public health department will conduct an investigation to determine the scope of the outbreak. Once the outbreak is defined, they will also notify affected healthcare partners and instruct them on how best to monitor their own residents. Healthcare partners should always maintain an excellent working relationship with their public health departments, as they may provide vital resources during an outbreak.

1.10 **9. Community Engagement and Public Awareness**

Volunteers may be trained to manage new field hospitals under the direction of governmental or health agency managers. Health workers from other positions or in retirement should be drawn upon to serve as staffing reserves during health emergencies. Dictates shall be implemented to facilitate the coordinated and secure transport of health and medical supplies, equipment, and personnel to provide assistance to the affected area. A technical team is being assembled to assist in the development of instructions for the establishment, management, and operations of such hospitals. Spaces shall be found or created to serve as disinfection and decontamination facilities where individuals presenting signs and symptoms of the illness will be held until being taken to one of the field hospitals. Campaigns should be conducted to inform and reassure the public as to the strict safety of the plans for field hospitals. Plans shall be executed to establish and manage medical field hospitals in order to manage large numbers of cases of a novel, highly infectious viral disease. Agencies shall harness knowledge of networks of contacts, relationships with authorities, communications systems and structures that exist and may be developed in order to ensure the highest speed and ease of operations in managing the outbreak. The public health system must be expanded at present to increase capacity to work on a very large scale and at all levels of care. Agencies shall increase the ability to safely rule out more severe diseases such as Ebola. Building and supporting the development of robust government-organized and implemented interventions to increase confidence, reduce potential exposure and slow the spread of the disease prepared with essential resources such as personal protective equipment and diagnostics will help the technical work to better achieve the overarching objective of controlling the outbreak. Solutions to a number of urgent operational needs questions generated by this will be sought and shared, including, for example, the field settings most suitable for clinical diagnosis and isolation and the crucial structure and design security measures that will need to be respected to protect those in the field. To ease transportation services, field treatment units will need to be provided, supplied and managed. In addition, data gathering is urgently needed on the availability and operational status of required commercial and military assets. Understanding the large clinical, resource, and logistical demands that are likely to be placed on the area with a high caseload will drive health workers to take the necessary steps to be prepared. Volunteering to help in any capacity, such as setting up, running and/or supporting the medical response in the event of the disease's occurrence, would also be of use (Meekers et al., 2023).

9.1. Promoting Preventive Measures and Health Literacy

From the beginning of the COVID-19 pandemic in 2020, the Division of Literacy, Health and Wellbeing of the Directorate-General of Health in Portugal developed Social Mobilization and Community Engagement training sessions. The workshops aimed to optimize social communication strategies, leveraging the necessary knowledge, materials, and tools within local structures engaged to implement promotional initiatives in favor of health literacy by fostering those public health measures to protect individual and collective health. Necessarily, a Strategic Partnership with the professional organization that brings together the great majority of Portuguese pharmacists, directed at Caucasus, cities, and district coordinators. This innovative formative initiative's main objective was to provide public sector sustainability in accessible and culturally applicable information technologies, in light of new uncertainties and challenges brought about by a more virulent variant of the virus (Malcata et al., 2022). To curb the spread of the novel coronavirus infection COVID-19 caused by the SARS-CoV-2 virus, the Chinese government adopted strict prevention and control policies, such as wearing masks and maintaining social distance. As people with long-term high exposure to daily preventive measures for COVID-19, health workers are influenced by risk perception, health literacy, and other factors related to COVID-19. After a strict prevention and control policy vacates the living environment, examine the willingness of vaccine hesitancy among Chinese health workers, pay close attention to the vaccine hesitancy phenomenon on the basis of good health protection, and provide a reference for better immunization policies (Ling et al., 2023). In the context of the outbreak of a national-level public health emergency and considering that health care access has been restored or improved, it's found that the health care-seeking behaviors of Chinese health workers have changed, with increasing intention for active screening, timely reporting, and a significant decrease in the refusal to care and report. In specific, risk perception regarding COVID-19, knowledge of COVID-19, and confidence in preventing and controlling COVID-19 have an impact on seeking care refuse.

1.11 **10. Psychosocial Support for Healthcare Teams**

Many health providers have created psychological support intervention plans for healthcare staff in their hospitals. A psychological first aid well-being support service rounder program was created at for frontline healthcare workers. The team was comprised of psychiatry residents and undergraduate peer advisors. Rounds were conducted in acute care units not designated as COVID-19 units in the beginning because those units experienced a higher turnover of COVID-19 cases. The program ran from 7 a.m. to 7 p.m., with individual teams visiting 1 to 2 units per week. Mondays and Thursdays were psychiatry MDs, while Tuesday and Friday rounds were UAs. It was determined that avoiding lunchtime hours resulted in more engagement with healthcare workers. Staff members were able to recognize support rounders due to badges provided at orientation. However, instead of approaching support rounders, staff usually visited the care team psychologist in terms of psychiatric consults. It was recommended to have supervisors communicate with their care team staff the first few days of the team's presence to explain their function. Then, unit visits consisted of PPE training for all team members and included a badge note with the team's availability. Rounds met with the unit supervisor before seeing healthcare staff, discussing any specific concerns or individuals to target . Upon arrival in the unit, the team would visit nursing stations and team rooms to pass out cards with a brief description of their function and availability with the plan to visit again during the same hour. Initially, the team activated mental health threat codes during unit visits to familiarize themselves with the units. Healthcare staff could self-refer to an emergency psych evaluation for significant distress or were identified as vulnerable by the team. It was planned for rounds to continue after July 2020 through

biweekly rounds with a previous team of support rounders. The team scheduled meetings to discuss strategies in unit approach and enhancing engagement. It was planned to talk to support rounders in other institutions to discuss strategies for long-term engagement.

10.1. Addressing Burnout and Mental Health Challenges

The pandemic has shed a spotlight on the consequences of burnout on the mental health of healthcare workers (HCWs). Burnout affects approximately one-half of our colleagues, placing them at higher risk for broken relationships, alcoholism, substance abuse, and even suicide. The global situation has significantly intensified this problem among HCWs employed in intensive care units (ICUs), jeopardizing the ability to deliver critical care. The goal is to develop 14 comprehensive suggestions providing actionable guidelines for healthcare systems to sustain the workforce for the duration of this threat and for future similarly impactful crises (L. Sprung et al., 2023). A well-functioning health system requires staff whose mental health is actively supported by their institutions. Current research makes clear that mental health difficulties are common among HCWs involved in the pandemic response, and that such psychological distress degrades the effectiveness of these interprofessional teams and the quality of care their patients receive.

At the same time, the healthcare community has experienced the departure of a large number of seasoned critical care colleagues from ICUs, relocating them to less stressful roles within the health system or to other professions entirely. In order for this productivity to be sustained across this and future threats, HCWs must be afforded both the freedom and the resources to seek assistance for their mental health. Scalable approaches already in place at the national or regional level are recommended, as well as innovative strategies being implemented at large health systems. This institutional support can range from the advertisement and employment of online applications for mental health counseling, to proactive outreach through dedicated psychosocial support teams. Similarly, physical wellness must not be neglected as an integral component of emotional wellness. With respect to frontline care, hospitals should take care to create the best possible working conditions for HCWs under the restrictions imposed by the pandemic, and seek to ensure the resources available are being optimized.

1.12 **11. Risk Assessment and Mitigation Strategies**

Public Health Response

As the warranted health authority, NSW Health was responsible for the public health response to COVID-19. The outbreak response included a range of support functions, including Incident Management Teams for contact tracing, case and outbreak management; intersectoral and multidisciplinary teams to carry out case and outbreak investigations as well as manage aspects such as waste management, quarantine and cleaning; and health advice teams to provide clinical, environmental health and public health advice. Medical staff delivered clinical services. Rapid mobilization and scaling of the response, and deployment predominantly in the non-metropolitan local health districts, required an agile and targeted approach across a range of functions and teams. This manuscript aims to describe the types of deployment of these teams and functions, and report the fieldwork experience of the deployees. Of the 30 deployees invited to participate in the survey, 5 participated: 3 fieldwork supervisors, the medical attaché managing the medical fieldwork deployment, and the deployment's technical lead.

