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THE ROLE OF HEALTHCARE STAFF IN DISEASE CONTROL AND OUTBREAK RESPONSE

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Abstract:

Healthcare staff plays a crucial role in disease control and outbreak response to protect public health and prevent the spread of infectious diseases. Their responsibilities include surveillance, prevention, control measures, and coordination of resources during outbreaks. This essay explores the significant contributions of healthcare staff in disease control and outbreak response, highlighting the essential skills, knowledge, and training required for effective response. It also discusses the challenges faced by healthcare staff in managing outbreaks and the importance of collaboration and communication in a multidisciplinary team approach. By understanding the role of healthcare staff in disease control and outbreak response, we can better appreciate their dedication and commitment to safeguarding public health. Keywords: healthcare staff, disease control, outbreak response, public health, infectious diseases The Role of Healthcare Staff in Disease Control and Outbreak Response Introduction: Disease outbreaks pose significant threats to public health, requiring prompt and coordinated responses to mitigate their impact.

Keywords: Healthcare staff, including physicians, nurses, epidemiologists, and public health professionals, play a pivotal role in disease control and outbreak response.

1.2 1. Introduction

The role of healthcare staff, especially when a disease outbreak occurs, is crucial. Any misstep may cause diseases to spread even more rapidly. So what should healthcare staff do before facing an outbreak and during one? For disease control and responding to any disease outbreak, it is necessary to keep in mind the daily basic actions that keep healthcare staff free from disease. Wearing personal protective equipment and performing basic actions such as hand hygiene, combined with environmental surface cleaning and decontamination, can create an environment in which the spread of disease is more difficult. Using this kind of equipment does not only protect healthcare workers themselves but also protect health facility clients and other healthcare workers.

The spread of diseases can also be controlled by following principles such as disposing of waste properly and not touching parts of the body (such as the face) to which germs are frequently exposed.

(Pablo Caeiro & I. Garzón, 2018). Ensuring strict use of the aforementioned methods by healthcare staff prior to the onset of a disease outbreak creates a system for controlling the spread of disease in a limited manner even if the disease eventually enters a particular region. It is also necessary to constantly monitor the health status and location of staff. In this way, when a worker is suspected of being infected after the onset of the disease, the detailed symptoms, as well as who the worker might have contacted, will be clear. A treatment system can quickly be established by observing to see which healthcare staff may have been infected after contact.

1.1. Background and Significance

As the role of medical and healthcare workers is highlighted by the response to COVID-19, they actually have a lot to do with disease control and response in the first place. When COVID-19 reached the shores of Indonesia in early March 2020, a makeshift rapid response unit was put up in Batan Hospital to carry out rapid testing within the first few days it had run. A color-coded shift regulation was designed to maintain sanitation procedure. This paper attempts to analyze the worker dedication in medical services to handle a contagious disease by looking at the case of Batan Hospital. An observation-based conclusion is drawn as a heterodox perspective on the endurance of the top-down approach.

Medical and healthcare workers play an essential role in disease control and specifically the response of outbreaks as clinical medicine develops alongside its hygiene. Technological systems such as sanitation procedures and treatments steadily improve for diseases caused by viruses and other pathogens. Especially for contagious diseases, procedures maintained a level of segregation between the sick and the healthy. The elaboration of this might start from the black death, tuberculosis, smallpox to the pandemic flu. Shortly following the second industrial revolution, in the time where germ theory is largely acknowledged, a University of Public Health has been established in Jakarta to acquaint the healthcare profile of the successive nation with the European hygienist standard procedures.

1.2. Purpose of the Study

In the first ten weeks of the COVID-19 pandemic, 1,945 confirmed cases (93.3% asymptomatic, comprised mainly of foreign workers) were identified in the migrant worker population in Singapore through active screening. They were initially isolated at seven dormitories with medical facilities before being transferred to four community care facilities when the number of cases escalated alarmingly. The median time from detection to isolation at the dormitories was 1 day. A significant proportion of the constraint was dealing with the escalating workload, fear, anxiety, and non-compliance with isolation/quarantine measures among the cases. An appropriate preparedness and scalable response plan are crucial for public health to manage a large influx of cases. There is a unique application of semipermanent medical facilities in the community for isolation/quarantine to manage the COVID-19 outbreak. These findings provide key insights into addressing the operational challenges of the rapid set-up of medical dormitories during a public health crisis, and managing the worker dormitory and associated community COVID-19 outbreak

(Venkatachalam et al., 2021). The COVID-19 pandemic has posed significant challenges for healthcare workers in hospital settings in terms of implementation, compliance, and effectiveness of infection prevention and control (IPC) measures to prevent the spread and protect against the virus. This grounded theory study explored the perspectives of 27 HCWs, doctors, and nurses (medical and nursing personnel) working in a 1,200-bed university hospital; ten were involved in direct care of suspected, probable, and confirmed COVID-19 cases. The data were collected on May 2020–November 2021 with semi-structured interviews. Healthcare workers expressed fears and stress regarding their safety and the risk of becoming infected, and passing the disease on to their families, as well as their training needs on IPC. The results categorised the main risks and challenges from the healthcare workers' perspectives, detailed their experiences, and suggested ways to enhance IPC practices and risks mitigations. This qualitative study provides nursing implications, and hospitals, national policymakers, public health advocates, and researchers are expected to find it useful to address the gaps in risk and challenges regarding COVID-19 up to the present factual accumulation (Jongdeepaisal et al., 2023).

1.3 2. Understanding Disease Control and Outbreak Response

Outbreaks of infectious diseases are an important public health concern. They may have worrisome epidemiological effects related to mortality, morbidity, and health care delivery. Infectious diseases are transmissible between persons and are sometimes highly pathogenic, creating the potential for an extremely rapid rise in cases. There is legitimate concern regarding the risk of deliberate release of high-pathogen infectious diseases. Following the intentional release of aerosolized Bacillus anthracis in the United States in 2001, 22 individuals developed anthrax and there were five fatalities. Due to their highly transmissible nature, the deliberate release of a high-pathogen infectious disease would have the potential to cause significantly more cases and fatalities than bioterrorism utilizing non-infectious biological toxins. Consequently, preparation for the control of highly pathogenic and highly transmissible diseases is of utmost importance (Pablo Caeiro & I. Garzón, 2018).

