Qualitative exploration of intentions, concerns and information needs of vaccine-hesitant adults initially prioritised to receive COVID-19 vaccines in Australia

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In 2019, the World Health Organization (WHO) identified vaccine hesitancy and refusal as one of the top 10 threats to global public health.[1] As of October 2021, this warning has become critically relevant. For the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, the vaccination threshold required for substantial population protection has been estimated to be between 75% and 90% (assuming vaccine of 80% efficacy and R_o value between 2.5 and 3.5).[2] The Australian Government's four-phase National Plan[3] provides transitions through varying levels of restriction, predicated on reaching 70% and subsequently 80% coverage.[4] As most children and some individuals with medical contraindications are currently unable to be vaccinated, attaining this threshold will require high uptake among those who are eligible. While a number of COVID-19 vaccines are now available,[5] current vaccine hesitancy or refusal rates threaten

Abstract

Objective: Tailored communication is necessary to address COVID-19 vaccine hesitancy and increase uptake. We aimed to understand the information needs, perceived benefits and barriers to COVID-19 vaccination of people prioritised, but hesitant to receive the vaccine.

Method: In this qualitative study in Victoria, Australia (February-May 2021), we purposively sampled hesitant adults who were health or aged/disability care workers (n=20), or adults aged 18-69 with comorbidities or aged ≥70 years ('prioritised adults'; n=19). We thematically analysed interviews inductively, then deductively organised themes within the World Health Organization Behavioural and Social Drivers of vaccination model. Two stakeholder workshops (n=12) explored understanding and preferences for communicating risks and benefits. We subsequently formed communication recommendations.

Results: Prioritised adults and health and aged care workers had short- and long-term safety concerns specific to personal circumstances, and felt like "guinea pigs". They saw vaccination as beneficial for individual and community protection and travel. Some health and aged care workers felt insufficiently informed to recommend vaccines, or viewed this as outside their scope of practice. Workshop participants requested interactive materials and transparency from spokespeople about uncertainty.

Conclusions and public health implications: Eleven recommendations address communication content, delivery and context to increase uptake and acceptance of COVID-19 vaccines.

Key words: immunisation, vaccination, coronavirus, vaccine acceptance, communication

the threshold targets identified.[6,7] Data from August 2021 suggested that approximately 78% of people in Australia had been or were willing to be vaccinated against COVID-19, with one in five people hesitant or not intending to be vaccinated.[8] However, levels can vary by demographic; for example, at this same time point, 31% of those aged 18–44 were unsure or unwilling to be vaccinated.[8]

A range of behavioural and social drivers influence vaccine decision-making and uptake.[9] These factors include what people think and feel about vaccines and vaccine-preventable diseases, as well as social processes like workplace norms or the influence of people close to us. According to the WHO's Behavioural and Social Drivers (BeSD) of Vaccination model,[10] these factors influence peoples' motivation to get vaccinated, with practical or logistical issues – such as ease of access – moderating the link between motivation and subsequent vaccination behaviour.[10,11] Understanding the drivers influencing COVID-19 vaccination is key to developing effective communication strategies as part of public health campaigns.[12] Successful campaigns can raise awareness, address concerns directly, reinforce positive motivations and help address identified practical challenges.

While a number of studies have explored COVID-19 vaccination intentions and factors influencing uptake internationally[13-15] and in Australia,[16,17] there is limited information about vaccination intentions or concerns among groups prioritised for vaccination in the Australian Government's phased roll-out strategy.[18] These groups include those working in high-risk settings such as healthcare workers and aged care and disability care staff (Phase 1a), and those at risk given personal circumstances, such as older adults (70 and over) or those with a chronic health condition (Phase 1b). Therefore, we conducted a multi-stage, mixed methods study with people in these initial priority groups in Victoria, Australia. The aims were: i) to explore the factors influencing people's uptake of COVID-19 vaccines; and ii) to provide relevant information for the Victorian Government vaccination program communication planning.

In the two qualitative stages of the study, which are the focus of this paper, we specifically explored vaccination intentions, perceived concerns about and benefits of vaccines, and information experiences and preferences for those who were refusing or hesitant towards COVID-19 vaccines. In addition, questions for healthcare workers targeted their needs around recommending or providing the vaccines. The findings informed recommendations for communication strategies to reduce misinformation, build trust and optimise COVID-19 vaccine uptake for those refusing or hesitating in Victoria.