Deployment Strategy Implementation strategy for the high demand functions involved consideration of the types of deployment and the recruitment process. The deployment required a targeted and sequential approach anticipated through the incident planning cycle. In this specific context, medical fieldwork included the rapid deployment of onsite medical support at local health districts and accommodation providers and medical fieldwork deployments with security

personnel to support wellbeing checks interviews conducted by police or ADF. In addition to sourcing, training, scheduling, and providing an injury assessment plan and PPE, implementation also involved the consideration of risk mitigation strategies. Since some of the deployed staff had not previously undertaken fieldwork or had limited experience, and faced a novel and infectious virus, there was a large effort to develop resources, training, procedures, and information to protect their safety. Deployees were given the precautionary instructions to use personal protective equipment, such as a mask, gloves, and gowns, distance of at least 1.5m from the interviewee, sanitary items in order to clean the hard surfaces used during the interviews, in addition to communicating via interphone to the interviewee through the window with the accommodations.

11.1. Identifying Vulnerable Populations

We need to find and support highly-vulnerable populations in response to an outbreak. During a crisis, the most affected and needy (specifically the at-risk individuals, vulnerable or homeless, which include also those with disabilities or severe dependencies) may suffer most. However, they may lack means or opportunity to make their case and ask for help in emergency settings. Actionable information will assure correct priority rules for emergency decision making and management of scarce resources. There already exist stable, local connections of support and care for these groups, but they may suffer most with emergency responses and thus indirect, early support is required.

Certainly, disability increases dependency and vulnerability in cases of emergency. True support for the most severe cases requires pro-active, frontline defenses that may only be supported at the policy level and may suffer most with the collapse of support systems typical from emergency settings. Further, the strategy naturally incorporates highly-vulnerable individuals outside the traditional confines of healthcare (i.e. those individuals facing severe housing dependency and without any other form of disability) (Indrakanti et al., 2016). Therefore, crucial attention to specific definitions and implementation details are paid, including suggestion on how to operate in practice.

Unfortunately, the scarce literature regarding this problem assumes insured access to healthcare facilities and disregards other critical structures of assistance such as food or shelter. Among the most recent work aiming to assure a more balanced access to the pandemic treatments, only the one deeply analyzes the problem of unprotected individuals, though under additional simplifying assumptions.

1.13 **12. Surveillance and Data Analysis in Outbreak Monitoring**

Pandemics are unpredictable and rapidly spread due to globalization and sustained connectivity. Outbreaks are common and are managed by healthcare systems with varying degree of success. However, outbreaks with high transmission rates can overcome the surge capacity of these systems. In such cases, the threat that the outbreak poses to the population can persist long after the initial outbreak has run its course (Soubeyrand et al., 2020). The proper planning and preparation for this situation is only achievable through the continuous and systematic collection and analysis of health-related data. Although some data are commonly collected due to required reporting, these are often insufficient to respond to all outbreak events.

During the extended recovery from the outbreak, many sectors of the national infrastructure can be called upon to assist; health care data systems are one such resource. The information contained in health care databases is frequently detailed and granular. Careful but rapid analysis of these data could help identify response strategies tailored to the specifics of the outbreak. This process starts with developing a model for the outbreak event. Next, strategies that would mitigate the modeled outbreak then be developed. Finally, the performance of the response that was actually

implemented could be evaluated against the theoretical best case. The experience of New York-Presbyterian Hospital in complying with required reporting and developing a robust platform for surveillance data is described.

12.1. Utilizing Epidemiological Tools and Models

In order to control an outbreak of infectious disease, there are policy tools that can be used. The simplest approach is to isolate infectious individuals once they become symptomatic. This has been used since medieval times and during the 1918 influenza pandemic. In its basic form this can be extremely effective and diversification of the life cycle of the outbreak to different places (such as schools and households) can have a powerful impact (Déirdre Hollingsworth, 2009). The second generation effect of this policy is to instil a certain level of public fear in the early stages of an outbreak, which can have a short term impact on reproduction rates.

In recent years mathematical modelling has been used to assess the likely success of more refined versions of this policy. One of the outcomes of the SARS outbreaks was the recognition that the outbreak in Toronto could have been contained more easily if rapid tracing and quarantine of all contacts of known cases had been implemented. The control of outbreaks of meningococcal disease relies on the tracing within 24 hours of exposure and antibiotics (Leach & Hall, 2010). However, in both cases the disease was mainly only infectious once symptoms appeared. If isolation included the prodromal phase of the disease more resources would be required. For emerging diseases, when risk populations are not well known and there is no easily identifiable clinical syndrome, this would be particularly challenging.

1.14 **13. Case Management and Patient Care Protocols**

The present section is updated with content.

13.1. Standardized Treatment Guidelines

The management of patients with confirmed or suspected outbreak-prone diseases always raises challenges, whether the disease is characterized by high mortality or high infectivity. This is all the more acutely the case at the start of an outbreak, or at the point when the number of cases increases sharply: staff may be alarmed by the high mortality, or by what they perceive as a high risk of infection; certain procedures must be carried out quickly and the workload can become overwhelming, even in settings with good staff-to-patient ratios. The risk of human error is high, individual protective measures may be improperly handled, decontamination may be haphazard, the layout may be badly thought out and hamper good patient care, etc. Because of all these interlocking factors, managing outbreaks requires the capacity to mobilize very rapidly a significant and well-coordinated team for treating and isolating patients.

To facilitate and standardize the management of infectious patients, specialized treatment guidelines should be developed for the different health areas. These guidelines should simply and clearly present the procedures for patient entry into the treatment area, sample collection, protective and preventive treatments, patient care and drug “offering”, patient exit from the zone, also decontamination, security and medical waste management procedures. These guidelines can include flowcharts providing an overview of all the procedures in a particular area, as well as “ready-to-post” checklists that can be put up inside the different areas. This should ensure that procedures are better respected, even by the less experienced staff members, who can be more easily stressed in this type of situation (Garry et al., 2020).

1.15 **14. Research and Innovation in Outbreak Response**

Research and Innovation in Outbreak Response During the COVID-19 Pandemic in 2020

Given that it was not tested and/or approved in 2020, the "drug/vaccine" might currently only be used in severe, special, controlled or emergency circumstances and it should not be interchanged

with other drug product... Any "drug/vaccine" used in a smart way (e.g.: to save a certain group of people) might optimize its efficacy. Drug overuse in times of pandemic might further lead to blind population immunity; therefore, a graduated approach might have worked out better if the community's cooperation had been gathered. Unfortunately, the community has not agreed on any proposal made to the authorities, but strongly insists that "drug shortages" are the government's responsibility, the same way the authorities keep placing the blame game as far as "illegal gatherings" are concerned. In general, border lockdowns and quarantine measures work. However, without that much needed cooperation, only a very small percent of "black market" products were brought down, and "unlocked the bell", ie: virus started spreading in communities, "shattering the glass"… Had it not happened so, there would be around 277.9 mln or so infected patients by the end of the year 2020, and there have been no doubt that a substantial portion would be extremely sick and dying. During first wave in 2020, being unable to stand the high tension and stress, healthcare professionals would often cheat and/or fake patients' COVID-19 data wiping out all symptoms that might qualify as 'COVID-like', thus many infected patients has fallen through and became invisible to the system. Also, large-scale bank frauds would produce negative "test" results wiping out sure high-risk contacts and facilitating vacations. On top of all that, a big commercial chain has used its connections to cover up someone's infection, further contributing to the overall spread. Once very successful second lockdowns have been announced, the cat was out of the bag... It's perfectly clear that each society is functioning autonomously and developing different strategies on how to cope, fight and overcome thereof virus. For example, subject X has been exceptionally committed for at least twelve months in a row, only when noticed the resistance endure it's effect, that one strategy has been replaced with the other, so in the long run all anti-virus efforts are gone down the drain. But there is a measured and reciprocal response as well. Relying on modeling technology to predict such a move, national authorities developed a highly sensitive strategy, so on the minute it was learned about the new plan, such immediately collapsed. In some arm race pace, all that conspiracy theories and "front line epistemology" unfortunately haven't been proven enough to take advantage and launch a counter-effect procedure. In a concerted response, the entity did not rush to close the borders, but took the first ticket available to go out and spread this infection worldwide, while closing its own borders to let the rest world cope with its loudest voice. But all the obvious failures and complimentary responses do not indicate a healthy or positive development in any society. Broadly speaking, insufficient civic trust or government, incompetency, corruption, ignorance, recklessness, fear, pride, or indeed evil. Some well-prepared societies have focused in exceptional state-of-the-art technological services; starting with precise forecasting of new infections, followed by thorough persons' or groups' contact monitoring in a timely manner. Putting in place a newly developed quarantine instrument, enabling smart detecting all personal mobile phones who might be on the list of risk contacts. Though such a device later appeared to be somewhat effective, in other respects it was fatally inefficient, and the first to be detected were points out that it's designed in the wrong way. Anyway, forces are at work to bring to relative compliance. The efficacious vigilance idea, reciprocated just in time, brought about the new and terrible difficulties, as the legally observed number of infected patients skyrocketed, leading to overwhelm the already crippled health care system, a point which in turn negatively impacted the economy and buckled the government's knees. So, a fairly strong warning advising further, i.e. the "boiling frog approach" it's already on the table. As such approach matures, the original conceptual idea of reciprocation and mutual trust will also be put to better use. Resentment on the terrible failure to destroy the viral reservoir it's nurtured in the populace, compelling him to attempt such a strong unilateral measure against already down-torn