A number of large outbreaks of highly pathogenic or highly transmissible infectious diseases involving a considerable number of cases and fatalities have occurred in the recent past, including plague, diphtheria, Ebola, monkeypox, and Zika. Recently, numerous travelers to and from east and southern Africa may have contributed to the spread of infectious diseases. The potential for an outbreak of a high-consequence infectious disease remains high. Over the last 20 years almost one-half of the population of health care support staff have experienced communicable diseases (F Houlihan & Ag Whitworth, 2019). The fact that returning travelers had symptoms of influenza-like illness may also have contributed to the spread of diseases. Among the many people believed to be in contact with travelers, just one cause of suspicion is that there are so many others who are not ill at this time but who will become ill in the future. After weeks of illnesses caused by a protracted incubation period, some cases will progress to late-stage disease, becoming highly infectious. Between 15 and 21 days after being in contact with Ebola patients, for example, most cases in care workers occur.

2.1. Epidemiology Basics

Communicable disease control is most appropriately seen as a cross-disciplinary issue, with contributions not only from epidemiologists, but also from biologists, biochemists, and

administrators. However, there is no group of workers who have a more direct or responsible role in the early containment and control of an outbreak than those involved in the control of diseases themselves. The latter should include clinicians as well as professional encephalologists and, while admitting to a bias, it is the former group of workers who usually play the pivotal role in the early recognition of a new disease. A good example of this is the role played by the Belgian physician who recognised the first outbreak of Ebola haemorrhagic fever. Transmission of communicable disease, as all participants are doubtless acutely aware, can take place in a variety of ways—for example by direct person-to-person contact; by contact between a common source and a susceptible host; by a fecal-oral route; or by some vector that transmits the infection from one host to another. These observations are fundamental to the understanding of transmission dynamics and the subsequent construction of a containment strategy, and emerge from a consideration of the basic reproduction rate of the infective agent-R0. Ideally, the former should not exceed unity (S. Evans, 2009).

2.2. Key Concepts in Disease Control

In recent years, the world has witnessed several unexpected health threats which unveiled the vulnerability of the global health system. Rapid spread of dangerous pathogens diseases and climate change are some of the leading global health threats. Two diseases, Severe Acute Respiratory Syndrome (SARS) appeared initially in 2003 and Middle East Respiratory Syndrome (MERS) at the end of 2012 and still counting, attracted the most attention to increase the level of global readiness to health threats. Unprecedented levels of response have been taken after the emergence of SARS and MERS. With these responses, two major elements of the global health threat have been improved. The first one is the readiness of prompt response action after the acknowledgement of the issue. For preventing the spread of the pathogen or cutting off the possible transmission ways definitive arrangements have been done. Much-improved global public health system has been accomplished after 2003 outbreaks; the most notable activity has been 2005 amended International Health Regulations (IHR2005) in World Health Organization (WHO) history with 196 State Parties (Pablo Caeiro & I. Garzón, 2018). The 2nd element is the establishment of an understanding at the international level that all health systems have to work in collaboration. In other words, disease safety can be obtainable only by providing the necessary conditions for all countries of sharing information, knowledge, technology, capacity and resources. In the face of dangers, there is no other option besides acting together. This new awareness has been accepted by the global health authorities in the following year of those outbreaks. Moreover, it has also been recognized that countries will not be able to develop alone such global preparedness measures and they started to emphasize that Covid-19 pandemic risk will be significantly lower if the entire world acts in coordination. The European Commission has also extensively communicated this awareness and urged the EU member countries' health services to act in coordination. In case of health hazards, they have also highlighted that all countries have to cooperate and show solidarity: We are all in this together. This common act awareness has also been notified to the public with tweets by relevant authorities including the WHO Director-General. With the emergence of Covid-19, the global level of the health threat has been recalled and crucial reminders from the past outbreaks have been addressed.

1.4 3. The Role of Healthcare Staff in Disease Control

In a study conducted at your hospital, HCWs made up 58 (53%) of 109 individuals diagnosed with COVID-19 from February to early May of 2020. The majority (65%, 37/57 with occupational history) of these had occupational exposures, and 47 (41%) were among 1154 HCWs tested, giving a HCW positivity rate of 1.03%. A number of these cases were acquired in the hospital, representing potential vectors of healthcare-associated transmission. As governments worldwide strive to resume economic activities while controlling a re-emerging infection, healthcare workers (HCWs) are called upon to serve in the frontline. Efforts to protect HCWs should not overlook up-stream exposure in the healthcare setting. Healthcare worker safety and well-being are essential to sustain the acute and long-term functioning of a health system, both in delivering care and in outbreak control. Healthcare systems should recognise the significant role of HCWs in ensuring the health of the community, and implement measures to ensure their safety as a priority. When health systems are overwhelmed, such as during infectious disease outbreaks, the capacity to deliver health care becomes compromised, exacerbating the impact of the outbreak. Disease control measures, including extended screening criteria and contact tracing, may be compromised, favouring hidden chains of transmission. The health of the HCWs, who form a sentinel surveillance population, is a metric indicative of the health system's ability to perform. Monitoring HCWs provides an avenue to gauge the overall health system preparedness against emerging infectious diseases. Rigorous infection prevention and control are important to avert HCW infections and prevent them from becoming vectors of healthcare-associated transmission (Venkatachalam et al., 2021). Early in the COVID-19 pandemic, healthcare workers (HCWs) were identified as a high-risk group, and healthcare settings had been implicated in driving disease spread in the outbreaks. Since December 2019, the vast majority of cases worldwide have been in non-HCWs. Concerns in many parts of the world have therefore focused on imported cases seeding local infections in the community, largely driven by nascent initiatives for disease control in the general population.