Methods

We conducted a mixed methods study, commencing with an online survey with prioritised Victorians to explore vaccination intentions, information needs, and attitudinal and behavioural drivers of vaccine uptake (manuscripts currently in preparation).

Design

In this subsequent qualitative study, we conducted individual interviews and stakeholder workshops with both healthcare workers (HCWs; i.e. allied health, nurses, paramedics, aged and disability care workers, medical doctors) and other prioritised adults, hereafter called 'prioritised adults' (i.e. those aged 70 years and over, and those aged 18–69 years with one or more chronic health conditions). We applied a constructivist approach. This study is presented using the Consolidated Criteria for Reporting Qualitative (COREQ) research.[19]

Setting and context

In Australia, the phased rollout of COVID-19 vaccines (Oxford AstraZeneca/ChAdOx1-S and Pfizer/BioNTech, Comirnaty) was announced in early 2021.[18] Phase 1a vaccine rollout in Victoria began on 22 February 2021, and Phase 1b on 22 March. Pfizer vaccine was prioritised for the 1a cohort, with both Pfizer and AstraZeneca delivered to those in Phase 1b and later.[20] However, Australian Government recommendations changed during our data collection period due to emerging evidence of an association between the Oxford AstraZeneca vaccine and thrombosis with thrombocytopenia (TTS; severe clotting syndrome).[21] Due to the changed risk/benefit ratios by age groups,[22] the Australian Technical Advisory Group on Immunisation (ATAGI) recommended Pfizer as the preferred vaccine for all adults aged under 50 years on 8 April 2021.[23] At the time of this study, Australia had very little community transmission, with a total of 873 new cases and no deaths attributed to COVID-19 between 1 January and 1 April 2021.[24]

Participant recruitment

We recruited participants (HCWs, prioritised adults) from those who had completed the online survey between 12 February and 26 March 2021 and had consented to be contacted for interviews or other research (42% of HCWs and 55% of prioritised adults). We used purposive sampling to target HCWs and prioritised adults who had responded: "no" or "not sure" to the survey question "If a COVID-19 vaccine were recommended for you, would you get it?" (22% of HCWs and 35% of prioritised adults who completed the survey consented to contact and responded "no" or "not sure") and HCWs who responded "no" or "not sure" to the question "Would you recommend COVID-19 vaccination to eligible patients or residents?" (12% of HCWs who completed the survey). We also interviewed participants who answered "yes" to getting or recommending the vaccine as a counter position. We included prioritised adults with various health conditions and those aged over 70 years, and HCWs from all settings (i.e. hospital, private practice/community, residential aged or disability care facility). We attempted to oversample HCWs in aged care facilities, as this was a government priority area for vaccination.

Two research assistants (DSO, CJ) contacted potential participants. Those interested received a participant information statement and provided informed consent electronically via REDCap. We aimed to recruit 20 prioritised adults and 20 HCWs for individual interviews, as well as up to eight prioritised adults and eight HCWs for two stakeholder workshops. Our sample size was pragmatic, given available timeframes and resources; saturation was not expected given the breadth of both targeted participants and interview schedule topics.[25] Each stakeholder workshop included a mix of HCWs and prioritised adults. The rationale for including mixed participants was to inform the design of communication materials that would be perceived as useful and acceptable by both hesitant consumers and HCWs who would be having vaccine discussions. Participants did not know each other prior to their workshop and all had concerns about COVID-19 vaccines.[26,27]

Data collection procedure

Interviews

Three researchers (KB, PhD, psychology; JT, PhD, medicine; JO, PhD, public health – all female and experienced in undertaking qualitative interviews) conducted individual interviews remotely via Zoom[28] or telephone between 2 March and 13 April 2021. Prior to commencement, all interviewers reviewed and discussed the interview schedule, and KB checked initial audio recordings and transcripts to ensure consistency across interviewers.

The semi-structured interview schedule covered a range of topics relating to the COVID-19 pandemic and vaccines including information needs and preferences (see Supplementary File 1), with additional topics for HCWs including patient-relevant information (see Supplementary File 2). Minor adaptations were made to the schedule during the interviewing period.

Interviews were audio-recorded with participant consent, transcribed verbatim and de-identified prior to analysis. Participants were able to review their transcript on request (n=2 HCWs, n=2 prioritised adults did so) and all were offered a digital $50 gift card.

