

Preventing COVID-19 collateral damage

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Summary: The lockdown in response to COVID-19 risks damaging the response to many infectious diseases. We recommend integrating the COVID-19 response into existing public health programs, strengthening both.

The world has shut down. Global commerce has screeched to a halt, the movement of people stopped and the supply of goods has slowed. As the world watched the agonies of Wuhan the virus was already spreading amongst us and left many countries with only one option – lockdown. The SARS-CoV-2 pandemic has surely been a severe reminder of the natural laws of epidemiology that still govern human society. It has sadly exacted the highest toll on the more vulnerable people in our communities. The world of public health needed no reminders of the social determinants of health. The unfair distribution of health and wealth is the shame of our planet and there are many more deadly epidemic reminders of this than the coronavirus. These communicable diseases were with us before and will be with us after the SARS-CoV-2 pandemic subsides. Progress has been made combating them but success is fragile and endangered as one of the many collateral damages wrought by COVID-19. In our compelling need to focus on COVID-19 we may lose sight of other existing epidemics and the tally of morbidity and mortality will add to and ultimately dwarf the toll of COVID-19 itself.

Here's a small selection of other diseases and people that will be affected.

Measles

Measles is a relatively old human disease. Closely related to the rinderpest virus of cattle, the current global strain probably made the inter-species jump in the 11th Century and has caused waves of disease ever since. It's another RNA virus that makes coronavirus look like an amateur – it is spread so efficiently by the respiratory route that on average one case infects at least 15 people, compared to an estimated 2.5 by SARS-CoV-2. Spread is explosive and outbreaks amplify rapidly [1]. The illness it causes is potentially severe with a 0.2% case fatality rate reported in the USA and the WHO attributed 140000 global deaths to measles in 2018 [2]. It can cause severe illness in infants, young children and adults and in outbreaks amongst malnourished infants it can kill one in four. Before the introduction of the first vaccine in 1963 there were frequent global measles pandemics with an estimated annual death toll of 2.6 million. Because of its transmission efficiency vaccination delivery has to reach 95% of all children to achieve herd immunity.

Despite the wealthier parts of the world having the irresponsible luxury of vaccine denial and tolerance for measles outbreaks, which have been increasing in the last five years, the poorer parts of the globe cannot afford this. In 2018

there were outbreaks of measles on every continent and 2019 was probably worse. The vaccine requires two separate doses for reliable immunity and only 69% of children received both in 2018. US CDC data from pediatrician vaccine orders and administration records measured a marked drop in measles vaccination coinciding with the COVID-19 lockdown [3] One may expect a similar drop globally as most of the world is in some form of isolation. In fact the WHO recommended that routine mass vaccination programs be halted on March 26th [4] even amidst ongoing outbreaks of measles, most notably in the Democratic Republic of Congo. This year at least a two-month long cohort of the world's children may have no protection against this most infectious of diseases. They may face consequent morbidity and mortality that will dwarf their risks from COVID-19.

Tuberculosis

Tuberculosis, also likely transmitted to humans by cattle, is amongst the oldest and most persistent of human pathogens. As with SARS-CoV-2, it is spread via respiratory secretions, with prominent fever, cough and shortness of breath, but

the tempo of symptoms and disease and its management is far more prolonged.

An estimated 25-30% of the global population (1.7-2 billion people) is infected with *M. tuberculosis* [5]. TB is the ninth leading cause of death globally and has surpassed HIV as the leading cause of death from a communicable disease.

Globally, an estimated 10.0 million (9.0–11.1 million) people fell ill and an estimated 1.5 million died of TB in 2019, despite the existence of effective prevention and treatment. [6].

The traditional public health approach to TB has achieved success, with millions of lives saved and restored to health. Unfortunately, in past decades, the rate of global decline of TB has slowed, drug resistant TB has emerged and increased and the arrival of the HIV epidemic has added dramatic new TB growth and complexities. TB prevention and treatment strategies have been deliberate and slow to change and severely underfunded. There has been a 40-year hiatus in new effective therapies and BCG, the poorly effective vaccine, dates back to 1921.