industry sectors. Given a newly appointed professional advisory board, a tainted controversial figure (easily debunked), with obvious conflicts of interest and undisclosed finances with the commercial competition, has been elected as the main medical adviser. Keen on facilitating the immunities agenda, that's dedicated adviser set out the ruthless strategy, advocating for a post-ponement of all stubborn government to make inroads with the authorities, to use all available conspiracy means to activate frenzied population fear, above all, the cost of life denigrating derogatory medical assertions it's much needed to deflect public attention from disastrous stats and incriminate the already decimated health care system. Such an unreliable advisor succumbs to the fittest authorities who harbors to expose his illegal schemes by feeding his trenches, further implementing the successful "Issue-Prove-Rebuttal" pattern. Diplomatic representatives are happy, always ready to oblige, confirming their respective democratic allies, while on the side to ensure the maximum income generation, enacting spurious unethical token contracts. Total collapse under the immense burden and one government designates as PM a proverbial Trojan Horse; a laundered criminal-sharp business man, entrusted to obliterate all industrial-services sector, except the financial markets which consistently works for his nefarious gain. All-permeating corruption comes out in the public domain, entangling all of the corrupted officials in vile corrupt practices. Brace-like exogrid cosmic six attempt to subvert the course of justice meets its inglorious end, as all judiciary institutions hold fair ground in the keenly observed forensic investigation. Emboldened by the positive reactions, extensive international mediation unfolds targeting the high-end stakeholders, culminating in the cessation of arm's arch Racketeering and unduly development interference.

14.1. Vaccine Development and Therapeutic Interventions

As an outbreak of an emerging infectious disease continues and is made manifest, planning is initiated and intensifies. Ultimately, in overwhelming and catastrophic settings a number of critical functions are identified, irrespective of the "bug" or country of emergence. This is true whether the setting is one of reassurance to donors and hosting countries of prevention or, unfortunately, moves into reaction. The need for immediate and expanding surge medical capacity and care is typically first among equals. In the aggregate, those who are detectably trying in the face of overwhelming odds are commonly a rallying point for public frustration. Rumors and panic can quickly spread. It is often those who respond, or seem to be in a position to do so, who bear the brunt of public anger that is seeking answers and a cure. For their own safety and the good of the community, planners and respondents have a shared incentive to minimize the opportunities for misinformation (J. Fischer et al., 2022).

Key strategies differ by the varying subgroups, but general approaches are shared. In broad terms for populations, medical countermeasures are prioritized. While vaccine development is a critical element, even under compressed timelines, therapeutics and supportive care figure more prominently in the early stages of preparedness and crisis. It is unlikely that in the face of a novel or unknown pathogen a clearly scaled and ordered stockpile would have been accumulated or that an existing one would be a perfect counterethumbell. Subsequently, the clinical and epidemiologic course of an emerging illness can have implications for the choice of drug or drugs to be stockpiled and distributed; for example, medications to counter a pathogen that causes a lengthy period of disease associated with hypotension. For medical facilities, training and guidelines are key. As illustrated vividly from the ongoing outbreak, even well-resourced sites and experienced personnel are reliant upon ongoing practice runs and expert input to maintain mandatory standards to reduce risks of nosocomial infection. Public health and risk communications are universal and key functions.

1.16 15. Lessons Learned from Past Outbreaks

INTRODUCTION

The specter of a global outbreak of infectious disease hangs heavily over discussions of pandemic influenza and other threats. Biodefense planners across the globe are contemplating the possibility of an outbreak of a particularly dangerous emerging infection - such as severe acute respiratory syndrome, highly pathogenic avian influenza, Ebola hemorrhagic fever, and smallpox - escalating into a worldwide disaster. This fear is driven by a number of factors, most notably the appearance of HIV/AIDS, SARS, West Nile virus, and severe acute respiratory syndrome, all arising from obscure microbes with new virulence factors and presenting the threat of global spread (Broom et al., 2016), and there is concomitant fear of man-made, intentionally released bioweapons, an apparent example of which is the release of Bacillus anthracis letter spores in late 2001. In an effort to obscure the mechanisms linking bacteria to plague, Z.R. Liu and others have suggested the Yersinia pestis-L. migratoria mania-pig cycle. Implementing the revised International Health Regulations was associated with strengthening the availability of key surveillance and response capacities, although there is variation among countries. Substantial investment of resources into preparedness for such global health threats has occurred since September 11, 2001, and these efforts will likely continue for the foreseeable future.

There is little disagreement about the broad outlines of what will be necessary to manage such an outbreak: containment, quarantine, social distancing, antiviral pharmaceuticals, vaccines if available, and supportive measures focused on the critical functions of healthcare in managing outbreaks. However, practitioners planning for viral outbreak response have identified a striking paucity of detailed operational guides, particularly with respect to the logistics of management of mass prophylaxis or vaccination campaigns. The problem with mass prophylaxis programs is how to get antivirals to everyone who needs it in a very short time. What is less discussed are the political and logistical complexities entailed in early detection of outbreaks, the targeting of clinical interventions, and the need for mobile, flexible policies that can be better adjusted to local needs and constraints. These complex and challenging issues are the focus of current research. This paper includes findings from an ongoing qualitative study of multi-sector biodefense planning in planning for epidemic infectious diseases in one U.S. metropolitan area and how an array of syndromic surveillance systems has been integrated into the response protocols of local medical providers and public health agencies. Using this metropolitan area as a frame, analysis of the challenges facing healthcare systems, with special focus on the likely tensions between clinics and hospitals, is provided.

15.1. Application of Best Practices

During an emerging infectious disease outbreak, healthcare teams are mobilized to manage surges in patient demand, working long hours, engaging in active task engagement, performing high-reliability tasks, debriefing patient care, accessing mental health resources where needed, and demonstrating teamwork. The pandemic response includes executing carefully orchestrated deployment strategies and contingent operation plans, prioritizing the ability to respond proactively and collaborating effectively across different teams to mitigate the exponential spread of the outbreak, transferring knowledge when training opportunities become available, better equipping healthcare professionals to deal with outbreaks and increasing public hospital preparedness.

While information is becoming more readily available on clinical aspects, outcomes, management, and mitigation of the outbreak, there is little insight into the reallocation of clinical staff and the strategies used to deploy the workforce in response to emerging infectious disease outbreaks. The

rapid generation of and demand for this information is essential in continuing to prepare health systems. This narrative aims to connect scholarly information on workforce planning, redeployment, recruitment, nursing, staff at multiple facilities, and volunteers to inform the response of healthcare teams, specifically in looking to best utilize and contemplate the workforce, to anticipate and handle emergent infectious disease events. Sector and industry-wide guidance, advice, and resources have been collated and analyzed in line with recent pandemics to assist in effective health service management.

1.17 16. Global Health Security and International Cooperation

While research efforts focused on the development of progressive and advanced pharmaceutical countermeasures and treatments have been pursued in recent years, other fundamental cornerstones of healthcare readiness inevitably remain critical. Broadly speaking, outbreaks and pandemic events depend critically on the mobilization of healthcare teams to a) control the transmission and spread of a pathogen, b) provide the necessary care to those who are affected, and, c) assure the resilience of essential healthcare services in the face of a potentially devastating shock. The low-tech components of healthcare readiness may indeed, at times, be the most consequential (E. Bloom & Cadarette, 2019). While there has been a recent explosion of funding for the development of advanced vaccines and treatments, there remain many underexplored aspects of ensuring the preparedness of local healthcare teams in the face of severe and novel threats.

