Rapid summary

Question:

What might be effective methods of communicating with the public (including healthcare professionals) to address concerns about the vaccine and encourage uptake?

Brief summary:

Five reviews, two guidance documents, two intervention studies, two qualitative studies and twelve cross-sectional surveys were identified to address this question.

Vaccine hesitancy is defined by the WHO SAGE working group as *"a delay in acceptance or refusal of vaccination despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place, and vaccines"*.[1] This suggests that the barriers to vaccine uptake can be different depending on the vaccine and disease in question.[1]

Communicating with the general population:

The majority of research examining novel vaccine uptake in the context of a pandemic relates to the H1N1 vaccine during 2009-2010.

Barriers to uptake include:

- Complacency and perceptions of personal risk about the disease: low levels of concern about the disease in terms of perceived risk, disease susceptibility and severity[1,2,3,8]
- Lack of confidence in the vaccine's effectiveness or in authorities[1].
- Safety concerns including worries about side effects/adverse events, or a perceived lack of testing of the vaccine[1,2,3]
- Not receiving a recommendation to be vaccinated from a healthcare professional[1]. Lack of pressure from family and friends[1]
- Lack of knowledge[1]
- Unhealthy lifestyles[1]

Facilitators of uptake include:

- A recommendation from a health professional[1,2,3]
- Perceived vaccine efficacy[2]
- Increased risk[2]
- Pressure from family and/or friends[1,21]
- Concern for vulnerable family members[21]

Sources identify the following as being potentially useful components of communication strategies to increase the uptake of novel vaccinations:

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- **Addressing vaccine safety concerns and associated risks.** This could include information concerning the assured source of safe vaccines, differences between vaccine formulations, as well as having a system in place for monitoring and managing 'adverse events following immunisation'[4]

- **Ensuring communications outline the ethical principles that inform decisions, the processes used and rationale for recommendations**[4,9]

- **Ensuring messaging is clear and consistent across all government levels involved in vaccine communications**[4,9]

- **Promoting information and materials from government sources or official websites.** Accessing such information has been shown to increase the likelihood of being vaccinated with a novel vaccine amongst both the general public[5] and amongst certain groups such as pregnant women[2,3,9]

- **Using multiple strategies to provide vaccine information.** This could include traditional media and social media[4], or mass media along with more personal sources of information such as physician recommendation[1,6]

- **Using appropriate communication methods and targeting for certain groups.** For example, tailored information may be needed for some groups, such as provision of information in multiple languages, the use of Braille and text-to-speech[4]. Community leaders could also be used to convey accurate information and champion vaccines amongst their communites[4]

- **Addressing vaccine misinformation quickly and aggressively**[4]

- **Monitoring and responding to social media** to detect increases in online activity, shifts in sentiments, or other signals that may influence vaccination uptake or confidence in real time[7,8]. A Canadian survey found that those opposed to the vaccine were more than twice as likely to identify the internet as their most influential source of information around the decision to be vaccinated[8]. This suggests that health policy makers should attend carefully to information available online and increase the visibility of official websites, and their presence on social media[8]

- **Facilitating recommendations from healthcare practitioners**, who are perceived to be a trusted source of information.[9] Receiving a recommendation for a novel vaccine from a trusted healthcare practitioner was associated with a higher likelihood and/or uptake of being vaccinated [1,2,3]

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- **Framing of vaccine messages**[10,11,12]. Short[10], factual, evidence-based messages[11]. Loss-framed messages may be more effective in older populations[12].

Vaccine hesitancy and communicating with healthcare professionals:

Amongst healthcare professionals, identified barriers to uptake of novel vaccines in pandemic contexts include:

- Complacency and perceptions of personal risk (lack of concern about virus, low perceived risk of becoming infected, low perceived risk of severe illness) [1,2,13]
- Lack of confidence in vaccine effectiveness[2,13]
- Safety concerns such as fear of side effects or inadequate testing in clinical trials[1,2,13]
- Immunity derived from previous exposure. Those who perceived themselves to have already had virus were less likely to accept vaccination[13]

Studies have also found that healthcare workers exclusively relying on the media for pandemic influenza information were less likely to be vaccinated or recommend it to patients[13]. Evidence suggests that scientific reports had a positive influence on healthcare professionals' vaccine uptake[13].

The sources in this rapid answer identify the following as being potentially useful components of communication strategies to increase uptake of novel vaccinations in healthcare workers:

- **Keeping healthcare workers well-informed about the vaccine, using trusted sources and networks**[4]. Regional and local public health authorities can help to ensure that information and guidelines are disseminated to local healthcare professionals and that these workers are provided with details of the local immunisation campaign[4]

- **Leadership within the workplace.** One review reported that encouragement from individuals at a person's place of work such as employers, colleagues or supervisors was reported to lead to more healthcare workers receiving the H1N1 vaccine in two studies[13]. Encouragement from physicians, family and friends was also found to be an important cue to action in three studies[13].

  A US survey of health professionals also found that increased rates of H1N1 vaccination were strongly associated with employer policies and programs (including those that required vaccination, with or without penalties) although the use of incentives did not[14]

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- **Ensuring consistent positive responses from central government and local government health authorities.** Evidence from two reviews indicates this is associated with significantly increased vaccine uptake[1,13]

- **Facilitating training workshops** to convey relevant information to healthcare professionals about the vaccine's safety and dissipate misperceptions were found to increase the likelihood of vaccination during the H1N1 campaign in the Murcia region of Spain[9]

Considerations for future COVID-19 mass vaccination campaigns:

Recent surveys from Wales and the wider United Kingdom have identified that between 14% and 23% of respondents may be unsure or intending to refuse a COVID-19 vaccine when it becomes available[18,22,23].

