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Evaluation of a personal protective equipment support programme for staff during the COVID-19 pandemic in London

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SUMMARY

Background: The coronavirus disease 2019 pandemic has presented an enormous challenge to healthcare providers worldwide. The appropriate use of personal protective equipment (PPE) has been essential to ensure staff and patient safety. The 'PPE Helper Programme' was developed at a large London hospital group to counteract suboptimal PPE practice. Based on a behaviour change model of capability, opportunity and motivation (COM-B), the programme provided PPE support, advice and education to ward staff.

Aim: Evaluation of the PPE Helper Programme.

Methods: Clinical and non-clinical ward staff completed a questionnaire informed by the Theoretical Domains Framework and COM-B model. The questionnaire was available in paper and electronic versions. Quantitative responses were analysed using descriptive and non-parametric statistics, and free-text responses were analysed thematically.

Findings: Over a 6-week period, PPE helpers made 268 ward visits. Overall, 261 questionnaires were available for analysis. Across the Trust, 68% of respondents reported having had contact with a PPE helper. Staff who had encountered a PPE helper responded significantly more positively to a range of statements about using PPE than staff who had not encountered a PPE helper. Black and minority ethnic staff were significantly more anxious regarding the adequacy of PPE. Non-clinical and redeployed staff (e.g. domestic staff) were most positive about the impact of PPE helpers. Free-text comments showed

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that staff found the PPE Helper Programme supportive and would have liked it earlier in the pandemic.

Conclusion: The PPE Helper Programme is a feasible and beneficial intervention for providing support, advice and education to ward staff during infectious disease outbreaks.

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Introduction

During the first wave of the coronavirus disease 2019 (COVID-19) pandemic, the UK was one of the worst affected countries in the world [1], with more than 57,000 COVID-19-related deaths recorded by mid-September 2020 [2]. The pandemic has presented one of the greatest challenges in recent history to healthcare providers worldwide. The infectious nature of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) [3] means that careful use of personal protective equipment (PPE) is vital to ensure staff and patient safety. The availability and use of PPE across the health and social care system has been one of the most controversial aspects of COVID-19 [4]. Deaths in health and social care professionals have been high, with increasing evidence that staff from black and minority ethnic (BAME) groups have experienced significantly worse outcomes [5]. Many affected families have blamed the UK Government for shortages of PPE [6]. Early in the pandemic, Public Health England (PHE) published guidance [7], based on the best evidence [8] available, on PPE needed for different clinical situations; donning and doffing procedures to protect against self-contamination; and the value of education and training to improve PPE practice in clinical settings.

Equipping staff to use PPE safely was an unprecedented challenge to health and social care systems. Complex messages had to be conveyed appropriately to staff, within a context of high anxiety and significant clinical pressure. Incorrect or over-use of PPE is a risk for cross-transmission (patient–patient [9], patient–staff, staff–patient) and self-inoculation [10]. Changes in guidance over time, and differences in recommended protection for different countries and transmission routes (i.e. contact, droplet, airborne), extended the challenge facing UK hospitals during the pandemic.

Within the first 4 months of the outbreak, one of the largest acute and specialist hospital groups in London, UK (Imperial College Healthcare NHS Trust) cared for 1328 patients who tested positive for SARS-CoV-2. The infection prevention and control (IPC) team were observing suboptimal PPE practice across the Trust, which risked compromising staff and patient safety. It was recognized that regular communication and information about PPE was insufficient to support behaviour change. Therefore, the IPC team, in conjunction with improvement experts, developed a model of PPE support based on behaviour change theory. This paper describes the evaluation of the ‘PPE Helper Programme’. Lessons learned may help prepare for further COVID-19 surges or other outbreaks of infectious disease.

Methods

Development of the PPE Helper Programme

The PPE Helper Programme adopted core improvement principles, and was underpinned by the COM-B model [11]

which proposes that there are three components to any behaviour (B): capability (C), opportunity (O) and motivation (M). To perform a particular behaviour, a person must feel psychologically and physically able (C), have the social and physical opportunity (O), and want or need to carry out the behaviour more than other competing behaviours (M).

The starting assumption in designing the PPE Helper Programme was that staff would want to use PPE correctly to ensure their safety, but that many factors might get in the way. Recognizing safe use of PPE as a complex multi-faceted behaviour, the COM-B model was used to deconstruct potential challenges that could affect behaviours related to the use of PPE, and to design PPE helper interventions to address those challenges (Table 1). These crystallized into three key objectives for PPE helpers: listen to staff members’ concerns about PPE, signpost information, and promote best practice in clinical settings.

