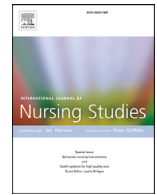




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Addressing vaccine hesitancy and resistance for COVID-19 vaccines

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ABSTRACT

The COVID-19 vaccine rollout has had various degrees of success in different countries. Achieving high levels of vaccine coverage is key to responding to and mitigating the impact of the pandemic on health and aged care systems and the community. In many countries, vaccine hesitancy, resistance, and refusal are emerging as significant barriers to immunisation uptake and the relaxation of policies that limit everyday life. Vaccine hesitancy/ resistance/ refusal is complex and multi-faceted. Individuals and groups have diverse and often multiple reasons for delaying or refusing vaccination. These reasons include: social determinants of health, convenience, ease of availability and access, health literacy understandability and clarity of information, judgements around risk versus benefit, notions of collective versus individual responsibility, trust or mistrust of authority or healthcare, and personal or group beliefs, customs, or ideologies. Published evidence suggests that targeting and adapting interventions to particular population groups, contexts, and specific reasons for vaccine hesitancy/ resistance may enhance the effectiveness of interventions. While evidence regarding the effectiveness of interventions to address vaccine hesitancy and improve uptake is limited and generally unable to underpin any specific strategy, multi-pronged interventions are promising. In many settings, mandating vaccination, particularly for those working in health or high risk/ transmission industries, has been implemented or debated by Governments, decision-makers, and health authorities. While mandatory vaccination is effective for seasonal influenza uptake amongst healthcare workers, this evidence may not be appropriately transferred to the context of COVID-19. Financial or other incentives for addressing vaccine hesitancy may have limited effectiveness with much evidence for benefit appearing to have been translated across from other public/preventive health issues such as smoking cessation. Multicomponent, dialogue-based (i.e., communication) interventions are effective in addressing vaccine hesitancy/resistance. Multicomponent interventions that encompasses the following might be effective: (i) targeting specific groups such as unvaccinated/under-vaccinated groups or healthcare workers, (ii) increasing vaccine knowledge and awareness, (iii) enhanced access and convenience of vaccination, (iv) mandating vaccination or implementing sanctions against non-vaccination, (v) engaging religious and community leaders, (vi) embedding new vaccine knowledge and evidence in routine health practices and procedures, and (vii) addressing mistrust and improving trust in healthcare providers and institutions via genuine engagement and dialogue. It is universally important that healthcare professionals and representative groups, as often highly trusted sources of health guidance, should be closely involved in policymaker and health authority decisions regarding the establishment and implementation of vaccine recommendations and interventions to address vaccine hesitancy.

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What is already known

- Vaccine hesitancy/resistance/refusal is complex and multi-faceted with individuals and groups having diverse and often

multiple reasons for either delaying/avoiding vaccination or refusing vaccination entirely.

- Multicomponent, dialogue-based (i.e., communication) interventions are effective in addressing vaccine hesitancy/resistance.
- Healthcare professionals and their representative groups should be closely involved in policymaker and health authority decisions regarding the establishment and implementation of vaccine recommendations.

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What this paper adds

- Mandatory vaccination is effective for seasonal influenza uptake amongst healthcare workers, but this evidence may not be appropriately transferred to the context of COVID-19 vaccination.
- Evidence regarding the effectiveness of interventions to address vaccine hesitancy and improve uptake is limited and generally unable to underpin any specific strategy.
- Financial or other incentives for addressing vaccine hesitancy may have limited effectiveness with much evidence for benefit appearing to have been translated across from other public/preventive health issues such as smoking cessation.

1. Introduction

In many countries, the rollout of COVID-19 vaccines has been hampered by many factors including issues with affordability (Wouters et al., 2021), supply (Alam et al., 2021), storage (Sun et al., 2022), resources (Feinmann, 2021), logistics (Mills and Salisbury, 2021), public confusion (Mac et al., 2021), and political leaders and others promoting misinformation (Muric et al., 2021; Romer and Jamieson, 2021; Recio-Román et al., 2021). Many high-income countries have now achieved relatively high two-dose vaccine coverage and are now progressing to third and even fourth-dose administration in comparison to many low-middle income countries (LMICs) that have struggled to access vaccines and deploy largescale vaccination rollouts. New variants of concern such as Delta and Omicron are now emerging to threaten both highly vaccinated and under-vaccinated populations alike, due to greater vaccine escape and immune system evasion ability.

