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Understanding and addressing the barriers and facilitators for influenza and COVID-19 vaccine uptake among NHS employees in Wales:

Qualitative insights and co-produced interventions



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Executive summary

Introduction

The success of any vaccination programme for communicable diseases depends on uptake. National Health Service (NHS) staff are offered an annual influenza vaccination to protect them and their patients. Despite several influenza campaigns, fewer than 55% of NHS Wales staff received their vaccination in 2018/19. NHS staff were offered the COVID-19 vaccine from December 2020. On the 14th of September 2021, it was confirmed that the COVID-19 booster vaccine will be offered to priority groups, including frontline health and social care workers. There is a strong need to identify the barriers and facilitators for influenza and COVID-19 vaccination uptake so that interventions can be put in place to support uptake among NHS employees in Wales and therefore the success of the staff vaccination programme. To understand factors relevant to vaccination uptake in NHS employees, we must first understand people's Capabilities, Opportunities and Motivations.

This study aimed to explore the barriers and facilitators for uptake of the influenza and COVID-19 vaccine among NHS employees in Wales and co-produce new interventions with NHS employees in Wales to support vaccination uptake.

Methodological overview

The project consisted of two phases with employees at Cwm Taf Morgannwg University Health Board (CTMUHB). In Phase 1 we conducted 36 interviews with CTMUHB employees to explore the barriers and facilitators influencing influenza and COVID-19 vaccine uptake using the COM-B model. Using the findings from Phase 1, Phase 2 co-production workshops were then held with CTMUHB to design interventions to support influenza and COVID-19 vaccination uptake using the COM-B model and the Behaviour Change Wheel.



Findings

A number of key factors were found to be associated with influenza vaccine uptake in CTMUHB employees.

High uptake (receiving ≥ 3 influenza vaccinations between 2017 – 2021) participants reported:

- That they expected negative consequences if they personally contracted influenza, which included potential transmission to patients and colleagues.
- High perceived necessity to have the vaccine when offered, to protect themselves, others (e.g., patients, loved ones, colleagues), and the NHS.
- The positive consequences of receiving the influenza vaccine and reported no concerns about it for themselves.

Low uptake (receiving ≤ 2 influenza vaccinations between 2017 – 2021) participants reported:

- That COVID-19 has increased their perception of personal need for the influenza vaccine for protecting themselves and others.
- Having had concerns about the influenza vaccine and perceived potential negative consequences of receiving it, including the impact of any short-term side-effects on their ability to work and their recreational activities.

Both groups of participants discussed support received from work to receive their vaccine.

Key factors associated with COVID-19 vaccine uptake were:

- Participants report high perceived necessity to receive the COVID-19 vaccine to protect themselves, others, and the NHS.
- Some participants discussed receiving support from work to receive their COVID-19 vaccine, including support to take time out of work to get the vaccine and recover from any side-effects.

Our findings suggest that to promote influenza and COVID-19 vaccine uptake we need to increase motivation and put plans in place to optimise social opportunities:

- Increase perceptions of need for the influenza vaccine and COVID-19 vaccine for protecting themselves, others, and the NHS.
- Increase perceptions of the positive consequences of receiving the influenza vaccine and COVID-19 vaccine, for protecting themselves, others, and the NHS.
- Address perceptions of negative or uncertain consequences of receiving the influenza vaccine and COVID-19 vaccine and support people to manage any potential negative consequences.
- Ensure people receive support from work to make an informed decision and to receive their vaccines with time to recover from any side effects.

Recommendations

Based on the results from the Phase 2 co-production workshops, we recommend behavioural-science informed messaging and communications continue to be used to address the key barriers for influenza and COVID-19 vaccination uptake for the 2021/2022 season and beyond.

Behavioural-science informed messages and communications could address the following barriers:

- Increasing perceptions of the value and benefit of the influenza vaccine, for all staff groups.
- Increasing awareness about the opportunities to be vaccinated, including how, where, and when to receive the influenza vaccine.
- Addressing concerns about potential side-effects and their impact.
- Increasing awareness of colleagues receiving the influenza vaccine (e.g., 'people like me').

We suggest that new messages and communications include:

- A range of positive-framed messages, emphasising the value and benefit of vaccines.
- A range of positive-framed messages, emphasising different reasons for receiving a vaccine e.g., protecting yourself, protecting loved ones (e.g., family, friends), protecting patients, protecting colleagues, protecting the NHS.
- Ensuring that messages include images and messages that represent different staff groups (e.g., clinical and non-clinical staff) to represent 'people like me' receiving vaccines.
- Ensuring messages include information about how, where, and when they can receive their vaccines, as well as links to further information and support about vaccines (e.g., using links to CTMUHB resources).
- Ensuring messages reinforce that vaccines are safe and effective, and address any concerns about any potential side-effects and their impact, including links to reputable resources for further information and support.
- Ensuring messages use accessible language.
- Ensuring that CTMUHB specific logos and branding are included on the messages.

We suggest the following message and communication formats and methods of delivery:

- Written messages.
- Short videos ('talking heads').
- Ensure messages reach all staff groups by using a range of delivery methods (e.g., social media, laminated posters, computer screensavers).
- Messages should be placed in areas where there is high footfall and where all staff groups can see them.
- Consideration needs to be given to how messages are communicated to employees across the different locations of CTMUHB, to ensure that all employees know about opportunities to receive vaccines and the value and benefit of the vaccine for them.

The suggestions above could potentially be implemented within the coming 2021/22 vaccine season. Based on the results from the co-production workshops, we also identified suggestions that could be implemented in the future but would require further planning and resources to implement. For future vaccine seasons, providing in-person support for CTMUHB employees to help support the uptake of the influenza and the COVID-19 vaccine was suggested. This would provide an opportunity to educate and persuade people about the value and benefit of vaccines, elicit and address concerns about vaccines and any potential negative consequences, provide an example (role model) for people to emulate, and enable people to receive their vaccine by increasing the means to do so, or by reducing barriers. We believe this is a promising intervention for future consideration. This intervention could build upon existing schemes in place (e.g. 'peer vaccinators') or develop new ones (e.g. 'staff champions'). However, people are unlikely to be able to offer this kind of support without having additional training. We recommend co-producing new training materials and resources to help peer vaccinators, or staff champions, identify and address the different barriers and facilitators associated with vaccination uptake.

Conclusion

This project has enabled us to identify key barriers and facilitators to the uptake of influenza and COVID-19 vaccinations in CTMUHB employees. The co-production workshops informed by behavioural science frameworks have enabled us to identify some suggestions that are likely to maximise uptake of the annual influenza vaccination and COVID-19 vaccinations. These include behavioural science-informed messages and communications that address a range of barriers. Training CTMUHB peers to have supportive conversations to promote vaccination uptake may be particularly valuable for those with complex concerns.



Background



The success of any vaccination programme for communicable diseases depends on uptake. National Health Service (NHS) staff are offered the annual influenza vaccination to protect them and their patients. The Welsh Government set a target of 60% uptake of seasonal influenza vaccine (2017/2018), but despite several influenza campaigns, fewer than 55% of NHS Wales staff received their vaccination (2018/19). Cwm Taf Morgannwg University Health Board (CTMUHB)

met this target for the first time in December 2019, however, the Welsh Government target for the 2021/2022 rollout in CTMUHB for staff with direct patient contact is 80%, so there is still a need to further promote and optimise influenza vaccine uptake in CTMUHB employees, and hence a pressing need to put effective plans in place to do so.

NHS staff were offered the COVID-19 vaccine from December 2020. In Wales and as of the 27th of August 2021, 96.7% and 94.5% of healthcare workers had received their first and second dose of the COVID-19 vaccine¹. On the 30th of June 2021, the Joint Committee on Vaccination and Immunisation (JCVI) published interim advice recommending the start of a booster campaign in Autumn 2021 that broadly follows the nine priority groups to further reduce the incidence of COVID-19 and to maximise protection in those most at risk². On the 14th of September 2021, it was confirmed that the COVID-19 booster vaccine will be offered to priority groups, including frontline health and social care workers.

There is a strong need to identify the barriers and facilitators for influenza and COVID-19 vaccination uptake so plans can be put in place to support uptake among NHS employees in Wales and therefore the success of the staff vaccination programme. To support vaccination uptake in NHS employees, we must first understand to what extent people have the capability, the opportunity, and the motivation to receive their vaccine.

Previous research has identified a range of barriers and facilitators associated with influenza uptake, including:

- Having knowledge and understanding of the benefits of the influenza vaccine.
 - Unvaccinated healthcare workers lacked this knowledge (Dini et al, 2018; Hollmeyer et al, 2009).
- Having access and awareness of the influenza vaccine.
 - Vaccinated healthcare workers reported greater access to the vaccine and being aware of it being promoted within the workplace (Corace et al, 2016; Eaton et al, 2017; Hollmeyer et al, 2009).

¹ <https://research.senedd.wales/research-articles/covid-19-vaccination-data/>

² JCVI interim advice: potential COVID-19 booster vaccine programme winter 2021 to 2022 - GOV.UK (www.gov.uk)

- Receiving support from others.
 - Positive encouragement from colleagues and friends, as well as encouragement from senior colleagues and respected sources was also reported as a facilitator to vaccine uptake (Akan et al, 2016; Boey et al, 2018; Lorenc et al, 2017).
- Having low concerns about the influenza vaccine.
 - Healthcare workers that did not receive the vaccine reported worries and fears about the safety of vaccinations and concern of potential side-effects, as well as perceiving to be at low personal risk of developing seasonal influenza (Boey et al, 2018; Cozza et al, 2016; Dini et al, 2018; Napolitano et al, 2019; Schmid et al, 2017).
- Perceiving the influenza vaccine to be necessary.
 - Healthcare workers that did receive the vaccine reported wanting to protect themselves, their loved ones, and their patients from getting influenza (Dini et al, 2018; Rabensteiner et al, 2018; Shrikrishna et al, 2015; Vasilevska et al, 2014).
- Strong perceptions of professional responsibility to receive the influenza vaccine.
 - Vaccinated healthcare workers reported a strong belief about their responsibility and duty of healthcare workers to be vaccinated to carry out their role, as well as believing seasonal influenza to be a dangerous illness (Corace et al, 2016; Hollmeyer et al, 2009; Mo et al, 2018).