A request from hospital management was circulated through management channels, and appropriate healthcare staff were redeployed as ‘PPE helpers’. A 10-day pilot helped develop the scope, training and content of the role. PPE helpers received training on mechanisms of transmission of COVID-19, appropriate levels of PPE for different circumstances, and safe donning and doffing procedures. PPE helpers were all clinicians (including physiotherapists, nuclear medicine technologists, nurses, scientists and doctors), so could draw on clinical experience and transferable skills such as listening, coaching, reflection and problem-solving. Following a ‘practice’ ward visit with an IPC nurse, PPE helpers were allocated to wards. Across three large hospitals within the NHS Trust, groups of PPE helpers were supported by an identified member of the IPC team. After the initial pilot, the programme was expanded to 20 PPE helpers across the Trust.

Informed by a daily review of all wards with COVID-19 patients, PPE helpers were placed on wards judged by the IPC team to be in greatest need of support, enabling rapid adjustments to the allocation of PPE helpers to wards as required; for example, when patients requiring aerosol-generating procedures were admitted. Over a 6-week period, PPE helpers visited their designated wards each weekday, keeping records of the duration and content of visits.

A ‘Plan–Do–Study–Act cycle’ [12] was used to develop and adapt the programme iteratively. Daily team meetings were held to share reflections and feedback from ward visits, and to discuss changes and direction of the programme (e.g. an increased focus on BAME staff).

Evaluation of the programme – survey of all staff on PPE perceptions at the conclusion of the programme

A staff survey was developed to explore the impact of the PPE Helper Programme (see online [supplementary material](#)). The content was influenced by the Theoretical Domains

Table 1

Challenges and key features of the Personal Protective Equipment (PPE) Helper Programme using a behaviour change model of capability, opportunity and motivation

	Potential challenges	Key features of the PPE Helper Programme
Capability – to ensure the person has the necessary knowledge and skills to perform the behaviour	<ul style="list-style-type: none"> • Rapidly changing national guidance • Lack of clarity or confusion on the most up-to-date knowledge and information on use of PPE • Lack of knowledge or confusion on the transmission mechanism of SARS-CoV-2 • Lack of knowledge or confusion on mask fit testing processes 	<ul style="list-style-type: none"> • Ensuing that changes to national PPE guidance were related to staff in a timely manner • Providing more personalized PPE knowledge and practical training depending on the staff member's understanding, patient cohort and care being provided • Supporting staff with and without previous experience of using PPE to learn techniques so that they could practice safe donning and doffing • Signposting staff to the intranet for further information on safe use of PPE • Communicating the risks of over- and underuse of PPE, the importance of good technique for donning and doffing PPE, and the importance of hand hygiene
Opportunity – to ensure there are no environmental constraints that make it impossible to perform the behaviour	<ul style="list-style-type: none"> • Physical or psychological harm and pain caused by PPE • Lack of immediate access to appropriate PPE • Lack of opportunity to learn and practice safe donning and doffing techniques • Lack of appropriate space to store and dispose of PPE • Lack of appropriate space to doff PPE safely • Physical characteristics (e.g. glasses, long hair, body shape, items of religious clothing) • Lack of time, intense workload pressures and life-or-death decisions • Normalization of suboptimal use of PPE (social norms) • Lack of or unclear social cues and prompts for safe use of PPE • Lack of timely access to intranet 	<ul style="list-style-type: none"> • Assessing concerns and obstacles to using PPE safely • Signposting staff to mask fit testing services • Reporting on local PPE shortages • Providing advice on safer ways to store and dispose of PPE • Providing advice on better ways to use space to don and doff PPE safely
Motivation – to ensure the person has formed a strong positive intention to perform the behaviour	<ul style="list-style-type: none"> • Unfounded or incorrect beliefs or perceptions on use of PPE [e.g. severe PPE shortages (scarcity), belief that overuse increases personal safety] • Heightened emotion, distress, anxiety and fear • Forgetfulness due to an unprecedented working environment (cognitive load) • Recalling that previous suboptimal use did not appear to harm the individual • Impulsive doffing behaviour (e.g. a strong and emotive desire to get PPE off when completing care of patients with COVID-19) • Recollection of previous physical or psychological harm and pain caused by PPE • Habitual use of PPE 	<ul style="list-style-type: none"> • Active listening of concerns to build trust and to reassure staff • Coaching conversations to support problem solving • Myth-busting • Reinforcing good practice through face-to-face feedback wherever staff were using PPE safely and appropriately • Signposting staff to other trust support (i.e. webpages, IPC team) • Following up on specific questions from staff