These surveys, along with those from other areas of the world, have identified several characteristics and opinions of those who may be hesitant to be vaccinated with a novel COVID-19 vaccine. In some instances the evidence is quite mixed.

Demographic characteristics:

- **Age**
  Older people had greater intent to vaccinate in five studies[16,17,18,19,23], and lower intent in a sixth for young women aged 18-35 and those aged 75+[15].

- **Gender**
  Being female was found to be associated with less intention in three surveys[15,16,19], although two other surveys found no differences between genders[17,18].

- **Ethnicity**
  A UK survey found that individuals from BAME groups were significantly more likely to be unsure about receiving a COVID-19 vaccine[23]. A US survey found high levels of intent in Asians but less acceptance in Black Americans.[19] However an Australian survey found no differences by ethnicity[17].

Attitudes and beliefs:

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- **Perception of risk**
  Surveys conducted in France and Australia identified that a low perceived risk was associated with less intention or likelihood of being vaccinated.[16,17] A UK study found that those who felt the media had over-exaggerated the risk were less likely to want to receive a COVID-19 vaccine[18].

- **Conspiracy**
  Those in England with higher levels of COVID-19 conspiracy thinking were less willing to vaccinate and would try to stop family and friends doing so[20]. They were also more likely to share (mis)information and their views about COVID-19.

- **Political views**
  A French survey found that those with extreme political views and those who had abstained from voting were less likely to use a vaccine if it became available[15].

- **Income/employment/education**
  One study identified those on a low income were less likely to use a vaccine than those on a higher income[15]. Another identified that the unemployed were less likely to accept a COVID-19 vaccination than those who were employed or retired[19]. The latter study also indicated that uptake intentions correlated directly with levels of education[19]. However a UK survey identified that unemployed (vs. in full or part-time employment) were more likely to be willing to receive a COVID-19 vaccine.[23]

The surveys identified some additional predictors of COVID-19 vaccine uptake:

- being a healthcare worker[16]
- greater medical/scientific understanding of and knowledge about COVID-19[17]
- having received a seasonal flu vaccine[17]
- confidence in government information[17]
- suffering from asthma/COPD[18]

Evidence indicates that the following may be COVID-19 specific trusted sources of information:

- **Media**
  Increased exposure to media coverage (although not defined) demonstrated an increased intention to be vaccinated.[17] In a US survey, 21% of participants considered social media to be a reliable source of COVID-19 information[19].

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- **Health professionals**
  Participants in a US survey reported highest levels of confidence in health professionals including their GP, the CDC and both state and local health departments. Health professionals and health officials were seen to be the most reliable sources of information on COVID-19[19].

Authors of two studies recommended two strategies for a COVID-19 mass vaccination programme.

- Utilising behaviour change techniques of information about health, emotional, social and environmental consequences and salience of consequences[18].

- Education may improve knowledge of susceptibility and severity of COVID-19 and the effectiveness of vaccination, while persuasion can be used to change beliefs and encourage action towards vaccination[18].

- There's a need to develop and test thoughtful and targeted messaging to build on the current public interest and continue the momentum past the release of a vaccine. Messaging and education should focus the general population as well as high risk groups[19].

Methods

A search in June 2020 of databases and grey literature and screening (details available on request) identified 23 publications. Title and abstract screening was conducted independently by two reviewers. Full text screening was conducted by one reviewer with a 20% consistency check by a second reviewer. Data extraction was conducted by one reviewer and checked by a second. No critical appraisal of the included sources was undertaken. Only sources from OECD countries were included.

Table 1 includes links to some potentially useful resources from the large literature on routine vaccination.

Table 2 includes details and a summary of the content of the sources used.

Limitations:

This summary may be useful to identify key points on the topic, however the included research has not been assessed for quality and comes from a wide range of published material

Some of the reviews identified for this summary included studies from low and middle-income countries.

The literature on COVID-19 is new and a number of the included sources are from pre-print sources. These papers had not been peer-reviewed or published at time of identification.

Table 1: Useful sources:

These sources were identified whilst screening the literature for this rapid answer. They did not meet the inclusion criteria as they only consider vaccine hesitancy in the context of routine immunisation.

Source:	Link:
National Institute for Health and Care Excellence. *Flu vaccination: increasing uptake*. NG103. London: NICE 2018.	Guideline available here Underpinning evidence reviews available here
Cairns G, MacDonald L, Angus K, Walker L, Cairns-Haylor T, Bowdler T. *Systematic literature review of the evidence for effective national immunisation schedule promotional communications. Insights into health communication.* Stockholm: ECDC; 2012	Available here
World Health Organization; SAGE working group dealing with vaccine hesitancy. *Strategies for addressing vaccine hesitancy – a systematic review.* World Health Organization. 2014. [NOTE: All but three studies conducted in low and middle income countries]	Available here
World Health Organization. *TIP: Tailoring immunization programmes.* Copenhagen: World Health Organization; 2019.	Available here
Larson H, Karafillakis E. *Rapid literature review on motivating hesitant population groups in Europe to vaccinate*. Stockholm: ECDC; 2015.	Available here
Eve D, Dominique G, Noni EM. Strategies intended to address vaccine hesitancy: Review of published reviews. *Vaccine.* 2015; 33(34). Pp.4191-203	Available here
European Centre for Disease Prevention and Control. Guidance on community engagement for public health events caused by communicable disease threats in the EU/EEA, 2020. Stockholm ECDC; 2020.	Available here
European Centre for Disease Prevention and Control. Let's talk about hesitancy. Enhancing confidence in vaccination and uptake: Practical guide for public health programme managers and communicators. Stockholm: ECDC; 2016.	Available here
European Centre for Disease Prevention and Control. A literature review of trust and reputation management in communicable disease public health. Stockholm: ECDC; 2011.	Available here