Another factor that has frequently taken centre stage in relation to national and global vaccination efforts is a slower than ideal uptake by community members, sometimes including healthcare professionals and workers themselves, who have ready access to vaccines (Dror et al., 2020; Dubov et al., 2021). People's decisions regarding vaccination are based on numerous factors (Machingaidze and Wiysonge, 2021); convenience ease of availability and access (Rosen et al., 2021), health literacy understandability and clarity of information (Lorini et al., 2018), judgements around risk versus benefit (Patelarou et al., 2021; Wagner et al., 2021), notions of collective versus individual responsibility (Zia Sadique, 2006; Korn et al., 2020), trust/mistrust of authoritative institutions and healthcare (Quinn and Andrasik, 2021; Vergara et al., 2021), and personal or group beliefs, customs, or ideologies (Agarwal et al., 2021).

Investigation and efforts to encourage improved vaccine uptake preceded the SARS-CoV-2 pandemic and subsequent development of an array of vaccines (Butler and MacDonald, 2015), but possibly now more than ever, a focus on increasing the number of vaccinated individuals within jurisdictions and globally against COVID-19 has been driven by both concern for the health and wellbeing of the community as well as the desire to bring forward the end of many pandemic-related policies that restrict individual freedoms and economic activity (Sallam, 2021). Many governments have promoted vaccination as a social responsibility, particularly amongst younger and otherwise healthy groups of people, who are relatively less likely to become seriously ill or die even without a vaccination (Zia Sadique, 2006). In contrast, in the highly politicised world of the pandemic, parties and political figures have also campaigned on the basis of protecting individuals' freedoms from mandatory vaccination, as well as public and social health measures that have been deployed to protect communities against the spread of the virus.

Governments and political power play an important role in global and local issues around vaccine access, hesitancy, and resistance. Political views are a critical factor for many people mak-

ing choices regarding whether to be vaccinated, with a recent study finding counties in the regions of the United States with a high percentage of Republican Party voters had significantly lower COVID-19 vaccination rates and higher numbers of COVID-19 cases and deaths per 100,000 residents (Albrecht, 2022). This study also provides a revealing review of the exogenous variables of race/ethnicity, educational attainment, and poverty in relation to political views in the United States and suggests that these factors indirectly influence vaccination rates via their relationship with people's political views.

Since the emergence of vaccines (Durbach, 2000), some have highlighted the importance of getting vaccinated as a collective responsibly to protect the health of the community and part of the social contract (Korn et al., 2020), while others have raised concerns regarding impositions on personal freedom, bodily autonomy, and creation or perpetuation unfair social hierarchies where those who are vaccinated are afforded greater freedom from pandemic restrictions than those who are not (Durbach, 2000). In efforts to encourage vaccination, many governments have set specific goals and timelines linking the relaxation of "lockdown" measures, cross-border travel, and restrictions that prevent many social and commercial activities with population-level vaccination status milestones (Prime Minister of Australia 2021; United Kingdom Government 2021; Government of Manitoba 2021). Many of these measures have been extremely unpopular, with many communities experiencing divisions between those who have, more or less, supported restrictions and those who wish to see all restrictions removed and life return to "normal". In August in Australia, the Government announced a milestone to progressively ease COVID-19 restrictions once the eligible population had reached around 70 percent vaccination coverage. At that time, only 41.4 percent of the Australian population aged 16 years and older had received one dose of either of the Pfizer/Comirnaty (BNT162b2) or AstraZeneca (ChAdOx1-S) vaccines, with 19.7 percent of the same population having received two doses (Prime Minister of Australia, 2021). At the time of writing, 94.9 percent of the eligible population aged 16 or older has now received at least two doses of an Australian approved COVID-19 vaccination with attention now turning to the administration of booster shots for eligible people (currently at 66.5% of the eligible population) in the wake of the emergence of the Omicron variant and findings of waning vaccine effectiveness and immune response (Australian Government Department of Health, 2022). With many countries relaxing restrictions on travel, the Delta and Omicron variants have now become dominant in many contexts worldwide. Government responses to the spread of variants of concern has not been uniform or necessarily consistent. Some governments have reintroduced restrictions on social and economic activity despite high vaccine coverage at a time when it was previously anticipated that such limitations would be significantly diminished. Others continue to reduce restrictions despite increasing case numbers. Vaccine and immunity "passports" to allow people who have been vaccinated and/or who test positive for COVID-19 antibodies to return to more normal, pre-pandemic behaviours, including freer travelling and returning to work have been considered, implemented, and widely debated in many jurisdictions (Kofler and Baylis, 2020; Brown et al., 2021; Phelan, 2020; Spitale et al., 2022; Walkowiak et al., 2021). In many jurisdictions, vaccination status and the number of doses a person must have to be considered "fully vaccinated" and thus eligible to take advantage of reduced restrictions on activities such as travel or entry into hospitality venues or health and aged care facilities, has become a focus (Saban et al., 2021; Rubin, 2021). Using mandates to restrict unvaccinated people's participation in community life is not new, as different actions and impacts of vaccine mandates have been in place for some time, particularly regarding childhood immunisation and participation in childcare and school