On the one hand, outbreaks are a terrifying prospect that prompt instinctive responses prominently characterized by suspicion, isolation, and fear of contagion. On the other, successfully managing a public health event entails each one of these responses to have a unique twist of nuance, restraint, and precision in a complex, coordinated act of public health coordination. Such unleashing of emergency public health control functions typically involves a well-functioning set of dedicated, trained, and systematized actors embedded in the healthcare sector. Medical examination screening at international crossing points, setting up isolation wards, conducting retrospective contact tracing, or implementing quarantine measures tend to quickly become frustratingly expensive, involving management of a vast number of working parts at precisely the time where anxieties rise and political pressures are at their peak.

16.1. Role of WHO and Other Global Health Organizations

The COVID-19 pandemic has highlighted that responding to a global infectious disease requires a whole-of-society approach. The United Nations (UN) was well placed to support the response at the country level with relationships and influence across governments and key partners. The World Health Organization (WHO) has contributed to this response, leading the health response as per its mandate. To facilitate coordination between different partners and to promote a whole-of-society approach, WHO has also provided leadership, policy, and technical guidance, and has quickly developed tools and products supporting countries in risk communication and community engagement (RCCE) (Samaan et al., 2022).

The whole-of-society response at the country level was a collaborative effort between all UN agencies, governments, and partners, leading to positive outcomes such as strengthened community engagement and education around the pandemic and beyond. A focus on specific groups at high risk of infection, such as older persons, was also prioritized. At the same time, structured societal response mechanisms have been created, for example, to manage the socio-economic fallout in whole regions of the world. It quickly became apparent, however, that the economic blow to many industries would be disproportionately hard. In response, the UN system provided technical information and policy guidance to limit the social disruption of whole sectors.

Heightened attention to such guidance is likely to become a feature in the global response to health emergencies in the future. Beyond leading the health response, WHO also led the UN system's response to the pandemic at the country level, with many country offices expanding their emergency roles as a result. Special Crisis Management Teams have been set up that have formed a forum where a shared imperative for joint effort has driven expanded UN response activities in-country. On the ground in many countries, WHO has played an important role in largely acting as the linking organization through which the national government has engaged the entire UN and where RCCE areas have been set out as an initial collective operational response.

1.18 17. Legal and Regulatory Frameworks in Outbreak Management

Introduction

Although the emergency law regime suggested by the WHO is intended for a standardized international perspective, there is not detailed information on how national health legislative scaffold is to be implemented to achieve greater general wisdom of the community situated within separate countries, particularly for the most affected at the time, - the health care personnel (Marks-Sultan et al., 2016). This estimates which features of the national health law set may be most critical to creating strategies for the effective management of outbreaks through the explicit support for additional research that may encourage stakeholders to seek a more active medical policy role. At present, however, people cannot be isolated to anticipate public knowledge on any single consideration. To initiate discussion and instigate additional research in this area, a quantitative examination of over 1,500 national enactments used during the first half of the previous century was conducted. Three highly probable strategies for improved outbreak management were singled out. These are: (1) ensuring an acceptable societal response level to the presentation of any new contagious disease, (2) guaranteeing that lawfully ordered quarantine measures may be taken efficiently with limited resistance, or (3) providing the power and support for limiting individual enforcement of the presentation of a contagious syndrome.

Based on the available inventory, the following factors can be evaluated concerning an examination of outbreak management ability: Jurisdictional responses to epidemics derive from the constitutionally mandated combination of state and municipal prerogatives. The implemented tips define standings wherein statutory authority exists at the national level, promulgate disease prevention, patient isolation, or caregiver protection provisions, and delegate powers on these matters to the community. Practice additionally allows placement under admiral control, but neither legislate this directly nor define the preferred venues wherein affected stands may be pursued. On similar items, it recommends against public gatherings of school and church and provides for concordant compensatory financial relief. Public reaction to the influenza emergency is of determinable posture.

17.1. Compliance with Health Laws and Regulations

Adherence to health laws by all health professionals, from the top of the apex of professionals, must all strictly observe respectively health laws. These are similar to hospitals all personnel at all level are expected to observe a certain health laws, to observe hygienic laws, and everybody working in the health sector from top professional to dentists to nurses and the hospital or clinics guards all of them must observe health laws strictly.

It is punishable crime by law to admit or transfer or not rum patients who came your clinic or hospital, though personally, who can afford you to treat him/her. (Marks-Sultan et al., 2016) It is punishable crime by law to give false or fabricated health certificate, medical examination or evaluation, prescriptions. It is punishable crime by law to do abortion. It is punishable crime by law to take dead body which is death due to clinical reasons and to make postmortem clinical

activity which is not necessary. It is mandatory for all top professionals to teach their juniors, students, by respecting and executing health laws, actually not all professionals who are in this field. But, so many are very much negligent and reluctant to do according and as per the respect of each health law, by with respect (Timen et al., 2010).

1.19 **18. Financial Planning and Budgeting for Outbreak Preparedness**

In critical high-risk outbreak management, financial planning and budgeting is a critical function. Aside from public health control resources, other resources have to be mobilized in attempt to efficiently control a burgeoning, ascending outbreak. If in place in the earliest hours of an outbreak to assist with resource management, a strategic financial planning division can offer insights and strategies to accelerate the quantitative containment of an outbreak. In certain situations, these intermediate financial management tactics can involve longer-term resource management issues such as repurposing control center funding and allocation of intensive care unit (ICU) mechanical ventilators in local hospitals.

These problems can require high-level extreme measures and strategic long-term budget projections greatly exceeding short-term budgetary capabilities. Nevertheless, sound public health stewardship necessitates the development of a comprehensive financial strategy from the earliest possible moment during an outbreak response and the timely mobilization of resources to forestall or deter any eventuality, regardless of cost-output ratio. To the best of their ability to foresee, large-scale outbreak events and their cost implications must be calculated by countries currently in the containment stages of infectious disease outbreaks. Several resource-rich countries have made available billions of dollars in funds to finance international outbreak containment expenses (Yamey et al., 2017). The pertinent estimation of resources to be made available for international action will largely depend on the many unique characteristics of a given outbreak, including both up to date epidemiological modeling and the overall behaviour and responses to the outbreak. Outbreak responses are, however, expensive and are prohibited given total available resources for outbreak containment. Small and not-wealthy countries have significantly fewer chances of gaining control over imported outbreaks if a given outbreak event becomes widespread and, what many consider to be an increasing likelihood, leading to concurrent widespread outbreaks across national boundaries.

18.1. Allocating Resources for Emergency Response

Introduction to the outbreak: A novel strain of coronavirus (nCoV), designated nCoV-2019, emerged in the city of Wuhan, the largest city in Central China, in December 2019, causing an outbreak of respiratory illness that clinically resembles viral pneumonia, now known as COVID-19. The source of the outbreak has not been confirmed but is believed to be related to wildlife and seafood or wet animal wholesale market. Massive travel associated with the coming of the Spring Festival has led to the spread of the disease from Wuhan to various provinces in China and abroad, making this disease particularly harmful. The outbreak represents a Public Health Emergency of International Concern (PHEIC) as declared by the World Health Organization (WHO), and cases have been confirmed in a total of 24 countries. The daily lives of people in various countries, and China in particular, have been severely disrupted (Devereaux et al., 2020).

The epidemic situation is severe and complex. To date, there have been 42 708 confirmed cases in China, and 1022 severe cases; a total of 1017 people have died while 3996 have recovered. 23 589 suspected cases are under isolation and observation. 372 565 close contacts have been traced, 187 728 of which are currently under medical observation. Over 27 other countries have reported that a total of 319 confirmed cases have been reported. As the outbreak of COVID-19 spreads, it is critical to adequately mobilize the expertise and resources of healthcare teams for outbreak

prevention and control to improve efficiency and effectiveness. In the context of hospital-based medical teams fighting the nCov-2019 outbreak, a comprehensive understanding of the system, best practices, and potential challenges of team implementation in public health emergencies is essential to better cope with the severe situation.

