



Research paper

Improving uptake of seasonal influenza vaccination by healthcare workers: Implementation differences between higher and lower uptake NHS trusts in England

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Abstract *Background:* Uptake of influenza vaccination by healthcare workers (HCWs) may be related to how influenza campaigns are implemented. This study explores differences in annual influenza campaign implementation between NHS trusts (healthcare organisations) with higher and lower vaccine uptake.

Methods: A cross-sectional survey with influenza campaign staff in 2016/2017 in 87 NHS trusts in England. The survey measured vaccination policy and uptake target, staff involvement, accessibility, use of peer vaccinators, communication strategies, strategies to address HCW concerns, use of incentives, and management support. The analysis considered implementation differences between higher (n = 50) and lower (n = 37) uptake trusts.

Results and Conclusions: Higher uptake trusts were more likely to set higher uptake targets, involve a broader range of staff groups in the campaign, and make the vaccine easy to access by core or hard-to-reach HCWs. Higher uptake trusts were also more likely to use a greater range of communication strategies, provide real-time feedback on uptake, provide a greater range of incentives to be vaccinated, and have vaccine uptake considered important by managers. Successful influenza vaccination programmes are multifaceted and involve implementation factors at a strategic, organisational, logistical, and personnel level. Lower uptake trusts could improve uptake by identifying and implementing examples of best practice from higher uptake trusts.

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Highlights

- Uptake of influenza vaccination by healthcare workers (HCWs) varies between NHS trusts in England.
- We conducted a survey to assess whether implementation factors may explain some of this variation.
- Varied skills in implementation teams and easy vaccine access were associated with higher uptake.
- Communications, incentives, and management support were also associated with higher uptake.
- Uptake may be increased by adopting best implementation practices used in higher uptake trusts.

Introduction

The seasonal influenza ('flu') vaccination has been shown to be effective and safe [1–3] and lower rates of seasonal influenza in healthcare workers (HCWs) reduce illness-related absenteeism [4,5]. Accordingly, HCWs in the National Health Service (NHS) in England are advised to have an annual vaccination against seasonal influenza ('flu') to reduce their risk of contracting the illness and transmitting it to other members of staff or service users [6]. Although uptake of the seasonal influenza vaccination by HCWs in England has increased over the past decade, reaching 68.7% in 2017–2018 [7], the national average still falls below the NHS national target of 75% [8].

There are several factors which can influence uptake of influenza vaccination among HCWs. On an individual level, knowledge and attitudes about the vaccination, concerns about safety, level of perceived risk, sense of employment duty, and demographic factors have been linked to variation in uptake among HCWs [9–13]. At an organisational level, the policy adopted towards seasonal influenza vaccination, for example whether a mandatory or voluntary approach is adopted, can also generate variation in uptake [14–16]. From a practical perspective, research has suggested that uptake is influenced by how influenza vaccination programmes are implemented. Implementation factors include perceived and real ease of accessing the vaccination, widespread availability to HCWs, use of peer vaccinators, educational strategies to address misconceptions and concerns, use of 'vaccine champions' (i.e. influential members of staff who promote the importance of vaccination), communication strategies, and the use of incentives [9,13,16–22].

There is a wide variation in vaccination uptake across NHS trusts¹ in England, ranging from 18.4% to 95.7% in 2016/2017 [8]. Such variation lends support to the idea that organisational and implementation factors play a role in explaining how some trusts achieve high vaccination uptake and others comparatively lower. To help improve uptake among trusts, the organisation which provides information and resources to help NHS trusts in England to run their annual influenza campaigns for HCWs (NHS Employers) has begun to promote a model of good practice. This model is

based around seven benchmark elements which have been recommended for a successful influenza campaign, based on extant literature and case studies of successful trusts [1]: having a balanced team to help plan, promote and deliver the vaccination programme [2]; support for the vaccination across all levels of the organisation, particularly among management [3]; vaccination accessibility [4]; use of peer vaccinators (e.g. HCWs being trained to deliver vaccinations) [5]; clear communication strategy to promote the vaccination [6]; addressing concerns and misconceptions by staff about the vaccine (more colloquially known as 'myth-busting') [7]; and providing incentives and rewards to HCWs to be vaccinated [23].

In this study we explore to what extent (if at all) NHS trusts in England implemented their seasonal influenza vaccination campaigns in 2016/2017 in accordance with the best practice benchmark elements outlined by NHS Employers. We extend understanding by measuring implementation across a range of NHS trust types (e.g. acute, mental health, community and ambulance trusts), exploring both organisational (e.g. vaccination policy and management support) and practical aspects of implementation (e.g. availability and use of communications), and by comparing differences in implementation between higher-uptake trusts (i.e. those which met the national minimum standard for vaccination uptake) and lower uptake trusts (i.e. those which did not meet the minimum standard).