(Attwell et al., 2018), and healthcare staff's eligibility to work (Haviari et al., 2015). These types of mandates and consequences for non-compliance have now extended into communities more widely are unsurprisingly controversial and hotly debated (Hagan et al., 2022; Ioannidis, 2021). Amongst the many concerns and ethical issues in this area, is whether or not such mandates and legislation designed to encourage vaccine uptake represents coercion and whether such interventions appropriately address people's feelings of hesitancy or vaccine refusal.

The sociodemographic factors that underpin vaccine hesitancy and resistance are both context- and time-specific as well as multifaceted and interlinked. Issues such as social determinants of health, health inequality, socioeconomic dis/advantage, ethnicity, racism, exposure to mis/information, and access/convenience, are all at play. Each of these factors being more or less dominant depending upon time and place (Biswas et al., 2021; Aw et al., 2021; AlShurman et al., 2021; Joshi et al., 2021). Poverty is one factor that is strongly related to vaccine hesitancy, with persons living in poverty more likely to face language barriers and lack trust in health experts (Howell and Fagan, 1988), as well as living in more crowded and less sanitary conditions with poorer access to healthcare (Chokshi, 2018). This also raises the important issue that while people from marginalised, impoverished, or disadvantaged backgrounds might be more hesitant to be vaccinated, they are often also the communities that face the greatest risk and burden of disease due to the sequelae of negative social determinants of health.

Vaccine hesitancy/resistance is inextricably linked with issues around equity of vaccine access particularly in LMICs and amongst population groups with poorer access to healthcare and services (Machingaidze and Wiysonge, 2021; Moola et al., 2021). Many members of these population groups have not been vaccinated due to severe resource shortages and poor access to vaccines. Recent evidence suggests that LMIC populations may be more willing to receive a COVID-19 vaccine than counterparts in high-income United States and upper-middle income Russia (Solís Arce et al., 2021). These results indicate that prioritising vaccination in LMICs with populations who are willing to be vaccinated may be an effective approach to boosting worldwide vaccine coverage. This is important, as low vaccine coverage in these settings is known to be a precondition for the emergence of new variants including Delta and Omicron, which appear to be better able to evade vaccine-associated immune responses, particularly without a booster dose, or when a person has not been infected previously (Anderson et al., 2022; Flemming, 2022).

Understanding and addressing vaccine hesitancy and resistance in local settings is important for nurses and other healthcare professionals, as they are often community members' most accessible and trusted sources of healthcare information and guidance. This discussion paper summarises evidence regarding key issues around vaccine hesitancy and resistance and presents perspectives regarding interventions for addressing resistance and hesitancy. The paper also discusses how nurses and nursing organisations can act to respond to vaccine hesitancy and resistance.

1.1. Vaccine hesitancy and resistance/refusal

While the World Health Organization (WHO) defines vaccine hesitancy to encapsulate both concepts of delay in acceptance and abject refusal, this broad conceptualisation might create further issues in gaining a clear understanding of what is a complex, and often varied phenomena (MacDonald, 2015). While people's views on whether to receive a vaccine and their subsequent action to do so exists on a continuum from full acceptance to outright refusal (MacDonald, 2015), it is within this spectrum that distinctions and differences become important in terms of working out how to address the attendant challenges (Jarrett et al., 2015).