1.20 19. Continuous Quality Improvement in Outbreak Response

Healthcare systems around the globe must be ready for the threat of emerging infectious diseases, such as pre-existing threats involving antimicrobial resistance (AMR). A report on AMR found that could face 2.4 million deaths in the next 30 years and that each death will cost the economy from $20,000 to $100,000. reported a rise in the AMR gonorrhoea cases in some countries and the lack of new antibiotics needed against the disease, although the condition escalated further over the years. In 2019 and 2020, antibiotic resistance was labeled critical by . The Organization suggested global efforts to help address the worsening AMR situation and the launch of a campaign themed 'United to safeguard antibiotics' to raise awareness of the issue and motivate actions in minimizing the spread of the agent. Exploration of antimicrobial drugs is shifting away, coupled with cases of rare occurrence of new agents, for example, grinded from sloth's fur. However, the present scenario requires of sharpening AMR awareness and the possibility of enhanced mobility and surveillance. Thus, students must be motivated to enhance various management and study strategies assuring them about the easy availability of treatment and contact with secrets (Jeanes et al., 2019).

19.1. Monitoring and Evaluation of Response Efforts

The extent to which emergency response teams perform collectively focused actions in the field of public health emergency preparedness and response is little understood from the perspective of the individual epidemiologists who comprise these teams. Within emergency response settings there is amplified difficulty for individuals to effectively transition from individuals to united groups, and team effectiveness is frequently undermined by time, physiological and procedural barriers. Assembled epidemiologists said an emergency response team's collection of overall suitability tasks and their conduct while undertaking changing ambiguity management activity are key to enacting their intent as a work group (Elizabeth Parry et al., 2023).

The effectiveness of an emergency response workforce is crucial in the mitigation of the impact of an emergency response on an affected population. Of interest is the performance appraisal of individuals and teams, an issue considered important to the enhancement of, and the manufacturing of, measures with which to monitor the quality of emergency response efforts. An examination of the monitoring of human resources during emergency response suggests that emergency response settings introduce a range of challenges that directly affect teams and their performance. In order to be effective, the performance management of teams would benefit from a customised approach designed specifically for emergency response settings that would assist in overcoming existing team dynamic constraints.

1.21 20. Crisis Communication and Media Relations

When faced with an infectious disease crisis, safety is a top priority. Therefore, a serious consideration should be directed to media strategies to minimize both internal and external risks created by crisis situations.

Crisis Communication and Media Relations

When faced with an infectious disease crisis, safety is obviously the most pressing concern. Given the potential for a public health crisis to impact dozens or even hundreds of employees, serious consideration should also be directed to media strategies to minimize both the internal and external risks created by crisis situations. It's expected that during an outbreak severe enough to require

the mobilization of a health care team, more or less everything written here will go out the window as events unfold at a speed and direction that's impossible to predict in advance and could well be completely contrary to assumptions made in advance.

At the same time, the internal and external communication team is one area where it's possible to do at least some work in advance of the hypothetical worst coming to pass. As such, this chapter focuses on: providing a list of key functions that the emergency communication team is expected to undertake during an outbreak of infectious disease; a discussion of how said team should be structured; and initial strategies that can be imparted for preparing for internal and external communication risks. Taking steps now to listen to and build relationships with both the internal team and the media can pay significant dividends down the road by both facilitating the handling of the emergency communications response and potentially heading off some of the challenges and criticisms likely to come with the placement of a health care facility at the center of a high profile infectious disease incident.

20.1. Addressing Misinformation and Rumors

Misinformation and rumor can spread during an outbreak, which has been seen with pathogens such as Ebola, SARS, H1N1, and COVID-19. Misinformation, which is not a form of harmful rumor, is defined as false or misleading information, and rumors are defined as information that concerns and circulates among the population. Rumors often arise during emergencies during which information is scarce, uncertain, and sensational. This is the case with emerging diseases. Rumor tracking is the process of documenting and analyzing rumors in order to prioritize response. A methodological framework was developed for tracking harmful rumors using evidence-based, community-based methods, in Côte d'Ivoire, after discussing the results of a real-time rumor-tracking system response to the COVID-19 pandemic. In addition to discussing effectiveness of response efforts and uptake of correct information, a qualitative sub-analysis was conducted of the type of information shared by cadres de santé communautaires agents de santé communautaires agents-relais choisis, including rumors and other general COVID-19 knowledge (Tibbels et al., 2021). Twenty-two lay rumor trackers were trained to monitor rumors in six regions of Côte d'Ivoire. Reports of potential rumors were submitted daily through a free phone line, via SMS, or through an online form. Submissions were categorized according to rumor type and harm to the public. Most harmful rumors were rapidly confirmed or denied, but a few rumors proved difficult to verify. Nearly all potential rumors submitted, however, proved to be rumors, outlining the importance of systematically documenting the flow of information within a community. Findings underscore the utility of this relatively low-cost approach for identifying and responding to harmful rumors. Public health emergencies are often characterized by accelerated transmission of rumors. Outbreaks of disease are prime environments for the spread of misinformation and rumors. There is a cyclical relationship between the spread of rumors and the transmission of a disease. Rumors about emerging health threats can lead to intentional spread of the disease, cause its potential spreaders to go into hiding, or prevent people from seeking help (J. Brandt et al., 2021). In addition, rumors can exacerbate the negative impact of the epidemic. Violent and chaotic scenarios can occur, disrupting healthcare services and sowing fear among both patients and providers.

1.22 21. Leadership and Decision-Making in Crisis Situations

Throughout history, communities have faced outbreaks of infectious diseases and other natural and man-made disasters that pose significant threats to lives, public health, and business continuity. Responses to infectious disease events aim to reduce morbidity, mortality, and impact on the community, including primary and secondary effects. Outbreaks of emerging infectious

diseases like the novel coronavirus present unique challenges. resources are available to guide the response to emerging disease threats. Leadership and decision-making are crucial to mobilizing healthcare teams in managing outbreaks. Decisions made in the midst of a significant public health event can have long-lasting effects on the community and require the rapid deployment of resources.

The COVID-19 pandemic is a recent example, with public leaders responding to and formulating strategies to attenuate the relentless waves of transmission. The pandemic underscored the importance of understanding how healthcare leaders make decisions in crisis and what factors they prioritize in their decision-making process. Understanding how healthcare leaders make critical decisions during public health crises take advantage of the lessons learned to inform how future health crises are managed (Al Qaf'an et al., 2024). Leadership quality can make a crucial difference between an effective response and chaos. Some studies also indicated that a democratic style of leadership can and should be adapted to the changing situation. Transformational leadership in the health sector promotes effective communication and collaboration and achieves psychological success in crisis. Transformational leadership could be more efficient in emergencies due to high expectations for leadership integrity, targeted vision building, strong support for members, and intellectual stimulation.

21.1. Effective Team Management

People management is a very difficult job not all can achieve success in. Working with a team can also be hard for different reasons, and sometimes you might feel like you are the captain of a sinking ship rather than steering a successful project. Indeed, every successful project needs a well-trained and enthusiastic team, and one of the most important goals and tasks of a team manager is to create and promote such a team. A team manager is a leader who's responsible for a clear project vision and direction and contributes significantly to accomplishing the work.

Managing a team in general can be quite demanding, let alone managing a team during the quarantine. While being quarantined, there is a danger of isolation and depression for the team members, and the manager shall compensate for each team member's duties. In this case, it is crucial that the manager promotes work and life balance; always schedules work hours, regular days-off, and vacation time; and promotes open and healthy communication as well as a good level of team empathy. It is wise to have open channels where mental health can be discussed, can share tips of quarantine survival, or simply can talk about how was the day. In addition, some managers can be strict with the deadlines under regular circumstances, and this is the recipe for burnout under quarantine. It is crucial to tread slowly and understand the situation, as the psychological situation can be very different for a team member under quarantine (Lefterov et al., 2023).

1.23 22. Infection Control Measures and Personal Protective Equipment

Given the high secondary attack rate among close healthcare worker contacts in combination with a growing number of outbreak investigations without a confirmed source of transmission, the desire for better understanding of patients who are infected, but remain asymptomatic, arose. This is particularly important among healthcare workers in patient-facing roles. Little is known about the viral load of asymptomatic individuals compared with that of symptomatic patients, and the clinical and virological course shed light on its infectivity. Sharing clinical and virological data of asymptomatic infected individuals observed in a public healthcare facility provides a detailed description of the current results.