Framework [13] and the COM-B model. Questions related to the staff member’s experience of using PPE and their feedback about the PPE helpers. Positively and negatively worded questions (to prevent automatic responses) were framed using Likert scales. Paper copies of the survey were delivered to wards which had been visited by a PPE helper, and were collated each day by the ward manager. Over a 10-day period, a broad range of staff in different roles were encouraged to complete the survey. Additionally, the link to an electronic version of the survey was advertised via the daily ‘all staff e-mail’. Participation was voluntary. Data were entered into SPSS Version 25.0 (IBM Corp., Armonk, NY, USA) by an administrator who was not involved with the programme (CS). The work was registered locally as a service evaluation (#533).

Analysis methods

Using SPSS, staff questionnaires were analysed descriptively. Responses to numerical and closed questions were presented as frequencies and percentages. Bivariate analyses of contact with PPE helpers, participant characteristics and responses to questionnaire items were performed using non-parametric tests. Statistical significance was established at $P < 0.05$. Due to the small numbers in some categories, allied health professionals (AHPs) were grouped with doctors as they are autonomous professionals who usually ‘visit’ wards to see patients rather than working on a given ward for an entire shift. Non-clinical support staff included cleaners, porters and catering staff. Nursing and medical students were included in

nurse and medical/AHP categories. Ethnic groups were recategorized for the analysis as White or BAME (including Asian or Asian British; Black, African, Caribbean or Black British; mixed or multiple ethnic group).

Free-text comments were extracted into a Word document (Microsoft Corp., Redmond, WA, USA), read in detail by two researchers independently (MW and ECS), and then coded according to content. Coded data from all responses were then compared and contrasted. Categories and emergent themes were reached by consensus between the two researchers.

Results

PPE helpers conducted 268 visits to 30 wards across the hospital group between 20th April and 15th May 2020, and engaged with hundreds of staff using PPE during the COVID-19 surge. Overall, 261 staff questionnaires were available for analysis. Of these, 177/261 (68%) respondents reported having had contact with a PPE helper. Table S1 (see online supplementary material) shows the demographics of respondents by profession, job type and ethnicity.

Survey findings

Staff exposed to a PPE helper were significantly more likely to respond positively to the following statements compared with staff who had not been exposed to a PPE helper: ‘PPE is easily visible on the ward’, ‘PPE is immediately available for me where and when I need it’, ‘This ward has adequate

