

The College Mirror is pleased to recognise the winners of the College of Family Physicians Singapore Prize by publishing their essays, titled, "**The GP's role in achieving herd immunity against COVID-19**" for our readers to enjoy.

The GP's role in achieving herd immunity against COVID-19

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Introduction

Herd immunity is defined as the protection of susceptible individuals against an infectious disease when a minimum proportion of a population is immune against the infection, either through natural infection or vaccination.¹ This allows for protection of individuals to whom vaccination against the particular infectious agent is contraindicated, such as immunocompromised individuals or those at extremes of age.²

The minimum proportion of immune individuals to achieve herd immunity, known as the critical proportion, p_c , depends on how infectious a disease is, quantified by the basic reproduction number, R_0 .³ R_0 is the theoretical average number of secondary infections generated by one infected individual in a susceptible population. They are related by the following formula:

$$p_c = 1 - (1/R_0)$$

The assumptions held in this model include that of a well-mixed population, meaning that individuals are all equally likely to come into contact with each other; and that the infectious agent has a constant infectivity with no new mutations.⁴

The COVID-19 infection, spread by the SARS-CoV-2 virus, has an R_0 value of around 2.5-4,⁵ which translates to a p_c of 0.75 (75%). Accounting for variabilities such as vaccine efficacy and limitations of using R_0 to model a pandemic, a target of vaccinating at least 80% of our population would be prudent to achieve herd immunity.⁶ Achieving a high vaccination rate enables gradual recovery to normality after a pandemic. The eventual goal is for the effective reproduction number, $R(t)$, the number of actual secondary infections generated from an infected individual at timepoint t , to fall below 1.⁷

Ever since COVID-19 arrived at our shores more than a year ago, multiple strategies have been introduced to control the spread of infection, such as equipping our healthcare workers and upgrading our infrastructure to manage a surge in the number of patients. The vaccination

campaign is one of the most crucial components in our arsenal to control the spread of COVID-19 infection in the community by achieving herd immunity more quickly. As compared to natural infection and immunity, vaccinations will reduce the number of unnecessary cases and deaths. Allowing an unregulated spread of COVID-19 infection to achieve natural immunity is also unsubstantiated and unethical.⁸

At time of writing, the Pfizer-BioNTech COVID-19 Vaccine and Moderna COVID-19 Vaccine have been authorised for usage by the Health Sciences Authority under the Pandemic Special Access Route.

General Practitioners (GPs) play an important role in not only engaging the population to improve the acceptability towards vaccination, but also collaborating with authorities to ensure that the rollout will be smooth. The role played by GPs can be outlined in 3 phases: before, during and after the vaccination.

Before vaccination

Screening of individuals suitable for the COVID-19 vaccination and obtaining informed consent are important prerequisites of the vaccination programme.

As our population ages, medical conditions tend to become more complex, and correspondingly the patients' medication list would compound. Certain medical conditions like immunocompromised states from active malignancy precludes one from vaccination at this moment. On the other hand, chronic conditions such as diabetes mellitus and chronic kidney disease requiring dialysis are not contraindications, per se. The GP has a holistic picture of one's health and is thus able to provide contextualised advice on the suitability of vaccination. With GPs integrated into the community setting and family members visiting the same GP as their family doctor, the trust and rapport built allows patients to be more forthcoming when revealing details about their health.⁹

GPs also have the benefit of access to past medical history and an unhurried setting to take a detailed drug and allergy history. Patients may perceive "side effects" to be equivalent to a "drug allergy", a common example being

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gastrointestinal discomfort from augmentin (amoxicillin/clavulanate). Drug intolerance or drug-infection interactions may be mislabelled as allergies especially with beta-lactam antibiotics.¹⁰ Such patients would in turn exclude themselves from the vaccination drive. Mislabelling of a drug allergy has implications not only on COVID-19 vaccination but on one's medical treatment in the long run.¹¹ Patients may also be unsure about the definition of a severe drug allergy or anaphylaxis, which a family doctor could advise on. Proper evaluation and reassurance by a GP would reduce the number of individuals who "self-exclude" from the vaccination drive, allowing them to benefit as well.