Stakeholder workshops

Two stakeholder workshops were conducted to brainstorm ideas and gather feedback on potential strategies and messages to communicate the risks and benefits of COVID-19 vaccines. The workshops were conducted (26 and 27 April 2021) online using Zoom. One researcher facilitated both sessions (JK, PhD, public health) while another acted as the scribe (KB); both were experienced in conducting focus group research. Two others observed one workshop (MD, RB). Participant input was captured and collated under relevant headings on a live virtual whiteboard, shared with researchers and participants (https://www.mural.co/). Participants could see their comments summarised on virtual post-it notes in real-time and could request notes be rephrased, moved, combined or colour coded to accurately reflect and summarise their views.

The discussion prompts and structure for the workshop were developed based on survey and interview results and covered the following four broad topic areas:

1. Review of key survey and interview themes
2. Focused discussion of risks and benefits and brainstorm of hypothetical communication material
3. Review of government-provided prototype on 'Weighing COVID-19 vaccine risks and benefits'
4. Brainstorm next priority areas for communication

See Supplementary File 3 for the Stakeholder Workshop Discussion Guide.

Workshops were audio-recorded with participant consent, but not transcribed. Separate virtual walls were used for each topic area. Participants were offered a $50 gift card.

Ethics

Ethics approval for the mixed methods study was received from the Royal Children's Hospital Human Research Ethics Committee (HREC/72845/RCHM-2021).

Analysis procedure

Interviews

Primary interviewers (KB, JT) undertook an initial descriptive thematic analysis[29,30] with an inductive approach. After reviewing the transcripts, we categorised data initially into codes and sub-codes and then grouped these thematically. We completed coding by participant group separately within NVivo (v12),[31] and then used a virtual whiteboard (https://www.mural.co/) to identify common and unique themes, colour coded for each participant group. We then organised these themes and sub-themes deductively within the BeSD vaccination model (Figure 1). We overlaid the Precaution-Adoption Process Model (PAPM)[32] on specific findings to illustrate the breadth of stages in vaccination decision-making (Supplementary File 4). Illustrative quotes, corrected for grammar, are provided.

Stakeholder workshops

Participant comments were synthesised and organised to generate themes in real-time with participants via the virtual whiteboard, so the analysis of audio transcripts was not required.[33] The facilitator and scribe reviewed and refined the content of virtual walls during and immediately following each workshop, grouping similar discussion points and sub-categories together. We then combined results from both workshops across topics, merging similar categories and refining category names. Categories are presented under the topic headings.

Triangulation

Results for interviews and workshops are initially presented separately. Subsequently, data from both interviews and workshops are triangulated with the survey results to present comprehensive results for participant-based recommendations.[34]

Results

Interview participants

There were 19 prioritised adult and 20 HCW interviews with an average duration of 43.5 minutes. The majority of interviews were undertaken via Zoom (n=28, 72%).

Demographic characteristics by vaccine intention, as reported in the survey, are presented in Table 1. Eight participants had already received or booked an appointment for their first dose of a vaccine at the time of the interview (n=3 prioritised adults, n=5

Figure 1: The adapted Behavioural and Social Drivers Framework[9,10] showing key themes identified during individual interviews.
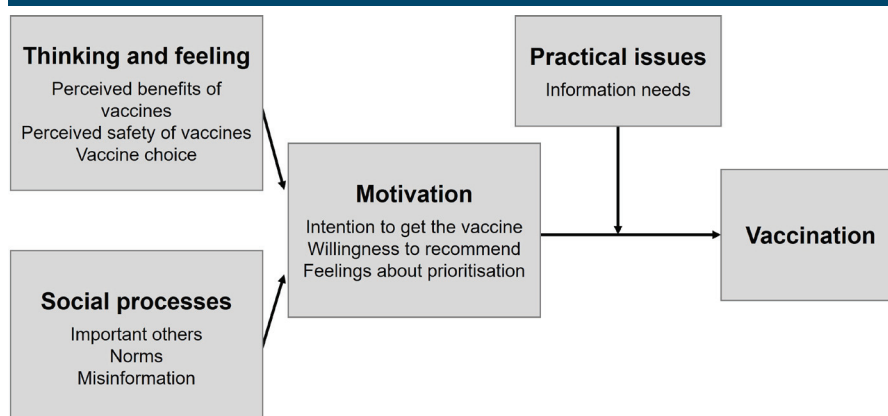
HCWs). Five interviews were conducted after the AstraZeneca vaccine recommendations were changed.

Interview key themes and sub-themes

Key themes are presented for each category of the BeSD framework (Figure 1), with sub-themes underlined in the text.