3.1. Healthcare Staff Categories

Six healthcare worker (HCW) COVID-19 cases were detected in the first 12-weeks of the outbreak. This infection rate of 5.3 per 10,000 HCWs is higher than that found in the general population at 0.392 per 10,000. A detailed log of staff contacts and activities were compiled as part of the institution's outbreak containment plan. During the investigation, this document, symptom logs, staff movement in the break facilities, and cleaning rosters were cross-checked to identify potential exposures and lapses in infection prevention procedures. A cross-sectional survey found that only 30.1% of HCWs had received training in pandemic preparedness. Considering that patients in the community with febrile symptoms and no history of contact with known cases were not recognised, these results suggest a low level of preparedness for the COVID-19 epidemic among primary healthcare HCWs (Tang et al., 2022).

3.2. Responsibilities and Tasks

This study aimed to investigate the implementation of the responsibilities and tasks of healthcare staff in disease control and outbreak response for coronavirus in Indonesia. Healthcare staff in hospitals, primary health care facilities, and the government's disease center were included in this study. Data was collected through online survey questionnaires distributed using nonprobability

convenience sampling. The respondents were asked to answer questions related to the implementation of their responsibilities and tasks in the healthcare facility where they worked. There were 13 immediate responsibilities and tasks directly related to patient care; these were mostly about clinical operations to prevent the spread, mitigate, and treatment of patients suspected and confirmed cases of coronavirus. There were 6 medium-term responsibilities and tasks, largely about workshops and training that implement the coronavirus protocol to healthcare providers. The two responsibilities and tasks beyond those when the disease center was involved in outbreak and daily updates to the clinical staffing of coronavirus outbreak developments. Such of limitations are the possibility of information bias on self-reported data and only urgent responses collected. Future data collections may incorporate more comprehensive data collection methods. There is evidence that healthcare staff in healthcare facilities were big parts of coronavirus control in Indonesia based on the responsibilities and tasks they carry out. If responsibilities and tasks were not implemented in the healthcare facility concerned, these need to be considered from management and provide better support to healthcare staff at this time (Venkatachalam et al., 2021).

1.5 4. Training and Preparedness of Healthcare Staff

The global spread of the highly contagious and often fatal SARS-CoV-2 virus serves as a stark reminder of the critical role frontline healthcare workers (HCW) play in pandemic response. While the fight against COVID-19 is still raging in many corners of the world, there is a heightened awareness of the disproportionate harm done to HCW. In response to this vulnerability, in the early months of the pandemic, widespread calls were made for governments to increase protection for their HCW. In addition to the immediate need to ensure the availability of appropriate personal protective equipment (PPE), much of the advice was to strengthen the preparedness of health systems in order that early detection of new cases and effective prevention of transmission within health facilities might be achieved (Tsiouris et al., 2022). The preparedness measures of health systems can be regarded as the sum of the abilities and resources possessed by each HCW, resulting in a differentiated capacity of health staff in different facilities to respond. This paper seeks to provide a general overview of the role HCW can play in IPC by affecting as well as being affected by the health system in which they are embedded. It proceeds by describing the interconnectedness of HCW knowledge, perceptions and practices related to outbreak response and analyzes each of these areas in turn. Solid border security measures have meant that the response has to take place within the Sicily region, which is led by the Department of Health and Prevention. Within the region, facilities such as hospitals have developed highly detailed plans involving departmental restructuring, staff reallocation and space reorganization with the phase-out of elective activities. This bureaucracy contrasts with the Sicilian situation in which there was a widespread COVID-19 outbreak in March 2020. Variations in staff experience, in the local distribution of COVID-19 cases, and in facility size have combined to produce differences in preparedness to respond to the COVID-19 outbreak.

4.1. Educational Requirements

1. Introduction

A disease caused by novel Corona Virus (SARS-CoV-2) was first recognised in Wuhan in December 2019. It was declared as a public health emergency of international concern on January

30, 2020, and soon a global pandemic. In response to that, the government of India declared a 21 days nationwide lockdown. Infection prevention and control (IPC) measures are essential to prevent the spread of Covid-19. Healthcare personnel (HCP) in hospitals are at increased risk of getting infected. It is necessary to understand the expectation of HCP from Infection prevention and control (IPC) programmes. Additionally, it can be beneficial to understand the expectation according to position or department and can assist in the planned activity or intervention accordingly (Shah et al., 2021). Items for this questionnaire were made based on literature review. This was drafted and later reviewed with an infection preventionist. Further, it was shared with a few healthcare personnel for validation. The purpose of this validation was to confirm that there aren't any important questions that should be added. However, the design allowed them to fill any additional expectations they believe are important that have not been covered yet. Meta information was also gathered like designation, department, and organisation. This was carried out to assess whether the expectation differs across different designation or position or department. Participants were ensured about data privacy and confidentiality. Written informed consent was obtained from all participants.

2. Materials and Methods

The principal investigator prepared a questionnaire after reviewing the previous literature. This was later shared with an infection preventionist and a Medical Microbiologist for further review. The assessment was made over the content of the questionnaire. Later, this was again shared with HCO staff for validation of the questionnaire. All HCP serving for more than 1 year in a HCO irrespective of the healthcare department were included. Discussion participants, lab technicians, operational assistants and other worked in a store, pantry etc. were excluded. The survey was conducted and the principal investigator verbally interacted.

