



Apollo's Arrows & Sun Tzu's Stratagem

Text by Dr Gan Wee Hoe | Photos by SingHealth and SGH

The culprit causing COVID-19 has been described as a “very smart virus [that] will find ways to remain in the human population”.¹ An infected patient recounted how battling the disease was akin to “running a marathon on the bed”.²

These are just two of the many crippling accounts of COVID-19 that have emerged since the tentacles of this pandemic first surfaced at the turn of the decade.

On 31 December 2019, the Wuhan Municipal Health Commission reported to the World Health Organization (WHO) China Country Office on a cluster of pneumonia cases occurring in the capital city of Hubei province. Subsequent reports suggest that the first case could be traced back to as early as 17 November 2019.³

Much has been postulated, researched and written about COVID-19. At the time of writing, global case count has crossed the five-million mark with the infection claiming more than 331,000 lives. As countries gradually ease lockdown restrictions, reports of second and third waves are already surfacing.

This is an infection where the fallout – in terms of mortality, socio-economic consequences and the profound impact on the way of living as we know it – is of monumental proportions. By many accounts, we may only be at the end of the beginning.

Pandemics in human history

The bubonic plague in the 14th century wiped out almost a third of Europe's population. Caused by *Yersinia pestis* and spread by infected fleas carried by rodents to humans, the disease was so contagious that it has been described by the Italian poet Giovanni Boccaccio that “the mere touching of the clothes appeared to itself to communicate the malady to the toucher”.⁴

Ships were sailing into ports with crew either severely ill or dead. To stem the spread of infection, officials kept sailors in isolation on their ships for 30 days (*trentino*), which was later lengthened to 40 days (*quarantino*).⁵ This public health concept has proven its effectiveness even up to the present day.

Another epochal event was the 1918 influenza pandemic. It started at the tail end of World War I (WWI), when the four years of war prior had already resulted in insufferable hardship and depletion of resources.

The H1N1 virus infected one-third of the world's population and was associated with at least 50 million deaths. The epidemiological observation of the high mortality in the 20- to 40-year-old age group (apart from the young and the elderly) was surprising to many. During WWI, the US had joined to aid the Allies' eventual victory against Germany. Of the US fatalities on the war front, half were due to influenza and not attributed to direct enemy action.⁶

Ironically, WWI also shaped the social attitudes among the citizenry in many countries, who were by then used to restrictions in their daily lives. This, together with the advent of science and technology propelled by the war, ensured equanimity and acceptance as public health measures were applied on a large scale.

Rain of Apollo's arrows

Even with humankind's experience with past pandemics, it remains almost unfathomable how a contagion such as a virus, measured only in nanometres, has thrown the order of life of almost everyone topsy-turvy.

With COVID-19, WFH and HBL (which stands for work from home and home-based learning, respectively) are now instantly recognisable acronyms with thematic associations with Singapore's circuit breaker measures. Global losses are estimated at up to USD 8.8 trillion⁷ (SGD 12.5 trillion) and economic repercussions have become a leitmotif of a COVID-19 Black Swan event.

In modern day Singapore and much of the developed world, our usually very low mortality rates from communicable diseases threw the hard truth of COVID-19 deaths into sharp relief. The five countries with the highest number of fatalities are all in North America and Europe, with the US leading the pack. It is a surreal situation.

Apollo, a god in the ancient Greek pantheon, shot arrows of plague at the Greek army for nine continuous days because King Agememnon captured and refused to release the daughter of Chryses, who was Apollo's priest.

Some scholars in Greek mythology have drawn a link between plagues and leadership. King Agememnon's ill-considered decision resulted in devastating losses in his army. It was said that "...he [King Agememnon] rages with baneful mind, and knows not at all to look both before and after..."⁸ The ability to understand cause and effect unpins the ability for effective prevention, preparation and prosecution of an operation. This is manifestly projected in the management of a public health crisis.

Sun Tzu's stratagem

Most people will agree that handling a public health crisis is akin to waging a war against an invisible enemy. Strategies and tactics therefore need to be employed, overlaid by political will and underpinned by unity of the people.

The Art of War by Sun Tzu is one of the most well-known guides on military warfare. A general from the 5th century BC, Sun Tzu has been widely acknowledged as a master strategist. *The Art of War* is said to have shaped Mao Zedong's thinking and the Chinese communists' actions against the Japanese.⁹

The art of war is of vital importance to the State. It is a matter of life and death, a road either to safety or to ruin.

The contemporaneous application of Sun Tzu's teaching on battle preparation is to recognise that political considerations, policy decisions and ground actions are inextricably linked and deterministic to success or failure.