As with every form of medical treatment or investigation, there are indications, benefits and risks to receiving vaccination against COVID-19. Common mild side effects such as lethargy and injection site soreness are well-established.¹² On the other hand, there are reports worldwide of supposed adverse reactions such as paralysis and cardiac arrest after vaccination, of which the causal relationship has yet to be concretely established.

GPs assist in addressing such concerns and beliefs, especially in this climate where everyone has access to a large volume of news via social media, whether true or unverified.¹³ Patients would thus be able to make an informed decision weighing the risks and benefits based on information from a trusted source.¹⁴ Having a family doctor to counsel and advise accordingly has been shown to improve the acceptability and uptake towards vaccinations.¹⁵

GPs are also the bridge between the authorities and patients, helping to disseminate scientific information to the laymen. Guidelines on the suitability of vaccination may vary based on new evidence available. A GP would be equipped to appraise such information and counsel patients accordingly. For example, it was recently announced that patients with a history of allergies to medications, such as non-steroidal anti-inflammatory drugs (NSAIDs), would be eligible to receive the vaccination as long as they do not have a history of anaphylaxis. This group of individuals were previously advised to defer vaccination until further notice.

GPs engage in opportunistic health promotion, one of the four areas to explore in a primary care consultation modelled by Stott and Davis.¹⁶ For patients of which seeking advice for the COVID-19 vaccine is not the presenting problem, GPs could still discuss their suitability for vaccination after the reason for encounter (be it acute or chronic medical issues) has been addressed. This augments the ongoing nation-wide publicity efforts to promote COVID-19 vaccination.

During vaccination

GPs play an important role in the actual rollout of the vaccination programme. GP clinics are well-woven into

the community and complement the expanding number of vaccination centres opening up across Singapore. They are also equipped with storage facilities to hold vaccines for a short duration of time (5 days at 2°C for the Pfizer-BioNTech vaccine).¹⁷ The convenience of visiting one's family doctor, who could be as near as within the same HDB block, increases the accessibility of the COVID-19 vaccine especially for groups with reduced mobility like the elderly. The familiarity of someone trusted administering the jab is also a plus factor for those who may be afraid of needles.

GPs also help to resolve logistical issues surrounding the administration of the vaccine. The Pfizer-BioNTech and Moderna vaccines come in vials with 5 and 10 doses respectively, meant for administration to multiple patients within several hours of thawing.¹⁸ It is thus crucial for vaccine recipients to turn up at their appointed time punctually to prevent the wastage of resources. However, there is still a chance of patients not turning up at the last minute, or found to be unsuitable upon final screening at the clinic (e.g. recent fever or a newly diagnosed medical condition). In such a scenario, "backup recipients" would need to be activated to replace the said individual to prevent wastage of the vaccine. A GP who maintains a detailed database of pre-screened individuals in the community would play a key role in activating backups in this situation.

After vaccination

After the vaccination procedure, there are still clinical and administrative responsibilities that GPs fulfil. Recipients are monitored for at least 30 minutes after their vaccination in case of any severe allergic reaction like anaphylaxis which requires prompt attention and resuscitation, albeit being rare. GP clinics in the community have such facilities and resuscitation capabilities. They would also be able to arrange for transfer of care where necessary, such as to the Emergency Department. The more common side effects, such as myalgia, lethargy and fever, tend to linger on for a couple more days after the vaccination. Having a GP located nearby enables patients experiencing such side effects to receive prompt evaluation and treatment, particularly to rule out other causes of such symptoms before attributing it to side effects from the COVID-19 vaccination.

Given that both the Pfizer-BioNTech and Moderna vaccines require inoculation of 2 doses several weeks apart, GPs could facilitate the follow-up for the second dose at patients' convenience while keeping to the recommended dose interval.

GPs also have a role in accurate and timely reporting of vaccination numbers and adverse reactions to the relevant authorities. This enables policymakers to receive the most up-to-date data on the vaccination programme in Singapore, which in turn influences the next steps when it comes to

issuance of practice updates and guidelines. The numbers guide the pace at which the rollout of vaccines, in phases, will take place. It also enables policymakers to gradually make adjustments to the various restrictions and safe management measures as deemed appropriate.