Table 1: Data extraction:

Reference	Relevant findings	Caveats
1. World Health Organization. *Barriers of influenza vaccination intention and behavior: a systematic review of influenza vaccine hesitancy 2005 – 2016*. World Health Organization. 2016. 2011;29(38):6472-84. Available here. Scoping review Multiple countries	Scoping review of 470 studies to identify individual barriers to seasonal and pandemic influenza vaccination. Most of the studies were conducted in Western regions and in general populations (191/470). 156/470 studies focused on pandemic influenza. The following were associated with vaccination uptake: [↑ = increased uptake; ↓ = decreased uptake; ↔ = mixed evidence; ND = no significant difference] Perceiving oneself to be at low or no risk: ↓12 studies in general popn; ↓18 in HCPs Lack of social benefit: ↓9 studies in general public; ↓10 in HCPs Lack of pressure from family/friends: ↓13 studies in general public; ↓4 in HCPs Having been vaccinated against seasonal flu: ↑43 studies in HCPs Lack of knowledge: ↓2 studies in general popn; ↓15 studies in HCPs Unhealthy lifestyles: ↓9 studies in general popn; Lack of direct recommendation from HCP: ↓11 studies in general popn; ↓5 studies in HCPs Higher age: ↓5 studies in general popn; ↓8 studies in HCPs Most sociodemographic factors present a mixed picture of results	Limited description of methods, Design of included studies not specified. Authors state that quality was assured by limiting inclusion to 'peer review' publications. Authors note that conclusions about the relative importance of determinants cannot be made. Not all studies will be generalisable to a Welsh population.
2. Bish A, et al. Factors associated with uptake of vaccination against pandemic influenza: a systematic review. *Vaccine*; 2011: 29(38):6472-84	Review of 37 studies (36 cross-sectional surveys and one qualitative study) looking at psychological and demographic factors associated with uptake of vaccination during the H1N1 pandemic. Studies conducted in Australia, France, Greece, Hong Kong, Israel, Italy, South Korea, Malaysia, Mexico, Morocco, Sicily, Spain, Turkey, UK, and USA. The following were associated with vaccination uptake/intention to vaccinate:	No information on quality of included studies. 36/37 studies were cross sectional carried out at different points during the 2009 pandemic. They provide a snapshot of predicted intentions/

Available here. Systematic literature review	[↑ = increased uptake/intention; ↓ = decreased uptake/intention; ↔ = mixed evidence; ND = no significant difference] Perceiving oneself to be at low or no risk: ↓10 studies in general popn; ↓3 in HCPs Perception of pandemic as severe: ↑8 studies in general popn; ↑3 in HCPs Perceived vaccine efficacy ↑5 studies in general popn; ↑5 in HCPs; perceived lack of efficacy ↓4 in HCPs. Concerns about safety and possible side effects ↓5 studies in general popn; ↓10 in HCPs Having been vaccinated against seasonal flu ↑8 studies in general popn; ↑10 in HCPs Age ↔ 8 studies in general popn (older people ↑6; younger people ↑1; ND1); 9 studies in HCPs (older people ↑7; younger people ↑1 ND1) Gender male: ↑5 studies in general popn; ↑4 in HCPs. Ethnic minorities: ↑5 studies in general popn. Low socio-economic status: ↔3 studies in general popn (↑2; ↓1). Increased risk: ↑4 studies in general popn.	behaviour at a specific time point. A causal relationship cannot be inferred.
3. Yuen C & Tarrant M. Determinants of uptake of influenza vaccination among pregnant women - A systematic review. *Vaccine.* 2014;32(36):4602-13. Available here. Systematic literature review Multiple countries	Review of 45 studies of knowledge, attitudes and practices of pregnant women re seasonal and H1N1 influenza infection and to identify predictors of vaccine uptake. Study findings for both infections were highly similar so results aggregated. Cues to action that influenced vaccination choices: - Participants who received a **recommendation from an HCW** were 20-100 times more likely to receive the vaccine. (4 studies). Several studies also reported that those who were vaccinated and trusted HCW recommendations were more likely to believe the vaccine was safe and efficacious. - **Negative media reports** on possible associations between influenza vaccination and adverse maternal and foetal outcomes were obstacles to vaccination acceptance (6 studies). Although a study reported that more than 65% of participants perceived that the	No information on quality of included studies. The majority of the studies were small-scale, cross-sectional studies using convenience sampling. High heterogeneity in terms of outcome variables and methods of data analysis.

	media were not helpful sources of information, a survey of pregnant women indicated strong reliance on the internet to help their decision-making. - Getting **information from government sources or official websites** was significantly associated with vaccine acceptance (2 studies).	
4. Pan-Canadian Public Health Network. *Vaccine annex: Canadian Pandemic Influenza Preparedness: Planning Guidance for the Health Sector*. Pan-Canadian Public Health Network; 2017. Available here.	The following is around guidance for mass immunisation clinics and communication strategies: Timely, clear and frequent communication with the public and staff utilising a variety of materials and mediums should be utilised to educate and inform healthcare workers (HCWs), and target groups. Communication plans should be flexible and dynamic. • Have a detailed and realistic communication strategy based on research. • Be clear about what is to be communicated, how, by whom and to whom. • Coordinated, consistent and targeted messaging to meet public's needs. • For each action, define and agree specific key messages with the health authorities, in collaboration with the appropriate decision-makers and experts. These messages need to be evidence-based, referring to relevant medical research and studies that lend strong support to the content. • Be transparent when communicating risk. • Early education about pandemic vaccine (e.g. its manufacture, regulation and safety). • Address vaccine misinformation quickly and aggressively. • Provide clear communication regarding where legitimate pandemic vaccine supply is available (locations). • Be transparent about the vaccine prioritisation process. • Credible marketing campaign using both traditional and social media. • Appropriate contingency plans for rapid implementation. • Identify and establish relationships with key stakeholders in advance. • Central provision of fact sheets and training tools; • Identify public's needs, concerns and attitudes through communication monitoring.	Guidance outlining how Canadian jurisdictions will work together to ensure a coordinated and consistent health sector approach. Useful examples of materials, mediums and format for communication with the public listed in Table B3