Singapore has long relied on migrant workers for infrastructure building and other essential services. Today, we have about 200,000 of them housed in 43 purpose-built dormitories, 95,000 in 1,200 factory-converted dormitories, 20,000 in construction temporary quarters and 85,000 in Housing and Development Board flats and other private residential premises across the country.¹⁰

While much has been debated on whether we can afford to reduce our dependence on migrant workers, what is clear and present today is the disproportionate impact of COVID-19 on this group of residents in Singapore. Since the first cases were diagnosed in migrant workers in early February 2020, dormitory residents now (as at 24 May 2020) account for 29,363 of 31,616 cases of COVID-19 infections in Singapore.¹¹

Close, communal living and the pattern of life are probably significant factors in disease propagation. There are countries facing the same issues which compartmentalise them away and choose to do nothing, but Singapore is one of the few governments in the world which has arguably done the most to contain COVID-19 in migrant workers.

Additional housing arrangements were onboarded to de-densify living quarters. Significant resources were deployed from the public and private healthcare sectors to ensure timely access to healthcare for every migrant worker. These also include the conduct

of large-scale swab and serological testing to ascertain their COVID-19 status, and the setting up of community care and recovery facilities to allow the recuperation of those infected.

One may question the political wisdom of the State taking the lead at great cost, given that the majority of migrant workers come under the employment of private companies.

The political will for Singapore to take these extraordinary measures is because first and foremost, it is the right thing to do. Migrant workers have contributed to our nation building and development. Until recently, they belonged to a segment of the workforce in Singapore's society that was not often talked about.

Our Government is also keenly aware of the policy consideration that without addressing the problem of infection in the migrant worker population, we cannot win the war against COVID-19. Many of them work in the community and share the same social and recreational spaces as fellow Singaporeans. The position statement that Singapore has "a responsibility to our migrant workers"¹² dictated the decisive actions that unfolded over the last couple of months.

In many aspects, the "dormitory operation" is not only a whole-of-Government endeavour, but a whole-of-society effort. Ultimately, Singapore is aware that we can overcome our current public health crisis only if our migrant workers, too, win the fight against COVID-19.

If you know the enemy and know yourself, you need not fear the result of a hundred battles.

Shortly after their report of atypical pneumonia cases to the WHO China Country Office, Chinese scientists isolated and fully sequenced the virus in early January 2020. The gene sequencing data was submitted to Virological.org, a forum for analysis and interpretation of virus molecular evolution and epidemiology. This early access was pivotal in allowing scientists around the world to kickstart research in diagnostics and therapeutics.



WHO also activated its R&D Blueprint soon after. The Blueprint improves coordination among scientists, clinicians and public health professionals in research priorities and the development of public health response standards – absolutely vital as the world comes to grips with a highly infectious novel pathogen.

It is estimated that from January to April, more than 23,000 scientific papers on COVID-19 have been published at a doubling time of 20 days!¹³ This is an astounding pace that left many “drowning in COVID-19 papers”.

While Singapore may be a small nation, we punch above our weight and are an undisputed powerhouse for translational research in biomedical sciences.

From the early days of the pandemic, our hospitals and research agencies actively participated in multi-centre clinical trials on different modalities of COVID-19 treatment. We also made major breakthroughs in developing the first-in-the-world rapid COVID-19 detection system employing the surrogate virus neutralisation test,¹⁴ and using serological testing to establish a link between two local COVID-19 clusters.¹⁵

In foreign worker accommodation, the pattern of disease spread differs depending on local ecological, environmental and social factors specific to each dormitory. Working with infectious disease modelling

scientists from the National University of Singapore’s School of Public Health has enabled us to better understand the transmission dynamics and apply the right interventional strategies.

To leverage our strengths and exploit the enemy’s vulnerabilities is a time-tested stratagem that applies to both conventional warfare and the non-conventional battleground, such as the COVID-19 pandemic.

The good fighters of old first put themselves beyond the possibility of defeat, and then waited for an opportunity of defeating the enemy.

Merely five months into the pandemic, we are still a distance away from developing an effective cure or vaccine. While the “enemy” is holding the higher ground, one should bid for time, minimise unnecessary confrontations and losses, and await the right opportunity for a decisive strike.

Primary prevention has been the mainstay of public health strategy against COVID-19. Whether it is safe distancing, the wearing of masks or the practice of hand hygiene, these measures seek to minimise infections in the general populace, especially those from the vulnerable groups.

Flattening the curve is what we seek to achieve epidemiologically, which will translate into lower peaks of infected cases that could otherwise overwhelm our healthcare system. Many fatalities

from COVID-19 can be avoided if there were timely access to intensive care resources to support those with severe disease through their most critical periods of illness.

Hospitals have concurrently been ramping up their intensive care capacities. Refresher training for healthcare

workers with previous experience in critical care has been conducted to scale up more teams. Ventilators, other life support equipment and medications are stockpiled to enable hospitals to go into surge capacity when infections peak nationally.