Thinking and feeling: Perceived benefits of vaccines

Direct benefits including individual and community protection from severe disease was a key benefit for prioritised adult and HCW groups, and included less severe symptoms and protecting others in the community who are unable to have a vaccine. For HCWs, this included protecting vulnerable patients. On the benefit of receiving a vaccine, one participant noted:

> I would stop worrying about the risk of getting sick…I'm only in my early 60s, I would like to kick around for a few more years! (Prioritised adult 1662 female, 60–69, respiratory condition, no/unsure to vaccine)

Domestic and international travel to see friends and family were noted by many, including being able to travel without quarantining or the risk of borders closing.

While some prioritised adults referred to herd immunity, prioritised adults and HCWs noted vaccine benefits as limiting transmission or eradicating COVID-19, and life could 'return to normal'. Others were concerned about unrealistic expectations of the vaccines:

> I think a lot of people at the moment are thinking, "Oh yes, you get vaccinated and that's it. You're fine." And obviously, it's only time that will tell, I think, with something like this. (Prioritised adult 3294, female, 50–59, diabetes, yes to vaccine)

Some did not think the benefits outweighed the risks:

> We're not interested in having it just so that we can go overseas to see our family. (Prioritised adult 3227, female 60–69, autoimmune, no to vaccine)

Some participants framed vaccine benefits as risks associated with being unvaccinated, including losing work and income. One

HCW felt that it was a way of mandating the vaccine, without mandating it, and interpreted this as a lack of transparency:

> People who don't want to have it, have to have it because they've got mortgages to pay and things like that. So, there's a bit of coercion in regard to taking the vaccine. Even though the message is "it's not mandatory", it kind of is. (HCW1662 aged care nurse, female, 40–49, no/unsure to vaccine)

Thinking and feeling: Perceived safety of vaccines

Many participants discussed the potential risks of having a vaccine, with varying degrees of detail, concern and influence on vaccination decisions. These included concerns about experiencing short- and/or long-term side effects. The speed of vaccine development and the thoroughness of testing were also raised as concerns, with examples of historical medical errors provided.

> There was all the thalidomide things back in the 60s…We just don't know. There hasn't been enough information on any long-term trials to say, "Hey, these are the complications down the track". (HCW2390 aged care nurse, male, 50–59, no to vaccine)

All participants (i.e. both those unsure about getting a vaccine and those planning to get a vaccine) discussed side effects. Information about short-term side effects was required to support decision-making and/or managing any post-vaccination outcomes. Some felt the early reports of blood clot risks did not impact their decision-making, while others reported that any risk precluded vaccination.

> We're bringing out a vaccine before the long term, I mean, has there ever been a vaccine rolled out in this short timeframe? I doubt it. So, what would I like to know? Yeah, how effective it was, what possible side effects. (Prioritised adult 2467, female, 70–79, no/unsure to vaccine)

The role of personal circumstances and risk factors were raised. Prioritised adults raised queries about how the vaccine would interact with their specific health condition/s (e.g. diabetes, post-cardiac surgery) or their specific medications (e.g. anticoagulant). Prioritised adults and HCWs raised concerns about the vaccines' potential impact on fertility, pregnancy and breastfeeding for themselves and others (e.g. patients, female partners, daughters).

> I'm sort of conflicted, because on the basis of my GP's advice, because we're trying to get pregnant, I won't be having the vaccine.

Table 1: Individual interview participant demographic characteristics by intentions to vaccinate from survey (n, %).		Prioritised Public N=19		Healthcare Workers N=20	
Demographic characteristics	Detail	No or not sure to vaccine n=12	Yes to vaccine n=7	No or not sure to vaccine n=12	Yes to vaccine n=8
Gender	Female	10, 83%	4, 57%	9, 75%	6, 75%
Age group	18-29	1, 8%	0	1, 8%	0
	30-39	0	1, 14%	6, 50%	5, 63%
	40-49	2, 17%	1, 14%	3, 25%	1, 13%
	50-59	1, 8%	1, 14%	2, 17%	0
	60-69	2, 17%	2, 29%	0	2, 25%
	70-79	6, 50%	2, 29%	0	0
	80+	0	0	0	0
Location[a]	Metropolitan	9, 75% [1 unknown]	5, 71%	9, 75%	4, 50%
Country of birth	Not Australia	3, 25%	2, 29%	3, 25%	2, 25%
Language[b]	Other than English	1, 8%	0	0	2, 25%
Health[c]	Health condition	6, 50%	5, 71%	n/a	n/a
Professional Role	Nurse	n/a	n/a	5, 42%	0
	Allied health	n/a	n/a	4, 33%	4, 50%
	Medical doctor	n/a	n/a	1, 8%	4, 50%
	Paramedic	n/a	n/a	2, 17%	0
Setting	Hospital	n/a	n/a	2, 17%	5, 63%
	Aged Care	n/a	n/a	4, 33%	0
	Community/Private Practice	n/a	n/a	6, 50%	3, 38%