Methods

Design and sample

An online cross-sectional survey was conducted June–August 2017 with 'flu leads' in NHS trusts in England. Flu leads were defined as members of staff with a designated role to help implement the influenza campaign: some trusts had a single flu lead, while others had multiple designated members of staff. The sample was drawn from an opt-out process conducted by the organisation NHS Employers, which emailed all the flu leads on their database (263 trusts in total). Details of flu leads who did not opt out ($n = 883$) were transferred securely to the research team and

¹ NHS trusts are healthcare organisations with the English NHS which serve a geographical area, sometimes providing specialist functions.

subsequently sent an invitation to take part in the study with a unique link to complete an online questionnaire. Three further reminder e-mails were sent a week apart. Duplicate responses from the same trust were excluded by either selecting the most complete response from a trust or, if two or more complete responses were provided by a single trust, by random selection of one response.

Trusts were classified as either higher or lower uptake based on whether or not they had met the Commissioning for Quality and Innovation Guide (CQUIN, a national initiative and framework designed to encourage and reward improvements in care quality and efficiency) minimum vaccination uptake target of 65% [24]. Since 2016, trusts have been eligible to receive CQUIN funds linked to the percentage of frontline HCWs that have been vaccinated.

Measures

Measures were designed to capture the influenza vaccination policy and uptake target in each trust and to what extent each trust had applied the Flu Fighter campaign benchmarks of good practice [23]. The measures were developed based on NHS Employers campaign material (e.g. 'how-to' and support guides), a rapid literature review of influenza implementation strategies and research, and cognitive testing with flu leads in NHS trusts in England. Cognitive testing is a preliminary questionnaire procedure widely used to provide insight into the mental processes participants use when answering survey questions, helping researchers to identify problems with question wording and design. Five cognitive test interviews were conducted with flu leads in four trusts to ensure that the survey questions were appropriate and comprehensible, and that the individuals taking part in the survey felt comfortable answering them. All questions were phrased to make clear that the survey was measuring implementation for the 2016/2017 influenza season (and not other preceding seasons or planned activity in coming seasons).

Trust influenza vaccination policy and target

Respondents were asked to indicate their trust's policy for HCW influenza vaccination (1): Completely voluntary (2); Voluntary but with 'soft mandates' such as declination forms (3); Mixture of mandatory policy for some HCWs but voluntary for others; and (4) Mandatory for all HCWs. Options were also provided for 'uncertain' and 'other'. Respondents were also asked to indicate if their trust had a vaccination target and, if so, what that target was for the 2016/2017 influenza season (%).

Balanced influenza team

Involvement of different staff groups in planning and delivering the influenza campaign was measured for thirteen groups (the response options for survey items with many categories are reported in the results). For each staff group, responses were provided on a five-point scale (1 = *Not at all*–5 = *A lot*; *Don't know or N/A*) and collapsed into three categories for analysis (1): Staff group had some involvement (2); Staff group was not involved or don't know; and (3) Staff group not applicable. For this question, and for other relevant measures, the 'Don't

know' and 'No' responses were grouped on the assumption that if a flu lead did not know whether a particular aspect of implementation had been conducted, it was unlikely to have been conducted or not in any meaningful or impactful way.

Accessibility of influenza vaccination, by method and by staff group

Use of different ways to make the influenza vaccine accessible to HCWs was measured for nine methods. For each, responses were provided on a five-point scale (1 = *Not at all*–5 = *A lot*; *Don't know or N/A*) and then collapsed into three categories for analysis (1): Method was used (2); Method was not used or don't know, and (3) Method not applicable.

The extent to which HCWs could access the vaccine easily (defined as 'without significant disruption to their working day'), was measured for eleven HCW groups. For each HCW group, responses were provided on a five-point scale (1 = *Very easy*–5 = *Very difficult*; *Don't know or N/A*) and collapsed into three categories for analysis (1): Staff group had easy access (2); Staff did not have easy access or don't know; and (3) Staff group not applicable.

Use of peer vaccinators

The involvement of different personnel and organisations in administering vaccinations was measured for five groups – bank nurses and agency staff, external or private companies, infection control teams, occupational health team, peer vaccinators – plus any other groups. For each, responses were provided on a five-point scale (1 *Not at all*–5 = *A lot*; *Don't know or N/A*) and collapsed into three categories for analysis (1): Group provided vaccinations (2); Group did not provide vaccinations or don't know; and (3) Group not applicable.

Communication strategies to promote the influenza vaccination

Promotion of the vaccine was measured for 19 communication strategies, including ads and promotions (e.g. leaflets), electronic communications (e.g. personalised e-mail signatures), and direct communications (e.g. staff briefings). For each, respondents reported whether the channel had (1 = *Yes*) or had not (0 = *No*) been used. A cumulative score was computed by summing the number of communication channels reported as being used (i.e. a 'Yes' response). A score was computed across all communication channels (0–19 channels) and separately for ads and promotions (0–7 channels), electronic communications (0–7 channels), and direct communications (0–5 channels).

Respondents were also asked whether they had used any communication strategies to feed back information on vaccination uptake during the 2016/2017 season to show how the trust of different departments were performing ('feedback loops'). Respondents reported whether they had (1 = *Yes*) or had not used feedback loops (0 = *No*).