Lastly, the psychosocial impact of the COVID-19 pandemic is well-reported in literature.¹⁹ The disruption to our livelihoods brings about a great deal of frustration and influences the wellbeing of the population. Other than administering the vaccine, GPs play an equally important role in addressing such stressors and normalising the uncertainty that we experience as a trusted confidante. After all, GPs are at the frontline, often approached first when patients have pandemic-related concerns.

Conclusion

Herd immunity against COVID-19 is achieved not just by convincing more people to get vaccinated, but also building a supportive infrastructure that allows seamless delivery of the vaccine. It is also important to remember that equally crucial in our fight against COVID-19 are other evidence-based aspects of transmission control, such as safe distancing and mask wearing. The partnership between government agencies, healthcare institutions and the primary care sector is crucial to ensure that Singapore can gradually emerge from the pandemic, and that in our fight against COVID-19, no one gets left behind.

Summary of the GP's role during the COVID-19 pandemic Before vaccination

	Before vaccination	During vaccination	After vaccination
Patient-facing	Assessment of suitability Dispelling myths Opportunistic health promotion	Reassurance of a familiar face Reducing wastage	Monitoring of adverse events Follow-up for 2nd dose and other COVID-related health concerns
Authority-facing	Dissemination of latest information/guidelines	Increased coverage and accessibility to the population	Reporting of vaccination rates and adverse events

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Introduction

The COVID-19 pandemic has tested the resolve of healthcare systems globally. In what could be described as the greatest economic and social destabilizer of this generation, General Practitioners (GPs) and other healthcare workers have had to continuously adapt to the ever-changing situation. Now slightly over a year after the first cases were confirmed, the global COVID strategy is gradually shifting toward achieving herd immunity, recovery, and emerging stronger from the global crisis. This essay therefore attempts to highlight the multitudinous roles that GPs can play in achieving these goals, particularly in achieving herd immunity. The present paper defines "GP" as any family physician who practices within an academic medical centre, polyclinic, private practice, or other healthcare institution; whose primary duties are clinical, but may choose to expand the scope of their duties beyond direct patient care. "Herd immunity" refers to achieving immunity against COVID-19 by means of authorized vaccinations, as well as any other measures which directly or indirectly result in a progressive flattening of the epidemic curve in an attempt to 'buy time' for the roll-out of mass vaccination programmes.

Methodology

To identify relevant articles for this essay, a search was conducted on the Medline and Web of Knowledge databases using the following keywords alone or in combination: "family doctor", "family physician", "family medicine", "herd immunity", "immunization", "vaccine hesitancy", "vaccine misinformation", "COVID-19", "pandemic", and "social media". To expand the literature base and diversity of opinions consulted, the Google search engine was consulted using the same keywords to identify relevant news articles and media from reputable sources.

Vaccine Advocacy and Patient Education

As the first point of contact with healthcare services, GPs are well-positioned to encourage vaccine uptake amongst their patients. Two cornerstones of the Family

Physician's practice are especially useful in these pandemic times: firstly, GPs offer holistic, comprehensive care to all their patients. Similar to how patients are routinely encouraged by their GPs to receive their annual vaccines in accordance with the National Immunization Schedule, the act of offering COVID-19 vaccines to all eligible patients attending an outpatient GP clinic can be normalized. Secondly, GPs often establish strong therapeutic alliances with their patients, especially amongst repeat or long-term patients. By leveraging on the strong trust that undergirds the physician-patient relationship, GPs can begin a discussion with their patients regarding their suitability and openness to receiving the COVID-19 vaccine. Successful communication should include adequate emphasis on the benefit of vaccinations and the risks of developing severe

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COVID-19 if unvaccinated (1, 2). By these means, GPs can fulfil the dual roles of vaccine advocate and patient educator.