During the past decade, however, there has been a remarkable and gratifying acceleration in TB research and practice with progress on multiple fronts and across the entire prevention to cure continuum, and including new diagnostics,

therapies and people centered strategies. The COVID-19 lockdown threatens these gains. A recent example of the unintended collateral consequences of enforced 'stay at home' has been documented in South Africa, where TB remains the leading infectious disease cause of death. Following the national lockdown, a 48% average weekly decrease in TB Xpert diagnostic testing has occurred accompanied by a 33% decline in diagnoses of active TB and anticipated negative impact on TB control [7]. A mathematical model suggests that if the COVID-19 pandemic led to a global disruption in TB detection of just 25% for 3 months in multiple countries a 13% increase in TB deaths would be expected, removing the reductions in TB mortality achieved during the past 5 years [8]. An additional 1.4 million TB deaths could be registered as direct consequence of the COVID-19 pandemic between 2020 and 2025 [9].

Human Immunodeficiency Virus

Human Immunodeficiency Virus (HIV) is a relatively new human infection.

Another zoonosis, it made the species jump from chimpanzees to humans shortly after the First World War and transmitted through sex, blood and birth has spread

steadily following increasing globalization of commerce and travel. HIV is an efficient pathogen which has caused a massive global pandemic with an estimated 38 million people living with HIV infection (PLWH), and responsible for an estimated 770,000 deaths in 2018 [10]. There has been great success in treatment, which although not curative, is exceptionally effective in suppressing viral replication and preservation of the immune system and reduces the mortality from almost 100% within 10 years to a normal life expectancy. Complete viral suppression prevents transmission and slows epidemic propagation. The largest public health programs ever implemented, including the President's Emergency Plan for AIDS Relief (PEPFAR) and the Global Fund, have successfully delivered prevention and treatment to high burden countries around the world, mostly in sub-Saharan Africa. In the absence of a vaccine the efficient delivery of these prevention and treatment services to people living with HIV (PLWH), identified by diagnostic testing as early as possible in the course of their disease, is the key component of continued success in combatting HIV globally.

Because testing and lifelong treatment are the keys to success in limiting HIV in sub-Saharan Africa the resources and logistics to implement programs are paramount. The integrity of the supply chain is essential to maintain a population

level of viral suppression in this ongoing global HIV pandemic. Stockouts of key supplies including medications plagued early establishment of treatment programs in multiple countries resulting in intermittent treatment and emergence of viral drug-resistance. Although improved, supply chains remain vulnerable, particularly within poor countries with a widespread network of treatment clinics, many rural, at the end of crumbling road networks. The COVID-19 global lockdown has disrupted both international and national supply chains. Movement of goods and people has been curtailed, points of service are closed and monthly prescriptions are not being filled, with healthcare staff staying at home in national lockdowns [11]. International borders are highly restricted and many land-locked African countries are dependent on efficient cross-border road haulage [12][]. South Africa and Nigeria have had interrupted HIV services in the past due to weak supply chains [13]. They have 7.7 and 1.9 million PLWH respectively [14]. Although both countries are struggling to detect and treat a growing number of COVID-19 patients they cannot take their eye off HIV.

Poliovirus Eradication

Poliovirus is one of the smallest human viruses, only a quarter the size of SARS-CoV-2. It is an Enterovirus and is spread via fecal-oral transmission. It has likely caused human illness and nerve damage for millennia but an acute flaccid paralysis syndrome (AFP) in children was first described in London in 1798.

Epidemics of polio accompanied the urbanization of the industrial revolution with increasingly dense living conditions and poor sanitation. It is a summer virus and in the first half of the 20th Century parents lived in fear of the arrival of the 'polio season' and the possibility of their child's permanent paralysis. Outbreaks in the '40s and '50s, within living memory, would shut swimming pools, summer camps, and send children into enforced summer lockdown indoors. One of the first successful vaccines developed was against poliovirus, the inactivated poliovirus injection, which reduced annual incidence by 90% through the late '50s and early '60s. The oral poliovirus vaccine completed the eradication of the infection from North America and Northern Europe [15]. Poliovirus has no wild reservoir and the vaccine induces lifelong immunity so it became the next target for global eradication after smallpox.

Despite the tools available, poliovirus has continued to infect children in the poorest parts of the world. Wild-type poliovirus is still endemic in Afghanistan, Pakistan and Nigeria and the case count of AFP has risen in the last two years. In addition reverted vaccine strains have caused outbreaks in a number of African countries that have been unable to reach herd immunity levels of vaccination. Last month, in the midst of the COVID-19 lockdown, the Global Polio Eradication Initiative reluctantly halted all surveillance and vaccination activities worldwide [16] This will inevitably result in more poliovirus cases in Afghanistan and Pakistan which have also had widespread SARS-CoV-2 introduction via the pilgrimage and trade routes from Iran. Vaccine strains will definitely infect more widely in Africa in coming days, weeks and months. The elimination of the second human pathogen after smallpox seemed so close, but, as a COVID-19 collateral casualty, it will now take years more to accomplish.