Similarly, research has begun to explore the factors influencing willingness and intentions to receive the COVID-19 vaccine in healthcare workers. The reported barriers and facilitators influencing healthcare worker's willingness to receive the COVID-19 vaccine include:

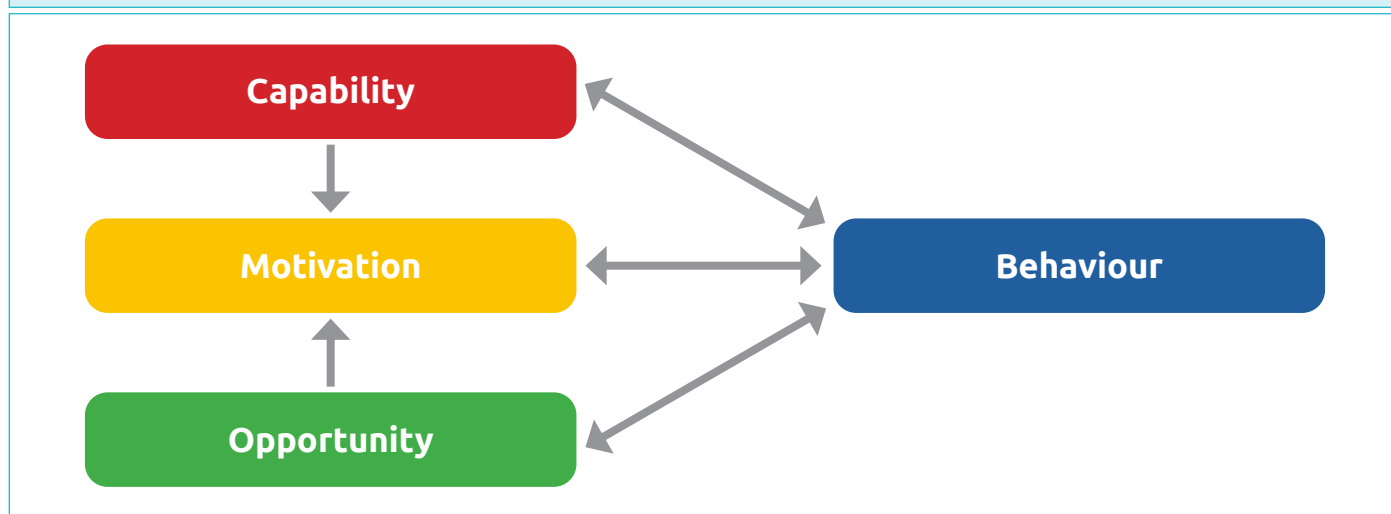
- (Mis)information about the COVID-19 vaccine.
 - The spread of misinformation online negatively impacted healthcare workers attitudes towards the vaccination, particularly amongst junior level and Black, Asian, and Minority Ethnic employees (Manby et al, 2021).
- Perceptions of personal risk of COVID-19.
 - Fear of having COVID-19 and high perceived personal risk of COVID-19 was a factor associated with vaccine uptake (Detoc et al, 2020; Gagneux-Brunon et al, 2021; Galanis et al, 2020; Ledda et al, 2021).
- Having low concerns about the COVID-19 vaccine.
 - Positive attitudes and confidence in the COVID-19 vaccine was related to increased willingness to receive the vaccine (Galanis et al, 2020).
 - Vaccine hesitancy was associated with concerns about the safety and efficacy of the COVID-19 vaccine, as well as distrust in pharmaceutical companies and belief that COVID-19 was not a dangerous illness (Di Gennaro et al, 2021; Gagneux-Brunon et al, 2021; Ledda et al, 2021).
 - Concerns that the vaccine roll-out had not been supported by evidence-based science and uncertainty about the vaccines' long-term efficacy against mutant strains also influenced vaccine hesitancy (Biwas et al, 2021; Manby et al, 2021).

Research into vaccine uptake would benefit from being conducted using a behavioural science approach to understand the barriers and facilitators influencing vaccine uptake as this has been missing from previous vaccine behaviour research.

Behavioural science theory

The COM-B model (Michie et al., 2011; Michie et al., 2014) describes the range of factors that can influence behaviour. In the context of vaccination uptake (behaviour), people need sufficient knowledge about why they are being offered a vaccine and when, where, and how to access it, in addition to having the ability to plan to get the vaccine (capability). They also need access to environments and resources that enable them to receive the vaccine and have sufficient encouragement from others, as well as practical and emotional support to receive it (opportunity). People need to believe that getting the vaccine will be beneficial for themselves or others and feel confident that they can cope with any negative consequences (e.g., impact on work) (motivation). In order to understand factors relevant to vaccination uptake in NHS employees, we must first understand people's Capabilities, Opportunities and Motivations.

Figure 1. COM-B model (Michie et al, 2011)



The Theoretical Domains Framework (TDF) (Cane, Connor and Michie, 2012) describes 14 key domains that influence capability, opportunity, and motivation and is recommended as a framework for identifying the factors that influence a behaviour (Michie, Atkins, and West, 2014).

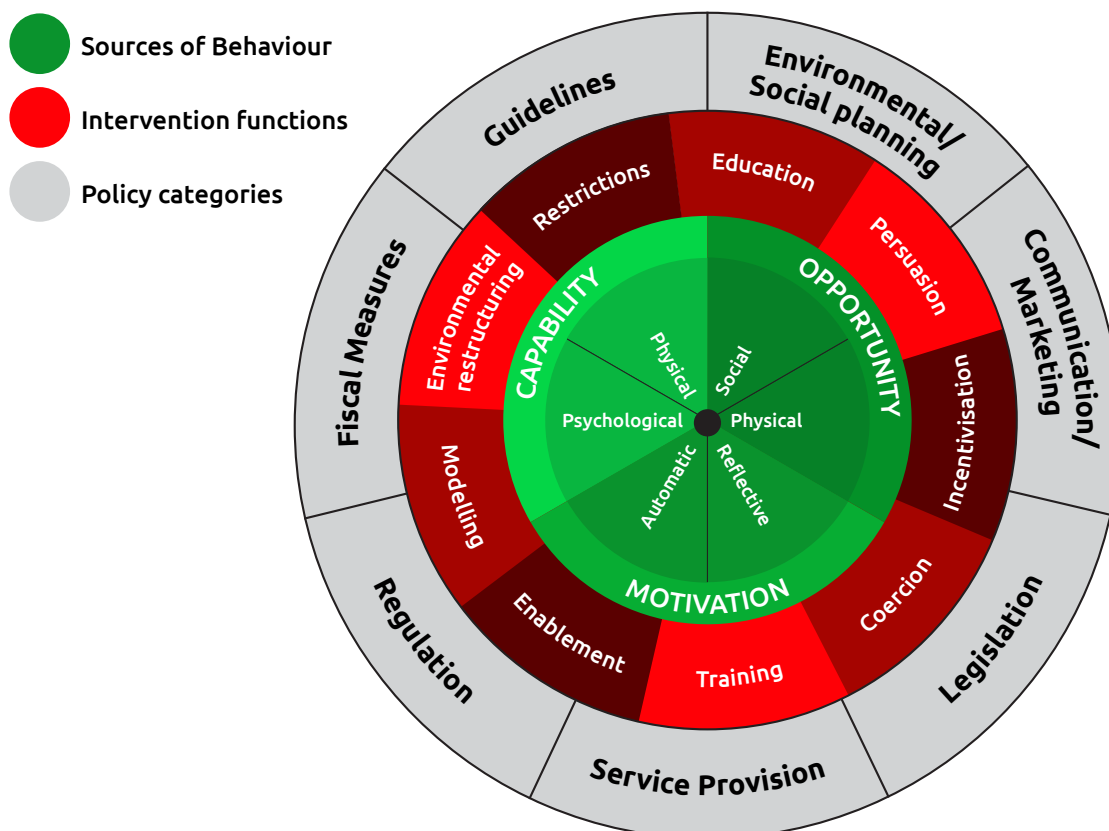


Table 1. The relationship between TDF Domains and components of the COM-B Model

COM-B Component		TDF Domain
Capability	Psychological	Knowledge
		Skills
		Memory, Attention & Decision Process
		Behavioural Regulation
	Physical	Skills
Opportunity	Social	Social Influences
	Physical	Environmental Context & Resources
Motivation	Reflective	Social/Professional Role Identity
		Beliefs about Capabilities
		Beliefs about Consequences
		Optimism
		Intentions
		Goals
	Automatic	Emotion
		Reinforcement

COM-B is part of the Behaviour Change Wheel (Michie et al., 2014). This provides a framework for intervention development. The COM-B and TDF can help us to determine what needs to change, and then we can use the Behaviour Change Wheel to determine what types of interventions are needed to address those needs.

Figure 2. Behaviour Change Wheel (Michie et al, 2014)



Aims



This study aimed to

- (i) explore the barriers and facilitators for uptake of the influenza and COVID-19 vaccines among NHS employees in Wales using the COM-B model and
- (ii) co-produce new interventions with NHS employees in Wales to support vaccination uptake.

Ethical approval

Ethics approval for the research was received from Sheffield Hallam University Research Ethics Committee (ER21814369). Approval was also received from the Health Research Authority (IRAS ID 281333), and local capacity and clearance was received from CTMUHB to conduct the research.

The role of Public Health Wales

Public health experts from Public Health Wales (PHW) and Cwm Taf Morgannwg University Health Board (CTMUHB) conceptualised the research, commissioned the research and were involved in guiding the planning and the conduct of the work programme, including the development of the study protocol. Only members of the research team independent of CTMUHB and PHW were involved in data collection, analysis, and interpretation for quality assurance and to reduce the risk of bias.

Phase 1

To explore the barriers and facilitators for uptake of the influenza and COVID-19 vaccine among NHS employees in Wales.

Phase 1 methods

NHS employees working within CTMUHB were recruited into the study between November 2020 and July 2021. CTMUHB is the local health board of NHS Wales for three local authority areas in Wales: Merthyr Tydfil, Rhondda Cyon Taf, and Bridgend in the south of Wales. Both clinical and non-clinical healthcare workers of CTMUHB were eligible to take part. Participants who self-reported that they were: employed by CTMUHB; in contact with patients; aged ≥ 18 years; willing to provide self-reported influenza vaccination status; willing to take part in a semi-structured interview and; able to give informed consent were eligible to take part.

Recruitment

Participants were recruited via staff emails and recruitment posters, distributed by CTMUHB employees who were members of CTMUHB immunisation groups (Strategic Immunisation Group [SIG] and the Operational Immunisation Group [OIG]), as well as recruitment posters and messages advertised on the CTMUHB staff Facebook page (a private group that can only be accessed by CTMUHB employees). Those who expressed an interest in participating were asked about their influenza vaccination history, to ensure that we recruited CTMUHB employees that had low and high vaccine uptake. We recruited participants who always received their influenza vaccine, those who received it irregularly, and those who always declined it. We compared and contrasted the barriers and facilitators for those with low uptake and high uptake. All participants were provided with an online participant information sheet and written informed consent was obtained prior to participation. All study information was provided in English and Welsh, and all participants were offered a £25 e-voucher as a token of thanks for participation in the interview.

Data collection

Participants took part in a semi-structured online interview lasting 45 – 60 minutes. Interviews were held in the evenings and at weekends to facilitate attendance. All participants completed a brief survey collecting demographic and clinical data before the start of the interview. This measured: age; gender; ethnicity; current employee role; duration in current employee role; working pattern (full or part-time); influenza vaccination history and; COVID-19 status (whether they have had COVID-19, either confirmed or not confirmed by a test). A semi-structured topic guide explored individuals' capability, opportunity, and motivation to receive their influenza vaccine and the COVID-19 vaccine, separately. All participants chose for the interviews to be conducted in English. Data were audio-recorded, transcribed, and anonymised.



Data analysis

Data relating to the uptake of each vaccine (influenza and COVID-19) were analysed separately. We analysed data according to influenza vaccine uptake behaviour, based on participants self-reported influenza vaccine uptake between 2017 – 2021. Participants were asked to self-report their vaccine uptake between 2017 – 2021, regardless of whether they had been employed at CTMUHB or within the NHS during that time. Participants who self-reported low uptake of the influenza vaccine were analysed separately from those who self-reported high uptake of the influenza vaccine. Low uptake of the influenza vaccine was defined as receiving ≤ 2 influenza vaccinations between 2017 – 2021 (across 4 influenza seasons). High uptake of the influenza vaccine was defined as receiving ≥ 3 influenza vaccinations between 2017 – 2021.

We had planned to compare and contrast data from those who received or declined the COVID-19 vaccine, however it was not possible to conduct this analysis. Three participants had not been offered the vaccine at the time of the interview (due to their interview occurring at the very early stages of the vaccination roll-out) and were excluded from the analysis. Only 2 of the 36 participants had declined the offer of a vaccine at the time of the interview; due to limited transferability of the findings and to minimise the risk of individuals being identified due to small sample size, these participants were excluded from the analysis. Of the two participants that were excluded, one participant reported high uptake of the influenza vaccine, and the other reported low uptake.

Across all groups, the barriers and facilitators associated with vaccination uptake were mapped onto the relevant COM-B components, and then mapped directly to the relevant 14 TDF domains (Cane, Connor and Michie, 2012) using Framework Analysis (Ritchie and Spencer, 1994).

We used inductive content analysis (as described by Elo & Kyngäs, 2008) to analyse the types of statements under each TDF domain and to identify themes. Similar and contrasting patterns and connections between themes were explored between and within cases.

All data were managed in NVivo (V.12).