Notes:
Percentages may be >100% due to rounding.
a: Location Metropolitan and Regional by postcode
b: Language other than English spoken mostly at home
c: Health conditions included autoimmune disease, neurological condition, diabetes, respiratory, cardiovascular disease, obesity.
Some participants had multiple health conditions. n/a=not applicable demographic for this group

(HCW078 allied health, female, 30–39, no to vaccine)

Thinking and feeling: Vaccine choice and preference

Some participants preferred one vaccine brand (i.e. Pfizer, AstraZeneca) over another, with others citing reasons without referring to a brand name, including country of manufacture, type of vaccine (e.g. mRNA), or wanting something that was suitable for those with allergies (i.e. egg-free/wheat-free). Some participants referenced specific clinical trial data about the two vaccines, while others were vague about data sources. A small number of both prioritised adults and HCWs mentioned that they would receive whatever is available or offered.

Social processes: Important others

Individuals and organisations were identified as important influences on participants' vaccination intentions. Individuals included personal contacts such as friends, family, and work colleagues, as well as their own general practitioner (GP) or non-GP medical specialist/s.

> *I'd rather not have it but if the doctor says we've got to have it, we've got to have it and that's it.* (Prioritised adult 1334, female, 70–79, no/not sure to vaccine)

Other individuals included people with public profiles such as Dr Norman Swan, a medical doctor and journalist; Prof Brett Sutton, Chief Health Officer in Victoria; and Prof Raina MacIntyre, Professor of Global Biosecurity. Specific roles mentioned included scientists, doctors, epidemiologists, and those within government such as the Chief Medical or Health Officers.

Participants also noted the importance of hearing from regular people who had already been vaccinated. Influential organisations included employers as well as others such as the Australian Medical Association, Royal Australian College of General Practice, or specific condition organisations (e.g. Diabetes Australia).

However, some commonly cited trusted sources were not without criticism, including politicians or 'the government'.

> *Look, anything coming from the government would be fine, but personally, I would like to see some third-party research backing it up.* (Prioritised adult 3294, female, 50–59, diabetes, no/not sure to vaccine)

Additionally, for some prioritised adults with health conditions, medical doctors did not always have all the answers, and some HCWs wanted information from their own GP rather than their health service employer.

Social processes: Norms

For some of the prioritised adults, getting vaccinated was considered an important contribution and responsibility as a member of the community. Many HCWs felt that getting the vaccine was an expectation of their role and responsibility as HCWs (workplace norms).

> *I think in general vaccination is a positive thing, especially for the wider community…I'd be happy to take the vaccine as long as it wasn't going to cause adverse side effects that would affect my heart.* (Prioritised adult 2946, male, 40–49, cardiovascular, no/not sure to vaccine)

> *Why wouldn't you [get the vaccine]? You're a physician, this is what we do.* (HCW3283 hospital doctor, female, 60–69, yes to vaccine)

Social processes: Misinformation

Nearly all participants knew somebody who they thought was an 'anti-vaxxer' or who believed in a conspiracy theory about the COVID-19 vaccines, with participants reporting concerns or describing strategies to ignore such discussion content. At times, participants would confidently refer to information that was factually incorrect. For example, one HCW had a number of concerns about vaccine safety, drawing a parallel with thalidomide and saying of the COVID-19 vaccines, "It is something that will affect DNA", (HCW2390, nurse aged care, female, 50–59, no/not sure to vaccine).

Motivation: Intention to get or recommend the vaccines

Due to our sampling strategy, we had participants across the seven stages of the PAPM decision-making model, including those not intending to receive the vaccines (now or ever) and those who were intending to receive (or had received) the vaccines (Supplementary File 4).

Motivation: Willingness of HCWs to recommend the vaccine to others

Hesitating HCWs (mostly nurses, allied health practitioners, paramedics) indicated that making a COVID-19 vaccine recommendation for patients was outside the scope of their practice. Many of these HCWs said they would refer patients to speak to their primary healthcare provider, although some needed more information for patient discussions.