Addressing staff concerns and beliefs ('mythbusting')

The extent to which trusts used 'mythbusting' activities to address staff concerns and beliefs about the vaccine was measured for ten specified methods. For each, respondents reported whether the method had been used to address

concerns or misperceptions (1 = Yes), whether it had not (0 = No). An option was also provided for 'Don't know'.

Incentives

Use of incentives to encourage and motivate HCWs to have the vaccination was measured for nine specified types of incentives. For each, respondents reported whether the incentive had (1 = Yes), or had not (0 = No) been offered. Options were also provided for 'Don't know', 'No incentive offered', and 'Prefer not to say'.

Support at all levels of the organisation

This was measured by assessing the perceived importance of vaccine uptake by HCWs to (1): executive and senior managers and (2) line and department managers. Respondents indicated agreement that uptake was important to each group on a five-point scale (1 = *Not at all important*, 5 = *Very important*; *Uncertain*), and these were collapsed into binary categories for analysis (1): Vaccine uptake was important and (2) Not important or uncertain.

Ethical approval and informed consent

Ethical approval was obtained from the NHS Health Research Authority, NatCen Ethics Committee and University of Stirling's NHS, Invasive and Clinical Research Ethics committee. All flu leads in primary care trusts in NHS England were initially contacted by e-mail by the organisation NHS Employers. The e-mail advised respondents of the aims and methods of the study, and provided two weeks to opt-out of being contacted to complete the survey by NatCen Social Research, who hosted the online survey. Prior to survey onset, respondents were informed of the study aims, that responses would be anonymised, and the voluntary nature and ability to withdraw at any point.

Data analysis

Data were analysed using SPSS Version 23. Frequencies and descriptive statistics were used to examine the types of trusts who had responded (e.g. acute or mental health) and the number of HCWs employed in direct patient care in responding trusts. Independent samples *t*-tests, based on 2000 bootstrapped samples, compared responding and non-responding trusts by number of HCWs involved in direct patient care in 2016/2017, number of seasonal influenza vaccinations given in 2016/2017 season, vaccination uptake rate (%), and change in vaccination uptake between 2015/2016 and 2016/2017.

Frequencies examined how many trusts had used each aspect of implementation (e.g. number of trusts who had involvement from occupational health teams in planning and delivering the campaign or number of trusts who perceived vaccination uptake among HCWs to be important to executive and senior management). Cross-tabulations, based on Chi-square or Fisher's exact comparisons, were used to compare implementation factors between higher ($\geq 65\%$ uptake) and lower uptake trusts ($< 64.99\%$). In all cross-tabulation analyses, missing responses or cases in which a respondent indicated that an option was not applicable to their trust (e.g. ambulance trusts may not

have midwives or dentists) were excluded from that analysis. In questions where 'not applicable' answers were permitted, the base numbers for the analysis (i.e. after exclusion) are reported in the results. Independent samples *t*-tests were used to compare differences between higher and lower uptake trusts for vaccination uptake target in 2016/2017 (%), number of communication strategies used to promote vaccination, number of 'mythbusting' strategies used, and number of incentives offered to HCWs to receive vaccination.

Results

Respondent characteristics

Overall, 101 attempts were made to complete the survey. Two responses were excluded as incomplete duplicate responses from a trust which had provided a complete response, and 12 complete responses were excluded (using random selection for each trust ID) to avoid duplicate responses from a single trust. The valid sample was 87 unique trusts, representing 33% response rate from the 263 NHS trusts in England (50 acute, 22 mental health, 10 community, and 5 ambulance trusts). These trusts employed a total of 342,166 HCWs. The survey completion rate was 83%. The mean vaccination uptake rate across responding trusts was 64.07% ($SD = 15.54$). Within each type of trust, the mean vaccination uptake rates were: acute 70.39% ($SD = 11.19$), mental health 54.64% ($SD = 18.33$), community 54.86% ($SD = 15.16$), and ambulance trusts 60.62% ($SD = 12.86$). Overall, 50 trusts (57%) were defined as higher uptake and 37 (43%) as lower uptake.

Independent samples *t*-tests indicated that responding trusts did not significantly differ from non-responding trusts on the mean number of HCWs involved in direct patient care ($t = -0.92$, $p = 0.36$), number of seasonal influenza doses given since 1st September 2016 ($t = 1.35$, $p = 0.18$), influenza vaccine uptake in 2016/2017 (%) ($t = -0.84$, $p = 0.41$), or change in influenza vaccination uptake from 2015/2016 ($t = 0.21$, $p = 0.83$).

Organisational aspects of the influenza campaign

Most trusts (90%) reported that the influenza vaccine was voluntary for HCWs and there were no penalties for not being vaccinated. A further 9% reported that it was voluntary, but that non-vaccinated staff had to follow 'soft mandates' (e.g. to fill in a 'declination form' stating that they had been offered but refused the vaccine). Only one trust indicated that it had a mandatory policy for *some* HCWs. A Fisher's exact test indicated no significant difference between higher uptake and lower uptake trusts for influenza vaccination policy ($p = 0.69$).