To date, Singapore’s fatality rate from COVID-19 stands at 0.1%, among the lowest in the world. In comparison, countries such as the UK, Italy and Belgium have fatality rates in excess of 13%.¹⁶

Even for our migrant worker population, generally of the young-to-middle age groups and largely free of serious chronic diseases, additional measures have been put in place to reduce morbidity and prevent mortality. They are equipped with health monitoring devices, such as thermometers and pulse oximeters; they also have round-the-clock access to medical care, including after-hours telemedicine services.

In the absence of effective therapeutics or vaccines, COVID-19 remains a significant threat to public health. We need to buy time for scientists to do their work. Before we reach there, the preventive strategy is the best we have in our limited armamentarium.

Concluding thoughts

A Gallup poll of the most important events in the 20th century featured, among others, the World Wars and Neil

Armstrong's 1969 historic landing on the moon.¹⁷ Pandemics did not make it to the list. COVID-19 may just be the historic event to tilt the equation.

The auntie from the nasi padang store which I frequent predicted that it would take "at least three years" for Singapore's economy to turnaround to the pre-COVID-19 state. A friend, who is a freelance sports coach, has not been working since the shutters came down on sports halls throughout the country.

Yet, there are positives out of this. COVID-19 has accelerated revolutionary disruptive technology. My neighbour, a lawyer, shared with me how he has adapted to working from home using different platforms for teleconferences and virtual meetings. Instead of meaning to go speedily, "Zoom" has taken on a whole new dimension.

We need to get ahead of the curve in order to secure order back to our lives. Sure, there will be new norms to adapt to. Old habits like queuing for *bak kwa* at People's Park will have to change. Employment landscapes will evolve. However, what is immutable is the resilience of the human spirit and our fortitude in the face of adversity.

We will overcome. ◆

Information is accurate as at time of writing.

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Legend

1. Providing primary care medical services to migrant workers at their place of residence
2. SingHealth deployed medical and dental teams to swab migrant workers in dormitories to ascertain their COVID-19 status
3. Donning personal protective equipment (PPE) before commencing clinical duties
4. Extracorporeal membrane oxygenation simulation training with full PPE

References

1. Tan A. Covid-19 caused by a 'smart virus' that can find blind spots, crucial for system to be flexible to overcome challenges: experts. Available at: <https://bit.ly/3d161H3>.
2. Lee LY. 'Running a marathon on the bed': COVID-19 survivors describe their struggles with the coronavirus. Available at: <https://bit.ly/3d71S5L>.
3. Ma J. Coronavirus: China's first confirmed COVID-19 case traced back to November 17. Available at: <https://bit.ly/2LZNTkO>.
4. Mark JJ. Boccaccio on the black death: Text and commentary. Available at: <https://bit.ly/2LXx9Lg>.
5. History.com Editors. Black death. Available at: <https://bit.ly/2X2gf4l>.
6. Billings M. The influenza pandemic of 1918. Available at: <https://stanford.io/2TEzfE8>
7. Asian Development Bank. COVID-19 economic impact could reach \$8.8 trillion globally – new ADB report. Available at: <https://bit.ly/36ydmEJ>.
8. Homer. The Iliad. Available at: <https://bit.ly/2M2nEKE>.
9. Kuiper K. Sunzi: Chinese strategist. Available at: <https://bit.ly/2Xz3hu4>.
10. Ng JS, Ong J. The Big Read: Solving Singapore's foreign workers problem requires serious soul searching, from top to bottom. Available at: <https://bit.ly/2XsfsJ2>.
11. Ministry of Health, Singapore. 24 May 2020 daily report on COVID-19. Available at: <https://bit.ly/2ZDIAzB>.
12. Ministry of Manpower. Ministerial statement by Mrs Josephine Teo, Minister for Manpower. Available at: <https://bit.ly/3c5YzCq>.
13. Brainard J. Scientists are drowning in COVID-19 papers. Can new tools keep them afloat? Available at: <https://bit.ly/36wbZgC>.
14. Duke-NUS Medical School. Duke-NUS, GenScript and A*STAR launch first-in-the-world SARS-CoV-2 serology test to detect neutralising antibodies without need of containment facility or specimen. Available at: <https://nus.edu/2LXFOx8>.
15. Channel NewsAsia. Duke-NUS used COVID-19 antibody tests to establish link between church clusters in a world-first. Available at: <https://bit.ly/3c7cbUC>.
16. Rajendran S. Singapore's COVID-19 death rate low, but seniors vulnerable. Available at: <https://bit.ly/2ZEQoRL>.
17. Newport F, Moore DW, Saad L. The most important events of the century from the viewpoint of the people. Available at: <https://bit.ly/36v0XbA>.