Phase 1 findings

Sample

In total, 36 participants were recruited (Table 2). All three Local Authority areas which are provided services by CTMUHB (Merthyr Tydfil, Rhondda Cyon Taf, and Bridgend) were represented in the sample, with 25 participants from clinical services (including representation from nursing and midwifery, medical and dental, allied health professionals) and 12 participants from non-clinical services (including representation from administrative services and support services). There was good representation of junior and senior members of staff within these professional roles, in addition to full-time ($n = 24$) and part-time ($n = 12$) working patterns and number of years in current role (< 1 year - ≥ 21 years).

In total, 12 of the 36 participants self-reported low uptake of the influenza vaccine (≤ 2 vaccinations between 2017 – 2021) and 24 of the 36 participants self-reported high uptake (≥ 3 vaccinations). There was an equal number of participants who self-reported they have had or suspect that they have had COVID-19 (either with or without confirmation with a test) ($n = 18$) and participants who self-reported that they have not had, or suspect that they have not had, COVID-19 ($n = 18$).

In total, 31 of the 36 participants had received their first or second dose of a COVID-19 vaccine at the time of the interview.

One audio-recording was poor quality and was unable to be transcribed. This resulted in a final dataset of 35 participants for the influenza vaccine analysis (12 with low uptake and 23 with high uptake) and 30 participants for the COVID-19 analysis (all of whom had received their first or second dose of the COVID-19 vaccine at the time of the interview). Sample characteristics for the full dataset are presented in Table 2.

Table 2. Participant characteristics (n = 35)

Participant Characteristics		N
Age	18 – 39 years	12
	40 – 59 years	21
	≥ 60 years	2
Gender	Female	27
	Male	8
Ethnicity	White	35
Professional role*	Clinical services (medical and dental, nursing and midwifery, allied health professions, healthcare scientists, additional clinical service)	24
	Non-clinical services (Administrative and clerical, estates and ancillary)	12
Number of years in current role*	< 1 year	3
	1 – 10 years	16
	11 – 20 years	12
	≥ 21 years	5
Working pattern	Full-time	24
	Part-time	11
Influenza vaccine uptake between 2017 - 2021	Low uptake (≤ 2)	12
	High uptake (≥ 3)	23
COVID-19 vaccine uptake	Received one or both doses	30
	Declined the vaccine	2
	Vaccine unavailable at the time of the interview	3
COVID-19 status	Not had COVID-19	18
	Has had COVID-19 (either confirmed with or without a test)	17

**Participants can report more than 1 professional role/number of years in current roles*



Factors influencing influenza vaccine uptake

Participants with low (n = 12) and high uptake (n = 24) of the influenza vaccine reported a range of capability, opportunity, and motivation factors that were associated with influenza vaccine uptake. Key factors influencing vaccine uptake that are important for future interventions are discussed below. We have organised these by COM and TDF domains, with exemplar quotes provided below.

Do CTMUHB employees have the Capability to receive their influenza vaccine?

Knowledge In general, most participants who had low and high uptake of the influenza vaccine reported having sufficient knowledge about influenza and the vaccine. Two participants who were new starters in the NHS were unsure whether they should receive the vaccine.

Behavioural regulation A small number of participants who had high uptake described having a back-up plan for getting their influenza vaccine. For example, some described how they would book an appointment at their GP surgery or attend a drop-in session to receive their vaccine if they missed an opportunity to receive it. One participant with high uptake described having a plan for managing potential short-term side-effects from the vaccine.

"I know the year before last I missed out, I was out and about doing my visiting and the nurse came and obviously I was walking in the building and she was coming out. So, of course I missed the opportunity to have it that day and I think it was arranged for her to come back but she didn't, but I had it in the surgery then."

P10 (high uptake)

"They have flu vaccination clinics and then they have mobile trolleys coming around, so if I'm on a ward and they're there I have it there and then, if they come to the department I have it or I go to a set location, it's simple yes, very easy."

P16 (high uptake)

Do CTMUHB employees have the Opportunity to receive their influenza vaccine?

Environmental context and resources Overall, participants with low and high uptake believed it was easy to receive their vaccine at CTMUHB. Key practical barriers experienced by participants, or areas that could be improved in the future included:

- Need for more communications and resources about influenza and the vaccine, including where, when, and how to get it.
- Ensuring that people can receive their vaccine at their place of work.
- Ensuring that flexibility opportunities are offered, especially for those who may find it difficult to find the time to receive their vaccine due to their work commitments/ night shifts.

"Perhaps if it was advertised as this definitely a drop-in session, not an appointment based, then that would be helpful. I think that might be the final nudge that would nudge me."

P3 (low uptake)

"And the peer vaccinators, that really – all the vaccinators that were coming around to the department would have been at an inconvenient time."

P31 (low uptake)

"...The groups of staff who probably only work at night, so the flu vaccines would run predominantly I believe in the day, so you know, come in outside of work to get your flu vaccine, that's always going to be a barrier."

P19 (high uptake)

Social influences Some participants with low and high uptake believed that the decision to receive or decline an influenza vaccine was a personal decision. Some participants perceived peer pressure to receive their vaccine.

"...When we'd had a team meeting, the vaccine was there, and they made me feel really guilty... I was the only one who actually didn't want it, so I had to have it that day. I felt like I had to."

P1 (low uptake)

"Last year the girl who said, who was champion, I just basically said to her oh I don't have the vaccine so please don't be nagging me."

P5 (low uptake)

Some people with low and high uptake discussed receiving support from work to receive their vaccine.

"...I even had a DVD given to me and they said, well, watch this and see, you know, this is something for you to think of... And it was just showing how they delivered it, how they would explain it to patients. It wasn't COVID for me; it was definitely the way they explained it to me."

P29 (low uptake)

"...Basically, I wasn't aware that the vaccine is not a live vaccine and that was explained to me in more detail. And the reason I say that is because that's what was put in the flu jab from a long time ago when I had it because I was really unwell with it for two years and I was putting it down to the vaccine."

P29 (low uptake)

"I did actually confide in, in the general dual trained nurse and said right, you know I'm only having you doing it [giving the injection]. And she'd say, yeah, that's fine, I'll come and find you, you know, sometime this week, which days are you in?"

P25 (high uptake)

"I mean like last year when I went, I went with the other girls and she was like oh come on let's go and have our flu vaccine now as they're doing a session, I was alright okay yes. So she sort of like prompted me to go..."

P22 (high uptake)

Do CTMUHB employees have the Motivation to receive their influenza vaccine?

Beliefs about capabilities In general, most participants who had low and high uptake of the influenza vaccine reported that it was easy to receive their influenza vaccine in CTMUHB, if they wanted to receive it. A small number of participants with low and high uptake reported some challenges in receiving their vaccine, due to night work, work location, or work commitments.

"When I'm on an inpatient ward, very easy, when I'm not on an inpatient ward, I find it a lot harder to get, get it done."

P7 (high uptake)

"I would have it because I don't want flu, I don't want my parents to get flu, I don't want my kids to get flu, all the rest of that and recognise how bad it is but just don't have it because it's become a faff."

P30 (low uptake)

Beliefs about consequences Some participants in the high uptake group reported that they were at increased risk of potentially catching influenza due to their job role, and that they were at increased risk of transmitting the virus to others.

"...I work in the environment where I think my risk is, so I am not at risk for a personal side, but I am in a hospital where we've got people walking around with bugs, so..."

P6 (high uptake)

"I think I'm probably high risk of transmission aren't I but for our patients that's why we have it, rather than high risk of getting it, I think."

P16 (high uptake)

Most participants with low and high uptake discussed the negative impact influenza has on the NHS and vulnerable groups. Participants with high uptake reported negative consequences if they personally contracted influenza, which included potential transmission to patients and colleagues.

"If I had flu and I was in work and gave it to patients it would be devastating for those, especially the ones who're more advanced and more compromised for all sorts of reasons, sort of causing harm to a patients would be horrendous."

P16 (high uptake)

"I you know, could be, you know, exposed to flu and then pass it onto someone whilst I'm still asymptomatic and yeah, pass it onto patients, you know, other colleagues who then would also be taken out of the workplace, so yeah, you know, I would want to consciously try and avoid that."

P19 (high uptake)

Most people with low and high uptake of the vaccine believed it was important that other people (especially vulnerable groups) received the vaccine, and many discussed how they encouraged others to do so. Participants with high uptake reported high perceived necessity to have the vaccine when offered, to protect themselves, others (e.g., patients, loved ones, colleagues), and the NHS. Participants with high uptake discussed the positive consequences of receiving the vaccine and reported no concerns about it for themselves.

"Well to prevent myself having it because I don't want to be ill and to ensure I can continue to work and to prevent the transmission to anybody, whether it's colleagues, patients or my family."

P16 (high uptake)

"I feel better for having it, I feel I'm protected."

P9 (high uptake)

Some participants with high uptake reported that COVID-19 had not influenced their decision-making surrounding the influenza vaccine or reinforced positive beliefs about its value and benefit. Conversely, those with low uptake were more likely to report that COVID-19 has increased their perception of personal need for the influenza vaccine. This included: not wanting time off work during COVID-19; not wanting COVID-19 and influenza at the same time; increases in perception of perceived risk from influenza; increased perceptions of risk of transmission; increased perceptions of the influenza vaccine offering protection.

"...You know I think it's something, mindful of and like I said unfortunately, I think it's taken COVID to really consider what you are passing to your patients as well."

P2 (low uptake)

"I'm thinking, you've got a good chance of catching COVID, I don't want to have the flu as well."

P1 (low uptake)

Most people with low and high uptake had no concerns about the vaccine. A small number of people with low uptake shared concerns about its efficacy and short-term side-effects.

"So I think it was around the flu vaccine feeling a little bit like it was a shot in the dark. It was our best guess of, you know, at what vaccine – and what strain would be the prevalent strain, so it was a bit of a – a [stab] in the dark as to whether it would work or not. Not feeling that if I did pick up influenza that I was going to die."

P31 (low uptake)

"I don't think so, because at that time I think, well I can say that it was kind of always, would become more, would you become unnecessarily unwell due to having that against the sort of risk of actually contracting flu, if that makes sense."

P2 (low uptake)

Some participants with low uptake reported concerns about potential negative consequences of receiving the vaccine, including the impact of short-term side-effects on their ability to work and their recreational activities. Some participants with low uptake were hesitant or unsure about the potential value and benefit of the vaccine.

"...If I get a shot in the arm, then I have a sore arm for a couple of days and it impacts my recreational life."

P3 (low uptake)

"I think I've just thought, like I said that it's not fully – more [my] selfish point of view, it's not guaranteeing me that I won't get it"

P5 (low uptake)

"...A lot of colleagues I've spoken to have said, oh I had the flu vaccine and I was really unwell after it and had to take time off and things, so that kind of puts you off a bit. You know, you are going to end up missing [work] yourself because you've had a vaccine that makes you unwell"

P2 (low uptake)

Social/ professional role and responsibility Most participants with high uptake believed that it was an important part of their professional duty and responsibility to receive their influenza vaccine, in order to protect themselves, others, and the NHS, as well as act as a role model for their patients.

"I think it's my responsibility to make sure I have the flu vaccine, so that I am safe going about doing my work and I am safe for my family, and you know, like in the professional side of it, that I am safe to go and do the job that I do without passing anything on to any of the families that I work with."

P12 (high uptake)



Factors influencing COVID-19 vaccine uptake

In total, 30 participants who were interviewed had received their first and/or second dose of the COVID-19 vaccine at the time of the interview. Due to a small number of participants that had declined their COVID-19 vaccine (n=2), these findings can only be translated to participants that had received their COVID-19 vaccine. In Table 3, we present key factors relevant for COVID-19 vaccine uptake, as well as areas that could be improved in the future to support the roll-out of the vaccine. These are organised by COM and TDF domains with exemplar quotes provided.

Do CTMUHB employees have the Capability to receive their COVID-19 vaccine?

Knowledge Participants reporting having knowledge about COVID-19 and the vaccines available in the UK, including why they are important.