Almost all trusts (98%) had set an influenza vaccination uptake target, with the mean target 73.3% ($SD = 7.81$; range: 37–100%). Higher uptake trusts set, on average, significantly higher targets (%) ($M = 75.65$; $SD = 2.51$) than lower uptake trusts ($M = 69.91$; $SD = 10.97$) ($t = 3.04$, $p = 0.007$ [Equal variances not assumed]).

Balanced influenza team

Across trusts, the staff groups most involved in helping to plan, promote, and deliver the influenza campaign were communications teams (100%), occupational health teams (94%), and executive or senior managers (91%) (Table 1). Higher uptake trusts were significantly more likely than lower uptake trusts to report involvement from department and line managers ($\chi^2 = 4.46$, $p = 0.04$), IT teams ($\chi^2 = 6.12$, $p = 0.01$), and estate and facilities teams ($\chi^2 = 5.10$, $p = 0.02$).

Methods for making vaccination accessible

Across trusts, the methods used most frequently to make the vaccination accessible were at routine staff events (99%), peer vaccinators (97%), and drop-in appointments with occupational health teams (95%). There were no significant differences between higher and lower uptake trusts for use of the different accessibility methods (Table 2).

Accessibility of influenza vaccination for different staff groups

The staff groups most reported to have easy access to vaccination were pharmacists (95%), midwives (94%), and students (92%) (Table 3). Higher uptake trusts were

Table 1 Staff groups involved in planning, promoting, and delivering the flu vaccine in 2016/2017.

Staff groups	Valid n^1	Type of trust			Sig ²
		Overall	Lower uptake	Higher uptake	
		%	%	%	
Communications Teams	87	100	100	100	—
Occupational Health Team	85	94	95	94	0.87
Executive or Senior Managers	87	91	87	94	0.23
Department or Line Managers	87	85	76	92	0.04
Flu Fighter Team	76	84	76	91	0.77
Frontline Healthcare Staff	87	84	84	84	0.98
Infection Control Teams	87	83	81	84	0.72
Admin Groups	81	67	67	67	—
HR	86	66	67	66	0.95
IT teams	83	53	37	65	0.01
Estate and facilities teams	83	34	20	44	0.02
Volunteers	76	24	18	28	0.32
Students	76	15	15	14	0.88

Note: ¹Excluding N/A or missing responses. Percentages are valid % (i.e. excl. missing or N/A responses). ²Based on Chi Square or Fisher's Exact 2×2 comparisons (Group involved Y/N vs. Higher/Lower).

Table 2 Access methods used to deliver the flu vaccine in 2016/2017.

Methods of vaccine access	Valid n^1	Type of trust			Sig ²
		Overall	Lower uptake	Higher uptake	
		%	%	%	
Routine staff events	86	99	97	100	0.24
Peer Vaccinators	85	97	100	94	0.13
OHT ³ — Drop In	85	95	97	94	0.47
Mobile or Visiting Service	85	94	91	96	0.38
Pop up clinics	84	91	82	96	0.06
Alternative or extended clinic hours	84	91	83	96	0.06
OHT ³ — By appointment	81	82	77	85	0.32
Flu Fighter Events	83	74	69	77	0.39
Voucher for external purchase	70	33	37	32	0.56

Note: ¹Excludes N/A or missing responses. Percentages are based on valid % (i.e. excl. missing or N/A responses). ²Based on Chi Square or Fisher's Exact 2×2 comparisons (Method used Y/N v Higher/Lower). ³OHT = Occupational Health Team.

significantly more than likely than lower uptake trusts to report easy access for midwives ($p = 0.02$, Fisher's exact), doctors ($p = 0.04$ Fisher's exact), nurses ($p = 0.04$, Fisher's exact), and staff who work remotely (i.e. not within the main trust sites) ($\chi^2 = 4.15$, $p = 0.04$).

Table 3 Staff groups who had easy access to the flu vaccine in 2016/2017.

Staff groups	Valid n^1	Type of trust			Sig ²
		Overall	Lower uptake	Higher uptake	
		%	%	%	
Pharmacists	73	95	90	98	0.30
Midwives	51	94	80	100	0.02
Students	75	92	86	96	0.20
Doctors	80	91	82	98	0.04
Nurses	80	91	82	98	0.04
Allied and health professionals	82	90	82	96	0.06
Volunteers	70	89	81	93	0.14
Bank nurses or agency staff	78	83	74	89	0.08
Dentists	45	80	75	83	0.70
Paramedics and ambulance staff	25	76	88	71	0.62
Remote staff	76	74	61	82	0.04

Note: ¹Excludes N/A or missing responses. Percentages are based on valid % (i.e. excl. missing or N/A responses). ²Based on Chi Square or Fisher's Exact 2×2 comparisons (Ease of access Y/N vs. Higher/Lower).

Staff administering vaccines and use of peer vaccinators

Across trusts, the groups most often reported to deliver vaccines were occupational health teams and peer vaccinators (both 91%). Other groups involved were infection control teams (59%), bank nurses (41%), other groups (27%), and external companies (19%). Although the proportion of higher uptake trusts using peer vaccinators (97%) was greater than lower uptake trusts (86%), the difference was not significant ($p = 0.23$, Fisher's exact). There was also no significant difference between higher and lower uptake trusts for other staff groups.