> *I'm prepared to have those conversations, but I don't have a lot of information in regard to the actual vaccine.* (HCW1662 aged care nurse, female, 40–49, no/unsure to vaccine)

Motivation: Perspectives on being prioritised

For some HCW participants, being prioritised to receive the vaccine in the early phases of the rollout was associated with feelings of being a 'guinea pig'. Some prioritised adults (both those over age 70 and those with medical conditions) were not sure about being vaccinated and were taking a wait-and-see approach; that is, waiting for others to be vaccinated and to see the outcome. In addition, there were participants in both groups indicating that while they were happy to receive the vaccine, they thought others should be equally or more highly prioritised.

Practical issues: Access

Those participants who were not hesitant about receiving the vaccine were more likely to discuss practical issues. These included vaccine supply and availability, lack of clarity around participant eligibility, how to book, where to be vaccinated and by whom (e.g. some preferred visiting a GP practice, not all were comfortable with vaccination centres). For many, these practical issues were a source of considerable frustration and concern.

> *If it hadn't been for my brother telling me that they were now available for our age group, I wouldn't have had any idea…I haven't received any information that it was available at all. I haven't even seen it on the TV.* (Prioritised adult 1824, female, 70–79, yes to vaccine)

For one GP, the limited supply was frustrating, given that the preparation and associated spending for delivery through primary care had been underway for some months. Most HCWs indicated that they would prefer to be vaccinated at their workplace (as notified by their employer), with information being provided over time as to when and where this would take place.

Practical issues: Information needs and preferences

Since the beginning of the pandemic, participants have had to navigate through an abundance of information, which has

varied in accuracy, relevance, and availability. Although one participant noted that we were watching "real-time science" in action (Prioritised adult 2467, female, 70–79, no/unsure to vaccine), the changing of specific information was a common source of frustration for participants. One noted, "I got to a saturation point where I just didn't want to be constantly exposed to bad news" (Prioritised adult 1087, male, 50–59, neurological condition, yes to vaccine). Similar comments were made regarding information about the virus as well as the vaccines.

Participants indicated that information about the vaccine should be personalised and specific to an individual's demographic characteristics, health condition and medications. Issues including logistical information about the vaccination process from eligibility and booking, through to reminders for second doses were raised. Participants wanted practical and easily accessible information, delivered across multiple delivery modes via trusted sources.

Stakeholder workshop participants

There were six participants in each of two stakeholder workshops (n=12), with a mix of HCW and prioritised adults in each. Demographic characteristics by group are presented in Table 2. A total of four HCW and one prioritised adult participant had previously completed the survey and been interviewed; the rest only completed the survey. HCWs and prioritised adults in each group presented similar and different

perspectives across the discussion topics, agreed and disagreed on discussion content, and shared information directly between themselves.

Workshop themes

There were seven broad themes about vaccine risks and benefits (underlined in text) identified throughout the workshops (see Supplementary File 5 for screenshots of virtual whiteboards). Participants provided information relevant for the planning of communication strategies, specifically around the risk communication approach to weighing up the risks and benefits of the COVID-19 vaccines.

Participants emphasised that personalisation of messaging about risks was important, particularly for prioritised adult participants. Tailoring to individual factors included health conditions, medications, and demographic characteristics. When communicating about vaccines, such as how they work, risks, benefits and eligibility, information should be vaccine-specific. HCWs shared their greater understanding and experiences of vaccines with prioritised adult participants. Different types of vaccines were referred to by delivery technology and brand name (e.g. mRNA or Pfizer, non-replicating viral vector or AstraZeneca). Information about minor and serious side effects was requested, although neither HCW nor prioritised adult participants said they were overly concerned about blood clots specifically when these workshops were conducted in April 2021. Discussion around preferred risk comparisons provided some

insights but did not achieve a single definitive response. Some mentioned comparisons to risks of COVID-19, everyday events (car or plane crashes), or to other health conditions/medications to put the numbers into perspective. Simple explanations were preferred, with some wanting numbers (others not), and some wanted visual aids. Benefits of vaccines or being vaccinated included removal of government-imposed public health measures such as lockdowns and school closures, and removal of local or international travel restrictions to see family and friends. Financial security from open borders was also identified. Transparency about uncertainty was important as HCW and prioritised adult participants noted that change was likely, and this should be reflected in communications. Doing so would build confidence in the information being delivered and who was delivering it. The specific types of communication materials were discussed and while brochures and written information were identified as important, participants wanted more dynamic communication modes such as interactive websites or videos that could be easily linked and distributed. Real people's stories, including those who had received the vaccine, were preferred over profiling politicians.

