INTRODUCTION
TO THE CASEBOOK

Public Health in the Midst of a Pandemic

Printed on the classroom wall of the Schulich Interfaculty Program in Public Health is a partial quote describing the mission of public health: **"…fulfilling society's interest in assuring conditions in which people can be healthy"** (Institute of Medicine, 1988). The public health workers who lead this mission represent possibly the most multidisciplinary of all professions - one comprised of virologists and immunologists, public health dentists, nurses and physicians, epidemiologists and biostatisticians, behavioural scientists, anthropologists, health economists, psychologists, communication and policy experts, and program managers, planners, and evaluators. This highly diverse skillset is needed, for the health challenges facing every population are myriad and interwoven.

People apply these diverse skillsets every day making the decisions that enable the conditions in which people can be healthy. Public health decision-making often requires deciding on a course of action using information that is imperfect, incomplete, and rapidly evolving. You will see in the cases in this volume a reflection of the philosophy "public health is a team sport", which our students encounter through the strong emphasis our program places on team-based learning, which in turn requires a high level of team functioning. Some people take more naturally than others to any collective effort – to putting the 'we' before the 'me'. We strongly believe the ability to work cooperatively and effectively with people from diverse backgrounds and interests is a skill that can be learned. It is not easy but learning life's most important skills rarely is.

The cases in this book were written by students from our Master of Public Health (MPH) Class of 2019. Because this was the last cohort to complete the program before the COVID-19 pandemic, these cases are a valuable snapshot of public health practice before the world was faced with the largest infectious disease threat in several generations. The cases cover an interesting array of public health issues; while some are about infectious disease, like vaccine hesitancy for Ebola virus, and testing for tuberculosis, most are not. This sampling of issues is typical of public health before COVID-19.

Nothing brings home the reality that humans live in a highly interconnected and interdependent world more so than a major crisis. Famines and droughts, earthquakes and tsunamis, hurricanes, tornadoes, floods, wildfires and volcanoes seem to be occurring with increasing frequency and severity. Most of these crises are local or regional in scope and of relatively short duration, making it possible for unaffected areas to respond quickly with international cooperation, aid and professional expertise. By contrast, the COVID-19 pandemic quickly became global in scope and will be with us much longer than the typical disaster. The ability of people to realize our interdependence varies among individuals, as does the ease with which they can work in a diverse team for the common good.

An MPH education exposes students to several frameworks they can use as graduate professionals to approach emerging public health problems, even ones as major as a novel virus pandemic. Systems Thinking allows us to map out the complex cause-effect relationships among dozens of health-related factors ranging from macro to micro in scale. For example,

early in the pandemic there were concerns about the stability of the U.S. meat supply because of localized outbreaks of COVID-19 among workers in meat packing plants. The multiple connections among international travel, commerce, a globalized economy, complex just-in-time supply chains, industrial-scale farming heavily reliant on imported labour, and the concentration of meat packing into a small number of enormous plants have implications for employment opportunities and job markets, food safety and security of supply, and the potential for occupational spread of illness among workers in precarious low-skilled jobs with few legal protections. Later in the spring, outbreaks of COVID-19 among migrant farm workers in Ontario brought to light the heavy dependency of industrial farming on imported labour, and the crowded living conditions that allows the virus to spread. In this way, a single factor – a virus – can affect the livelihood of Ontario farmers, the food prices paid by Ontario consumers, and the economic health of families in Mexico and Jamaica whose income depends on remittances received from their fathers and sons working in far-off Ontario.

The Determinants of Health is a framework that helps us understand many aspects of the pandemic. As with virtually all other causes of morbidity and mortality, the risk of COVID-19 infection is unevenly distributed among groups in society defined by their age, gender, race/ethnicity and socioeconomic position. Early in the pandemic the data from New York State clearly showed that people of colour, Hispanics and the poor were disproportionately affected, as were members of the Navajo Nation in the Southwest. Not only is initial infection risk unevenly distributed across social groups - all downstream effects are too: being able to afford, or access, medical care, receiving that care, surviving the hospitalization, and having a family, home and job to return to. People with middle-class occupations are often more able to do their work remotely, and to afford high-speed internet and up-to-date computers. By contrast, people with low wage jobs are usually required to be physically present in the workplace. These jobs often require using one's hands to touch multiple surfaces, often in close proximity to other workers and to clients. Many people in low wage jobs require more than one job at a time to afford food and housing. When people such as Personal Support Workers are employed in several long-term care facilities, the risk of viral transmission among themselves and to older highly vulnerable clients is increased. Often people with limited incomes rely on public transportation to get to work; many live in high-rise buildings with elevators and narrow stairwells that increase infection risk when maintaining physical distances in these closed spaces eventually proves impossible.