Communications strategies to promote vaccination

Trusts, on average, used 4.94 ($SD = 1.24$) of the seven advertising or promotion strategies to communicate about the vaccine (Table 4). Higher uptake trusts used significantly more advertising and promotion strategies ($M = 5.26$, $SD = 1.22$) compared to lower uptake trusts ($M = 4.50$, $SD = 1.13$) ($t = -2.83$, $p = 0.006$). Of the individual strategies, higher uptake trusts were significantly more likely to use leaflets and pamphlets (87%) compared to lower uptake trusts (68%) ($\chi^2 = 4.56$, $p = 0.03$).

On average trusts used 4.43 ($SD = 1.14$) of the seven electronic strategies to communicate about the vaccine (Table 4). There was no difference in the mean number of electronic communications strategies used in higher uptake trusts ($M = 4.64$, $SD = 1.07$) and lower uptake trusts ($M = 4.15$, $SD = 1.18$) ($t = -1.95$, $p = 0.06$), and no difference between higher and lower uptake trusts for individual electronic communication strategies.

Trusts, on average, used 3.27 ($SD = 1.22$) of the five direct strategies to communicate about the vaccine (Table 4). On average, higher uptake trusts used significantly more direct strategies ($M = 3.55$, $SD = 1.00$) than lower uptake trusts ($M = 2.88$, $SD = 1.41$) ($t = -2.51$, $p = 0.01$). Of the individual strategies, higher uptake trusts were significantly more likely to use staff briefings and meetings (96%) compared to lower uptake trusts (71%) ($\chi^2 = 9.89$, $p = 0.002$).

Overall, trusts had used, on average, 12.64 ($SD = 2.74$) of the 19 strategies to communicate about the vaccine. On average, higher uptake trusts used significantly more communication strategies ($M = 13.45$, $SD = 2.26$) than lower uptake trusts ($M = 11.54$, $SD = 2.98$) ($t = -3.29$, $p = 0.001$).

Over three quarters of trusts (85%) had provided ongoing feedback about vaccination uptake in their trust to HCWs during the campaign ('feedback loops'). Higher uptake trusts were significantly more likely to use feedback loops (94%) compared to lower uptake trusts (74%) ($\chi^2 = 6.31$, $p = 0.01$).

Addressing staff concerns and beliefs ('mythbusting')

Trusts, on average, used 4.42 ($SD = 1.84$) of the ten specified 'mythbusting' methods to address HCWs concerns and beliefs about the vaccination, with the majority providing facts in promotional materials (90%), messages

from Flu Fighter champions (78%), and messages from senior management (68%) ('mythbusting' approaches are summarised in online supplementary material). There was no significant difference between higher uptake and lower uptake trusts for the mean number of methods used ($t = -0.21$, $p = 0.83$) and no significant difference between higher and lower uptake trusts for individual methods.

Incentives and rewards

Trusts, on average, offered 1.73 ($SD = 1.24$) of the nine specified types of incentive to HCWs to receive the vaccine, with over half offering entry into a prize draw (56%) or giveaways (51%) (Table 5). Higher uptake trusts, on average, offered significantly more incentives ($M = 1.98$, $SD = 1.28$) than lower uptake trusts ($M = 1.39$, $SD = 1.12$) ($t = -2.08$, $p = 0.04$). Of the individual strategies, higher uptake trusts were significantly more likely to offer food and drink vouchers (30%) compared to lower uptake trusts (6%) ($\chi^2 = 6.63$, $p = 0.01$).

Support for vaccination by across all levels of organisation

Over three quarters of trusts (77%) reported that influenza vaccine uptake was perceived as important to senior and executive management in the trust. Perceived importance to senior management was significantly more likely in higher uptake trusts (86%) compared to lower uptake trusts (67%) ($\chi^2 = 3.83$, $p = 0.05$).

Over half of trusts (57%) reported that influenza vaccine uptake was perceived as important to line and department managers in the trust. Perceived importance to line and department managers was more significantly likely in higher uptake trusts (74%) compared to lower uptake trusts (36%) ($\chi^2 = 10.59$, $p = 0.001$).

Discussion

This study extends understanding of the role of implementation factors in explaining variation in influenza vaccination uptake between healthcare organisations. From a practical perspective, our findings demonstrate that trusts which achieved a higher influenza vaccination uptake consistently used more varied implementation methods or involved more staff groups in the influenza campaign, compared to lower uptake trusts. From a strategic perspective, influenza vaccination uptake was also perceived as a higher priority to managers in trusts which had met the CQUIN minimum uptake threshold, compared to those which had not.

The findings lend empirical support to the NHS Employers' seven broad benchmark elements of a successful influenza campaign [23]. In relation to five of the benchmarks – having a balanced influenza team, accessibility of the vaccine, communications, use of incentives, and support at management level – higher uptake trusts appeared to adopt the benchmark to a greater extent (e.g. using more communication strategies or offering more incentives) or implemented the benchmark in a particular

Table 4 Type of communication channels used to promote flu vaccine to HCWs in 2016/2017.