4.2. Simulation Exercises

In an era of increasing globalisation and environmental change, the risk of outbreaks and pandemics will remain a public health threat. The role of healthcare staff is vital in disease control and the response to outbreaks. Understanding the complexity of disease transmission, the role of environment and behaviour, and knowledge of evidence based control measures are essential. However outbreaks and emergency response can be complex and overwhelming, and many aspects of management are not solely medical but require multi-agency and interdisciplinary approaches. In addition a lack of clinical, public health and outbreak experience can contribute to high levels of staff anxiety accompanied by the burden of illness among close family members and friends (Ann O'Keeffe et al., 2016). Exercises and training can improve staff preparedness, procedures and systems, with the value of exercises shown in previous outbreaks. Such activities should include mass-casualty and disease-specific scenarios. However, it is recognised in some countries that exercises have been under-resourced. Other suggested aspects to enhance preparedness have included the development of response manuals, staff-briefing protocols, cross-border working and collaboration, and disease experience exchange programs (Yee Kong et al., 2021). Experimental studies have shown that hand-hygiene compliance falls to ten percent of baseline levels in disease outbreaks. Hand-hygiene training was assessed in Guinea following an Ebola outbreak, showing efficacy of short training and reminders. An analysis of PPE compliance within the current swine-flu outbreak, which varied from 89% in high-risk areas to only 33% in regular patient-care areas, suggests the use of training and education. Using the “wisdom of crowds” it is believed the best

professional advice on how to reduce respiratory disease transmission is via the proper use of PPE, and the effectiveness of completed training on hand hygiene and PPE use in medical staff.

1.6 5. Challenges Faced by Healthcare Staff

In the previous study, several challenges faced by HCWs were documented, including difficulties in working, such as using PPE, difficulties in carrying out assessments, failure to properly carry out physical examinations and in providing health education of patients and families, and physical and psychological fatigue due to working using PPE level 3 over a long time (Windo Setiawan et al., 2021). In this paper, perceived challenges at each step of disease control, from disease notification to management of isolated patients, using qualitative data from semi-structured interviews with HCWs. Also, possible ways to enhance the work capacity of HCWs in the epidemic control system were addressed.

Some studies have been conducted on the difficulties faced by HCWs treating COVID-19, but many challenges are still unknown, especially in settings where resources are limited. This study recruited 17 HCWs from a low-middle income country in Southeast Asia, caring for COVID-19 patients in outpatient and inpatient settings. Broadly, barriers faced by HCWs have implications in the process of disease control. This study identified challenges at each step of disease control among HCWs, from disease notification to management of isolated patients, based on qualitative data. These results will assist policy makers in systematically addressing the difficulties encountered by HCWs in disease control through an outbreak response.

5.1. Resource Constraints

Healthcare workers may be required to deploy to another location where there is an outbreak. However, governments may not always be able to provide the necessary resources or mechanisms to allocate the required workforce, as well as the other resources needed to ensure healthcare workers can effectively lead community engagement or deliver care. Additionally, healthcare workers can be exposed not only to the pathogen causing the outbreak but to the populations or other environmental changes produced by the outbreak response. This content draws on existing guidance and resources for health workforce deployment and usage during infectious disease outbreaks and proposes practical tools to reducing the likelihood of healthcare workers being exposed to the disease. These tools include checklists on preparing healthcare workers for deployment, logistical needs of healthcare workers, requirements for allocation deployment locations, and responsibilities for the organization deploying the healthcare workers. Types of healthcare workers outlined in this document include those employed by governmental health systems, those employed by nongovernmental organizations or community providers, and international volunteers or researchers.

5.2. Emotional and Psychological Impact

Instances of previously unknown or rare diseases have been frequently reported across the globe in recent years. The COVID-19 outbreak is the third outbreak of novel or highly pathogenic coronavirus diseases in the 21st century. The first two outbreaks of highly pathogenic coronavirus diseases, i.e., severe acute respiratory syndrome (SARS) in 2003 and Middle East respiratory syndrome (MERS) in 2012, both led to worldwide outbreaks of severe respiratory diseases. The most recent COVID-19 outbreak affected many countries and led to a World Health Organization

pandemic declaration. In general, person-to-person transmission of COVID-19 is partly attributable to a high prevalence of viral shedding diffused through respiratory droplets during a prolonged incubation period without showing any symptoms and SARS-related syndromes. Outbreaks of COVID-19 have been closely related to crowded places, such as homes, workplaces, and entertainment venues. The COVID-19 outbreak has had a huge impact on a global scale, resulting in soaring death rates and an overwhelmed healthcare system, particularly in the first emergence of the epidemic.

The daily number of new cases has been declining. Although people are gradually returning to their workplaces, all individuals are concerned about the second wave of cases occurring in China. Since March 2020, overseas governments have introduced various travel restrictions and official warnings to curb Chinese people from entering or returning from their countries. The Chinese mission has also provided the Chinese authorities advice on handling the epidemic, such as arranging chartered flights to alternative destinations or even a return to China. It also subsidizes protective equipment and health supplies at the centrally coordinated Chinese level to address the increasing number of homemade or imported cases (Rose et al., 2021). Handling the COVID-19 outbreak until a vaccine and drug therapy are effectively developed and implemented is a challenge for worldwide education, governments, and healthcare organizations. Given the potential for widespread global transmission, all countries have implemented a variety of containment and control measures to curb the spread of COVID-19 to protect their populations.

1.7 6. Success Stories and Best Practices

A range of practical and best practice advice has been shared internationally for healthcare staff in managing patients with diseases under investigation or to help in the development and implantation of national plans and guidelines. This includes recommendation on ward-level infection prevention and control guidance, setting up screening and triage of symptomatic patients, laboratory testing, and accompanying research to better understand transmissibility in healthcare settings. Useful insights have been shared on the engagement and training of private healthcare providers, and the development of guidelines tailored to community health workers and social workers.

Healthcare staff have been at the forefront of activities and recent activities have aimed to support them further. The collection of best practices and lessons learnt indicate a more phased approach to guideline development / improvement is often needed, and it can be helpful to engage specific health professional groups through taskforces and dedicated forums. Respond to the need for pragmatic resources for healthcare staff in laboratories, and the testing and treatment of patients with palliative care needs.