Vulnerable Hosts

It takes a pathogen but also a susceptible host and an unsafe environment to generate an epidemic,. The Bronx in New York City, the Cape Flats in Cape Town,

Brasilandia in Sao Paolo, Dharavi in Mumbai. Epidemics concentrate in areas of existing social, economic and health inequities, human rights abuses and leadership vacuums both domestically and globally and COVID-19 is no exception.

Some of the most vulnerable people in the world are those that have left the security of their homes and countries. Usually they have been forced to leave through fear of war or persecution or for a chance of economic security elsewhere. At the moment there are large camps of internally displaced people in northern Syria and Iraq who have fled civil war, large camps of Rohingya in Bangladesh who have fled persecution in Myanmar, large camps of refugees from South Sudan and Somalia in Uganda, Ethiopia and Kenya. Across southern Africa and south and central America large communities of economic migrants leave their home countries and families for work in neighboring countries or further afield. What characterizes all of these populations is, poverty, crowding and diminished access to health services. Outbreaks of food, waterborne and respiratory illness are common in crowded and unsanitary living conditions. The risks of outbreaks of cholera, typhoid, measles, polio, hepatitis A, tuberculosis and COVID-19 are all heightened during a time of global lockdown, economic disruption, supply chain disruption and increased food insecurity. COVID-19 has

already entered the world's largest temporary settlement in Cox's Bazaar, Bangladesh – a community of almost a million living under tarpaulin [17].

Avoiding Collateral Damage

SARS-CoV-2, without question, represents a great threat to global health and welfare. It has joined a long list of endemic and epidemic diseases. We have illustrated only a few but there are many more, such as malaria, that could have been included. The global response to the COVID-19 pandemic has suspended international and national programs and the impact on these public health priorities is likely to be profound and long lasting. The key components of these programs on the ground are the human resources that make them run and the supply chains that provide the materials to the point of prevention and care. A lockdown has limited access to healthcare workers, many of whom have been forced out of the workplace by strict national enforcement of social distancing. The reductions in international flow of goods and services and increased cross-border restrictions has reduced the flow of medicines, diagnostics and reagents worldwide. Addressing COVID-19 successfully while maintaining the fragile systems of prevention and care for other global health threats is key.

In listing these diseases we do not wish to diminish the seriousness of COVID-19 but to provide perspective. The necessary public health response to limiting the spread of SARS-CoV-2 should be integrated in both the time-honored and newly established responses for the control of Tuberculosis, HIV and vaccine-preventable diseases and not provided in a separate silo. It should be possible to integrate SARS-CoV-2 screening and testing into existing public health programs, strengthening both. Active screening and testing to identify early and asymptomatic cases, rapid isolation and treatment of cases, efficient tracing of contacts of cases and support for treatment completion or lifelong therapy for TB and HIV have been successfully integrated in many countries. Vaccines, where available, must be efficiently administered using existing pathways and personnel and their delivery not interrupted. We will need these pathways for SARS-CoV-2 vaccination, hopefully soon. Most low and middle income countries are quite experienced and adept at implementing these public health programs and have systems already in place. They have to be maintained and strengthened. COVID-19 programs have to be added and integrated, not substituted.

Central to the success of these integrated programs is protection of the healthcare workforce with procedures and Personal Protective Equipment (PPE) proven to work for SARS-CoV-2 and other communicable diseases. Health care and community facilities and outreach and vaccination programs should be maintained at full capacity with safety training and provision of enough PPE for all healthcare workers. 'Safe and Steady' is the message, not 'Lockdown and COVID'. Innovative use of new practices including use of social media and community-based telemedicine can enhance safe delivery of services. The confidence of the public must be maintained that they are visiting safe and well-managed facilities and that community vaccination or contact tracing outreach and screening and testing is conducted in a safe and respectful fashion. Where possible, shifting services from health care facilities to community settings is desirable.

The supply chain must be maintained to keep PPE stocks adequate. The supply of medications and vaccines should be prioritized and maintained to avoid bottlenecks and stockouts and will involve both international and national logistics. The growing backlogs of medicines and vaccines halted by COVID-19 lockdowns must be accelerated to their destinations. This agenda requires strong

and sustained leadership and resources if we are to halt a global public health disaster much larger than the SARS-CoV-2 pandemic itself.

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