	HCWs • Healthcare professionals should be using trusted sources and networks, updated ahead of the general public and be aware that recommendations may change. • Website information should include links to national information on the pandemic vaccine: regulatory process, vaccine safety, current product information leaflet and national vaccine recommendations, including prioritisation. • HCWs should be informed about the local immunisation campaign. **Public Communication (External)** • Consistent, clear information and recommendations about vaccination including how, when and why • Reassure public about vaccination safety at every stage of the process. • Communication on safety issues should address the risk-benefit balance while stressing that the benefits outweighs the risks. It should include a system for monitoring and managing reports of adverse events following immunisation. • Reinforce infection prevention strategies (i.e. what to do if symptomatic or have been in contact with a potential case).	
5. Walter D, et al. Risk perception and information-seeking behaviour during the 2009/10 influenza a(H1N1)pdm09 pandemic in Germany. *Eurosurveillance.* 2012;17(13):20120329. Available here. Cross-sectional survey Germany	13,010 participants aged 14+ surveyed via household phone Nov 2009 - April 2010 during H1N1 pandemic. Analysis aimed to identify key information for future communication planning during pandemics. Reported sources of information: **TV and radio** (71.2%; 95% CI: 69.3–73.0) **Magazines/newspapers** (58.6%; 95% CI: 56.6–60.7) **Internet** (27.6%; 95% CI: 26.0–29.4); but for 60+ years 10.2% (95% CI: 8.3–12.4) **Friends and relatives** 56.1% (95% CI: 54.1–58.1) **Physicians** 31.0% (95% CI: 29.1–32.8). **None**: 3.1% (95% CI: 2.4–4.0) Healthcare workers and those with chronic diseases used physicians more frequently (38.0% v. 28.1%; p<0.001) and peers less frequently (51.4% v 58.0%; p<0.01). Physicians used by	Methods of accessing news have changed considerably since 2010. Impact of social media not assessed. Survey conducted using household-based phone. Study can identify associations, but not causal links. Self-report measures

	62.1% of vaccinated respondents vs 28.8% of non-vaccinated (p<0.001). No significant associations between sources and vaccine uptake. Using radio/TV (OR: 0.62; 95% CI: 0.48–0.81) or family/friends (OR: 0.72; 95% CI: 0.55–0.94) as main information source independently associated with lower vaccine uptake. Physicians (OR: 2.77; 95% CI: 2.16–3.57) or official materials (OR: 2.07; 95% CI: 1.55–2.77). Mistrust in vaccines and perceived low disease risk were main factors for low vaccination coverage during the pandemic.	
6. Sengupta S & Wang HD. Information sources and adoption of vaccine during pandemics. *International Journal of Pharmaceutical & Healthcare Marketing.* 2014;8(4):357-70. Available here. Cross-sectional survey USA	Face-to-face survey of 321 adults visiting two shopping malls in a mid-Western city re uptake of H1N1 vaccine. Questions (mostly using 10-point Likert scales for responses), related to impact of various information sources on attitudes to H1N1 and intent to vaccinate. Personal information sources found to have greater impact on attitude and intent than mass media sources. Doctors considered most trusted but less used than news media and government sources. Authors suggest mass media campaigns should include interviews with credible personal information sources to enhance their effectiveness.	Small convenience sample from one US city. Study can identify associations, but not causal links Different segments of the population may respond to information sources differently.
7. European Centre for Disease Prevention and Control. *Systematic scoping review on social media monitoring methods and interventions relating to vaccine hesitancy.* Stockholm: ECDC; 2020. Available here.	Scoping review of 115 studies to map, analyse and summarise knowledge and research on social media (SM) and vaccination. [Search:2000 - Dec 2018] SM platforms are a common information source (14 studies). Most studies suggested a negative influence of consulting social media on vaccine uptake. **Using social media monitoring to inform vaccination strategies**: No formal evaluation, but some studies provided recommendations and suggestions: - Health authorities, governments and/or healthcare professionals should monitor SM to detect increases in online activity, shifts in sentiments, or other signals that may influence vaccination uptake or confidence in real time. (11 studies)	Follows established scoping review methodology. Heterogeneous studies with widely varying methodologies. Much of the data comes from single studies.