Another explanatory framework in public health is Epidemiology, a relatively new science born amidst outbreaks of bacterial diseases such as cholera in the growing industrial cities of the late 19th century. It is the framework that gave us the epidemic curve and the concept of 'herd immunity'. Infectious disease epidemiologists used early incomplete data from the Diamond Princess cruise ship to estimate R0 (R naught), the basic Reproductive number which quantifies the contagiousness of a virus like SARS-CoV19 (Zhang, 2020). Epidemiologists also used contact tracing to determine which types of person-to-person exposures were capable of disease transmission, and the time between exposure and onset of symptoms (Cheng, 2020). Based on these very early studies, experts were able to recommend preventive strategies like maintaining physical distances between people, frequent thorough hand washing, and not touching one's face. Similarly, identification of the British variant with a higher R0 in the late Fall led the UK to implement a second national lockdown.

Biostatistics provides us with the framework of probability theory as a means of evaluating practices and behaviours by directly estimating and comparing risks (risk = probability) from various exposures. The importance of this framework can be seen when we recognize the limitations of the common human habit of rapid simplistic binary thinking. Binary thinking leads

to either/or causal statements like “wearing facemasks work/don’t work” to prevent spread of the virus. In reality, for any exposure condition (mask on, mask off), the risk of becoming infected, or of infecting another, ranges from zero percent *to* 100 percent. Unfortunately, binary thinking constrains our options to zero percent *or* 100 percent. It completely discards all useful risk information between one and 99 percent. For example, the highly prized ‘N95’ masks are so-called because they filter 95 (not 100) percent of small virion-sized particles. Based on evidence at the beginning of the pandemic, it was thought that wearing cloth masks would not reduce infection risk relative to not wearing one because they would fit incorrectly, be worn improperly, and would cause people to touch their faces with contaminated hands while adjusting the masks. Experience with the novel virus quickly showed that cloth masks did reduce the risk of transmission, which resulted in a change in public health recommendation to reflect the changing evidence.

The behavioural sciences provide another major explanatory framework in public health. Indeed, there is no better example than a major crisis to show how much public health has become a behavioural science. We can start by observing that all public health issues that existed before the pandemic were still there the day it started. Most public health problems will exist after it has subsided, and some will be worse. Some prevalent health conditions such as generalized anxiety disorder were exacerbated by the fear and uncertainty posed by a novel virus. The problem was compounded when physical distancing requirements resulted in cancellations of group-based therapies. The psychological study of defense mechanisms and personality types provides a framework that helps us understand different individual responses to fear caused by external threats. For example, people with mature defense mechanisms tend to respond to crises with things like humour, or altruism. As the pandemic unfolded, humour was evident in comics, satirical writing and the astounding creative brilliance of dozens of TikTok dances and memes. Altruism was seen with the outpouring of support for front-line healthcare workers, and by people sewing protective masks or volunteering at food banks. Risk perception and communication is another vital explanatory framework in public health. Through it we are reminded that effective messaging by public health professionals requires compassion towards those who lack formal education in logic and reasoning, who feel threatened by those with expert knowledge, who cannot make or understand decisions made amidst uncertainty, and whose false beliefs about a devoutly apolitical virus are shaped by those with ulterior political motives.

Public health needs virological frameworks to understand the properties of a virus, clinical medicine frameworks to understand individual responses to treatment, and behavioural health frameworks to help us understand the behaviours of people. There are many threats to public health and safety at any moment, and people grow weary, fearful, and angry from the stress of dealing with each new problem. To counteract living with constant worry, humans have adopted a cyclical crisis-response-complacency-crisis behaviour. We must eventually relax our responses to each crisis if we are to have quality of life, but we cannot let our guard down so far that we are unprepared for the next crisis. Despite the many criticisms of public health and its professionals, it is important to remember that our current infrastructure is much stronger than it would have been had we not recently faced Ebola, SARS, and H1N1. As the link between the public’s health and society’s investment in the profession of public health grows clearer every day, so do our choices for the future.

We hope that the cases in this book will provide much food for thought and enhance the learning of the next generation of public health practitioners.

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