When discussing people's decisions regarding whether to receive a vaccination (or permit someone under their care such as a child or dependant adult to be vaccinated), it is important to be clear on the distinction between some key terms. 'Vaccine hesitant' is not the same as 'vaccine resistant' or as 'anti-vax' (Razai et al., 2021). Even within these categories there are a range of issues and distinctions that must be unpacked in order to properly understand and account for the variety of human behaviours and beliefs.

Confusing these distinct but related groups risks both failing to understand or even empathise with alternative and sometimes quite reasonable perspectives and missing critical opportunities to address, engage, or even alleviate these people's concerns or interpretations (Bedford et al., 2018). Healthcare professionals, including nurses who are at the frontlines of the COVID-19 vaccine effort, provide care to a diverse range of community members and the delivery of empathetic, individualised person-centred care is enshrined in professional codes of practice. Establishing trust between health providers and community members is vital to the delivery of appropriate and effective care. Addressing mistrust and ensuring genuine partnerships and shared decision-making underpins this. It is therefore vital that we better understand the perspectives and experiences of the patient/client and identify where and how safe, effective, and appropriate care can be delivered in the context of the vaccine roll-out.

As noted above, an individual's willingness/refusal to be vaccinated exists on a continuum. Vaccine hesitancy could be defined as closer to a "wait-and-see" approach regarding some people's reluctance to 'get the jab' as soon as possible (Rosenbaum, 2021b). A framework, based on data from high-income countries, suggests five core individual-level determinants for vaccine hesitancy: confidence, complacency, convenience/constraints, risk calculation, and collective responsibility (Betsch et al., 2018; Wiysonge et al., 2021). Vaccine hesitant people could intend to get vaccinated in the future, perhaps if certain conditions are met, but might avoid or delay vaccine administration. People who are vaccine hesitant may be delaying receiving a vaccine because of inconvenience, unfamiliarity with new clinics and booking processes, or confusion regarding whether or not they are eligible to receive one. Lockdowns implemented in response to COVID-19 may also impact upon vaccine hesitancy, with a recent Italian study finding that in comparison to pre-lockdown phases, regardless of beliefs about vaccines, more people were willing to be vaccinated for both COVID-19 and influenza as risk perceptions rose (Caserotti et al., 2021). This highlights how some people who are vaccine hesitant might be concerned or unaware of the emerging evidence for vaccine effectiveness and safety, or deem risk of illness for them or the people around them as too low to offset the potential for personal harm. Interestingly, there is also evidence to suggest that vaccine hesitant people may still accept vaccination while remaining vaccine hesitant, with a study from the United States finding that 60 percent of 1475 recently vaccinated adults reported some level of hesitancy including 10 percent who were still 'very hesitant' (Willis et al., 2022). This is potentially significant in terms of addressing vaccine hesitancy in already vaccinated populations in relation to second, third, and possible future doses, as it highlights that perhaps not every reason for a person to be hesitant needs to be resolved before decision and behaviour changes can occur.

Some vaccine hesitant people will not be swayed by even evidence-based information regarding the risk of harm from the disease the vaccine is designed to prevent (Rosenbaum, 2021b). Partially, this may be explained by a lack of knowledge about the vaccines, lower health literacy, or the understandably of and access to evidence and information. Others may be highly educated and very health-literate, but have political views or beliefs that may influence their willingness to be vaccinated. Vaccine hesitant people might have no particular opposition to the vaccines or medicine

in general, but may be distrusting, fearful, or reluctant to access healthcare or social services more broadly due to past experience, discrimination, or marginalisation (Quinn and Andrasik, 2021). The impact of discrimination and marginalisation is an important consideration for ethnic minorities and black, indigenous, and other people of colour (BIPOC) (Quinn and Andrasik, 2021; Razai et al., 2021). A recent community-led ethnographic study in Sierra Leone found that issues of trust/mistrust were closely linked to past experiences with the health system and workers and trepidation of having to pay unaffordable high prices (Enria et al., 2021). In Nigeria where vaccine hesitancy is a known issue, a recent study found that male gender, religion, ethnicity, and geographical location to positively influence the willingness of Nigerians to get vaccinated against COVID-19 and that over 60 percent of Nigerians would accept vaccination if recommended by healthcare workers (Eze et al., 2021). Another study in the United States found that black and Hispanic nursing home staff appeared to have significantly worse COVID-19 vaccine uptake in comparison to their colleagues, but that addressing cultural sensitivities, accessibility to information sessions, and providing multilingual educational materials may have reduced the disparity (Feifer et al., 2021).