Do CTMUHB employees have the Opportunity to receive their COVID-19 vaccine?

Environmental context and resources Although participants discussed some environmental factors relevant for receiving the vaccine, these were not perceived to be overly problematic, nor a barrier to them receiving the vaccine when offered. Key areas that participants suggested could be improved in the future were:

- More resources about the benefits and risks of the vaccine to be offered and provided in advance of their vaccine appointment, so they had the time to make an informed decision.
- Improved communications about the COVID-19 vaccine roll-out, including which NHS employee groups are to be offered the vaccine in the first instance and why, with clear communications as to when their employee group would be offered the vaccine.
- Clearer communications about where and when to receive the first and second dose of the vaccine, and what type of vaccine would be offered to them.
- Flexibility in when to receive the COVID-19 vaccine was viewed as important. Some liked that they received it during non-working hours, due to concerns about the impact any short-term side-effects could have on their ability to work. Others discussed how they and others may find it more convenient to receive it during working hours, if they had allocated time and were supported to do so by their employer.
- For some, it was easy and accessible to receive their vaccine as they were able to receive it within their place of work, whereas others described having to travel outside of their normal place of work. Although location was not a barrier to receiving the vaccine, some participants believed it would be easier and more convenient in the future if the vaccine was available at a local venue either at or close to their place of work.

Social influences There were social norms for vaccination uptake; most participants reported that people around them, including their colleagues, had received their vaccine, or intended to do so, although they were aware that some people were more hesitant or had declined the offer of a vaccine. Although not a barrier to them receiving the vaccine, a small number of participants discussed perceived social pressure to receive the vaccine from others (e.g., the vaccination team, their manager). Some participants discussed receiving support from work to receive their vaccine. This included:

- Having the opportunity to discuss the benefits and risks of the vaccine with others
- Having support to receive the vaccine, for example, support from their manager to identify an opportunity during their workday to receive the vaccine
- Having support to take out of work to get the vaccine, as well as time off work to cope with any potential short-term side-effects.

Do CTMUHB employees have the Motivation to receive their COVID-19 vaccine?

Beliefs about capabilities Most participants believed it was easy to receive their COVID-19 vaccine, although some reported experiencing some practical challenges (see opportunity).

Beliefs about consequences Participants perceived serious health consequences from COVID-19 infection. Many talked about how they had family, friends, and colleagues who had caught COVID-19 and had suffered serious health consequences or had died from the virus. They had seen first-hand the devastating health consequences COVID-19 has had on the wider community through their role as an NHS employee, as well as the impact COVID-19 has had on the NHS, including its employees and existing services.

Participants believed it was important for themselves and others to take up the offer of a COVID-19 vaccine when offered, and they encouraged others around them to do so. Reasons for receiving the vaccine included to protect: themselves from COVID-19 infection; serious health consequences; their ability to work in the NHS; other people (e.g., family, friends, wider community); their colleagues, patients, NHS and; to get back to normal.

Participants perceived a range of positive consequences from receiving the COVID-19 vaccine and believed that receiving it helped: reduce infections; hospitalisations; serious health consequences; feel protected/safer; protect other people (e.g., family, friends, colleagues, patients); reduce staff sickness and; protect the NHS. Some participants perceived limited negative health consequences from the vaccine (e.g., sore arm, 'flu-like' short-term side-effects), however a small number believed that these short-term side-effects could have a negative impact on their ability to work/ their sickness record and they were pleased that they had the opportunity to receive their vaccine outside of work hours.

Some participants reported having no concerns about the vaccine. Others reported that they and other people had some concerns about the vaccine, although this was not a barrier for them receiving the vaccine when offered. Areas of concern for participants included: the speed of its development; long-term safety and efficacy profile and; the gap between the 1st and 2nd dose and how it differed from manufacturing guidelines.

Reinforcement Some participants discussed experiencing side-effects from the COVID-19 vaccine (e.g., feeling extremely unwell and needing time to recover), whereas others reported experiencing very limited side-effects. Some discussed having caught COVID-19 and suffering negative health consequences which ranged in severity. Others discussed the impact having COVID-19 had on their ability to work, as well as their daily life. Participants discussed the direct impact COVID-19 has had on their role within the NHS, including changes in services in order to care for COVID-19 patients, as well as the impact COVID-19 has had on their existing services. These experiences reinforced perceptions of need for the vaccine.

Social/professional role and responsibility For many participants, they believed it was their professional responsibility to receive the vaccine in order to protect their patients, protect the NHS/their colleagues, and to be a role model for vaccine uptake for their patients and their colleagues.

Table 3. TDF domains related to capability, opportunity, and motivation to receive the COVID-19 vaccine (n = 30)

COM-B	TDF	Factor	Description	Exemplar quote
Capability	Knowledge	About COVID	Knowledge about COVID-19 consequences, virus transmission, risk groups	<i>"If you've got underlying health conditions you're more susceptible to getting it and the elderly are much more at risk of being ill and possibly dying from it" P5</i>
		About the vaccine	Knowledge about what the vaccine does, efficacy, side-effects, priority groups	<i>"...The risk of having a clot with the vaccine is much less than if you you're taking the contraceptive pill, and it's certainly much less than the risk of clots if you actually do get COVID..." P26</i>
	Behavioural regulation	Planning	In the future, having a plan for managing potential side-effects*	<i>"So, I suppose being prepared for it, so if you know that you are having your vaccine then maybe make sure you're having a quieter week the week after, so you have got that time and those support systems in place to be able to recuperate should you need it." P20</i>
Motivation	Beliefs about capabilities	Getting the vaccine	Easy to get the vaccine	<i>"Easy, really easy just phoned up, made the appointment, went in and like the second one was phone call, go over to the vaccination centre, and have your vaccine. It was really simple." P12</i>
			Some challenges, not problematic	<i>"...It was quite tricky because when I phoned up to book my vaccine they said, oh we're only giving second vaccines up here...I ended up phoning a few places until I kind of pinned somebody down..." P28</i>
	Beliefs about consequences	Concerns about the vaccine	No concerns	<i>"No [concerns], no, none at all because I mean you know, they have tested everything..." P12</i>
			Had some hesitancy about the vaccine, not problematic	<i>"I have like a little niggle in my head thinking gosh, you know, we haven't had any side effects now but is there something that's going to come out in the future, I've got that little niggle but then I've done it now." P15</i>
		Consequences from COVID-19	Perceptions of serious health consequences and impact on the NHS	<i>"...We've seen people coming in and out of hospital who've been at all ends of the spectrum, and we've seen people coming in and not coming out. I've lost colleagues through COVID who generally... have been really fit and well." P26</i>
		Consequences from the COVID-19 vaccine	Perceptions of limited negative health consequences from the vaccine	<i>"Couple of my colleagues felt a bit unwell and had headaches but was very mild and they got over them within twelve hours, you know." P17</i>
			Perceptions of negative consequences from the vaccine on their ability to work*	<i>"...She was unwell, the second one, she's fit, very fit and well but she was ill for twenty-four hours and that's unusual for her so I had it in the back of my mind and that's why I was glad it was a Saturday and I wasn't in work for mine" P5</i>
				<i>"I was lucky that I was actually on leave, you know, if I have to take sick and then that record will be against me because I've had to have the jab, you know." P21</i>
		Consequences from receiving the vaccine	Perceptions of positive consequences from themselves & others receiving the vaccine	<i>"I feel more confident now to probably to go back to work, to go back to a little bit more normality. I feel, you know, probably safer than not having the vaccine." P10</i>

COM-B	TDF	Factor	Description	Exemplar quote
Motivation	Beliefs about consequences	Consequences from receiving the vaccine		<i>"In some ways, with [the] COVID vaccine, if it makes any sense, it did a lot to your mental health thinking 'I've had the two vaccines now, I've got less chance of having those severe symptoms from it, which could cause anything'..." P11</i>
	Perceived necessity	For others	High perceived necessity for other people to have the vaccine	<i>"I tell anybody because people do always say to me have you had your vaccine yet? I said I have been fine, I said I know you can side effects and some people have been unwell, but if I talk to somebody in the street you know, or shopping, I always say to them, look when you are offered it, take it up." P4</i>
		For themselves	High perceived necessity for themselves to receive the vaccine	<i>"I wanted to boost my immune system and protect myself." P17</i>
	Perceived risk	High perceived risk	High perceived risk of COVID-19 severity/susceptibility/transmission	<i>"I think everybody is, well everybody in the right mind thinks, feels at risk from it." P35</i>
				<i>"I may be the transmitter, so I go from one patient, go to the next patient and then transmit it as well. That worries me a bit as well, not so much with the flu, but also with the COVID it worries me a bit more." P4</i>
	Reinforcement	Experienced consequences from COVID-19	Experiencing limited negative health consequences from COVID-19	<i>"No, well, it was very mild, it was, I think if I, hadn't worked in the health service, it mostly likely wouldn't have been picked up, but I was working one night and one of the girls I was working thought my face looked really flushed." P9</i>
			Experiencing negative health consequences from COVID-19	<i>"I was very unwell I mean, they kept on wanting me, to take me into hospital..." P25</i>
			Experiencing negative impact from COVID-19 infection on their ability to work/daily life	<i>"[I was] feeling so rough I just stayed in bed or laid on the settee. Couldn't really do a lot..." P17</i>
		Experienced consequences from the vaccine	Experiencing negative consequences from the vaccine	<i>"It was awful, it was actually, the second vaccine I had was actually worse than the Covid." P21</i>
			Experiencing limited negative consequences from the vaccine	<i>"I had no reaction from the COVID vaccine. The first one was fine, the second one I was aware of a bit of a sore arm but nothing, only when you turnover in bed, you know, but no side effects from it at all." P16</i>
	Social and professional responsibility	Professional responsibility	To protect patients, NHS, role model for colleagues, patients	<i>"...As a health worker and going into people's homes I have a duty to protect those people as well." P28</i>
Opportunity	Environmental context and resources	Communications and resources	Need more communications and resources, in advance of the appointment	<i>"I don't think there was enough information for me and like things were coming out, you know, oh it causes this, it could cause that, then all the blood clots and everything and it's just like ooh, you know, there's not enough information." P21</i>
			Need clear communications about the vaccine roll-out	<i>"And from the community we had heard that lots of staff and people working in offices were having it before ourselves you know, and we're out in the community. So, there was a bit of an issue at the beginning." P10</i>
				<i>"For the second one I was a bit concerned. I was told that the hospital I'd had the first one done in they weren't going to be doing the second one, so you're always concerned you're going to get missed..." P5</i>

COM-B	TDF	Factor	Description	Exemplar quote
Opportunity	Environmental context and resources	When to receive the COVID-19 vaccine	Having the option to receive it during working and non-working hours	<i>"In that sense, around when it was, how it was. If I'd have been at home on annual leave I would have been in to have it done....so that probably tainted. Going forward, how likely am I to say that I'm going to come in from my annual leave to have my vaccine? If I'm just told it's on Monday or whatever? Not so sure."</i> P31
				<i>"I mean I had mine on a day off and I was happy with that because they do thoroughly tell you that you could be unwell but yes, they were in work, so they shot off from work and it was fine..."</i> P5
			Co-administering covid and influenza vaccines would make it easier to receive in the future	<i>"For them to be given at the same time in the same sitting so you are minimising people you know, you are not asking people to come back in at two, four-week intervals."</i> P18
		Where to receive the COVID-19 vaccine	Location could be more local/ more options	<i>"But personally, for me, receiving it in my hospital of, of my base hospital, would be easier."</i> P25
				<i>"It was a little bit of a pain because I had to sort of drive – I had to leave in the middle of the day from work and drive - to another hospital that was, I can't remember, half an hour, forty minutes away and find somewhere to park and then I had to walk around the building a few times to find it"</i> P32
	Social influences	Social norms	Awareness that most people want or have had the vaccine	<i>"Well, I think everybody, like I said nobody declined it within the practise, everybody had it... the doctors and the frontline, more frontline staff knew that they had to have it because they are dealing with patients... you know, in the work environment the uptake was very, very good."</i> P21
		Social pressure	Perceived peer pressure*	<i>"Basically, it felt very pressured to get it, you know, you know, the various things she was saying, like, oh well if you don't get it I can't guarantee you're going to be able to have time off isolating if you need it or, you know..."</i> P32
		Social support	Encouragement and support from others	<i>"Because like when I've been there, when I've had a chance to speak to speak to some of them about all this COVID thing and all that, you know, they are very informative, they like, they like you to know, you know, oh it is safe, don't worry, don't listen to the scare mongering, you know."</i> P24
			Support to receive the vaccine	<i>"...Our head of [department] obviously had the list, he looked at our rosters and when we were in work etc., so we could have it whilst we were here really."</i> P33
			Supported to take time out of work to get the vaccine	<i>"I took time out of work, and I was told to, like, claim my travel expenses and things to where I had to travel to, to get it because it wasn't in my normal working area so yes, I was very well supported to get the vaccine."</i> P28
			Supported to take time off if experiencing short-term side-effects from the vaccine	<i>"I was supposed to have been in the night on the Wednesday and I cancelled, so I said to my manager, I said oh, I said I don't feel ill but I feel a bit like can't be bothered sort of thing, I said so can I take annual leave instead..."</i> P15

Key: * Reported by a small number of participants

Phase 1 summary

This project has identified the likely positive influences on influenza and COVID-19 vaccine uptake, as well as areas that could be improved in the future.