Scoping review Multiple countries	- Monitoring could help health authorities anticipate, understand and respond to public questions and concerns. (21 studies) - Health authorities need to increase their presence and popularity on SM. (9 studies) **<u>Interventions</u>** 15 studies described social media as an intervention tool in relation to vaccination. The majority of these studies were conducted in Canada, Germany, the Netherlands, and the United States. Three types of social media interventions were identified: **Information on social media (10 studies)** - No quantitative study found providing information re vaccination on SM significantly increased uptake or willingness to vaccinate. - Info supporting HPV vaccination on Facebook significantly decreased perceived barriers and opinions of risk and increased knowledge about the vaccine. (1 study - USA) - The content matters: loss-framed messages on Facebook associated with a significantly higher intention to vaccinate than gain-framed messages ($p<0.05$). (1 study - USA) - Narratives about vaccine adverse events corresponded to decreasing intention. (1 study - Germany) **Online group discussions (two studies)** - Parents and friends have a strong influence on vaccination decision-making, whether online or in person. (1 study , Netherlands) - No significant difference in number of responses to factual information or to personal experiences; but responses to latter were more emotional. (1 study – Germany) **Interactive websites (three studies; four papers)** Interactive websites with a space for parents to contribute with content and discuss concerns found significant reduction in parental concerns around vaccination but no impact on attitudes or uptake. (1 study - USA) Survey found 50% of parents would use interactive websites if available. (1 study - USA)	
8. Ashbaugh AR, et al. The decision to vaccinate or not during the H1N1	Web-based survey conducted during H1N1 outbreak after vaccine was available. Examines how participants' beliefs or where they get information might influence decision to vaccinate.	Non-probability online survey.

pandemic: selecting the lesser of two evils? *PLoS ONE*: 2013;8(3):e58852. Available here. Cross-sectional survey Canada	• Info from the Internet, vs more traditional media sources was associated with deciding not to vaccinate. Undecided Individuals indicated TV and newspapers were influential sources of information. • Most based their decision on discussions with family, friends and co-workers. • Circa 30% categorised as 'Anti-Vaccine' identified Internet as their most influential source vs <15% of 'Pro Vaccine and 'Undecided'. • Circa 30% of Undecided participants indicated TV and print media to be influential vs 15–20% in the other groups. • Participants who intended to be vaccinated reported stronger beliefs about the dangers of H1N1 and weaker beliefs about vaccine dangers. They also had greater intolerance of uncertainty, higher levels of anxiety, and used more avoidant coping strategies than the unvaccinated. • Main sociodemographic predictors of intention to vaccinate were being at high risk and being a health professional. Authors note that results suggest the Internet may have been a significant source of negative vaccine information. They suggest government agencies should increase their presence and credibility on the Internet and social networking sites.	Sample skews strongly to highly educated females. Potential for high levels of volunteer and other biases. Survey can identify associations, but not causal links. Self-report measures
9. European Centre for Disease Prevention and Control. *Communication on immunisation – building trust*. Stockholm: ECDC; 2012. Available here. Communications Guide Multiple countries	Guide to support EU member states in planning and implementing communication activities in relation to immunisation programmes around: - Role of public health: being transparent, reassuring the public about vaccination safety, convincing healthcare professionals, making use of scientific information and establishing relationships of trust with key stakeholders and journalists. - Role of communications: including advocacy, social mobilisation and programme communication. Defining priority audiences, identifying the public's needs and attitudes, acknowledging and anticipating barriers and designing specific key messages. The guide also lists examples of H1N1 pandemic flu vaccine campaigns: **Spain (Murcia region)** Two elements to strategy:	This guide summarises research results on this topic. It is readily adapted to national strategies and requirements. Summary provided relates to novel vaccination campaigns such as H1N1.

	- Direct communication with population to be vaccinated (groups at risk and individuals in essential services) through personalised letter. - Communication with healthcare professionals via information sent directly from public and private systems, training workshops (f2f and online), raising awareness sessions in the main hospitals. Specific promotional material: Posters, leaflets, short and longer documents about the illness and the vaccine; and a special website. Considered successful: Vaccination levels higher in the region than elsewhere. **Sweden**: Campaign targeted groups at high risk of developing complications. Information for group aged 18-24 years. Several government departments and medical/health advice organisations reached target group via social media. A key element was a virtual yellow badge with the tagline 'No to swine flu'. Other strategies included a central contact point with a dedicated phone number and website; regional and local dissemination of information through media; and press conferences with participation of different authorities; and quoting authorities and disease experts in media coverage. Campaign considered successful with 60% of popn being vaccinated. Issues identified were: - Lack of strategies to handle misinformation/conspiracy theories on social media. - Heavy workload associated with the contact service, but centralised and regularly updated information was considered valuable and informed communication strategies.	
10. Godinho CA, et al. Increasing the intent to receive a pandemic influenza vaccination: Testing the impact of theory-based messages. *Preventive Medicine.* 2016;89:104-11. Available here. Intervention study UK (England)	Internet-based study of 1424 individuals aged 16-75 to evaluate messages promoting uptake of vaccination in the context of an uncertain pandemic influenza scenario. Participants were allocated to one of four arms each with a different message: Department of Health (DoH) standard or one of three shortened messages; DoH; risk-reducing; health-enhancing. Results indicated: • Shorter DoH message was better recalled, rated as more personally relevant and increased vaccination intention more than the longer one; despite the latter being considered slightly more credible. • A briefer message resulted in greater intention to be vaccinated. • Intention was not improved by adding information on severity and benefits, and the health-enhancing message was not more effective than the risk-reducing message.	The study used a theoretical scenario. Responses may vary considerably with a real pandemic. Participants had to be fluent in English and have internet access. Little variability in intentions, which were generally high. May be due to social desirability bias, or to uncertainty re the consequences of the virus in the scenario.