Extreme and often uncontrollable events such as major outbreaks of infectious diseases are significant threats to medical workers. To the collective knowledge, this is the first study to provide a 1st-person view on dealing with an outbreak when uncertainty is high. This experience may also

serve as a guide for other healthcare workers around the world for preparing and deploying to combat the pandemic. This 1st-person perspective is partly focused on medical professionals in other countries less affected by the outbreak who are in the initial oversight stage, whereas a physician who works in a heavily impacted area discusses the outbreaks.

22.1. Implementation of Universal Precautions

Conduct a classroom exercise on proper technique for performing hand hygiene. Discuss when hands should be washed, the proper steps in technique, the ideal product to use, and the need for washing in addition to alcohol-based hand rub. This simple intervention could prevent the spread of a number of infections, including viral infections and multi-drug resistant organisms (MDROs). Instruct residents to take their own pulse while wearing gloves and then repeat after proper hand hygiene to demonstrate the benefit of removing impermeable gloves before washing hands. Instruct healthcare providers to use a watch (which should not be a wristwatch) and a badge holder attached to their lab coat when caring for patients in contact isolation measures to facilitate compliance with recommended precautions. In conjunction with the Infection Prevention and Control Committee, develop and provide pocket-sized cards for healthcare staff to use as a quick reference for appropriate infection control measures. Leaflets for patient education also can be developed and widely distributed. Conduct lectures on the proper technique for dressing and undressing in PPE, a proven intervention in the prevention of contact transmission of infections. Hold separate workshops with the housekeeping and laundry staff in infection control. Review the proper use of PPE when cleaning patient rooms and processing contaminated linens. Restate that basic precautions (frequently known as universal precautions) are the main strategy in infection control and provide the broadest protection to staff, patients, and the community. However, basic precautions must be supplemented with other precautions based on the patient's diagnosis, known infection status, and underlying conditions. Provide a detailed explanation of the additional contact, airborne, and droplet precautions. Review specific examples of precautions based on diagnosis including which multi-resistant organisms such as MRSA, VRE, ESBL, and Clostridium difficile, as well as a discussion of epidemiologically significant organisms. Prompt laboratory doctors to instruct the clinical faculty about the appropriate mode of isolation and the universal precautions needed for suspected/vulnerable infectious cases. In-service talks also may be held by the Infection Control Team outside of the CME schedule. Inform residents directly about the histories of such cases or give a printed sheet on this topic. Discuss the coincidental outbreak of nosocomial infection in other healthcare units, as a perceptive way to encourage adult learning. Medical staff should also be inquired about any other clustering of infections or notifications. Additionally, postal mailings, covering relevant topics, could be sent to their outpatient clinics in anticipation of the afternoon out-patient activities.

1.24 **23. Environmental Health and Sanitation Practices**

Walls and horizontal surfaces within a facility, particularly patient care areas, must be clean, free from dirt, items, and grime, with no evidence of potential harborage for pests or vectors. Surfaces, such as floors, walls, ceilings, countertops, beds, and medical equipment, must be cleanable, water/moisture resistant, and impervious. For cleaning and disinfection, a facility must have adequate, fixed, and mechanical capabilities. There must be engineered, integrated, appropriate, and modern systems to efficiently clean and disinfect large equipment and high-touch locations. These systems must include heating, ventilation, and air condition (HVAC) that maximize ventilation and filtration, integrate with smoke doors, and are energy efficient (Cunningham Goedken et al., 2022). Sanitation and waste must be processed or safely disposed. Incidental, as needed, and urgent contingencies such as liquid spills, flooding, patient vomiting, and excessive

patient bleeding must be planned for and quickly addressed to limit immediate spread of biological pathogens.

Refuse/recycling containers must be emptied regularly and washed as soon as they are emptied and contaminated. Contaminated or used cleaning supplies must never be transferred to other locations, containers, or used to clean other equipment. Contaminated devices must be properly packaged and labeled, before being presented for reprocessing by the healthcare facility's central medical supply, sterile processing, or surgery department (Lin Ling et al., 2021). Staff members responsible for environmental and sanitation services must be properly trained and competent in maintaining a healthcare facility environment that strongly inhibits the spread and transmission of infection.

23.1. Disinfection and Waste Management Protocols

Wherever critical functions are performed and critical areas are accessed in health care facilities for infection prevention and control (IPC), there should be floors with seamless finishing that enables effective cleaning and maintenance. These spaces may contain one or more of the following components: engineering controls for environmental safety and cleanability, such as ventilation with air exhausted directly outside, counters with water heating units soiled with biologic contaminants for hot bidding, and manifolds of medical gasses and vacuum within panels located at easy reach so that routine cleaning is not disrupted. Cracks in the re-grout and at wall-floor junctions provide harborage for insect vectors and pathogens; the walls, basically joints with the floors, shall have a coved finishing to avoid such flaws. Throughout the COVID-19 pandemic, the importance of health care waste management has increased. This paper describes the need for health care waste pickers to have access to personal protective equipment to protect themselves from contracting COVID-19, to be considered essential workers, and to be incorporated in health care waste management regulations to grant them job security and better working conditions (R. Gowda et al., 2021).

High-touch surfaces in common areas need frequent cleaning and disinfection, as they may represent transmission risk of healthcare-associated infections (HAI) (either COVID-19 or not) between patients and health care workers (HCW). Therefore, fabric should be avoided at least in easily contaminated library areas and common coffee/food break areas of wherever health care and food are served. Keyboards and mouses are utensils handled with dirty hands that may bear a risk of transmission of serious pathogens; hence, they are hereby totally discouraged at any hospital facility or strictly limited to be used in administrative areas of inpatient units, nursing stations, and consultation rooms. Official documents such as therapeutic and discharge forms, PT-SDM and physicians' registration were highly contaminated with pathogenic microorganisms. Standard microbial cultivable methods did not allow recovering microorganisms from the official papers, which pertain to a check list for the completion of the data; large portions of these materials were split in the culture media.

1.25 **24. Interdisciplinary Collaboration in Outbreak Response**

Throughout the COVID-19 pandemic, healthcare workers in hospitals have faced significant professional and personal stressors. Many have experienced both disengagement with work and moral injury. Frontline healthcare providers also navigated moral difficulties while responding to outbreaks of infectious disease, acts of bioterrorism, and natural disasters, and large-scale events have consistently prioritised local health and medical systems as primary responders. In this context, communication and collaboration between healthcare providers and other professional groups are critical for an effective response. Additionally, the engagement of these groups is vital as public health events draw attention to the limitations and capabilities of local health and medical

systems and highlight the need for a truly integrated and multidisciplinary approach to local event management (Sharma & Mahbub Hossain, 2019).

Being founded on principles of integrated and interdisciplinary working, public health emergency preparedness has often promoted partnerships between local health and medical systems and cross-sectoral partners, including local law enforcement. Despite promising evidence, collaboration between local law enforcement and public health authorities may be challenged by existing policies and legislation. Importantly, technological, administrative, communication and logistical complexities become evident only during a crisis event and may prevent timely troubleshooting (R. Jordan et al., 2022). Crises are most effectively addressed by advocating at the policy level and demonstrating the magnitude of public health emergencies to other possible partners through various, ideally cross-disciplinary, research activities. This is especially the case with public health events involving communicable pathogens, as violations of privacy, potential stigmatization, border management and so on, all often fall under local law enforcement jurisdiction.

24.1. Teamwork Among Healthcare Professionals

Interprofessional healthcare teamwork is vital to patient safety and health outcomes. Frontline healthcare workers (HCWs) of all professions on three emergency COVID-19 response teams in a tertiary hospital setting were interviewed. One team was deployed to work remotely, while the other two consisted of HCWs from various disciplines working at the bedside of COVID-19-positive patients. Responses indicated that interprofessional healthcare teams became fragmented during the pandemic. (R. Jordan et al., 2022). Many interviewees reported that as HCWs working remotely their status changed—others no longer viewed them as a member of the frontline team. As a result, they were removed from group message boards, informational emails and invited meetings, despite trying to participate in these activities to continue to contribute valuable information from their perspective. Interviewees found it increasingly difficult to provide the pre-pandemic level of quality care, with at least half citing countless missed opportunities for interprofessional learning, education and experience that were on hold indefinitely after the team was divided at the beginning of the crisis. Conversely, HCWs on the two COVID-19-positive response teams that worked at the bedside of patients of the same designation self-reported that their team came together in new ways to create mutual support between HCW disciplines. This was often by breaking down former interprofessional silos to ensure care tasks that no one discipline could provide were nevertheless fulfilled with excellence. Work teams that fostered this type of fluid cross-disciplinary support and problem-solving coped the best during the overwhelming first wave.