Our COM-B behavioural diagnosis identified the following likely positive **Capability (psychological)** influences on influenza and COVID-19 vaccine uptake.

- **Knowledge**
 - *about the virus* (i.e., understands the transmission of the virus and its impact)
 - *about who should receive the vaccine* (i.e., why they should be vaccinated, in addition to where, when, and how to access the vaccine)
 - *about vaccine safety and efficacy* (i.e., side-effects are likely to be mild and short-term and the benefits outweigh potential risks)
 - *about why the vaccine is needed* (i.e., value and benefit)
- **Ability to plan**
 - *to get the vaccine* (i.e., put plans in place to ensure they have the ability (e.g., time) to attend their appointment)
 - *to manage short-term side-effects* (i.e., ensuring they have the time, support, and provisions to recover if they feel unwell following the vaccine)

Our COM-B behavioural diagnosis identified some opportunity factors were challenging but were not overly problematic or a barrier to them receiving either the influenza or COVID-19 vaccine. However, we have identified the following likely positive **Opportunity (physical)** factors that could be improved in the future.

- **Accessible information and communications**
 - *accessible information about the vaccine, in advance of the appointment* (i.e., benefits and risks; small likelihood of side-effects)
- **Accessible resources to be able to get the vaccine**
 - *accessible resources to get the vaccine* (i.e., easy to use, accessible, and well-advertised resources)
 - *accessible environments to receive the vaccine* (i.e., local and familiar venues, preferably limiting travel, flexible options)

Our COM-B behavioural diagnosis identified the following likely positive **Opportunity (social)** influences on influenza and COVID-19 vaccine uptake.

- **Social influences and norms**
 - *encouragement and approval from others* (i.e., from family, friends, colleagues)
 - *social norms for receiving the COVID-19 vaccine* (i.e., from family, friends, colleagues)
- **Social support from others to make an informed decision**
 - *social support from others to make an informed decision to receive the vaccine* (i.e., information and support from family, friends, colleagues, vaccinators to make an informed decision without perceived pressure to be vaccinated)
- **Social support from others to receive the vaccine**
 - *social support from others to receive the vaccine* (i.e., having the time to make an informed decision; having allocated time and support from their manager to receive the vaccine; having support from their manager to have time-off if unwell following the vaccine)

Our COM-B behavioural diagnosis identified the following likely positive **Motivation (reflective)** influences on influenza and COVID-19 vaccine uptake.

- **Belief that getting the vaccine is necessary**
 - *receiving the vaccine will lead to positive outcomes for themselves and others* (e.g., reducing infections; reducing hospitalisations; feeling more confident/ protected/ safer; reducing risk of serious health consequences from infection; protecting family, friends, colleagues, patients, NHS; reducing staff sickness and ability to work)
- **Low concerns about the vaccine**
 - *Low concerns about the vaccine* (e.g., small likelihood of short-term side-effects, high levels of safety and efficacy)
- **Perception that it is part of their professional role to receive the vaccine**
 - *Holding a professional role and identity to receive the vaccine to protect themselves and others* (e.g., protect their patients, protect the NHS)
 - *Holding an identity of someone who wants to be a role model for others* (e.g., a role model for their colleagues and patients)

While all of the factors listed above are likely to be important for supporting the uptake of vaccines, our behavioural diagnosis has identified key areas to target in future interventions.

For *influenza* vaccine uptake, our behavioural diagnosis suggests that we need to address the following key *motivational barriers* and put plans in place to optimise *social opportunity*:

- Increase perceptions of **need** for the influenza vaccine for protecting themselves, others, and the NHS
- Increase perceptions of **positive consequences** from receiving the influenza vaccine, for protecting themselves, others, and the NHS
- Address perceptions of **negative or uncertain consequences** from receiving the influenza vaccine and support people to manage any potential negative consequences
- Ensure people receive **support from work** to make an informed decision and to receive their vaccine with time to recover from any side effects

For *COVID-19* vaccine uptake (both for those who remain hesitant, or supporting uptake of future vaccines), our analysis suggests that we need to ensure that *motivation* and *social opportunities* remain high based on the findings from participants that had received their *COVID-19* vaccine(s):

- Increase perceptions of **need** for the COVID-19 vaccine for protecting themselves, others, and the NHS
- Increase perceptions of **positive consequences** from receiving the COVID-19 vaccine, for protecting themselves, others, and the NHS
- Address perceptions of **negative or uncertain consequences** from receiving the COVID-19 vaccine and support people to manage any potential negative consequences
- Ensure people receive **support from work** to make an informed decision and to receive their vaccine with time to recover from any side effects

Phase 2

To co-produce new interventions with NHS employees in Wales to support influenza and COVID-19 vaccination uptake.

Phase 2 methods

NHS employees employed by CTMUHB were recruited into the study between July 2021 and August 2021. Both clinical and non-clinical healthcare workers of CTMUHB were eligible to take part. Participants who self-reported that they were: employed by CTMUHB; working in any role within an acute or community setting; in contact with patients; aged ≥ 18 years; willing to provide self-reported influenza vaccination status; willing to take part in two co-production workshops and; able to give informed consent were eligible to take part.

Recruitment

Participants that had participated in Phase 1 and expressed an interest in participating in Phase 2, were contacted by the research team. The research was also advertised to CTMUHB employees through the same staff Facebook page, as used in Phase 1. Those who expressed an interest in participating were asked about their influenza vaccination history to ensure that CTMUHB employees with low and high uptake of the influenza vaccine were recruited. All participants were provided with an online participant information sheet and written informed consent was obtained prior to participation. All study information was provided in English and Welsh. Participants were offered a £50 e-voucher as a token of thanks for their participation.

Data collection

Participants took part in two 2-hour co-production workshops as part of one of two cohorts of participants: one low influenza uptake and one high influenza uptake. This ensured that participants felt comfortable to speak openly and honestly about their own and others experiences of receiving or not receiving vaccines, without fear of potential stigmatisation or judgment from others. Workshops were held using an online platform, and there was a 1-week gap between the first and second workshops. All participants chose for the co-production workshops to be conducted in English.

The content for each co-production workshop utilised and explored the findings from the Phase 1. For both cohorts, the content for workshop 2 built upon and utilised the findings from workshop 1. Figure 3. outlines the content of workshops 1 and 2, for both cohorts.



Pre-workshop 1
<ul style="list-style-type: none"> • The research team generated a long-list of identified barriers and facilitators (B&F) for vaccination uptake, from the Phase 1 data
Workshop 1
<ul style="list-style-type: none"> • Prioritisation tasks: which B&F should be targeted in future interventions • Intervention development tasks: broadly exploring interventions to support vaccination uptake, with no resource limitations (e.g., money, time) • Testing interventions: using personas (fictional CTMUHB employees who vary in job role and capabilities, opportunities, and motivations to receive the vaccines) to develop intervention ideas
Between workshops
<ul style="list-style-type: none"> • The research team consolidated the findings and applied their knowledge of behaviour change theory (COM-B and BCW) to develop broad intervention ideas to address the identified B&F
Workshop 2
<ul style="list-style-type: none"> • Intervention refinement tasks: refining intervention content (what does it need to do) and delivery (who needs to do what, when, where, and how) • APEASE tasks: exploring the likely: Acceptability, Practicability, Effectiveness, Affordability, Side-effects, and; Equity of the interventions • Testing interventions: using personas to explore the APEASE criteria for each intervention idea

Figure 3. Overview of the co-production workshop content

Data analysis

All workshops were audio-recorded to allow the researchers to listen back to the topics that had been discussed. Data was collected from the researcher's field notes and the outputs that were created during the tasks in the workshops. Data from both cohorts were similar and therefore analysed together, rather than separately.

Phase 2 findings

Sample

In total, five CTMUHB employees attended the workshops (two were classified as having low uptake of the influenza vaccine – all participants had received both doses of their COVID-19 vaccine). The participants were split into two cohorts based on their influenza vaccine history, to ensure that participants felt comfortable discussing any reasons why they had or had not previously received a vaccine. All participants were employed in clinical roles within CTMUHB and four were female. The first workshops lasted approximately 2 hours and the second workshops 1.5 hours.

Across both cohorts, there was consensus that the following five barriers needed to be targeted in order to support vaccination uptake.

1. Increase perceptions of personal perceived need for the vaccine (motivation)
2. Address concerns about side-effects and their impact (motivation)
3. Increase awareness of the different opportunities and ways in which they can receive a vaccine (e.g., appointments, drop-in sessions), as well as their entitlement to having a vaccines (capability)
4. Have support from others to help them receive the vaccines (opportunity)
5. Be aware that their colleagues are also receiving vaccines (opportunity)

Interventions to help address those identified barriers were explored in the workshops. Across both cohorts, there was consensus that the following five interventions could help target those key barriers.

1. Conversations with people
2. Written communications
3. Providing support for CTMUHB employees
4. Seeing 'people like me' getting vaccinated
5. Providing flexible opportunities to be vaccinated

The following section provides further details as to how these intervention ideas could be implemented in CTMUHB, based on the data from the workshops. Participants were supported to apply the APEASE criteria (Acceptability, Practicability, Effectiveness, Affordability, Side-effects, and; Equity) for each intervention, to help evaluate the potential effectiveness and practicability of implementing each intervention at CTMUHB. The research team reflected upon how best the interventions could be implemented from their knowledge and experience of implementing behaviour change interventions.

For each intervention idea, we applied the Behaviour Change Wheel to identify likely intervention functions and Behaviour Change Techniques (BCTs) that would be most effective in supporting vaccine uptake. For each COM-B component, intervention functions and policy categories are specified, that are likely to be effective in changing behaviour (i.e., vaccination uptake). BCTs outline 'active ingredients' of the interventions, that have been demonstrated to be effective at changing a variety of behaviours (Michie et al, 2013).