	• Future campaigns should consider using brief messages, targeting knowledge about influenza and precautionary measures, perceived susceptibility to pandemic influenza, and the perceived efficacy and reduced costs of vaccination.	Reported acceptance or intent may not translate into actual behaviour Visual presentation not pretested.
11. Mowbray F, et al. Communicating to increase public uptake of pandemic flu vaccination in the UK: which message work? *Vaccine*. 2016;34:3268-74. Available here. Qualitative study UK	Focus group study examining persuasiveness of different types of framed messaging promoting vaccination. Eleven groups (41 participants aged 16-75) were presented with a brief hypothetical scenario of a pandemic flu outbreak including information on health consequences, impact and vaccination advice. Sample was purposive - 80% of participants did not receive an annual flu vaccination. The groups were given four sets of messages: 1) negatively (risk reduction); 2) positively (health enhancement); 3) emotion-focused (to elicit regret); 4) factual (cost-benefit). Participants found factual, evidence-based messages the most convincing and useful, particularly when they gave cost-benefit comparisons. Health-enhancing messages were received more sceptically, particularly re vaccine safety. Risk reduction messages were perceived to be more balanced and credible. Messaging designed to elicit regret about not vaccinating were seen as patronising and unprofessional.	Study uses a theoretical scenario so results may not be reflective of responses during a pandemic.
12. Nan X, Xie B, & Madden K. Acceptability of the H1N1 Vaccine Among Older Adults: The Interplay of Message Framing and Perceived Vaccine Safety and Efficacy. *Health Communication*. 2012; 27(6):559-68. Available here. Intervention study USA - Maryland	Study in 88 older adults (age 50+) recruited from 10 senior centres to examine relative effectiveness of gain- versus loss-framed messages (related to safety and efficacy) to promote H1N1 vaccination. Responses measured using 12 questions pre-messaging and six questions post messaging about attitudes and intentions. No significant differences noted in those who thought the vaccine was effective. In participants with low confidence in vaccine, loss-framed message was significantly more effective in inducing intentions (*b*=.819; p=.022).	Small study using a convenience sample. Limited information on methods. Reported acceptance or intent may not translate into actual behaviour.

13. Prematunge C, et al. Factors influencing pandemic influenza vaccination of healthcare workers-A systematic review. *Vaccine*. 2012;30(32):4733-43. Available here. Systematic Literature review Multiple countries	Review of 20 studies from different geographic regions considering healthcare workers (HCWs) and H1N1 vaccination uptake. Looked at actual vaccination uptake, so studies conducted after the launch of 2009/2010 pH1N1 immunisation campaigns. The review mentions several cues to action that influenced HCW vaccination choices. [↑ = increased uptake; ↓ = decreased uptake] - Concerns about vaccine safety and side effects. (↓ 13 studies) - Misleading media reports. (↓ 6 studies). - Access to scientific literature and information (↑ 3 studies). - Trust in public health authority communications (↑ 3 studies) - Doctor or loved ones endorsed the pH1N1 vaccine. (↑ 3 studies) - Encouragement from employers, colleagues, and supervisors were important external cues to action. One study found that HCW who refused the vaccine were less likely to report that their supervisors and/or co-workers encouraged them to get vaccinated against the pandemic ($p < 0.001$). Another study reported that vaccination behaviours of various workplace opinion leaders also influenced vaccine uptake decisions of other HCW. (↑ 2 studies) - Negative attitudes of political figures to vaccination. (↓ 2 studies)	No discussion of quality of included studies. Data extraction table does not include data about outcome measures- effect sizes, study demographics. Author-identified limitations: - Possible publication bias. - The majority of studies were cross-sectional with self-reported immunisation status. - Volunteer bias. - Use of dichotomous survey questions may have resulted in a loss of nuance. - Focus on overarching factors may be at the expense of understanding cultural/political differences.
14. Harris K, et al. Workplace efforts to promote influenza vaccination among healthcare personnel and their association with uptake during the 2009 pandemic influenza A (H1N1). *Vaccine*. 2011;29(16):2978-85. Available here.	Survey of workplace efforts to promote influenza vaccination among healthcare personnel (HCPs) Six employer policies were surveyed: vaccination required with penalty; vaccination required without penalty; vaccination recommended; vaccination offered at worksite; vaccination reminders issued and vaccination rewards offered. Most employers (63%) recommended vaccination, only 10% required it. Over 65% of HCPs offered worksite influenza vaccination. Vaccination requirements associated with increases in seasonal and pandemic vaccination rates of between 31 and 49% points ($p < 0.005$). On-site vaccination was associated with	Subset of data from a US national HCP survey. Can identify associations, but not causal links. Self-report measures Unclear whether the sample is representative. Sample too small provide reliable information about the prevalence or nature of penalties that employers

Cross-sectional survey USA	increases in seasonal and pandemic vaccination of between 13 and 29% points ($p < 0.05$). Reminders and incentives were not associated with vaccination. Even without penalties for noncompliance, a policy of requiring vaccination is associated with sharply higher rates of compliance. Findings also suggest that the convenience of on-site vaccination is very important. HCPs offered vaccination at work were almost 15% more likely to be vaccinated for pandemic influenza than those who were not. Physicians and other front-line personnel involved with direct care were substantially more likely to be vaccinated for pandemic influenza.	imposed on HCPs who choose to remain unvaccinated and on differences in vaccination rates associated with different types of requirements.
15. Coconel Group. A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. *Lancet Infect Diseases.* 2020. Available here. Cross-sectional survey France	Early results from an online survey of adults conducted in late March 2020. Indicates that distrust is likely to be an issue when a vaccine against SARS-CoV-2 becomes available. 26% of respondents stated they would not use it. Attitude more prevalent among low-income people (37%), young women aged 18-35 (36%) and those aged older than 75 years (22%). Results also associated with voting patterns with those supporting far left (32%) or far right (30%) presidential candidates or those abstaining (35%) being more likely to state that they would refuse the vaccine.	Non-probability online survey - cannot draw a representative national population sample. Potential for high levels of volunteer and other biases. Can identify associations, but not causal links. Self-report measures Cannot assume reported acceptance or intent will translate into actual behaviour, especially when there is a time lag.
16. Detoc M, et al. Intention to participate in a COVID-19 vaccine clinical trial and to get vaccinated against COVID-19 in France during the pandemic. *MedRxiv.* 2020. Available here.	Online survey of 3,259 French adults between 26th March and 10th April. It aimed to determine the proportion of people who intended to be vaccinated against COVID-19 or participate in a vaccine clinical trial. 2,512 participants (77.6%, 95 % CI 76.2-79.0 %) reported being definitely or probably to get vaccinated. Older age, male gender, fear about COVID-19, being healthcare workers and individual perceived risk were all associated with COVID-19 vaccine acceptance. Vaccine hesitancy was associated with a decrease in COVID-19 vaccine acceptance and observed in 1,150 respondents (35.3% 95%CI 33.6 – 36.9%).	Pre-print paper. Sample recruited via social media, email, hospital website, COVID-19 diagnosis centres, and medical centres. Unlikely to be representative. Can identify associations, but not causal links. Self-report measures.