Triangulation of findings

Results from all components of the mixed method study, including survey, interview and workshop analyses, were reviewed and combined by researchers (MD, JK, KB) to form 11 recommendations endorsed by all authors (Table 3). These recommendations covered the content of information, delivery mode and contextual factors.

Discussion

To our knowledge, this is the first study to explore the vaccination intentions, perceived concerns and benefits of vaccines and information experiences and preferences of vaccine-hesitant Victorians initially prioritised for COVID-19 vaccination. A further strength of the study was its qualitative approach, using open questions to identify the inter-relatedness of the behavioural and social drivers of vaccination that could affect vaccine acceptance. We translated these findings into eleven actionable recommendations for vaccine communication planning, focused on the

Table 2: Workshop participant demographic characteristics (n, %).			
Participants		**Workshop 1** **N=6** **(n=2 prioritised adults, n=4 HCWs)**	**Workshop 2** **N=6** **(n=4 prioritised adults, n=2 HCWs)**
Prioritised Adults	Gender, female	n=2	n=3
	70+ cohort	n=1	n=1
	Medical condition cohort	n=1	n=3
	Country of Birth/Language other than Australia/English[a]	n=1	n=2
Healthcare Workers	Gender, female	n=3	n=2
	Professional role	n=2 Allied health	n=2 Nurse
		n=1 Nurse	n=1 Aged care
		n=1 Medical Doctor	n=1 Hospital
	Setting	n=3 Community	n=2
		n=1 Hospital	
	Country of Birth/Language other than Australia/English[a]	n=1	

Notes:

Additional participants were booked, but did not attend: one person (prioritised adult) did not attend Workshop 1 and two people (HCWs) did not attend Workshop 2.

a: Language other than English spoken mostly at home

content, mode of delivery and context (Table 3). Our results are specifically tailored to those prioritised to receive the vaccine, and importantly, to the needs of HCWs who are trusted by members of the public.

Communication content

While the provision of information alone is rarely sufficient to change behaviour,[35,36] participants wanted more age- and health condition-specific information about how well vaccines work and how safe they are. They also wanted further details about how vaccines are developed and tested and clearer explanations of vaccine eligibility. Both HCW and prioritised adult participants expressed belief in misinformation and conspiracy theories, which is concerning but not surprising given the widespread circulation of misinformation since the beginning of the pandemic.[37] Providing up-to-date, accurate, accessible information that debunks myths and addresses concerns is of paramount importance.[6,29,38]

Although there was little consensus in the workshops as to how best to present vaccine-related risks, the participants highlighted the importance of discussing side effects and distinguishing between what is normal or expected and when to seek medical attention. Previous research has shown that providing balanced information about risks and benefits for childhood vaccines did not increase parental vaccine hesitancy, and indeed improved informed decision-making.[39] Participants discussed a range of benefits associated with vaccination that may motivate others to vaccinate, from the direct prevention of disease to more indirect benefits like freedom of movement. Research is mixed on the effectiveness of promoting COVID-19 vaccines by communicating about herd immunity and community benefit,[40,41] while highlighting other benefits may help motivate some but not others (e.g. vaccine passports).[42] Normalising COVID-19 uncertainty has been shown to be helpful.[43]

Communication delivery

Vaccine decision-making is influenced by what others think, say and do with regards to vaccination,[9] although evidence is mixed on the extent of this influence.[44,45] Participants identified a range of different influential individuals and organisations, highlighting the importance of diverse messengers. For the most part, our participants preferred non-politicians, contrary to other non-

Table 3: Eleven recommendations from the mixed-method (on-line survey, interviews, workshops) findings.	
Content	
1.	Communicate about vaccine safety and effectiveness
2.	Address concerns about expected side effects
3.	Highlight benefits of vaccination
4.	Discuss severity of COVID-19 to counter 'wait and see' approach
5.	Communicate about vaccine availability
Delivery	
6.	Personalise information
7.	Share messages from real people
8.	Make communication clear, simple and shareable
9.	Provide resources to support healthcare worker vaccine discussions
Context	
10.	Build trust and transparency
11.	Use vaccine requirements judiciously

empirically based recommendations.[37] Those with medical and science backgrounds were preferred, some identified by name, others by role.[6] Diverse real people (e.g. from a range of ethnic and occupational backgrounds), were also suggested as potential spokespeople. This approach is supported by psychological theory that indicates that we trust people who look like us.[46]

Plain language is required to reach all audiences, especially those with low health literacy. Government communication, including about COVID-19, has been reported as difficult to read, limiting accessibility to important information.[47,48] Strategies to increase comprehension include using visuals like icon arrays and using the same denominator in any comparisons.[49] HCWs, in particular, should be supported to communicate effectively with patients, as a recommendation to vaccinate from a healthcare provider is a powerful driver of vaccine uptake.[9] As with other vaccine communication,[50] consideration of variation in individual and community contexts is required to ensure reach and accessibility.