Intervention one: Conversations with people

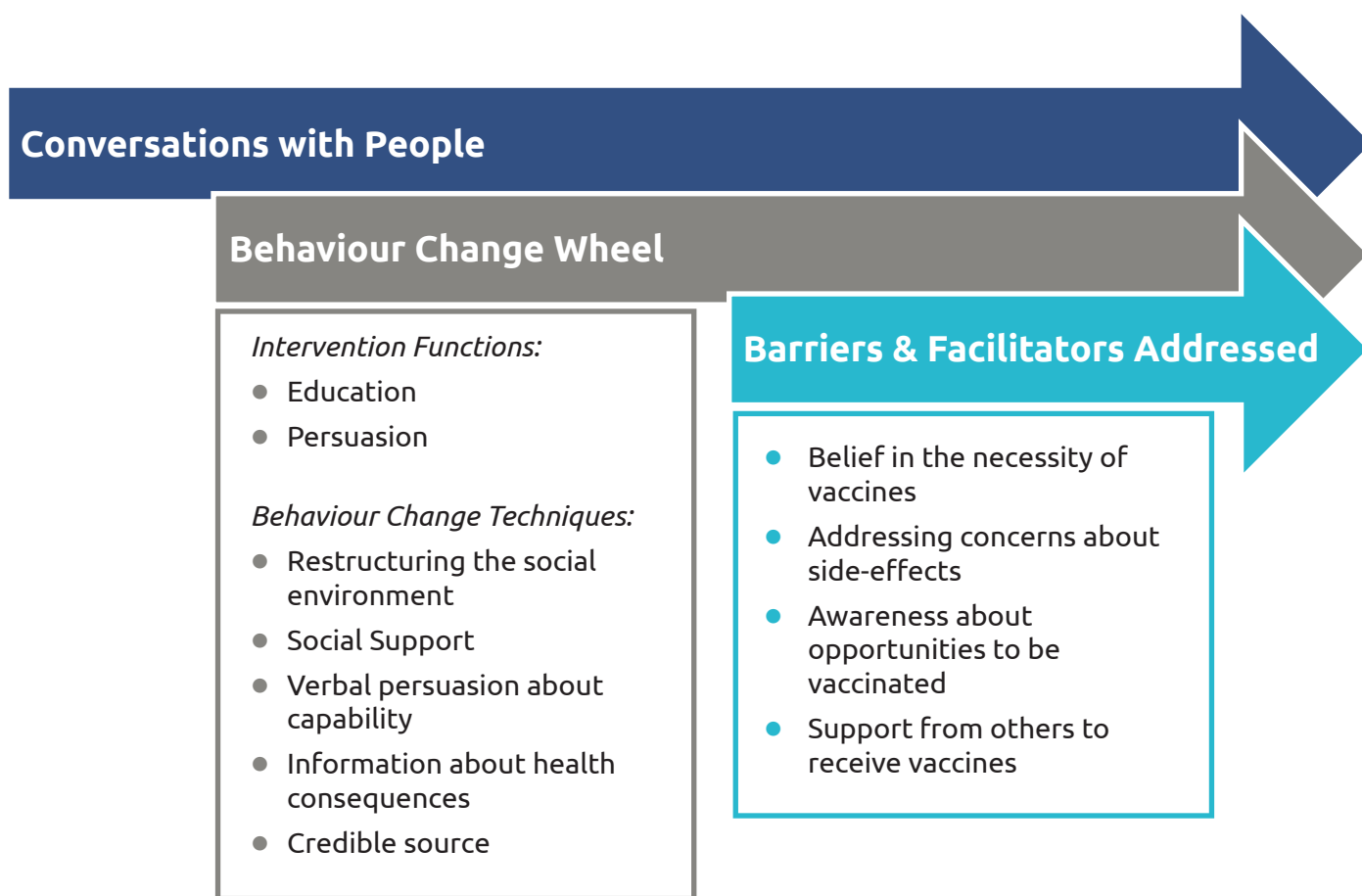


Figure 4. Intervention one: Conversations with people

Intervention content

Conversations were viewed as an opportunity to educate and persuade CTMUHB employees about:

- The risk of virus transmission
- Perceived necessity of vaccines
- Potential side-effects and their impact
- How, when, and where they could receive a vaccine that worked for them (e.g., suitable appointment or drop-in session).

When the intervention would take place

- Opportunities for conversations would be available before a CTMUHB employee has had a vaccine, giving them an opportunity to raise any concerns about the vaccine and seek further support and information if needed.
- CTMUHB employees should be supported to make an informed choice about receiving a vaccine, rather than feeling pressured into having it.

Where the intervention would take place

It is important that there are different opportunities for conversations to take place and that a CTMUHB employee can choose a time and place that is best for them.

- Walk arounds by members of the vaccination teams.
- A dedicated telephone line to allow CTMUHB employees to discuss vaccines with a member of the vaccine team, as well as book an appointment.
- Facebook groups or WhatsApp groups could be set-up to allow CTMUHB employees to ask questions privately.
- Support drop-in sessions/ workshops with vaccination teams could be set-up in different locations (e.g., near main entrances, lecture theatres). Workshop sessions could be recorded and shared for people to watch in their own time.

Who should deliver the intervention

- CTMUHB employees do not necessarily want to have these conversations with people they know or managers, but they would be willing to speak to someone who they feel is friendly, approachable, and relatable.
- This person would need to have the necessary skills to be able to deliver the intervention, including skills in the ability to have non-judgemental conversations.
- The person would need to have knowledge about the CTMUHB employee's role in order to support them to identify and access opportunities to receive the vaccine that are appropriate for them and their work commitments.

APEASE criteria

- Could be costly in terms of training requirements/ time commitments.
- Could be cost-effective in the long-term, as there would be minimal training required for future years and increased uptake of vaccines could lead to reduced staff absenteeism.
- Ensuring vaccination teams visit all staff groups would support intervention equity.
- Potentially acceptable for CTMUHB employees as there were several options available for them to access the intervention.
- The privacy of using online groups (e.g. Facebook, WhatsApp) would have to be checked to ensure any information shared through these groups remain private.

The researchers reflected upon this intervention and felt there is also the potential for unintended negative consequences if the person delivering the intervention has not been trained adequately to have supportive conversations with CTMUHB employees. It would be beneficial for these people to be trained in a conversation style such as Motivational Interviewing (Miller & Rollnick, 2002).

Intervention two: Written communications

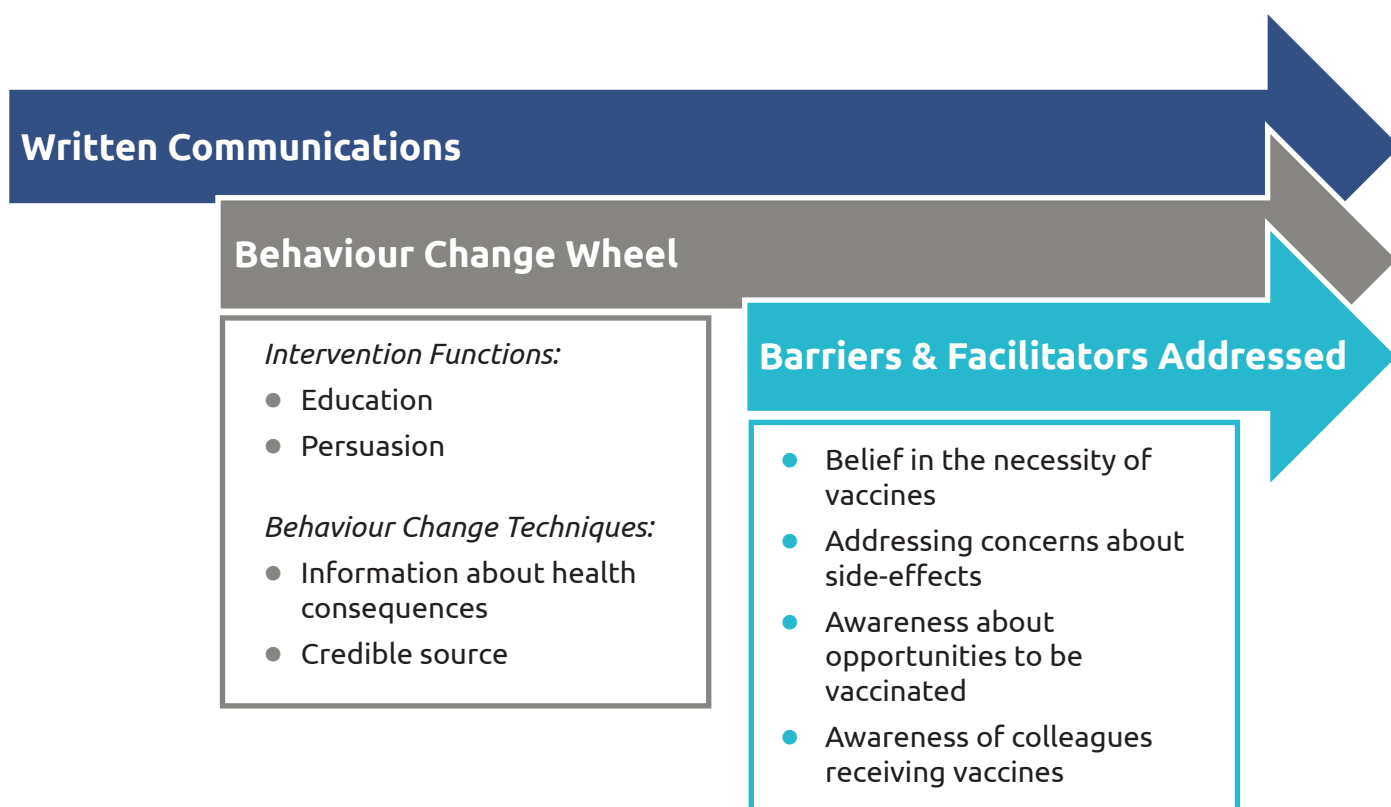


Figure 5. Intervention two: Written communications

Intervention content

Written communications were viewed as an opportunity to educate and persuade CTMUHB employees about:

- The risk of virus transmission.
- Perceived necessity of vaccines.
- Potential side-effects and their impact.
- How, when, and where they could receive a vaccine that worked for them (e.g., suitable appointment or drop-in session).

Messages should:

- Be positively framed and promote the benefits of vaccines, rather than focusing on the negative consequences of declining a vaccine, or potential side-effects.
- Promote the benefits of the vaccine in helping to keep patients and families safe.
- Signpost CTMUHB employees to further information about the vaccines.
- Use accessible language, to accommodate any differences in employee literacy levels.
- Provide links to further information about the vaccine and where, when, and how to book on posters and leaflets (e.g., website link, QR codes).

Where the intervention would take place

Ideas for message format and delivery included:

- Posters, leaflets.
 - Posters should be in areas where there is high footfall within the hospitals, for example in cafeterias, entrances / main corridors, and back of toilet doors. There are already a number of posters on noticeboards, therefore any posters should be placed in different locations so that they stand out and are noticeable.
 - Delivered directly to CTMUHB employees; any leaflets left for staff to collect on their own volition are likely to be ignored.
 - To ensure that all CTMUHB employees are reached and increase perceptions of the value and benefit of vaccines for themselves, posters and leaflets need to be made available in different staff spaces.
- Avoid using the staff intranet for the delivery of messages, as staff can find it difficult to navigate.
- Social media posts/ Staff CMTUHB Facebook group (which also offers the opportunity to access messages outside of working hours).
- A vaccine-specific website, which in addition to providing messaging and communications about the vaccines, could provide a mechanism for booking appointments/ identifying where and when there are drop-in sessions across CTMUHB.
- Wallpaper or screensavers on staff computer screens.

Intervention source

Messages should be:

- Appealing and relevant to all CTMUHB employees in different job roles, to ensure they know that vaccines are necessary for themselves.
 - Have staff from different job roles in the imagery used/message source.
- From local sources (e.g., CTMUHB), rather than national sources (e.g., NHS Wales, PHW).

APEASE criteria

- Could be affordable as the messages could be reused each influenza season (if there are no changes to the message content i.e., website/telephone number).
- Could be acceptable for all CTMUHB employees, however work is needed at the outset to ensure all staff groups are reached and targeted.