Communication channels	Overall (<i>n</i> = 81) %	Lower uptake (<i>n</i> = 34) %	Higher uptake (<i>n</i> = 47) %	Sig ¹
Ads and promotions				
Poster or electronic information screens	94	91	96	0.40
Leaflets or pamphlets	79	68	87	0.03
Giveaways	73	65	79	0.16
Prize draws	64	53	72	0.07
Local media coverage	41	38	43	0.70
Staff announcement	32	29	34	0.66
Sponsored events	16	12	19	0.37
Cumulative mean used (SD)	4.94 (1.24)	4.50 (1.13)	5.26 (1.22)	0.01
Electronic communications				
Staff newsletter or bulletin	95	94	96	0.74
Staff intranet or forums	94	88	98	0.08
Article or advert on trust website	93	94	95	0.66
Social media	75	68	81	0.17
Screensavers or pop ups	73	65	79	0.16
Personalised e-mail signatures	70	68	72	0.65
Online videos	38	32	43	0.35
Cumulative mean used (SD)	4.43 (1.14)	4.15 (1.18)	4.64 (1.07)	0.06
Direct communications				
Staff briefings and meetings	85	71	96	0.00
Peer-to-Peer	84	77	89	0.12
Staff training or inductions	82	74	87	0.12
Letters in payslips	47	41	51	0.38
Text, radio or pager messages to staff	30	27	32	0.60
Cumulative mean used (SD)	3.27 (1.22)	2.88 (1.41)	3.55 (1.00)	0.01
Total number of communications				
Cumulative mean used (SD)	12.64 (2.74)	11.54 (2.98)	13.45 (2.26)	0.00

Note: ¹Based on Chi Square or Fisher's Exact 2 × 2 comparisons (Yes/No v Higher/Lower) or, for cumulative means, independent samples *t*-tests.

way (e.g. involved of specific staff groups or making the vaccine easy to access by core staff) which contributed to more efficient planning, promotion, and delivery and stronger support in the trust. Two of the benchmarks – peer vaccinators and ‘mythbusting’ – were not related to differences between higher and lower uptake trusts. Most trusts, regardless of uptake level, were using peer vaccinators to deliver vaccines, and had taken steps to address concerns or ‘myths’ about the vaccine, although no single strategy was associated with increased uptake. This might indicate that such strategies have become so widespread that it is hard to evaluate their impact on uptake [18].

Our survey builds on previous research in England which examined the relationship between intervention factors

and vaccine uptake in acute trusts and found that the use of peer vaccination, video and educational presentations was associated with increased uptake among HCWs in general, and that having a senior doctor as ‘flu champion’ was likely to improve uptake by doctors [18]. Since that study, the use of peer vaccinators appears to have increased across all trusts, and most trusts are using several new forms of electronic media communications, which may help to explain why they were not found to differ between higher and lower uptake trusts in our study. Nevertheless, despite differences in individual implementation factors, both previous research and our study support the use of multi-faceted approaches (as opposed to targeted or isolated interventions) which address vaccination accessibility, use

Table 5 Incentives offered to staff to receive flu vaccine in 2016/2017.

Incentives offered	Overall (<i>n</i> = 77) %	Lower uptake (<i>n</i> = 33) %	Higher uptake (<i>n</i> = 44) %	Sig ¹
Entry to a prize draw	56	52	59	0.51
Giveaways	51	39	59	0.09
Food and drink vouchers	20	6	30	0.10
No incentives offered	20	24	16	0.36
Collective prizes	18	18	18	—
Free food during vaccination clinics	12	9	14	0.73
Other	9	9	9	—
Charity related incentive	5	3	7	0.63
Discounted or group vaccination	1	0	2	—
Indicator of staff performance	1	3	0	0.43
Prefer not to say	1	0	2	1.00
Cumulative mean (<i>SD</i>)	1.73 (1.24)	1.39 (1.12)	1.98 (1.28)	0.04

Note: ¹Based on Chi Square and Fisher's Exact 2 × 2 comparisons (Yes/No v Higher/Lower) or, for cumulative mean, independent samples *t*-test.

of communications and education, and the importance of senior level support. This is also supported by research in other countries where similar challenges are experienced in terms of increasing influenza vaccination uptake by HCWs (eg. [16,25–26]). Recent research in Australia emphasises the importance of both educational and operational strategies to optimise vaccine uptake [27].