6.1. Case Studies

Community Outbreak Response: Investigation and Risk Mitigation (CASE STUDY FOCUS - In-school group activity). Implementer/presenter: in-country staff or partners are welcome to use and adapt this material for any in-person case study discussion to enhance and foster trainee's ability to conduct a successful outbreak investigation in real-life outbreak situations, preparedness for the implementation of adequate safety measures from the very beginning, particularly in situations

where the etiology of an infectious pathogen outbreak is yet undetermined (specific scenarios are included) (Yayra Aku et al., 2021).

6.2. Innovative Approaches

By virtue of their work, healthcare staff are critical actors in the prevention, recognition and control of any emerging infectious diseases that have health and infection prevention and control implications. The need for up-skilling and training of health staff was identified even before the declaration of the Ebola Virus Disease as a Public Health Emergency of International Concern and this continues to be a priority task for responses to EVD or other newly emerging pathogens. Because of the role that healthcare staff play in infection transmission, with a substantial body of evidence in settings still without high standards or practice, a final lesson is that healthcare staff can quickly become a principal transmission route, with more staff infected and dying than in the general population. In view of the observed clinical and communication issues posed by C. auris, it is important to reflect on the public health and systems lessons that can be learned from this situation, including the identification of innovative approaches which may prove useful in future events. These are considered within the context of both C. auris and potential impacts on preparations for future novel pathogens.

1.8 7. Collaboration and Communication in Outbreak Response

Frontline interactions between healthcare staff will continue to be an important focus of public health research. Healthcare workers (HCWs) have recognized the importance of the role played by professional practice in individual healthcare providers, teams and staff more broadly. Prior work frequently focuses on the strategic logic to forge ties between disciplines, hospitals, or organizational levels. Integral however, to the functioning of any professional community, team or wider organisation are the daily interactions, routines and work practices through which healthcare staff collaborate and share information. It is here that the contingency planning, patient isolation, and pharmacological prophylaxis shaped so much by the threat of pandemic influenza reveals the most coherently observed practices of healthcare staff (R. Jordan et al., 2022). Interactions between healthcare professionals will be further investigated in this paper's exploration of how broader financial, legal, and political landscapes are mediated by routine practice.

Nurses, physicians, and allied healthcare professionals can and frequently do occupy distinct and incommensurate professional worlds. Prior work illustrates how the maintenance of - or interruption to - patient care is subject to interprofessional handovers, referrals, and the negotiation of collective and individual concern. Where such work practices go well, there is the promise of effective patient care; where they go badly, there is generally the opposite circumstance. A significant concern of the outbreak planning was thus to reshape those aspects of professional practice that were considered inefficient, incompatible, or a threat to ongoing patient care. This in turn necessitated that practices once particular to individual disciplines be restructured to permit collaboration across the professional divide.

Viewed from below, the outcome of the containment phase of the recent disease outbreaks changed the day-to-day business of healthcare staff in significant ways - and, in both extremis, would more than likely have had profound effects on the functioning of the health service more broadly. As

will be detailed here, much of what was planned, practiced, and revised during those recent episodes of 'containment' was profoundly shaped by the everyday working practices and professional commitments of nursing, pharmaceutical and allied health professionals. Across these different medical disciplines, shared communication was initiated to facilitate the exchange of what the government of the time referred to as 'rationale'. Staff were encouraged to view containing the disease in part as a problem of broader socio-technical networks (Tabbaa, 2010).

7.1. Interdisciplinary Teams

Disciplines in Infectious Disease Rounds have unlimited boundaries when infectious diseases disseminate from one region and one country to the rest of the world. Interdisciplinary teams need to be available to foresee these events. Infectious Disease Departments look for interdisciplinary teams in Healthcare Staff in a hospital to investigate the catastrophic situation. It is important for the Physicians, Epidemiologist, Infection Control Specialists, Administrative Counsel, Communication Person, and a Researcher to have patient confidentiality (Pablo Caeiro & I. Garzón, 2018). Because utmost care should be considered when moving from one question to the next, these professionals should review all questions and assign an individual's rights regarding prior knowledge of those questions. The Physician should first check the patient at the local hospital, and then transfer the patient into the Reporting Hospital. In the meantime, real-time collaboration is needed to draft a suitable entrance for hospitalization. The collaborative procedures should be well established in advance and are ready for immediate use. Assuring that well-prepared preventive measures are mandatory requirements, and good planning for collaborative treatment and health care techniques between Hospitals is necessary. An internet-based spread-out system to provide conferences for sharing equipment for sterile transports between Hospitals should be created. Subsequently, Hospitals with limited resources may require real-time assistors in pre-designed health care techniques. Medical Administrators of healthcare facilities must ensure patient surroundings will be kept to a minimum necessary level following recommended guidelines. In addition, all Healthcare Staff should have a clear understanding of what is expected. An active Infectious Disease Team should be engaged in hospital rounds. It is advantageous for other healthcare specialists to illustrate the significance of such a Team. Recent disasters have caused widespread discontent among the general public. Such contempt has generated an organizational vision to forewarn the disease outbreak and treat it properly. Throughout hospital rounds, one comparison can be made between a Hospital with an Infectious Disease Department and the other without an Infectious Disease Department. Results might be published anonymously.

7.2. Information Sharing

The "rapid" development of a quarantine hospital in Wuhan in response to the first known cases of novel coronavirus has brought historical comparisons with the response to the 2003 SARS outbreak. In both cases, local officials are reported to have sought to keep the outbreak quiet by limiting the release of information, although Wuhan officials have faced heightened criticism for the six-day delay in announcing the outbreak (Lencucha & Bandara, 2021). However, speculations developed earlier about the emergence of the SARS virus and the international dimensions of infectious disease outbreaks because of a wealth of opportunities for information to circulate from non-traditional sources. Local officials in Hanoi put out warnings about a pneumonia-like illness not long after SARS had been identified in Guangdong province. Taiwan made a similar complaint

about its exclusion from discussions. Rumors of the SARS outbreak spread rapidly through China via cellphone messages and unofficial reports. These anecdotes suggest that the immediate response of local societies to a public health threat need not be confined to information generated through formal mechanisms or state channels but can be shaped by extensive attention to less officially sanctioned sources. This attention can play a critical role in early recognition of an epidemic and in effective strategies for limiting its spread. Yet the epidemiological community in industrialized countries has continued to emphasize a traditionally biomedical model in which disease communication is an elite-led process centered on the generation of evidence by epidemiologists and the interpretation of best practice by public health authorities.