Intervention three: Providing support for CTMUHB employees

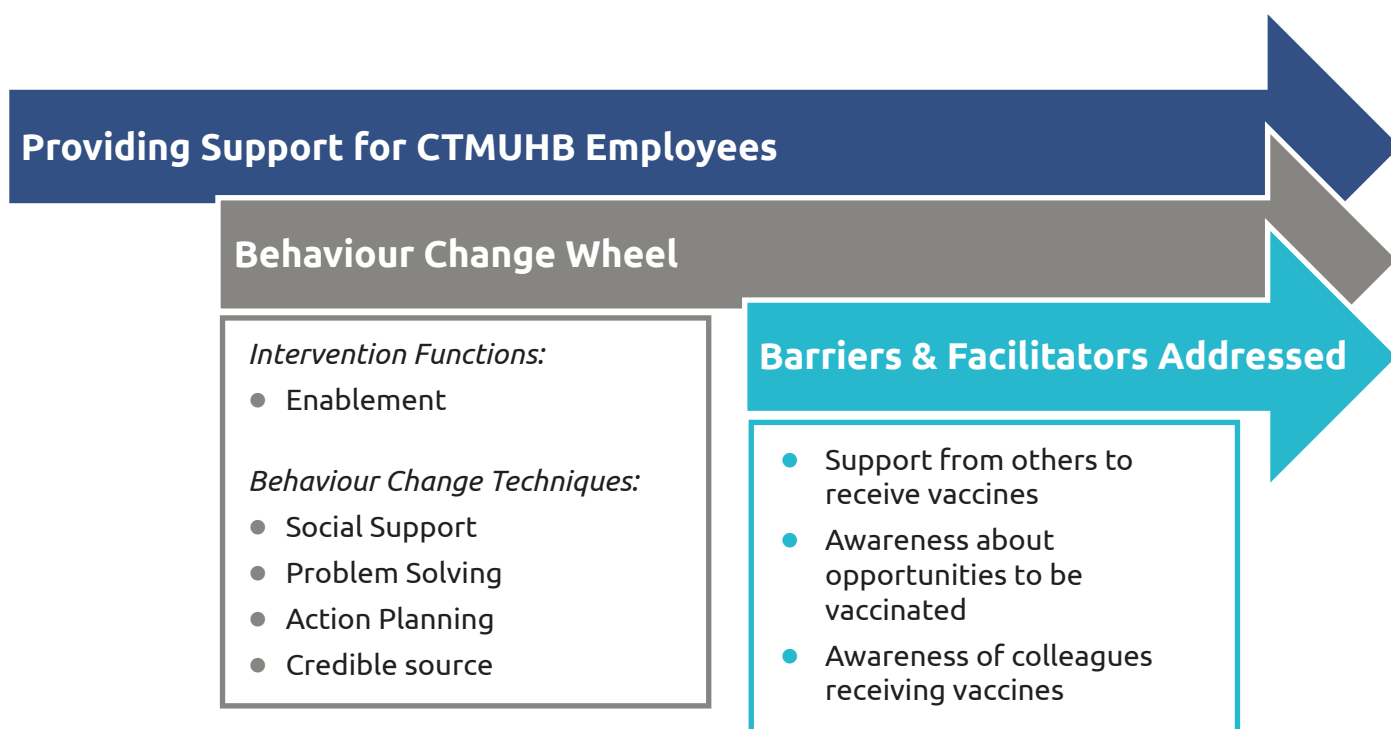


Figure 6. Intervention three: Providing support for CTMUHB employees

Intervention content

Providing in-person support for CTMUHB employees was viewed as an opportunity to enable CTMUHB employees to receive their vaccines. The intervention would include designated CTMUHB employees:

- Increasing awareness of where and when colleagues can receive their vaccines, including having supportive (non-judgemental) conversations to discuss the benefit and value of vaccines and address any concerns.
- Attending vaccination appointments with colleagues that are unsure or fearful of receiving vaccines (e.g., those who have a fear of needles).
- Acting as role models by receiving the vaccine.

Who should deliver the intervention

'Staff Champions' were suggested as an opportunity for CTMUHB employees to receive support.

- Staff Champions should include people from different job roles and working at different levels across CTMUHB.
- Managers should support the Staff Champions, but not necessarily be Staff Champions as this would likely make CTMUHB employees feel like they are being forced to receive the vaccines, and it is important that people feel able to make an informed decision.

- Ideally, a Staff Champion would be someone working within a person's own work team, who they already know and are familiar with.
 - Staff Champions should be available for each staff group, in particular, for non-clinical groups (e.g., catering staff, receptionists) who may have less exposure to other vaccine messages/communications and who may perceive vaccines to be less necessary for them compared with clinical groups.
 - Staff Champions should be familiar with the employees work roles and responsibilities, so that they can identify and support employees to access vaccination opportunities that are most suitable for them.
- Staff champions would need:
 - Support from their organisation/ their employer to undertake this role.
 - Training to ensure they have the necessary skills to support CTMUHB to receive their vaccines.

APEASE criteria

- Ensuring staff champions are represented, and reach, all staff groups would help ensure intervention equity.
- Could be an acceptable intervention if staff champions are representative of different staff groups.
- Could be expensive, as staff champions would need to receive training to undertake this role, and time away from their current role.
- Could be cost-effective in the long-term if it supported vaccination uptake and lead to a reduce in staff absenteeism.

The researchers reflected upon this intervention and felt there is also the potential for unintended negative consequences if the person delivering the intervention has not been trained adequately to have supportive conversations with CTMUHB employees. It would be beneficial for these people to be trained in a conversation style such as Motivational Interviewing (Miller & Rollnick, 2002).

Intervention four: Seeing 'people like me' getting vaccinated

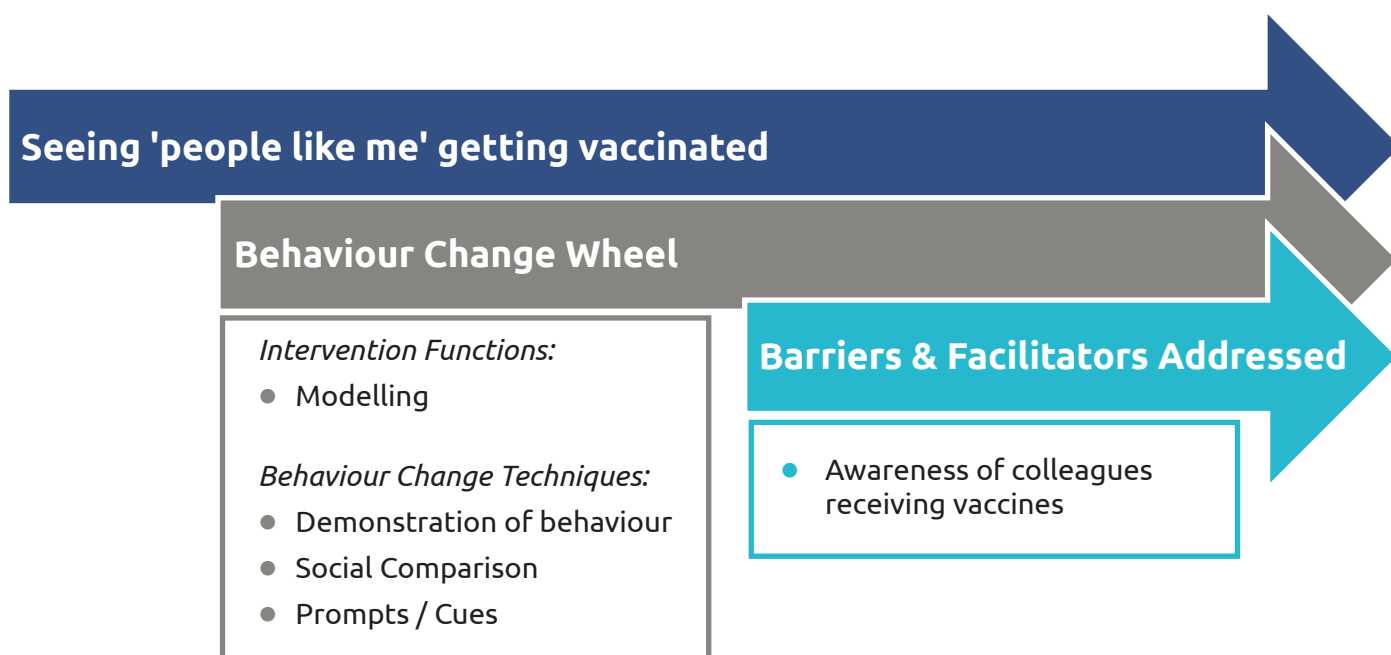


Figure 7. Intervention four: Seeing 'people like me' getting vaccinated

Intervention content

Providing examples for people to aspire to or model (e.g., seeing people 'like me' receiving the vaccines) was viewed as an opportunity to support vaccination uptake among CTMUHB employees. The intervention should include examples of different CTMUHB employees (in different roles) receiving the vaccines, including examples of when, where, how, and why they received their vaccines. This intervention would:

- Provide examples for other CTMUHB employees to aspire to and emulate.
- Provide an opportunity to raise awareness of the vaccination team and vaccination locations across CTMUHB.
- Increase familiarity with the processes involved in receiving vaccinations.
 - Avoid images/videos of people actually receiving the vaccine, as this may put some people off, especially if they have a fear of needles.

Where the intervention would take place

- Posters, leaflets.
- Videos or 'talking heads' of colleagues.

Message source

- Images/ videos of people representing a range of different staff groups at CTMUHB, especially non-clinical staff groups.
- The staff do not have to be medically trained or in managerial roles; what is most important is that CTMUHB employees see examples of people 'like them' receiving vaccines.

APEASE criteria

- Could be affordable and cost-effective, as it only requires communications to be made that document how people have received their vaccines.
- Potentially equitable, especially if the messages include imagery of different staff groups (especially non-clinical staff).
- There were concerns that CTMUHB employees who have a fear of needles/uncomfortable with vaccines may avoid these messages; care should be taken to avoid imagery/videos of people actually receiving the vaccine.

Intervention five: Providing flexibility in opportunities to receive the vaccines

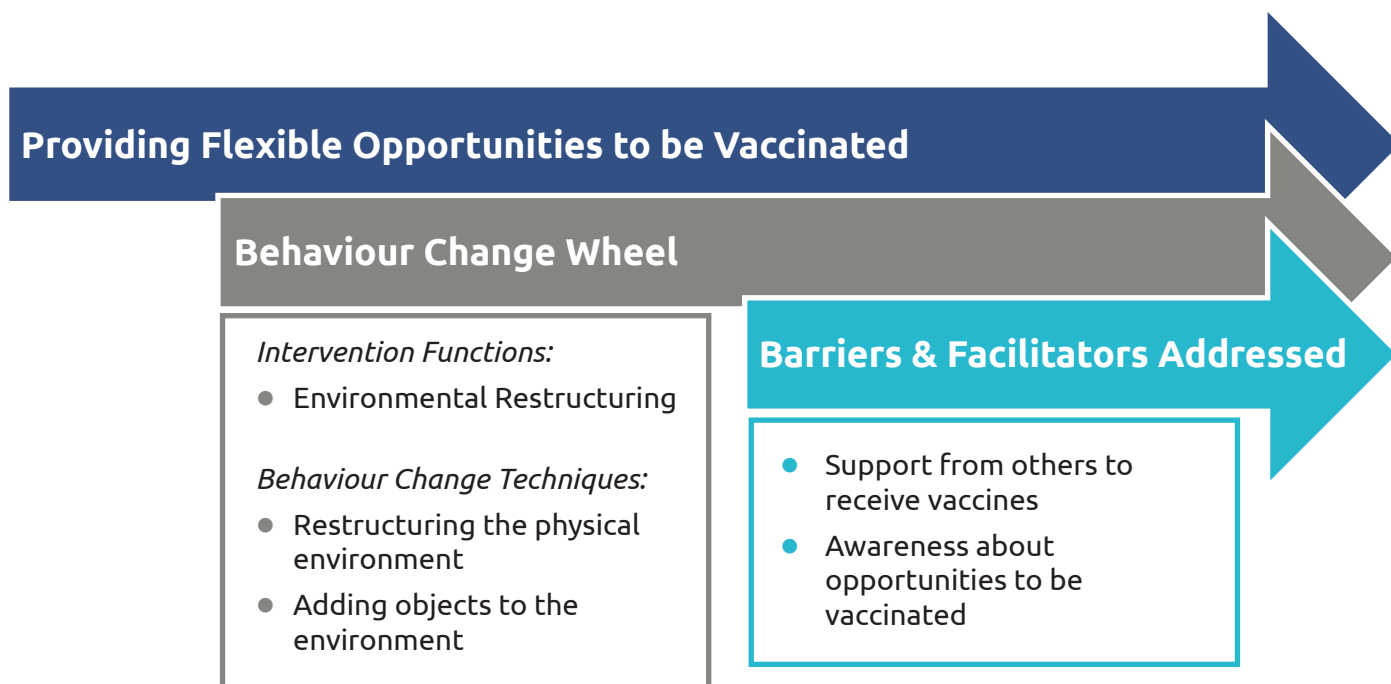


Figure 8. Intervention five: Providing flexible opportunities to be vaccinated

Intervention content

Participants discussed changes to the physical context (environmental restructuring) that could support vaccination uptake.