In contrast to vaccine hesitancy, which might evolve into or co-exist with willingness to be vaccinated, vaccine resistance or refusal (often termed 'anti-vax'), then might be understood to refer to a more ingrained opposition to either COVID-19 vaccines specifically, or vaccines (and indeed other medicines) in general (Rosenbaum, 2021a). This isn't to say, however, that an adamantly vaccine resistant or person who is 'antivax' will never change their mind. There are numerous recent media reports, personal stories, and suggested strategies regarding how to change the minds of people who are antivax (Ahmed, 2021). As with vaccine hesitant people, within the ranks of the 'vaccine resistant' are a diversity of beliefs, perceptions, and heuristics.

As with vaccine hesitancy, vaccine refusal has existed since the very first vaccines in the late 18th century, with the essence of many arguments against vaccines and vaccination appearing relatively consistently (Succi, 2018; Grzybowski et al., 2017). Some vaccine resistant people might be unpersuaded by 'the science' or see vaccines as a legitimate threat to their health, wellbeing, or bodily or even personal integrity (Lunz Trujillo et al., 2020; Whitehead et al., 2019; Agley and Xiao, 2021). Others may focus less on the vaccines themselves but more on distrust of the political or power machinations they see to be influencing governments and other people's behaviour (Lin et al., 2020). Indeed, the explosion of social media access and availability of information both accurate and misleading, as well as patently false - especially in a period of extremely fast-paced evidence production, dissemination and evolution - is one of the novel, recent 'game changing' conditions in the arena of vaccine willingness, hesitancy, and refusal (Puri et al., 2020; Wilson and Wiysonge, 2020; Benoit and Mauldin, 2021).

Political views and political populism are also known to be associated with vaccine hesitancy with both populist political groups and some groups of people who are vaccine hesitant or antivax sharing similar drivers including distrust in institutions, elites, and experts (Recio-Román et al., 2021; Albrecht, 2022; Bruine de Bruin et al., 2020). Indeed, populist parties have used vaccine-hesitant and antivax positions and sentiments to spread mistrust and division to advance political agendas and power despite findings that perceptions of political influence could undermine vaccine acceptance (Recio-Román et al., 2021; Bokemper et al., 2021). Beliefs that malevolent agendas, undue government or corporate control, or secret schemes underpin exhortations to get vaccinated might persuade some of these people against vaccination. Others may be confused or concerned by the speed at which vaccines were developed and approved for use, and believe they cannot have

been proven to be safe or effective (Jolley and Douglas, 2014; Cookson et al., 2021). Some vaccine resistant people have been found to be less likely to obtain information about the COVID-19 pandemic from traditional authoritative sources (Romer and Jamieson, 2021; Murphy et al., 2021). A very small minority of vaccine refusers might engage in active efforts to win over others through strategies that seek to spread 'alternative facts', conspiracy theories, or simply by focussing on reports of real or potential vaccine-related deaths and adverse events (van Stekelenburg et al., 2021). Social media is a common platform for this behaviour (Puri et al., 2020). People who are resistant or refuse vaccines outright might have the potential to be convinced otherwise, but this is unlikely to be as easy as advising people who are vaccine hesitant to become vaccinated.

1.2. Addressing vaccine hesitancy and resistance

Widespread uptake of COVID-19 vaccines in all nations will be an important factor to bringing about the end of the pandemic (Solís Arce et al., 2021). Many countries with both high and low COVID-19 vaccine uptake and coverage are grappling with issues around vaccine hesitancy and resistance. As noted, this is especially pertinent with the emergence and rapid spread of new, highly transmissible variants that appear to be relatively unhindered by less recent two-dose vaccine schedules. This can be dire in countries with low vaccine coverage that typically have fewer resources and significant challenges efficiently rolling out largescale vaccination and booster doses.