Together, the experiences of HCWs during COVID-19 response efforts suggest healthcare systems must create and implement structured communication processes in order to reliably share frontline HCW expertise with organizational leadership. Without such processes, critical insights, suggestions and knowledge about frontline conditions will flow in a disorganized, inconsistent way often only reached by chance. Across this study, HCWs indicated that sites not just of employment but of duty determined the ability to innovate. HCWs on non-clinical work teams were almost universally tasked to seek out ad-hoc inconsistencies and inefficiencies in pandemic procedures to passively relay to their leadership hierarchy. This represents a significant departure from the proactive changing of decisions seen in a previous outbreak. On the other hand, HCWs who should be the most informed about the daily processes and obstacles of frontline care delivery are positioned to seek a more proactive role and often found that leadership would only accept complaints or suggestions through an entangled web of bureaucratic tiers, discouraging further input or attempts at problem solving. Over time, HCWs became increasingly resigned to the fact

that without a clear process channels to key decision-makers their workplace observations and ideas for improvement would go untapped.

1.26 25. Strategic Planning and Preparedness Exercises

Careful planning and exercises to rehearse these plans will help to ensure that the team can efficiently and effectively respond to outbreaks. Healthcare systems should establish standardized candidate screening and management practices, regardless of patient presentation location, setting, or venue within the community healthcare system. Due to the risk to healthcare personnel (HCP) and the ability to rapidly disseminate infections, the importance of early identification and activation of candidate screening procedures is highlighted, ideally established prior to patient arrival (J. Herstein et al., 2021). Each healthcare system will need to decide on the mechanisms that best suit their facilities for an early candidate screening. From a large emergency department (ED) of a trauma center to family clinics and primary care physicians' offices, plans for candidate screening at all points of possible entry, transfer, or presenting to the hospital should be in place well before patient presentation. Internal personnel, whether part of pre-existing infection prevention, control, and occupational health teams or demarcated COVID-19 or similarly-named task force groups specifically assembled to address the needs of the outbreak, play crucial roles in healthcare system response to outbreaks.

Regular reassessment should ensure that all healthcare workers, including reception, food service, environmental services, and spiritual care, have a proficient understanding and adequate training in the basics of infection prevention principles well before an emergency patient presents. Healthcare workers with direct patient care roles should also have advanced training in the use of personal protective equipment (PPE) and facilities should maintain ample supplies of essential work equipment, such as fluid resistant surgical masks (FRSM) and N95 respirators. Plans are living documents, and hosting strategic planning and preparedness exercises should occur at a regular cadence annually, biannually, or at any defined frequency for the location. Drills and exercises should occur with a variety of both internal and external partners to the healthcare system, such as public health authorities, regional emergency medical service (EMS) agencies and other hospitals. Potentially, presenting the case of a high consequence infectious disease (HCID) patient in the emergency department (ED) is one scenario; an influx of patients supporting a surge of patient presentations, whether from pandemic illness or other cause, is another; other scenarios may involve natural or manmade disasters. Variability in exercise scenario provides the health system an opportunity to exercise the wide range of possible responses required to a variety of emergencies at different stages of presentation or number of patients. Exercises should be designed to test the numerous components of the healthcare facility response system, such as escalation of communication responses, personnel stressors involving activated staff who need to be fit tested, supplied with PPE and adequately trained, as well as constraints on patient treatment such as bed set-up, availability of equipment, and requirements to cohort infected patients. While these strategical and practical exercises are vital to improving preparedness and response capabilities, plans must be assembled to reassess and amend updated protocols at regular intervals. After each exercise or real-world event, responses should generate after-action reports and improvement plans that must be distributed across the multidisciplinary team, including high levels of facility leadership.

25.1. Conducting Simulation Drills and Tabletop Exercises

Healthcare teams are on the frontline of managing outbreaks. As such, healthcare simulation's top 10 list of recommended evidence-based practices for preparing for the COVID-19 pandemic includes conducting simulation drills (Andreae et al., 2020). Simulated patient cases representing

a wide variety of clinical conditions and acuity levels were developed. In situ simulations were performed in high-acuity areas of the hospital to train physicians and nurses. Time needed to entry of emergency airway team and subsequent intubation for a contagious patient was conducted, and the successful placement of a viral filter was also noted. A code blue with subsequent successful resuscitation utilizing mechanical CPR. Teamwork, critical actions, and tasks were continuously monitored by a team of expert simulation educators and a clinical educator who is the team's medical director. The use of PPE introduces additional barriers to communication and clinical activities that were not immediately apparent during training. Observers noted approximately 3- to 5-minute periods when no activities were conducted toward resuscitation. This brought a heightened sense of urgency to the daily 1500 huddle, which quickly transitioned from a brief overview of each team member's assignment to a plan of anticipated activities in the immediate future. Additionally, an index of pre-engagement discussion was adopted, and this was conducted with available clinical and environmental information. Importantly, prepotency huddles and briefings were identified as sources of truth in a clinical environment full of rumors and an unprecedented rate of protocol updates. Teams and individuals were encouraged to question directives that seemed inconsistent with their training. Overall, simulations were found to be particularly effective for practicing the donning and doffing of PPE, adjusting challenging airway management and resuscitation algorithms from incoming data, and adapting to likely resource constraints. In addition, these simulations also necessitated that the response team escalate the chain of command, which was typically bypassed when summoning the RRT directly to the bedside. Finally, in the debriefing, team members described how these scenarios were uniquely stressful due to the novel contagion, fear of depleting an irreplaceable stock of PPE, and high expectations from a number of concerned parties. Participants reported losing situational awareness and becoming hyperfocused in a way that hindered performance, a feeling heightened by confidence that could only be restored by adjusting recommended guidelines for appropriate PPE levels. Performance improved with increased number of repetitions, especially by the performance of the same team with largely (but not entirely) the same TM. Variability in the readiness level of participant teams was found. Successful management also depended on the clarity of communication between the various teams involved in the case. Subsequent participants were provided with explicit instructions on the expected sequence and content of the huddle report, and including the addition of single primary nurse contact at each location. In addition, the ER was informed to send a runner to ensure direct communication with RCU command still present. High-stress situations are likely to evoke the most primitive training, so it's important to train in the same way in which one's team expects to perform. Staff was encouraged to slow down, communicate clearly, and speak loudly, directly, and firmly to prevent misunderstandings. Staff also raised concerns that code orange drills may have less authenticity due to frequent, advance planning, feedback loops from participants, and staff who typically performed poorly in the drill has already received feedback from previous performances. Drills were therefore unannounced and conducted at peak times and days to prevent the unnecessary deregulation of participants. Early in bed status was declared until the patient held in the trait, which occurred when the suspect case was first triaged in the ambulance bay. After this, each action taken by health personnel was carefully tracked, and note was made of unnecessary delays after the decision was made to activate the code orange.

1.27 26. Monitoring and Reporting Outbreak Trends

Pandemics, as this COVID-19 experience has shown, are unpredictable and can explosively spread. As such, there might be no means to control the root causes of pandemics, but the impact

on them could be managed, and this management starts by having a sound plan, proper preparation, and quickly escalating tactics according to those plans. However, planning and preparation for the impact of outbreaks is only possible if one is accustomed to continuously and systematically collecting and analyzing all human action that is correlated with health or healthcare activity. Considering the speed and comprehensiveness of a response to a pandemic, such a systematic event seems unachievable, further with all the difficulties coherently comply with too many metrics and turn that data into useful information that informs action, leading to an array of actions to be tracked and many reporting requirements. Experience is described in regard to how to better comply with the required reporting and, in the process, develop a robust platform for reporting practice and surveillance data using laboratory analytics (Haghighi et al., 2022). To focus on standardizing response to the pandemic response, practical strategies are developed in collaboration with the World Health Organization, the CDC, the American Hospital Association and the Association of State and Territorial Health Officers in order to ensure that the broader infection control and healthcare establishment are provided the same guidance. The sources used as benchmarks for the absence of such generic strategies being available implies using only papers authored by same group for the study, although other helpful articles, toolbox and guidance that could be referred to are available as well.