- **Time:** Vaccination appointments should be available 24/7 so CTMUHB employees can access their vaccination at a time that suits them. Consideration needs to be given to those working night shifts and ensuring availability of appointments before, during, and after their shifts.
- **Types of appointments:** Having the option of appointments and drop-in sessions could help support uptake, by offering additional flexibility.
- **Arranging vaccinations:** Having the ability to book appointments/ identify available drop-in session times themselves, either through an online booking system or over the telephone. This could also provide the opportunity for an employee to ask any questions prior to their appointment.
- **Vaccination team walk arounds:** Having vaccinators attend the areas where CTMUHB employees work to arrange bookings could be helpful, as employees would not need to make the effort to book an appointment/identify a drop-in session time themselves.

APEASE criteria

- Could be expensive as it requires more staff time to reach all staff groups. Having 24/7 availability could be expensive and impractical, due to staff costs.
- Although potentially costly, it was acknowledged that this could lead to longer-term savings if uptake of the vaccines increases, therefore reducing staff absenteeism.
- The blended approach of appointments and drop-in sessions was believed to be suitable for all CTMUHB employees and likely to be acceptable by employees.

Discussion



There are a range of barriers and facilitators that influence vaccine uptake among CTMUHB employees, as well as several potential interventions that could help address those barriers. The co-production workshops produced five interventions that could be implemented at CTMUHB. These are:

1. Conversations with people – ensuring there are trained CTMUHB employees that are able to answer any questions that an employee may have in relation to receiving a vaccine and provide advice regarding when and where they could receive a vaccine, as well as why and the potential side-effects of the vaccines.
2. Written communications – using messages to encourage CTMUHB employees to have their vaccines, as well as providing information regarding how they can receive their vaccines.
3. Providing support for CTMUHB employees – having CTMUHB employees that an employee can relate to, provide support in arranging or attending vaccines, as well as provide advice regarding the vaccination process.
4. Seeing ‘people like me’ getting vaccinated – using CTMUHB employees working in different roles to demonstrate that the vaccines are available and necessary for all employees.
5. Providing flexible opportunities to be vaccinated – ensuring that there are different options as to how (e.g. appointments and drop-in sessions) and when employees can receive their vaccines.

Each of these interventions would overcome the different barriers to vaccine uptake, identified by participants in Phase 1. The practicality of implementing each intervention at CTMUHB has also been discussed using the APEASE criteria. It is unlikely that all of these interventions could be implemented at CTMUHB due to the resources that would be needed. The following section suggests an intervention that we feel would be most effective for the upcoming 2021/2022 vaccine season and for future vaccine seasons. We also suggest interventions to consider for future vaccine seasons which would require more time and resources to plan and implement.

Recommendations for the 2021/2022 influenza roll-out

Recognising the fact that CTMUHB will not be able to implement all the suggested interventions for the 2021/2022 influenza vaccine roll-out, we suggest that **behavioural-science messaging and communications** could be used to address the key barriers for vaccine uptake (as identified in Phase 1) this season; this intervention meets the APEASE criteria.

Behavioural-science informed messages and communications have the potential to *educate, persuade*, and could provide an example for people to emulate (*model*).

Messages and communications would incorporate two of the broad intervention ideas co-produced with NHS employees: Written communications (intervention 2) and Seeing 'people like me' getting vaccinated (intervention 4).

To support influenza vaccine uptake, future COVID-19 vaccine uptake, and if a synchronous delivery of influenza and COVID-19 vaccines is planned, we recommend that the same recommendations for behavioural science informed messaging apply to influenza and COVID-19 vaccines.

Table 4. provides an overview of the intervention content, source and format, and mode of delivery, as well as the key barriers addressed in the intervention.

Evidence base

There is evidence to support the use of messages to promote vaccine uptake:

- Lawes-Wickwar and colleagues (2021) conducted a rapid systematic review exploring health messages promoting vaccine uptake for infectious diseases (including influenza). Behavioural beliefs and intentions were improved when messages were; shorter, risk-reducing, the benefits of vaccines to society were emphasised, and concerns about vaccine safety were addressed. Messages that were clear, from credible sources, and in a language the target audience could understand were also associated with higher acceptability.
- Lazic and colleagues (2021) conducted an online experiment and reported that messages which communicated the social benefits of herd immunity increased self-reported vaccination intentions.
- Moon and colleagues (2021) reported that intentions to receive a influenza vaccine increased when healthcare workers were exposed to autonomy-supportive communication messages (i.e. upholding freedom of choice) when compared to messages with a controlling communication style (i.e. thwarting choice by implying obligation).

Table 4. Messaging and communications: recommendations for intervention content, source, format, and delivery

Behavioural-science informed messaging and communications

Barriers Addressed	Content	Source and format	Delivery
Increasing perceptions of the value and benefit of vaccines for all staff groups	Positive-framed messages emphasising the value and benefit of vaccines.	Include images and messages that represent different staff groups (e.g., clinical and non-clinical), to represent 'people like me' receiving the vaccine	Ensure messages reach all staff groups by using a range of different delivery methods: e.g., posters, social media posts, staff CTMUHB Facebook group; computer screensavers.
Addressing concerns about side-effects and their impact	Address potential side-effects and their impact, including links for further information and support	A range of short videos representing different staff groups (e.g., clinical and non-clinical), to represent 'people like me' receiving the vaccine	Posters should be placed in areas where there is high footfall and where all staff groups can see them.
Increasing awareness about opportunities to be vaccinated (how, where, when, to get the vaccine)	A range of positive-framed messages emphasising different reasons for receiving the vaccine e.g., messages emphasising the importance of vaccines for protecting themselves, their loved ones, patients, colleagues, NHS.	A range of short written messages representing different staff groups (e.g., clinical and non-clinical) to represent 'people like me' receiving the vaccine	
Increasing awareness of colleagues receiving vaccines (e.g., people like me receive the vaccine)	<p>Ensure messages include information about how, when, where they can get a vaccine (e.g., written messages should include links to CTMUHB resources)</p> <p>Ensure messages include information about how to access further information and support about vaccines (e.g., written messages should include links to reputable resources)</p> <p>Ensure messages use accessible language/avoid text-heavy messages or long videos</p>	Include CTMUHB specific branding/ logos	

Recommendations for future vaccination rollouts

We suggest that an intervention that aims to provide in-person support for CTMUHB employees (e.g., such as 'staff champions') is a promising intervention that could be explored in future vaccination rollouts.

Staff champions have the potential to educate, persuade, provide an example for people to emulate (*model*), and enable people to receive their influenza and COVID-19 vaccines by increasing means to do so or reducing barriers (*enablement*).

Peer vaccinators are a key strategy within CTMUHB for increasing staff influenza uptake. They are ideally placed to address many of the capability, opportunity, and motivational factors that were identified as being important for vaccine uptake in Phase 1. This includes (but not limited to) ensuring people have a plan to receive their vaccine, especially if they are unable to receive their vaccine immediately due to other competing demands (Capability), improving the accessibility of the vaccine (i.e., advertisement, flexible appointments, drop-in services) and offering encouragement and support to get the vaccine (i.e., help with planning, transport) (Opportunity), and increasing people's motivation to receive the vaccine, including persuading people about the benefits of vaccination for themselves and others, and eliciting and addressing any concerns or misconceptions they might have about the vaccine ('myth busting') (Motivation).

Peer vaccinators are unlikely to offer this kind of support and have these kinds of persuasive conversations without having additional training. Across different behaviour change contexts, the delivery of opportunistic behaviour change interventions delivered by healthcare professionals can result in behaviour change (Aveyard et al., 2012), but opportunities to address health behaviours are often missed (Noordman et al., 2010). In the context of staff influenza vaccine uptake, peer vaccinators are a common method used across NHS Trusts in England to make the vaccination more accessible, however; previous research has demonstrated no significant differences between higher and lower uptake NHS trusts in England for use of this strategy (Stead et al., 2019). Adding to this complexity, the results from Phase 1 demonstrate that some people may perceive peer pressure to receive their vaccine.

This suggests that it may be useful to address how peer vaccinators (or staff champions) interact with other staff and have conversations.

Peer vaccinators are in an excellent position to increase staff influenza uptake within CTMUHB. The results from Phase 1 and existing research suggests a need for research to build upon and optimise the peer vaccinator strategy. In particular:

- Co-producing new training models and resources that help peer vaccinators identify and address different barriers and facilitators associated with staff influenza uptake from Phase 1.
- Identifying the barriers and facilitators for peer vaccinators to deliver those interventions to increase staff influenza and COVID-19 vaccination uptake within CTMUHB using the COM-B model, and co-producing new training materials with peer vaccinators that addresses those identified barriers and facilitators.

Strengths and Limitations

This section outlines the strengths and limitations of this research project. A particular strength is the large number of in-depth interventions conducted with CTMUHB employees, in clinical and non-clinical roles, which means that the study findings are potentially transferable to other Health Boards in Wales, and to other UK healthcare settings more widely. By using appropriate behavioural science theory and theoretical frameworks, we were able to explore in-depth the range of barriers and facilitators influencing vaccination uptake and link the co-produced intervention recommendations to specific barriers. By co-producing interventions with CTMUHB employees, we were able to ensure that the intervention recommendations reflect the needs and priorities of employees, whilst ensuring that the intervention recommendations would be feasible and acceptable to be implemented within CTMUHB in current and future vaccination programmes.

It was challenging to recruit people who had low uptake of the influenza vaccine. This was likely in part due to COVID-19 which changed people's perceptions of the need for influenza vaccination, and which resulted in higher rates of uptake than in previous years. We acknowledge that the participants recruited might not reflect common experiences, particularly as we excluded participants that had not had their COVID-19 vaccine due to the small sample size ($n=2$). We recommend future research examines the extent to which these barriers and facilitators are prevalent using surveys with representative larger samples. Lastly, few people were able to participate in the co-production workshops due to their work commitments and the time of year when they were held. However, it was reassuring that there was good agreement between the two cohorts in the factors prioritised as being important for supporting vaccination uptake, as well as the intervention recommendations.

Conclusion

Vaccinations programmes for influenza and COVID-19 are vital to protect NHS staff and their patients but the success of the programme relies on uptake. This research has utilised behavioural science theory to identify key barriers and facilitators to the uptake of influenza and COVID-19 vaccinations in CTMUHB employees. The findings highlighted a range of barriers that interventions need to address to maximise uptake.



Co-production workshops enabled the identification of a range of interventions that met the perceived needs and priorities of CTMUHB employees, and which drew on behavioural science frameworks to match the identified barriers to uptake for both annual influenza and COVID-19 vaccinations. This included behavioural science-informed messages and communications that address a range of barriers. An additional intervention, likely to be of value, is to train some CTMUHB employees as staff champions to have supportive conversations with their peers to elicit and address concerns or misconceptions and to provide practical support beyond the scope of messages and communications. Further work is needed to develop to specific messages/communications, to change local practices to make vaccination access easy and flexible, and to co-produce a training programme for staff champions.

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