Communication context

Since the beginning of the pandemic, large amounts of information about COVID-19 and the vaccines have been circulated[51] (an infodemic),[52,53] and our participants described this as an information overload. While they found changing information frustrating, participants indicated that acknowledging uncertainty and avoiding overpromising made content and sources more trustworthy. Changing information and associated mistrust has been previously reported[51] and trust in authorities is important for vaccination uptake.[6] However, with greater transparency, the public can have improved understanding when available evidence

and subsequent health policy changes.[51] Improving health literacy may be successful for understanding the severity of the virus as well as the importance of the vaccines,[54-56] and why information may subsequently change.[51]

Strengths, limitations and future research

The strengths of our qualitative component include our sequential multi-method design, the inclusion of a range of vaccine priority groups and the focus on content required for communication planning, relevant to an Australian community. We undertook workshops with heterogenous participants (i.e. both prioritised adults and HCWs in each) to explore unique and shared factors.

Our study, however, is not without limitations. Notably, key changes occurred to the vaccination program throughout our study, in particular the age eligibility criterion for the AstraZeneca vaccine following emerging evidence on its safety profile. While no specific concerns regarding AstraZeneca were raised following this initial recommendation change, subsequent changes have taken place. Updated advice from ATAGI[57] has followed additional deaths (restricting eligibility recommendations) and an increase in COVID-19 cases and community outbreaks (expanding eligibility recommendations).[58] How our results may apply to other vaccines not yet available in Australia, particularly those with a different delivery method (e.g. Novavax, a protein vaccine), are unknown. Further, Victorian, and in particular Melbourne, residents had experienced six restrictive government-imposed lockdowns, but little community transmission for the months preceding our study. Just as vaccine intention rates may be impacted by these

experiences,[13] perceived risks and benefits of vaccines may also vary. As changes continue, ongoing research is warranted to ensure recommendations address current concerns and benefits.

Although reaching saturation is not always warranted,[25] our wide sampling of participant groups precluded meeting saturation for each group individually in our interviews. However, the interviews provided rich and comprehensive data across epidemiologically important target groups. The stakeholder workshops were not intended to explore experiences and achieve saturation of themes. We were unable to meet face-to-face due to COVID-19 restrictions in Victoria, but the remote format did allow people from regional areas to participate. Despite purposively sampling those prioritised to receive the vaccine, some groups were not represented. For example, there were few GPs or pharmacists who participated and were hesitant, and few aged care workers participated in the survey, despite recruitment efforts through several channels. Culturally and linguistically diverse groups, people with disabilities, people employed in casual workforces and First Nations groups were less represented and further research is required to ensure tailored messaging. Communication messages and modes based on these recommendations, and any from future research, need to be translated and tested[59] with relevant cohorts. Lastly, to support government planning, tight timelines were applied, limiting our ability to conduct a more robust multi-session co-design process for communication materials.

Conclusions and implications

It is essential to build and sustain vaccine confidence to reach the required levels of vaccine coverage and reduce the risks of COVID-19 for individuals and communities. Our results suggest that prioritised members of the Victorian population are at different stages in the decision-making process along the vaccine acceptance spectrum, highlighting the need for tailored communication strategies. Our evidence-based recommendations provide information on the content and delivery modes of information required by those prioritised but hesitant to be vaccinated, including to be cognisant of the context in which messaging takes place. Government and government-supported communication is highly accessed and has a critical role to support the ongoing uptake of COVID-19 vaccines in Victoria across these groups. Our recommendations provide insights to facilitate the relevance and access of vaccination communications.

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Supporting Information

Additional supporting information may be found in the online version of this article:

Supplementary File 1: Interview schedule, Prioritised Adults.

Supplementary File 2: Interview schedule, Healthcare Workers.

Supplementary File 3: Stakeholder workshop discussion guide.

Supplementary File 4: Illustrative quotes from prioritised adults and healthcare workers (HCWs) in individual interviews across stages of Precaution Adoption Process Model.

Supplementary File 5: Virtual whiteboards from stakeholder workshops.