There are limitations and directions for future research. The findings are cross-sectional and only show differences in implementation between higher and lower uptake trusts during one influenza season. Further research should use regular monitoring to understand how changes in implementation between seasons relate to uptake variation. Future research could also identify individual trusts which experience either significant improvement or deterioration in uptake between seasons, and identify what factors facilitated the change. The survey measures were devised to capture essential activity around the seven benchmark elements of good practice, and measures were informed by existing literature, a review of influenza campaign documentation available to trusts, and cognitive interviews with flu leads. Nevertheless, we know that individual trusts may differ in their structure, campaign strategy, and understanding of benchmark terminology, and that differently worded questions and response options may have elicited different responses. Our data were also only based on self-reported recall and perceptions of how the influenza campaign was implemented in each trust. Objective measures - for example, expenditure level or empirical estimates of staff time spent on planning or delivering vaccinations - would have been prohibitively difficult to obtain and would likely have been confounded by how such information was recorded between trusts. Subjectivity in measurement should be particularly acknowledged in relation to the questions on perceived importance to senior and executive or department and line management, as the responses were based on flu leads' perceptions and not the perceptions of those in management roles.

The findings are also based on a relatively small sample, albeit broadly representative of NHS trust types in the UK.

Nevertheless, no area teams responded to the survey – although these only represent a small proportion of NHS Trusts in England – and the trust response rate (33%) is lower than that in a previous survey in acute trusts [18]. A larger sample would have enabled us to examine the association between individual implementation factors and vaccine uptake while controlling for trust demography (e.g. type or size) or other implementation factors operating in tandem. Such analysis could have, for example, explored whether increased accessibility had a greater association with uptake than greater diverse staff involvement in campaign planning and promotion. Owing to the small sample, it was also necessary to group 'No' and 'Don't know' responses in the analysis to ensure meaningful groups for comparison. While this study was primarily focused on affirmative use of implementation factors (i.e. how many trusts had used certain methods of accessibility), a larger sample would have allowed consideration of when trusts could not be sure whether an implementation factor had been used, or degrees of usage. This may have highlighted issues of clarity in some survey measures, or areas where more explicit benchmark guidance could further increase uptake. Furthermore, as some trusts had multiple 'flu leads', it is possible that the individual who responded to the survey may have only been involved in certain aspects of the campaign and may not have had knowledge of all aspects of implementation. It is also possible that in trusts which provided more than one complete response, the random ID selection may have omitted a response from a more senior member of the influenza team, although the anonymity of the data at the respondent level precluded this as a selection criterion.

Concerning future research, the study also demonstrates that flu leads – staff who have responsibility for planning, promoting, and delivering the influenza campaign – are an important source of insight regarding strategies to increase vaccination uptake. They have detailed knowledge of how campaigns are implemented locally, and informed views on the relative strengths and limitation of different approaches, the feasibility and acceptability of different

methods to increase uptake and, crucially, the facilitators and barriers towards developing an effective influenza campaign. Future qualitative research should explore in detail the attitudes and experiences of flu leads in delivering the campaigns, differences between higher and lower uptake trusts, and attitudes towards alternative approaches. Furthermore, evaluation research exploring how implementation factors are received and evaluated by HCWs (the target of the campaigns) would help further refine the design and effectiveness of aspects of implementation, for example appraisals of communication materials.

Conclusion

Implementation factors play a role in explaining variations in influenza vaccination uptake between healthcare organisations. Organisations could improve uptake by identifying and implementing examples of best practice from higher uptake trusts.

Ethics

Ethical approval was obtained from the NHS Health Research Authority, NatCen Ethics Committee and University of Stirling's NHS, Invasive and Clinical Research Ethics committee.

Authorship statement

MS conceived of and drafted the manuscript. NC, AMM and MS designed the online survey. NC led the data analysis. RP conducted cognitive testing and administered the online survey. MS and FS designed the overall study. All authors commented on and contributed to the manuscript.

Conflict of interest

The authors declare no conflicts of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.idh.2018.09.082>.

References

- [1] Centers for Disease Control and Prevention. Seasonal influenza vaccine effectiveness, 2005-2018. 2018. Available at: <https://www.cdc.gov/flu/professionals/vaccination/effectiveness-studies.htm>. [Accessed 3 September 2018].
- [2] Jackson LA, Gagani MJ, Keyserling HL. Safety, efficacy and immunogenicity of an inactivated influenza vaccine in healthy adults: a randomised, placebo controlled trial over two influenza seasons. *BMC Infect Dis* 2010;10:71.
- [3] Public Health England. Influenza vaccine effectiveness in adults and children in primary care in the UK: provisional end of season results 2016 to 2017. 2017. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/726341/Influenza_vaccine_effectiveness_in_primary_care_2016_2017.pdf. [Accessed 3 September 2018].
- [4] Burls A, Jordan R, Barton P, Olowokure B, Wake B, Albon E, et al. Vaccinating healthcare workers against influenza to protect the vulnerable-is it a good use of healthcare resources? A systematic review of the evidence and an economic evaluation. *Vaccine* 2006;24(19):4212-21.
- [5] Pereira M, Williams S, Restrict L, Cullinan P, Hopkinson NS. Healthcare worker influenza vaccination and sickness absence: an ecological study. *Clin Med* 2017;17(6):484-9.
- [6] Public Health England. Healthcare worker vaccination: clinical evidence. 2017 (updated September 2017). *Flu Fighter*. Available: <https://www.nhsemployers.org/-/media/Employers/Documents/Flu/flu-fighter-clinical-evidence-1718.pdf>. [Accessed 3 September 2018].
- [7] Public Health England. Seasonal influenza vaccine uptake amongst frontline healthcare workers (HCWs) in England: February survey results (2017/2018). London: Public Health England; 2018. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/692969/Seasonal_Flu_Vaccine_February_Report_2018.pdf. [Accessed 3 September 2018].
- [8] Public Health England. Seasonal influenza vaccine uptake amongst frontline healthcare workers (HCWs) in England: February survey results (2016/2017). London: Public Health England; 2017. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/613450/Seasonal_influenza_vaccine_uptake_in_HCWs_2016_to_2017.pdf. [Accessed 3 September 2018].
- [9] Chen SC, Hawkins G, Aspinall E, Patel N. Factors influencing uptake of influenza A (H1N1) vaccine amongst healthcare workers in a regional paediatric centre: lessons for improving vaccination rates. *Vaccine* 2012;30(2):493-7.
- [10] Hopman CE, Riphagen-Dalhuisen J, Lookman-van der Akker I, Frijstein G, Van der Geest-Blankert AD, Danhof-Pont MB, et al. Determination of factors required to increase uptake of influenza vaccination among hospital-based healthcare workers. *J Hosp Infect* 2011;77(4):327-31.
- [11] Lewthwaite P, Campion K, Blackburn B, Kemp E, Major D, Sarangi K. Health workers' attitudes towards influenza