Addressing Vaccine Hesitancy

However, Vaccine Hesitancy amongst the general public is a large barrier to achieving herd immunity against COVID-19. The Strategic Advisory Group of Experts [SAGE] Working Group on Vaccine Hesitancy states that “*Vaccine Hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services*” (3). Vaccine Hesitancy has become increasingly prevalent in recent years, and in 2019 was declared by the World Health Organization [WHO] as one of the ten largest threats to public health in view of a resurgence of measles amongst unvaccinated communities (1, 4). In the COVID-19 pandemic, it is expected that vaccine hesitancy will result in a gradual prolongation of the pandemic and continued strain on healthcare systems if it is not adequately addressed.

The SAGE Group acknowledges that “*Vaccine hesitancy is complex and context specific, varying across time, place and vaccines*” (3). Indeed, making the conscious choice to receive a vaccine is a complex decision-making process. The decision is not simply a cognitive one, but a process involving emotional, cultural, social, spiritual, and even political considerations (5-8). While it is challenging to comprehend the full range of potential attitudes toward vaccinations, it is all the more necessary to provide tailored advice to address said attitudes if meaningful vaccine coverage is to be achieved (3, 5, 6, 9, 10). Whilst population-based interventions that encourage vaccine uptake are an essential element of the pandemic playbook, a “one size fits all” approach is unlikely to address the concerns of every vaccine-hesitant individual. Previous studies have demonstrated that the most effective interventions to combat vaccine hesitancy involve tailored interventions which addressed the specific concerns of vaccine hesitant groups (11, 12). This is the gap that GPs can attempt to fill – by offering individualized advice to meet patients at their level of hesitancy and understanding.

Combating Misinformation

A related, albeit slightly more nuanced challenge for the family physician is dealing with the wave of misinformation that has accompanied the COVID-19 pandemic. The WHO has popularized the term ‘infodemic’ to describe the phenomenon of “too much information including false or misleading information in digital and physical environments during a disease outbreak” (13-17). Misinformation surrounding the COVID-19 pandemic as well as the COVID-19 vaccines have been widely disseminated by social media channels such as Twitter and Instagram (13, 18). It was not uncommon to hear claims that the COVID-19 vaccine would alter one’s DNA, or that the mass vaccination strategy was part of a wider conspiracy to instil microchips into the arms of vaccinated individuals (19).

Misinformation has the potential to drive the spread of COVID-19, reduce vaccine uptake, undermine trust in science and experts, and perpetuate misleading health advice (1, 20-22). An adequate response to misinformation is likely to require the involvement of multiple stakeholders across numerous fields including but not limited to healthcare, government, and mass media. On this front, GPs can serve as prominent and respected voices in their community, promoting evidence-based vaccine literature to their patients. Prior studies with other vaccines have indicated that receiving advice from healthcare providers or official health sources is an important predictor of vaccine acceptance (10, 23-28). This suggests that GPs should take an active role when promoting COVID-19 vaccine acceptance amongst their patients.

Whilst addressing vaccine hesitancy and combating misinformation appear to be a huge challenge, it also presents a unique opportunity for GPs to engage in respectful discussions with their patients on the most up to date vaccine science. Patients can clarify common doubts and misconceptions, and GPs can tackle misinformation when it arises. These conversations, if handled appropriately, can aid the physician-patient relationship and allow their patients to make an informed decision. In this manner, GPs form an important link in the vaccination chain.

The Public Physician

For some family physicians, the battle against vaccine hesitancy and misinformation is not confined to their clinic. An emerging generation of physicians are taking the firefight to its source, and are combating vaccine hesitancy and misinformation using various forms of mass media.

In the social media sphere, prominent family physicians including Dr Mikhail Varshavski, more popularly known as ‘Dr Mike’, have established themselves as trusted and authoritative voices on social media platforms during the pandemic. Boasting a following of 4.1 million on Instagram and 6.9 million on Youtube, Dr Mike has produced videos that addressed key concerns relating to the coronavirus pandemic and vaccines, which have reached a wide audience (29). Other family physicians such as Dr Jennifer Bacani McKenney from Fredonia, Kansas, have taken to social media to address pandemic and vaccine-related questions daily (30).