Deng's acculturation theory argues that when groups migrate from one society to another, they may practice native culture in the host society. The extent of cultural retention is influenced by sociodemographic, cultural, and social network factors. Chinese migrants traveling between Australia and China show some acculturation to the mainstream health system and have alternative or complementary care back in their native country. Disease risk perception is associated with health behavior. With a different perception of health risks and media effects, Westerners and the Chinese may have different behavioral responses to the COVID-19 outbreak. Because of the different degree of acculturation to a society, Chinese living in Australia may demonstrate responses that are more likely contrastive to Australian native population. It is interesting to examine what kind of health related information is accessed and circulated amongst Chinese in response to COVID-19, given the role of the Chinese population in the emergence of the epidemic in Wuhan and its concerns about successful treatment and prevention. This study empirically investigates how Chinese in Australia and Chinese in China utilize as a means of disseminating and consuming information about the outbreak since illness in Wuhan was first identified and how their exposure, publishing, and dissemination of the outbreak-related messages are associated with the number of confirmed cases.

1.9 8. Ethical Considerations in Disease Control

8. Ethical Considerations in Disease Control During this symposium, preparedness plans for each of our communities have yet to be initiated. Certain ethical considerations should be addressed by those who write protocols and by those who must implement them. During the chaos that could ensue at the onset of a naturally occurring pandemic, it is possible that some actions taken might not be taken in the absence of the confusion that a health crisis of that magnitude would generate. The most immediate ethical consideration at issue is how the medical and burial needs of the community might be met. If there were few in this group left to develop protocols after such a crisis, governmental or institutional policies might direct that pandemic victims not be treated by healthcare staff. What if those persons, thought to be necessary care-givers by virtue of their professional training, refused to comply with such directives and found themselves to be one of the few remaining resources the community had? Would they have a moral obligation to care for the sick even in this unprecedented situation? Professional staff have always been the key resource during large responses. Once bioterrorism was made clear, a great number of health professionals answered the call to train and go to the effort of preparing local systems for effective responses. Yet, structured effort to include local healthcare workers in planning for provision of care equitably and fairly during the course of a large-scale event has been lacking. There are lessons

that should be learned before a need arises. Ethical dilemmas can help highlight important areas of concern and uncertainty.

8.1. Patient Privacy

As part of the disease control and outbreak response, local healthcare staff can contribute to early detection and patient's privacy, which may enhance the collaborative work between community and local government. Patient privacy in industrialized and developing regions maintains patient dignity. Obtaining adequate privacy in healthcare settings is a long-standing concern globally. Western countries pine on individual autonomy and privacy rights. Disclosure, access, and control individual information are controversional subjects in light of the spread of digital health. On the other hand, traditional East social values and reasons generally accord to group concerns rather than individual needs for privacy. Exceptions exist in this trend. For instance, the Southeast Asians in Malaysia by and large extend the respect for privacy family wise ((Bhakti Pratiwi et al., 2022)). Nowadays media grow widespread in rural settings where an array of secret information can be distributed nationally or at least within large regions. Indonesia is a case of such settings where the country has been world-wide reported for its rich culture, biodiversity, and numerous well-worth-seeing locations.

At the micro-level, when ill, patients pass on sensitive and secret information; the medical professionals apply techniques to bear secrets in treatment. Violation of patient privacy may induce detrimental effects on either patients or doctors among which are offensive and distressful patients, disputes involving patients and providers, faltering behavior towards patients or medical staffs, destroying trust, conflicts between collecting scientific data and maintaining patient's privacy, avoidance medical services. One such service is follow-up in which doctors evaluate the result of treatment. If privacy feeling and trust for care worker are in low level, follow-up consultation and therapy are likely to be questioned. In tackling the outbreak, formal responses such as prompt diagnosis on the first suspect, infection control, and psychosocial support have been immediately implemented following the guideline from the Ministry of Health ((for Disease Control and Prevention (U.S.), 1970)).

8.2. Equity and Access

The road ahead will be difficult, and collective action is paramount. Though vaccine production and rollout have been Herculean achievements, mass immunization is still far off in many countries, leaving populations vulnerable to mutations and variants. Also, in some areas (often low-income regions) interest in receiving the vaccine is below 50% ((B. Johnson, 2020)). It is still unclear what kind of inoculation will confer meaningful immunity, how long immunity will hold, and what effects variants might pose on vaccine efficacy. As time passes and barriers to global health access remain unaddressed, there is a risk that the pandemic may perpetuate social injustice and global health inequities. This is not a speculative worry, but a fact borne out by the conditions of past pandemics.

Healthcare workers are essential in the control of disease and responses to outbreaks, as has been made clear by the ongoing global response to the COVID-19 pandemic. There are societal, technical, and operational considerations for sustaining and supporting healthcare staff's contributions. It may be difficult to contain highly infectious diseases in crowded, resource-limited

and tightly inter-connected urban settings, such as DRC's capital Kinshasa, or urban areas affected by insurgency in North-Eastern Nigeria. Disease control and response efforts have to adapt to cities, which are home to approximately 6 out of 10 of the world's projected population by 2030. Accurate situation awareness is essential, and processes have been introduced to identify unknown outbreaks as early as possible. Although most (75%) of the 155 inquiries processed did not require additional public health follow-up, the formal inquiry process is believed to act as an infection prevention and control risk assessment, highlighting to both public health and clinical staff that infectious diseases are possible. Early activation of response mechanisms—while accepting that confirming an outbreak often takes time—is important to mitigate what can be cascading epidemiological and socio-economic impacts.