In an attempt to hasten the vaccine rollout and potentially sway vaccine hesitant/ refusing individuals to take up vaccines despite misgivings, many governments and decision makers have considered or implemented vaccine mandates. Mandating COVID-19 vaccination has been a significant and controversial topic raising notable disputes between individual freedom of choice and the social good and community health (Zia Sadique, 2006). While the World Health Organization has warned that mandating vaccines should be a last resort (World Health Organization (WHO) 2021), mandating vaccines does appear to be an effective way of enhancing vaccine uptake. A recent study found that campaigns for mandatory influenza vaccination including a 'vaccinate-or-wear-a-masque policy' as well as mandatory declination (i.e. where healthcare workers must sign an official statement when refusing to be vaccinated) reached vaccination coverage in healthcare workers of over 90 percent (Schumacher et al., 2021). Despite these results however, in many cases such policies may be unfeasible or undesirable, particularly where the vaccines in question are not familiar seasonal influenza vaccines, but vaccines that are novel, provisionally approved, and widely and publicly debated.

It could also be argued that mandating vaccination does not actually address the core issues underlying vaccine hesitancy or resistance, but instead marginalises vaccine hesitant/resistant people further by pushing aside any opposition. Mandating vaccines could also be seen to be coercive and intimidating, particularly for people whose jobs and livelihoods may be on the line if they refuse on any basis, as well as for people with existing distrust of institutions and healthcare. Further, a systematic review found that mandating seasonal influenza vaccines was effective, but also that 'soft mandates' such as declination statements, increasing awareness, and increased access were also effective, highlighting the need to examine alternative approaches further (Lytras et al., 2016). Additionally, mandating vaccines when access and availability is so limited that many individuals and groups cannot access them anyway is fraught with issues.

Addressing issues regarding convenience and complacency might usefully occur through interventions that seek to 'bring vaccines to the people' and ensure multiple, easily accessible

options for people to access vaccination services. Some examples of these are: in-reach teams to bring vaccines to at risk but less mobile patients such as those in permanent accommodation such as nursing homes (Feifer et al., 2021; Mor et al., 2021), prisons (Costumbrado et al., 2012; Ramaswamy et al., 2021), schools (Guarironi and Dignani, 2021), mass vaccination hubs (Signorelli et al., 2021), 'pop-up' clinics (Patil et al., 2021; Olusanya et al., 2021), and local general practices and pharmacies (Marwitz et al., 2021). Likewise, ensuring that vaccines can be co-ordinated or administered by multiple health professions including nurses and pharmacists can be helpful where access to physicians is limited (Ezeude et al., 2022).

Evidence appears to suggest that multi-component interventions may be more promising than single interventions for addressing vaccine hesitancy. This would appear to make reasonable sense, as it might better account for the complex factors and conditions that underpin hesitancy and refusal in the first place. In 2015 a review of 15 other reviews and meta-analyses found that limited evidence existed to suggest any specific approach to addressing vaccine hesitancy/refusal would be effective and highlighted that few interventions sought to actually target hesitant individuals (Dubé et al., 2015). A 2015 systematic review found limited evidence regarding strategies to address vaccine hesitancy (Jarrett et al., 2015). Thirteen studies were identified that provided moderate quality evidence for use of dialogue-based (e.g., social mobilisation, mass media, communication tool-based training for healthcare workers), non-financial incentives, and reminder/recall-based interventions. The review determined that multicompetent and dialogue-based interventions were most effective, however cautioned that strategies should be adapted to the target population, context, and specific reason/s for hesitancy (Jarrett et al., 2015).