Cross-sectional survey France	Healthcare workers were significantly (p <0.005) more willing to get vaccinated (81.5%) than non-healthcare workers (73.7%).	Cannot assume intent will translate into actual behaviour, especially when there is a time lag.
17. Faasse K & Newby J. Public perceptions of COVID-19 in Australia: perceived risk, knowledge, health-protective behaviours, and vaccine intentions. *MedRxiv*. 2020. Available here. Cross-sectional survey Australia	Online survey of 2174 adults conducted 2-9 March 2020, at an early stage of the COVID-19 outbreak. Included a question relating to how likely they were to choose to have a vaccination for the COVID-19 coronavirus, if there was a safe and effective vaccine. A 5-point scale was used where higher scores indicated higher vaccine intentions. Over 55% of respondents in each age group indicated they would definitely get a COVID-19 vaccine if it were available. Including those who would probably do so, the numbers rose to about 80%. Respondents differed in their vaccine intentions by age group (p 0.019). Compared to those in the 60 plus age group, being in the 30 to 49 (ExpB = 0.662, 95%CI [0.503 to 0.871], p 0.003) or 50 to 59 (ExpB = 0.695, 95%CI [0.515 to 0.938], p 0.017) age group was associated with a lower intention to vaccinate. No differences in intention by gender, ethnicity or education. Having received a seasonal flu vaccine in the past year, increased exposure to media coverage and heightened concern about the outbreak, greater scientific and medical understanding of the virus, confidence in government information, and greater knowledge about the virus, all predicted increased intention to get a COVID-19 vaccine.	Pre-print paper. Recruitment via Facebook ads. Sample is unlikely to be representative. Non-probability online survey. Potential for high levels of volunteer and other biases. Can identify associations, but not causal links. Measures are self-reported Cannot assume reported acceptance or intent will translate into actual behaviour, especially when there is a time lag.
18. Williams L, et al. Towards intervention development to increase the uptake of COVID-19 vaccination among those at high risk: outlining evidence-based and theoretically informed future intervention content. *MedRxiv*. 2020.	Online survey (mix of Likert scales and free text) of 527 high-risk individuals (65+ years and those aged 16-64 with asthma or COPD) conducted early April 2020. Aim: to identify barriers/facilitators to receiving a future COVID-19 vaccine in order to provide recommendations for the design of interventions to maximise vaccine uptake by the public. 58% of respondents would definitely and 27% would probably want to receive a vaccine. Uptake positively correlated with perception that COVID-19 will continue for a long time, and negatively associated with perception that the media has over-exaggerated risk. There were no significant differences by age, gender or socio-economic status.	Pre-print paper. Convenience sample drawn from participants of ongoing research study. Identifies associations, but not causal links. Self-report measures. Cannot assume reported acceptance or intent will translate

Available here. Cross-sectional survey UK	Analysis of free text identified personal health, severity of disease and health consequences for others as reasons for uptake. Concerns about vaccine safety was a barrier to uptake. Authors conclude: mass media interventions aimed at maximising vaccine uptake should utilise behaviour change techniques of information about health, emotional, social and environmental consequences, and salience of consequences.	into actual behaviour, especially when there is a time lag.
19. Malik AA, et al. Determinants of COVID-19 Vaccine Acceptance in the US. *MedRxiv*. 2020. Available here. Cross-sectional survey USA	Online survey of 672 U.S. adults in May 2020 to understand COVID-19 risk perceptions, acceptance of a vaccine, and trust in sources of information. 450 (67%) would accept a vaccine if recommended. Males (72%), older adults ≥55 years (78%), Asians (81%), and those with ≥ college education (75%) were more likely to accept. Comparing flu vaccine uptake to reported acceptance of the COVID-19 vaccine: 1) <high school diploma 10% flu; 60% COVID-19 vaccine; 2) unemployed participants reported lower influenza uptake and lower COVID-19 vaccine acceptance when compared to employed or retired respondents; 3) Black Americans reported lower influenza vaccine uptake and lower COVID-19 vaccine acceptance than nearly all other racial groups. Authors suggest the following to build confidence in a COVID-19 vaccine: develop and test thoughtful and targeted messaging to build on the current public interest and continue the momentum past vaccine release. Messaging and education should focus on the general population as well as high-risk groups. Participants reported the highest confidence in health professionals (n = 502; 75%), their own physician (n = 471; 70%), CDC (n = 430; 64%), state health departments (n = 419; 62%), and local health departments (n = 411; 61%). They also considered health professionals (n = 503; 75%) and health officials (n = 470, 70%) the most reliable sources of information. Comparatively, 144 participants (21%) reported social media as a reliable source of COVID-19 information.	Pre-print paper. Non-probability online survey - cannot draw a representative national population sample. Potential for high levels of volunteer and other biases. Can identify associations, but not causal links. Self-report measures Cannot assume reported acceptance or intent will translate into actual behaviour, especially when there is a time lag.