Podcasts are another way to reach audiences beyond one’s daily patient load. One example is “COVID-19: Commonsense Conversations on the Coronavirus Pandemic” hosted by Dr Ted O’Connell, family physician at Kaiser Permanente Napa-Solano, California. His podcast aims to educate the public with accurate information on the COVID-19 pandemic, “to combat the spread of disease and the hysteria that may spread along with it” (31). To

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this end, he has conducted interviews with notable leaders in healthcare, public policy, and epidemiology, including former CEO of The Permanente Medical Group, Dr Robert Pearl; and Virologist Dr Ken S. Rosenthal. Examples of topics he has covered include "Getting the Covid Vaccine While Pregnant" and "Vaccine Progress and Mortality Data Updates".

Although literature evaluating the effectiveness of such mass media interventions in achieving herd immunity remains sparse, social media and podcasts continue to be a potential vehicle for the delivery of informative and up-to-date content in the current pandemic (32, 33). This essay also recognizes that maintaining presence as a 'Public Physician' demands time and effort beyond what is routinely expected of a GP's job scope, and may simply not be a feasible role for many GPs to engage in. Rather than be prescriptive, this essay simply wishes to highlight the multitudinous roles that family physicians can play in the race toward herd immunity – becoming a 'Public Physician' is simply one but many of those roles.

Research and Education

Thus far we have mostly considered the roles of GPs who primarily undertake clinical duties; yet there also exists an important role for research and education. GPs practicing within an Academic Medical Centre or with a special interest in academia may be actively involved in contributing to literature on COVID-19 and vaccinations. Even GPs who see themselves in a purely clinical role have an important role to play in the accurate reporting of COVID-19 cases and vaccination data, which will ultimately contribute to public health research (34). As GPs are located in the community, they are able to keep a pulse on the overall health of those whom they serve and can feedback this data to relevant public health authorities. Sutter and colleagues even suggest that family physicians should play an active role in analysing this data together with their colleagues in epidemiology, public health, virology, data science, and relevant hospital specialities (35). Such multidisciplinary contributions have the potential to enhance our understanding of COVID-19 and future pandemics.

GPs may also be actively involved in the education of medical students and residents, holding appointments as clinical tutors or tenured faculty. Beyond sharing their medical expertise with trainees, these educators can offer their first-hand experiences and lessons learnt from dealing with the COVID-19 pandemic, in the hopes that future generations of medical professionals will be better informed and more well-equipped to respond to future exigencies.

Limitations

However, there are certain limitations to the GP's response which should be highlighted. Firstly, we must acknowledge

that GPs are presently operating in dynamic and uncertain times; as such, there is some degree of uncertainty as to how primary care will continue to evolve through the course of the pandemic (34). Secondly, one may express reservations as to whether individual efforts of GPs can result in sufficient momentum to create a meaningful impact on herd immunity. However, this essay recognizes that the GP exists within larger networks of experts across a variety of disciplines, which include specialist physicians, epidemiologists, and the local government. Collectively, their common goal is to bring an end to the present pandemic. While no individual can achieve this, each member must play their individual role, to the best of their ability, if we are to effectively turn the tide on COVID-19.

Considering the limitations of the present paper: due to a dearth of information assessing the effectiveness of interventions to improve COVID-19 vaccine uptake, extrapolations were drawn based on other vaccines [which included the Influenza and HPV vaccines, amongst others]. Furthermore, many interventions to reduce vaccine hesitancy either lack compelling evidence or suffer from insufficient evaluation to demonstrate their effectiveness (5).

Conclusion

The COVID-19 pandemic has reinforced the vital role that GPs play in the race towards herd immunity. Despite having to constantly adapt to the demands of this dynamic situation, they have continued to function as the backbone of our healthcare system. Most significantly, this essay has highlighted how GPs are well-positioned to bridge the gap between public health policy and its implementation. The multitudinous ways that GPs can respond highlights their flexibility and resilience in the face of overwhelming uncertainty.

Despite an ever-changing situation, the values that underpin our profession are unwavering – service before self, continuous improvement, lifelong learning, adaptability, resilience, and professionalism. Should the path towards herd immunity become unclear, GPs can fall back on these values to guide their decision making.

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