1.10 9. Technological Advancements in Disease Surveillance

Detection of disease outbreak is an urgent and important issue in health care and infectious disease control (Arita et al., 2008). Medical staff often first detect disease condition of the patient and can become a counterpart of the government authority to identify diseases. However, for ordinary medical staff working in health units in urban areas, disease detection is quite difficult because of the work load, especially in clinics, outpatient health units or hospitals. Though most notifiable infectious diseases should be detected or diagnosed at the first level health unit, in reality many cases might be overlooked or inaccurately diagnosed. Disease surveillance has been conducted for a long time in many developing countries, mainly to detect epidemic-prone diseases with the early warning function. Health units from national level to sub-district levels keep weekly reporting on total out-patients and total inpatients for specified diseases. Special surveillance is conducted time to time such as following a natural disaster for rapid detection of infectious diseases, and in immune-coverage campaigns. Recently, a well-functioning disease surveillance system with a good network of communication was credited in early detection of Avian Influenza outbreaks. A system was developed for monitoring of abnormal rumors from the community using signal function, not only from a prevention approach but also have people-participation theme. Formulation of comprehensive cross-sectoral pandemic preparedness and response plan included in the Revised International Health Regulation has been started. At this moment the linking process between comprehensive planning and practical implementation is being carried out. There are possibilities of increasing 'legal' obligations from individual health facilities to report, and better support from multi-sectoral and also cross-border elements. An interest file of the medical doctors has been formulated in several countries about their roles and requirement during public health emergency dealing with potential outbreak of Highly Pathogenic Avian Influenza. Inter-country meeting has been done in order to share experiences, update information, develop coordination and information exchange and unifying the terminology. Scientific/research surveillance was initiated with active participation and full commitment by responsible medical staff from all health facilities. Different aspects of surveillance have been practiced by the hospital logistic management for surveillance and clinical management of the cases. Data from the epi-surveillance activities are summarized and reported, which will accompany the result.

9.1. Big Data Analytics

The provision of basic health care and the implementation of prevention strategies in advanced health care systems play a crucial role in the fight against epidemics and contribute to their eradication in a timely manner. On the one hand, human health care matures and improves over

time on the basis of lessons learned during the fight against historical diseases, both globally and within different countries or regions. On the other hand, healthcare staff, which functions like a switch in a complex human-activated system, needs to act sensibly and adapt strategically to an emerging epidemic, activated by an alarm created by the relevant science research.

The fight against epidemics requires huge human resources and expertise. Since the beginning of human civilization, significant attention has been paid to this struggle, but the huge costs of this effort are not always in line with expectations, and epidemics usually cause unexpected and very serious harm. The use of existing big data obtained from preventive health services, patient health data, and previous diagnostic studies has the potential to guide healthcare staff to save time and funds in the treatment and control of epidemics. Under a joint effort at the international level, health ministries of one or more countries may establish a disease control department with sufficient manpower and specialization to work on outbreaks in the early stage. This task includes many responsibilities, such as forecasting the progress of the epidemic and providing hospitals with medical supplies, drugs, and specially trained healthcare staff, as well as disseminating medical knowledge about that disease's prevention and control to the general public (A. Polonsky et al., 2019).

9.2. Telemedicine

Telemedicine is the ability to provide medical services to patients located in another area using telecommunications. Telemedicine can include a wide range of services that bridge the gap between two healthcare professionals in different locations or between medical staff and long-distance patients (Shokri et al., 2023). With the advent of COVID-19, the use of telemedicine has been greatly expanded, and patients are now able to visit their doctors from the comfort and safety of their homes. The COVID-19 outbreak has brought an unprecedented healthcare crisis. The constantly increasing number of patients has also put a financial strain on governments. In such a crisis situation, it is crucial to manage limited healthcare resources well. In most countries, all routine medical interventions and procedures were stopped due to the COVID-19 outbreak, and only emergency cases were admitted to hospitals. Delayed admissions to the hospital due to the postponement of interventions resulted in undesirable consequences in many patients. In this respect, the use of telemedicine applications may not only save money, but may also reduce the spread of the disease. Telemedicine includes many forms of healthcare services, which include remote medical diagnosis and consultation by computer or phone, remote patient monitoring by telephone. Thanks to this, the patient is able to continue to receive healthcare services without leaving his/her home.

Due to the COVID-19 outbreak, the number of visits to hospitals has decreased significantly due to the fear of becoming contaminated. In such cases, the decision of a doctor often appears as a requirement. The need for a medical decision required many inspections and test results for the disease to be diagnosed accurately and quickly. This need can be met with telemedicine. Patients who think that they have the disease can be consulted online by an infectious diseases specialist. Online applications have been developed where people can consult and chat with a doctor for a few minutes for a certain fee, or they can directly do this free online consultation from official websites (Alperay Tarim et al., 2022). In this way, the patient will have become informed without leaving his place. Also, consultations will speed up the decision-making process of general practitioners working at the public emergency department and thus reduce crowd density.

1.11 10. Global Health Security and International Cooperation

By detecting and halting diseases early, participating in widespread vaccination programs, and dealing with both their immediate effect and their long-term outcomes, healthcare specialists identified the changing landscape of biological hazards. Together with other national and foreign contributors, they are an important role in avoiding an epidemic scenario. Health staff, including paramedics, professionals, providers and planners, employees, utility staff, microbiologists, x-ray and radiology, medication control staff and social care staff, offer a major contribution to both most of the routines seen in health care and federal denial and continuity planning to uphold healthcare systems in an infectious diseases situation. The Big Bush order specifies the tasks that must be carried out by the federal, state, municipal, tribal, and territorial governments to respond to an onslaught of bio-terror agents, and focuses on the readiness of the completely prepared and cooperative immediate treatment response. This necessarily involves the healthcare population. In preventing and treating contagious diseases, healthcare services are important to prevent the spread of infections, not only among the persons who have been in touch with someone who has contaminated, but also staff. In the case of exercising bio-terrorism mediates, healthcare staff are in a particularly high risk group for exposure so that adequate training and a good industry measure can create an important organizational safety frontier for the matter of healthcare services (Wang, 2012). Also, however, it is possible to assist in preventing many of them. During a crisis, healthcare operations take account of many sorts of firm action, in addition to the typical food supply, ethnic operations, search and help, and need to provide an equilibrium of immediacy to ensure appropriate service counts (L Heymann et al., 2015).