Within multicomponent interventions, the following specific interventions were found to lead to greater than 25 percent increases in vaccine uptake: targeting specific groups such as unvaccinated/under-vaccinated groups or healthcare workers, interventions to increase vaccine knowledge and awareness, enhancements to access and convenience of vaccination, mandating vaccination or implementing sanctions against non-vaccination, and engaging religious or other community leaders (Jarrett et al., 2015). The review also found that education initiatives where new knowledge was embedded in routine practices such as hospital procedures was found to lead to greater than 20 percent improvement in knowledge, awareness, or attitudes towards vaccines. Interventions that were found to be least effective (less than 10 percent vaccine uptake) included: quality improvement activities in vaccine clinics (e.g., increased hours, improved data collection), passive interventions (e.g., posters, websites), and incentive-based interventions (which often focussed on general preventive health rather than vaccination specifically). Reminder-recall interventions had variable, but positive results based on context.

As noted previously, trust and mistrust are important issues in relation to people's decisions regarding vaccination (González-Melado and Di Pietro, 2021). Trust, and conversely mistrust, can broadly refer to people's expectations that their health, safety, and best interests will be considered and accounted for in decisions that impact them and in the healthcare interventions delivered by those caring for them. Trust is fundamental regarding the willingness of people and communities to follow guidance and advice both from governing institutions and authorities as well as healthcare providers. People who are less likely to trust authoritative institutions and health providers due to past experiences both personal and systemic can be understandably unwilling to engage around receiving a new and relatively unfamiliar vaccine (Moran et al., 2016). Trust, also, is related to ethnicity/race, with studies finding that non-white participants often have less trust in

healthcare institutions than white participants (Armstrong et al., 2008; Schwei et al., 2014). Results are not always consistent however, with findings also revealing no difference between ethnic groups in terms of trust in healthcare providers (Moran et al., 2016). A recent study suggests that localised approaches with education and role-modelling from public officials and health authorities are necessary to build public trust and enhance vaccine uptake (Vergara et al., 2021). Trust is a core element in the patient-healthcare provider relationship. It is fundamental to the delivery of effective, appropriate care and to successful immunisation initiatives. A 2016 review highlighted that healthcare providers are amongst the community's most influential and trusted sources of advice regarding vaccination decision making (Paterson et al., 2016). This review recommended that because health professionals face considerable time and workload constraints, ensuring that adequate support is provided to ensure access to training information and resources is vital. The authors also recommended that shared involvement between health professionals, health authorities, and policy makers is necessary to enhance trust between these groups.

The working group of the Strategic Advisory Group of Experts on Immunization (SAGE), that advises the World Health Organization (WHO) on global vaccine policies and strategies regarding issues including delivery of immunisation, determined that communication is a tool that can both undermine and enhance vaccine acceptance (MacDonald, 2015). Where communication is poor, as with any other service, people may be more hesitant, however ensuring clear, accurate, and understandable communication about vaccines can enhance people's access to important information about the vaccines and how to access them.

Financial incentives to encourage behaviour change have been studied and found to be effective in other areas of public health including smoking cessation (Notley et al., 2019; Higgins et al., 2012). Financial incentives have been suggested as a potential solution to enhancing vaccine uptake and willingness, however evidence for the effectiveness such interventions remains limited (Lytras et al., 2016; Volpp and Cannuscio, 2021). Some researchers have also suggested that financial incentives could be coercive and morally questionable particularly if struggling individuals or families feel bound to vaccinate simply to purchase food or pay rent (Largent and Miller, 2021).

A 2021 study examined lottery incentives to influence vaccine hesitant individuals (Taber et al., 2021). The study found that several lottery structures were comparably effective, but that vaccination intentions did not differ across incentives and were strongly associated with baseline vaccine willingness. Participants tended to prefer options where less money was awarded to more people, but the study also found that 41.9 percent of participants would not vaccinate for any lottery-based monetary incentive. In another study, financial incentives were found to decrease likelihood of vaccination (i.e. \$20 co-payment) and did not increase willingness to vaccinate (Kreps et al., 2021).