20. Freeman D, et al. Coronavirus conspiracy beliefs, mistrust, and compliance with government guidelines in England. *Psychological Medicine*. 2020. Available here. Cross-sectional survey UK	A non-probability quota-matched online survey of 2501 adults in England to estimate the prevalence of conspiracy thinking about the pandemic and test associations with reduced adherence to government guidelines. Those who rated themselves as at the extreme ends of either left or right held higher levels of conspiracy thinking. A hierarchical regression showed that both the linear political item, B = -0.28, standard error = 0.05, t = -5.92, p < 0.001, and a quadratic term (the political item squared), B = 0.064, standard error = 0.01, t = 8.63, p < 0.001 were significant predictors of specific coronavirus conspiracy scores. Higher levels of coronavirus conspiracy thinking was associated with less adherence to all government guidelines and less willingness to vaccinate. Pearson's correlation with general Covid conspiracy beliefs: Accept a COVID-19 vaccine if offered 0.37, p<0.001 Try to stop family and friends from getting the vaccine -0.42, p<0.001 Higher levels are also associated being more likely to share information and opinions about coronavirus. The authors note “a substantial minority of the population endorses unequivocally false ideas about the pandemic.”.	Non-probability online survey - cannot draw a representative national population sample. Potential for high levels of volunteer and other biases. Can identify associations, but not causal links. Authors state that concerns could be "post-hoc rationalisations" of not following the guidelines.
21. Masse R, Desy M. Lay people's interpretation of ethical values related to mass vaccination; the case of A(H1N1) vaccination campaign in the province of Quebec (French Canada). *Health Expectations.* 2014; 17(6), pp.876-87.	Study of 100 participants split into 10 groups aimed at analysing the receptiveness of the French-speaking Quebec population to certain ethnical principles promoted by public health authorities during the H1N1 influenza vaccination campaign. Participants were asked five questions, of which two were relevant to vaccine hesitancy: - “What did you think of the argument stating that those who refused the vaccination were not acting responsibly and were shifting the burden of protection to others who agreed to vaccination?” - “Do you consider vaccination a civic duty?”	Limited information on methods and no discussion of potential study limitations.

Available here. Qualitative focus group study. Canada	Among those opposed to vaccination, the key factor in deciding to be vaccinated was concern for vulnerable family members. "This concern even led citizens profoundly opposed to vaccination to finally agree to it 'in order not to contaminate my own children.'..." Pressure from family and friends to be 'responsible', led some to get vaccinated to avoid feeling guilty or judged. However, others stood against this pressure using arguments about "the danger of vaccines" and "alarmist government propaganda". The majority of respondents saw this pressure as acceptable when it came from family and friends, but not when similar arguments were made by public health authorities or political figures.	
22. Public Health Wales. *How are we doing in Wales? Public engagement survey on health and wellbeing during Coronavirus measures. Week 16 (20th – 26th July 2020).* Cardiff: Public Health Wales NHS Trust; 2020. Available here. Cross sectional survey. Wales, UK.	Telephone survey of 604 adults living in Wales included two questions relevant to vaccine hesitancy: 1. *if a vaccine became available that protected against coronavirus infection, would you personally want to be vaccinated?* 83% = Yes; 10% = No; 7% = Unsure. 2. When asked *if a vaccine became available that protected against coronavirus infection, would you want your children to be vaccinated?* 78% = Yes; 8% = No; 13% = unsure.	Survey adjusted by age, sex and deprivation to be representative of population. Data for Q2 limited to those with children living in the household; excluding those responding 'not applicable'. Unweighted data. Cannot assume reported acceptance or intent will translate into actual behaviour, especially when there is a time lag.
23. Thorneloe R J, et al. Willingness to receive a COVID-19 vaccine among adults at high-risk of COVID-19: a UK-wide survey. *PsyArXiv Preprints.* 2020. Available here.	Subset analysis of a UK-wide online survey of adults conducted March-April 2020 examining the willingness of the general population to receive a COVID-19 vaccine and exploring associated socio-demographic and clinical factors Data relates to 2152/2878 participants who responded to the question: *If a vaccine was available for COVID-19, I would want to receive it'* using a five-point Likert Scale (strongly disagree → strongly agree). Responses dichotomised into willing (4 – 5) and	Pre-print paper. Non-probability online survey - cannot draw a representative national population sample. Potential for high levels of volunteer and other biases.

Cross sectional survey. United Kingdom.	unwilling/unsure1 – 3) for the main analysis. [Mean age 45.3 (SD ± 16.1); 84.4% self-reported they had not had COVID-19. In total, 76.9% (1654) classified as willing to receive a COVID-19 vaccine. Older individuals who were older (vs. younger); from white ethnic groups (vs. BAME groups); married or cohabiting (vs. single, widowed, divorced); unemployed (vs. in full or part-time employment); educated to degree level or above (vs. below degree level); a non-smoker or an ex-smoker (vs. a current smoker, for both comparisons) and; had not had COVID-19 (vs. has or has had COVID-19) were significantly more likely to be willing to have a COVID-19 vaccine. No significant difference in willingness by other variables, including high-risk group classification for both the individual and members of their household.	Can identify associations, but not causal links. Self-report measures Cannot assume reported acceptance or intent will translate into actual behaviour, especially when there is a time lag. Proportion of individuals from BAME groups was low (186; 8.7%).