10.1. WHO Framework

Responding to increasing frequency, scale and international spread of acute public health risks caused by various infectious agents and biological toxins requires improved ability by healthcare staff to protect themselves and others against such risks (Pablo Caeiro & I. Garzón, 2018). It also requires better preparedness to prevent, detect and promptly respond to threats to public health. In that regards, information has been gathered on desirable qualities of personal protective equipment to avoid potential biohazards generated in a healthcare environment during exposure to patients and biological agents with high epidemic potential.

Proper ranking and evaluation of technical parameters of personal protective equipment in connection with healthcare conditions enabled determination of a set of vital product characteristics. Based on empirical results, it was found that there are considerable deficiencies in the sizing and sealing of filtering half facepiece. These deficiencies, unrecognized by end-users, may be due to inadequate supplier information on how to wear them or put on incorrectly. Optimal solutions for biohazard protection generated during the high-risk procedures in healthcare work are proposed.

Considering the health hazard caused by emerging infectious diseases, it is crucial that healthcare staff are effectively protected against them. Therefore, highly efficient preventive methods are needed, including isolation of infected individuals, collection of biological samples, and others. Unfortunately, the high motivation of such cases poses equal risks for both healthcare workers and those being treated.

10.2. Pandemic Preparedness Plans

Guidance from WHO and public health authorities concerning appropriate respiratory protection for health care workers as they are one of the most vulnerable groups in an Avian Influenza outbreak is important to inform policy. As the outbreak response will rely on them, they need to feel safe, treating and caring for infected persons. Given the potential benefits of face-mask use for airway infection control, health care workers should be supported in their use. This is a key finding to influence the development of pandemic plans. It seems that quarantine and isolation are measures that can be accepted by health care workers if concerns about loss of income, fear of isolation, and concerns about family are appropriately addressed by health authorities. Participation in training on PPE and pandemic disease with resulting increased knowledge increases staff willingness to stay at work. Trust in the information provided and trust in the hospitals ability to provide protective measures are key determinants in the decision to stay at work. Measures to improve trust were improving knowledge, developing a staff Pandemic Preparedness Plan, and having a buddy system whereby staff checked each other and put on PPE together. These and other lessons have been used to inform the draft Australian Health Management Plan for Pandemic Influenza (Seale et al., 2009).

1.12 **11. Conclusion and Future Directions**

The participation of healthcare staff in infection control and outbreak response has a crucial role in ensuring the containment and mitigation of infectious disease. Healthcare workers are at greater risk of contracting diseases because of closer physical contact with patients. It is well recognized that healthcare staff are usually the first to become infected in an outbreak (Venkatachalam et al., 2021). In an outbreak, governments and professional organizations may institute chief infection control guidelines to reduce infection. Nonetheless, the guidelines staff receive may often cause problems. This is especially true for personnel who look after infected persons in rural areas of low living settings. Forty respondents were interviewed in town, upcountry, and rural clinics and hospitals in the eastern and central Ethiopia. The findings indicate that insecurity, a lack of training, and communication were the key variables that conspired against the respondents putting to practice what they know about how to take care of infected people. Difficulties like mains supply and scarcity of resources were identified. Development workers were urged to remember that the maxim of "simple is beautiful". They are advised to intend unique systems geared to the surroundings, tradition, and assets of the populace. Guides and training aimed at infection and preventative implementation should be made obtainable for all healthcare staff. Better communication amongst leaders, district health boards, and healthcare staff is necessary (F Houlihan & Ag Whitworth, 2019).

11.1. Summary of Key Findings

The risk for unintended disease exposure due to COVID-19 has led HRI to study and predict health screening compliance for healthcare staff. Parameters for dynamic modeling are estimated by training the network on healthcare facility access data collected from staff entry/exit turnstiles. The percentage of disease exposure for sundry screening compliance policies is calculated for infection rate, capacity of screening, and the number of staff with underlying chronic conditions that are knowledge or hypotheses. The risk for unintended disease exposure on staff during an outbreak in a healthcare setting is assessed, also considering the care provided to patients. Staff

providing care to patients are exposed continuously to infection. Staff foot traffic flows between the locations where care is provided and facilities necessary for that care provision. The behavior of hospital staff in emergency department locations is scrutinized and modeled. Temporal parameters of this model mimicking the emergency department are estimated using the data from twelve healthcare facilities. The effectiveness of this model is reliant on a good estimation of those parameters, which is crucial for modeling and predicting the staff's potential disease exposure then, with advanced knowledge of the model behavior, network's health behavior in an emergency department other area.

11.2. Recommendations for Policy and Practice

Four recommendations for policy and practice derived from this research are: Social media and Internet-based real-time alert systems for informing policy-making in low- and middle- income countries to be utilized; Evidence-based guidelines for policy-making in high-income countries to be produced and made publicly available; In high-income countries these guidelines are to be published, and where applicable updated, regularly; Health care staff to be educated in correct outbreak control procedures in any country.

Evidence for policy and practice derived from research on the effect of the healthcare staff's behaviour on the prevention and controlling of the spread of disease, specifically outbreaks in their communities and facilities, is presented. An extensive literature search was complimented by discussions with relevant professionals in the field. These sources were utilized to inform the discussion and recommendations for policies, implementations, and further research. These include the importance of social media and Internet-based real-time alert systems of possible outbreaks in informing policy in the case of low- and middle- income countries, the need for evidence-supported guidelines in high-income countries and the implementation of appropriate outbreak control training for healthcare staff worldwide (Pablo Caeiro & I. Garzón, 2018).

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