1.3. Nurses, nursing organisations, and addressing vaccine hesitancy and resistance

Nurses and nursing organisations, including professional associations and industrial trade unions, have an important role in addressing vaccine hesitancy and resistance (Burden et al., 2021). Nurses, together with other members of the healthcare professional team, are amongst the most trusted workforce groups in the world and also comprise the largest proportion of the health workforce. This means that for most people, nurses are some of the most commonly encountered healthcare professionals and that many look to nurses for guidance, information, and leadership regarding health related topics and concerns including vaccination (Solís Arce et al., 2021). A recent review highlighted that healthcare

professionals in LMICs could be influential in reducing the impact of misinformation on vaccine hesitancy as well as through helping members of the public, particularly those from lower socioeconomic groups, women, and unmarried or lower educated people, gain better understandings of vaccine safety (Moola et al., 2021). Importantly, any measures to address vaccine hesitancy and resistance should be locally tailored. Here is where healthcare staff 'at the coal face', who understand and engage with the community first-hand, can be so useful. Healthcare providers must work to establish genuine and trusting relationships with their patients and communities which can engender greater participation and willingness to be vaccinated for the community good.

Around the world, local, international and global nursing organisations have been active and vocal in raising awareness and advising governments, employers, and the public regarding COVID-19, infection prevention and control measures and policy, and vaccination (International Council of Nurses (ICN), 2021). Indeed as the largest group of frontline healthcare professionals caring for and working with people with COVID-19, ensuring widespread vaccine uptake along with adherence to public health and social measures is vital for supporting the health and safety of the healthcare workforce during the pandemic (World Health Organization (WHO), 2020). Nursing organisations and bodies have and should continue to work with governments and local communities to develop tailored strategies to address vaccine hesitancy and resistance and help inform and support their members and the nursing profession more broadly to be active in working to address vaccine hesitancy and resistance.

1.4. Conclusion

The COVID-19 pandemic and attendant vaccine rollout is an unprecedented public health and logistical phenomenon. Addressing vaccine hesitancy and resistance will demand a multifaceted solution, clear consistent messaging, trust, and collaboration between health professionals, public bodies, workforce representatives, unions, and professional associations, and policy makers. Understandings of the local contexts and communities where vaccine rollouts occur and awareness of what factors may underpin hesitancy and resistance are also vital. While past work has investigated vaccine hesitancy and measures to address it, the evidence even before 2020 was limited and often inconclusive. Vaccine hesitancy/ resistance/ refusal is complex and multi-faceted with individuals and groups having diverse and often multiple reasons for either delaying/avoiding vaccination or refusing vaccination entirely. It is important to not only distinguish between the hesitant and the more strident refuser, but also to attempt to genuinely understand and appreciate how and why their perspectives and beliefs are the way they are. Likewise, it may be unhelpful to dichotomise those who are 'pro-vax' and those who are 'anti-vax', as most people likely exist somewhere in between (Laine et al., 2020). Targeting and adapting interventions to the particular population group, context, and specific reasons for vaccine hesitancy/resistance enhances the effectiveness of interventions, however it appears that evidence regarding the effectiveness of interventions to address vaccine hesitancy and improve uptake is limited and generally unable to underpin any specific strategy.

While mandatory vaccination is effective for seasonal influenza uptake amongst healthcare workers, and often a moral obligation of health professionals and the wider community, this evidence may not be appropriately transferred to the context of COVID-19 vaccination, particularly for members of the community. Despite the limitations of the evidence, multicomponent, dialogue-based (i.e., communication) interventions do appear to be effective in addressing vaccine hesitancy/resistance. Overall, multicomponent approaches appear to be the most promising and also acknowledge

the complexity and variability regarding many of the reasons and factors behind vaccine hesitance and resistance. It also appears vital to understand that adapting messaging and communication to the targeted population is of especial importance and that failure to recognise the diverse and often reasonable concerns of different groups risks implementation of interventions that will fail to be effective. A multicomponent intervention that encompasses the following may be effective: (i) targeting specific groups such as unvaccinated/under-vaccinated groups or healthcare workers, (ii) increasing vaccine knowledge and awareness, (iii) enhance access and convenience of vaccination, (iv) mandating vaccination or implementing sanctions against non-vaccination, (v) engaging religious or other community leaders, (vi) embed new vaccine knowledge and evidence in routine practices such as hospital procedures. Financial or other incentives for addressing vaccine hesitancy may have limited effectiveness with much evidence for benefit appearing to have been translated across from other public/preventive health issues such as smoking cessation. In terms of designing and deploying interventions to enhance vaccine uptake, healthcare professionals including nurses and their representative groups should be closely involved in policymaker and health authority decisions regarding the establishment and implementation of vaccine recommendations.

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