- vaccination after the 2009 pandemic. *Occup Med* 2014;64: 348–51.
- [12] Seale H, Leask J, MacIntyre CR. Attitudes amongst Australian hospital healthcare workers towards seasonal influenza and vaccination. *Influenza Other Respir Viruses* 2009;4(1):41–6.
 - [13] Shrikishna D, Williams S, Restrick L, Hopkinson NS. Influenza vaccination for NHS staff: attitudes and uptake. *BMJ Open Respir Res* 2015;2(1), e000079.
 - [14] Babcock HM, Gemeinhart N, Jones M, Dunagan WC, Woeltje KF. Mandatory influenza vaccination of health care workers: translating policy into practice. *Clin Infect Dis* 2010; 50(4):459–64.
 - [15] Frederick J, Brown AC, Cummings DA, Gaydos CA, Gibert CL, Gorse GJ, et al. Protecting healthcare personnel in outpatient settings: the influence of mandatory versus non-mandatory influenza vaccination policies on workplace absenteeism during multiple respiratory virus seasons. *Infect Control Hosp Epidemiol* 2018;39(4):452–61.
 - [16] Hollmeyer HG, Hayden F, Mounts A, Buchholz U. Review: interventions to increase influenza vaccinations among health-care workers in hospitals. *Influenza Other Respir Dis* 2013; 7(4):604–21.
 - [17] Derber CJ, Shankaran S. Health-care worker vaccination for influenza: strategies and controversies. *Curr Infect Dis Rep* 2012;14(6):627–32.
 - [18] Edelstein M, Pebody R. Can we achieve high uptakes of influenza vaccination of health workers in hospitals? A cross-sectional survey of acute NHS trusts in England. *Epidemiol Infect* 2014;142:438–47.
 - [19] FitzSimons D, Hendrickx G, Lernout T, Badur S, Vorsters A, Van Damme P. Incentives and barriers regarding immunization against influenza and hepatitis of health care workers. *Vaccine* 2014;32(38):4849–54.
 - [20] Hollmeyer HG, Hayden F, Poland G, Buchholz U. Influenza vaccination of health care workers in hospitals: a review of studies on attitudes and predictors. *Vaccine* 2009;27(30): 3935–44.
 - [21] Hulo S, Nuvoli A, Sobaszek A, Salembier-Trichard A. Knowledge and attitudes towards influenza vaccination of health care workers in emergency services. *Vaccine* 2017;35:205–7.
 - [22] Weber DJ, Orenstein W, Rutala WA. How to improve influenza vaccine coverage of healthcare personnel. *Isr J Health Pol Res* 2016;5:61.
 - [23] National Health Service (NHS) Employers. Planning your campaign: a flu fighter guide. London: NHS Employers; 2017. Available: <http://www.nhsemployers.org/-/media/Employers/Publications/Flu-Fighter/Planning-your-campaign-a-flu-fighter-guide.pdf>.
 - [24] National Health Service (NHS) England. NHS staff health and wellbeing: CQUIN supplementary guidance. London: NHS England; 2016. Available: <https://www.england.nhs.uk/wp-content/uploads/2016/03/HWB-CQUIN-Guidance.pdf>.
 - [25] Kufel WD, Williams DM, Weber DJ. Improving immunization practices. 2017.
 - [26] Podczervinski S, Stednick Z, Helbert L, Davies J, Jagels B, Gooley T, et al. Employee influenza vaccination in a large cancer centre with high baseline compliance rates: comparison of carrot versus stick approaches. *Am J Infect Contr* 2015; 43:228–33.
 - [27] Knowler P, Barrett M, Watson DAR. Attitudes of healthcare workers to influenza vaccination. *Infect Dis Health* 2018;23(3): 156–62.