26.1. Utilizing Surveillance Data for Decision-Making

Pandemics, when they do occur, can quickly develop into a widespread and significant national health concern. Because pandemics are rare—typically occurring only once every few decades—and are difficult to predict, any given event may have limited relevance to planning for future events. COVID-19 was the first pandemic experienced by most people alive today. In light of the above, efforts to manage the impact of pandemics should include planning and preparation for a range of potential scenarios, including consequences that have never been experienced before, as well as the effects of relatively rare but extremely severe scenarios ((Haghighi et al., 2022)). Proper planning and preparation for these diverse scenarios is only achievable through continuous and systematic collection and analysis of relevant data.

Most of the specific actions taken during a pandemic are based on an analysis of surveillance data, and these analyses are in turn influenced by broader research into infectious diseases and health services. Healthcare surveillance data relies upon the timely and rigorous collection, compilation, and analysis of detailed health information. There is a wide range of activities that fall under the banner of healthcare surveillance data ((Buckeridge & Cadieux, 2006)). Broadly, healthcare surveillance data plays a critical role in all response options for the management of outbreaks and public health concerns. The articulations that follow delve into select surveillance data functions in greater detail, and also outline strategies for improving disease surveillance using newer surveillance data sources, such as data from hospital systems, primary-care systems, pharmacies, and disease registries.

1.28 **27. Policy Development and Implementation in Outbreak Response**

Introduction The article is set during a time of public health emergency. Such emergencies are expected to have a wide impact on individuals and society. Most public health emergencies are expected to result in closing of public gathering places, the dismissal of children from schools, and overcrowding of medical facilities (Sharma & Mahbub Hossain, 2019). During these times police are expected to ensure compliance with public health orders. It should also be expected that law enforcement take additional measures to protect the health care system, which could take away rights guaranteed by local law enforcement agencies. It is very important to inform all stakeholders about the risks that a pandemic poses, the potential evolution, and how law enforcement's role will

change throughout. In this venue, all stakeholders will be called upon to help the police in the community to draft response strategies and draft policies to enforce the mandates of health agencies, as well as the most current information available. There will be strategies of community mobilization, disease triage, and isolation, as well as strategies to provide logistical support during the community pandemic. It will also be possible to develop strategies and work plans to ensure the safety of materials and assets. Law enforcement agencies will be expected and obligated to comply with the mandates of the CEUs in the enforcement of federal quarantines. It will not be acceptable for a refusal that the police lack the bandwidth to enforce such a large-scale quarantine. Political assistance in the execution of these orders should be further conducted and followed by a timetable when the local police will be able to achieve the CEU measures. Protecting the healthcare system will be a top priority for the Department of Public Health and this municipality. The municipalities and health departments would like to provide additional information and assistance in the protection of this system. Social services will be organized in coordination with local hospitals and health care facilities to ensure continuity of care during a pandemic. If necessary, field hospitals will be established in this regard. Smaller medical settings such as village clinics will be directed to provide outpatient health care instead of utilizing overwhelmed emergency services. There are two appendices that are attached with the publication. These appendices are the preliminary plan for pandemic influenza. The first attachment proposes a statute for a mutual aid memorandum that was enacted; this statute was modeled after one used during the avian flu. The second attachment is a list of all PPE supplies and a proposal for protocols for the distribution of supplies in police stations. The second appendix also enumerates health care workers and facilities that will be prioritized for protective equipment. Proper maintenance and use of PPE is imperative. Instead of relying solely on external funding, various legislative bills have been initiated. Health Promotion Law emphasizes the active role of the community and individuals by increasing the motivation for health promotion activities, and two of the biggest programs, the health class, and health promotion district, are based on legal regulations. A national health screening of specific targets also started by the Enforcement Decree of the National Health Insurance Act. Approximately 11% of the adult population policy and use a wide range of health personnel. Using them in collaboration with healthcare institutions was effective in motivating the target population. The survey of health behavior of the community was carried out.

27.1. Adherence to National and International Guidelines

Outbreaks of novel infectious diseases have been occurring with increasing frequency. This has implications for populations beyond the epicenter, as people everywhere are closely or somewhat closely connected. Outbreaks of emerging infectious diseases are a concern especially because they are often unrecognizable at the onset and can rapidly become diffuse. The international concern about emerging infectious diseases is indicated by the notices of over 30 such diseases in the past three decades. The public health threat in these outbreaks can be mitigated considerably if surveillance systems are functioning well and if there is good awareness and preparedness among healthcare personnel. In the early stages of an outbreak, the mobilization of healthcare teams or facilities can be a critical function. Such mobilizations can well be launched before alert notices are issued by national or international agencies. Conversely, a failure to mobilize in a timely and appropriate manner can represent a missed opportunity to prevent a bad outbreak. Two fundamental issues are, first, which sorts of healthcare teams should be mobilized for what types of infectious diseases and, second, what sorts of strategies are useful for the mobilization of these selected teams (Timen et al., 2010). At each newly survey in a series of ten workshops, teams were asked to identify what functions or strategies, in their experience, are the most critical for the

management of an outbreak. They consistently provided novel infectious diseases and emerging diseases as one of their top answers, indicating a broad concern and varying experiences among their team members. Subsequent questions were tailor-made with the initial answers of relevance in mind. Some of the survey response types were predefined and multiple-choice, in other instances workshop facilitators used answer categories that had been developed in the prior sessions. The selected responses were analyzed for overall frequency and also for differences among and within team types.

1.29 28. Conclusion and Future Directions

The management of the recent COVID-19 outbreaks in an ethnically and socioeconomically diverse large county (population 3.4 million) in southern California are examined. Thirty-eight skilled nursing facilities (SNF) and three boarding care homes (BCH) with 5,360 beds received technical support. A nurse practitioner (NP) with infectious disease expertise was assigned to a public-private collaborative. Outbreak management entailed infection control, diagnostics, therapeutics, personal protective equipment (PPE), hospitalizations and monoclonal antibody (mAb) infusions. More recent outbreaks, initiated in March 2021, appeared to be mitigated by mAb therapy in exposed contacts. Upon confirmation of the first mAb treatment, outbreaks were reported in only 1/3 facilities two weeks thereafter in contrast to 61/79 facilities during the previous outbreaks (Kyoung Yun et al., 2024). The COVID-19 burden in the long-term care facilities (LTCF) was significantly reduced. Only the first two sequences of the Delta variant were identified. The largest and most recent outbreak of eight LTCFs involved all HAVs, with two SNFs receiving NP support; fatalities and hospitalizations decreased. It is suggested that LCTFs are closely monitored since they continue to accommodate the most vulnerable.

The management of the recent COVID-19 outbreaks in an ethnically and socio-economically diverse large county (population 3.4 million) in southern California is examined. Thirty-eight skilled nursing facilities (SNF) and three boarding care homes (BCH) with 5,360 beds in the county received technical support from January 2020 to April 2021. In February 2021, a nurse practitioner (NP) with infectious disease expertise was formally assigned to the COVID-19 response in a public-private collaborative. Outbreak management entailed enhanced infection control, diagnostics, enhanced therapeutics, personal protective equipment (PPE), as well as hospitalizations and monoclonal antibody (mAb) infusions. More recent outbreaks in LTCFs, initiated in March 2021, appear to be effectively mitigated by mAb therapy in exposed contacts. Upon confirmation of the first mAb treatment, new outbreaks involving downstream contacts were reported in only 1/3 facilities two weeks thereafter in contrast to 61/79 facilities affected by the first two COVID-19 outbreaks.

28.1. Emerging Trends in Outbreak Management

In the early weeks of 2021, roughly one year after the first known cases of COVID-19 in British Columbia (BC) Canada, widespread vaccination of at-risk individuals began in BC and other countries. By October, the panel had identified numerous emerging trends in media and professional literature that define current approaches to outbreak management. A notable trend is ongoing coordination of response efforts at operation centres (G. Richmond et al., 2021). Another notable development is the widespread protection of vulnerable populations through vaccine prioritization. In the October panel, vaccine coverage of nursing home residents and front-line health care workers in North America and Europe was reported to be approaching near universal levels. Clinicians responding to outbreaks may see measureable impacts on patient caseloads after periods of restricted movement end. In BC, depending on caseloads, elimination of the scientifically unfounded province-wide ban on outdoor dining in mid May 2021 was followed by

a significant decline in respiratory diseases presenting to emergency department (ED) visits. While clinicians cannot predict which specific public health interventions will terminate or at what time, epidemiologic and public policy trends may be ongoing signals that larger changes are imminent.

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