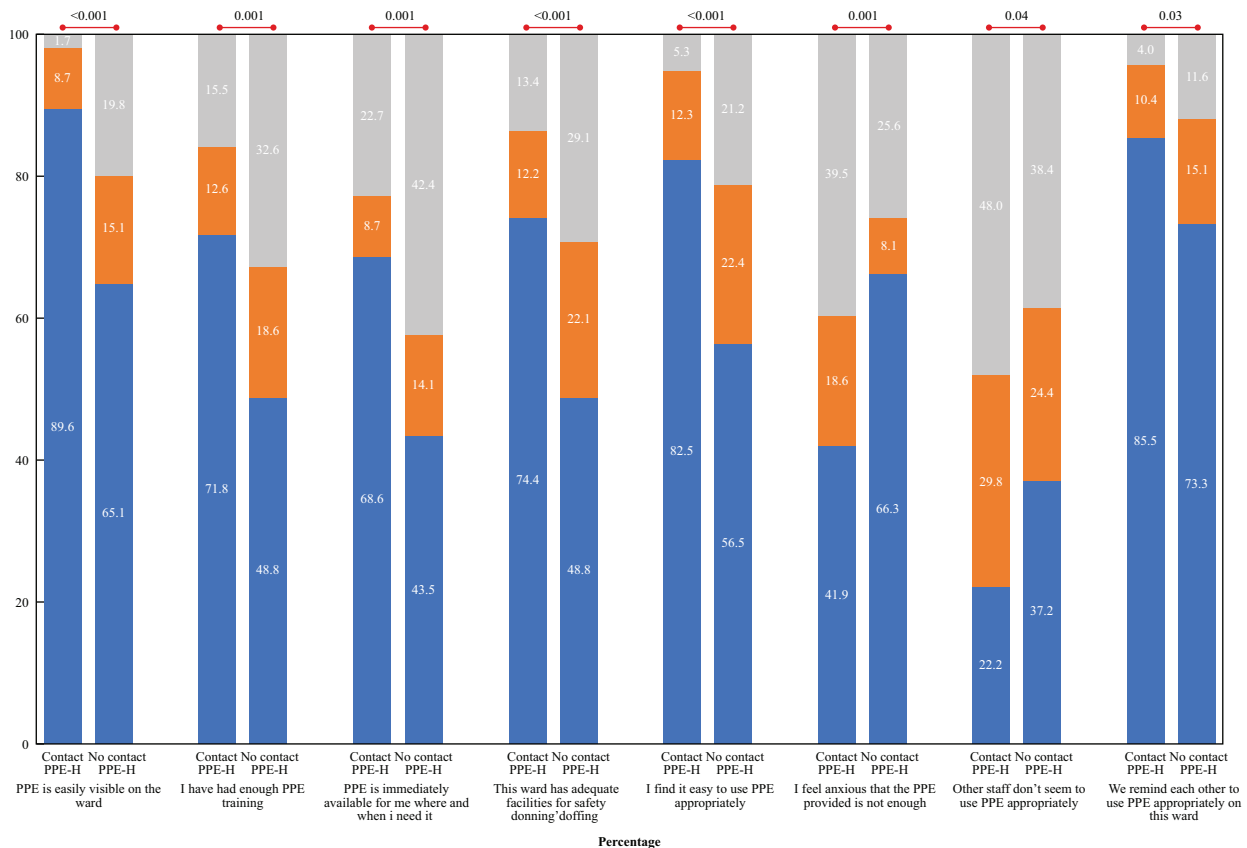


Figure 1. Opinions about personal protective equipment (PPE), by contact with a PPE helper (PPE-H). Blue bars, agree/strongly agree; orange bars, neither agree or disagree; grey bars, disagree/strongly disagree.

Table II
Opinions about personal protective equipment (PPE), by contact with a PPE helper

Questionnaire statement	Response	Contact with PPE helper		P-value
		Yes N (%)	No N (%)	
PPE is easily visible on the ward	Agree/strongly agree	155 (89.6)	56 (65.1)	<0.001 ^a
	Neither agree nor disagree	15 (8.7)	13 (15.1)	
	Disagree/strongly disagree	3 (1.7)	17 (19.8)	
	Total	173 (100)	86 (100)	
I have had enough PPE training	Agree/strongly agree	125 (71.8)	42 (48.8)	<0.001 ^a
	Neither agree nor disagree	22 (12.6)	16 (18.6)	
	Disagree/strongly disagree	27 (15.5)	28 (32.6)	
	Total	174 (100)	86 (100)	
PPE is immediately available for me where and when I need it	Agree/strongly agree	118 (68.6)	37 (43.5)	<0.001 ^a
	Neither agree nor disagree	15 (8.7)	12 (14.1)	
	Disagree/strongly disagree	39 (22.7)	36 (42.4)	
	Total	172 (100)	85 (100)	
This ward has adequate facilities for safely donning/doffing	Agree/strongly agree	128 (74.4)	42 (48.8)	<0.001 ^a
	Neither agree nor disagree	21 (12.2)	19 (22.1)	
	Disagree/strongly disagree	23 (13.4)	25 (29.1)	
	Total	172 (100)	86 (100)	
I find it easy to use PPE appropriately	Agree/strongly agree	141 (82.5)	48 (56.5)	<0.001 ^a
	Neither agree nor disagree	21 (12.3)	19 (22.4)	
	Disagree/strongly disagree	9 (5.3)	18 (21.2)	
	Total	171 (100)	85 (100)	
I understand when different levels of PPE are needed	Agree/strongly agree	142 (82.1)	69 (80.2)	0.09
	Neither agree nor disagree	19 (11)	5 (5.8)	
	Disagree/strongly disagree	12 (6.9)	12 (14)	
	Total	173 (100)	86 (100)	
It is clear to me why different levels of PPE are used	Agree/strongly agree	141 (81)	60 (69.8)	0.12
	Neither agree nor disagree	13 (7.5)	10 (11.6)	
	Disagree/strongly disagree	20 (11.5)	16 (18.6)	
	Total	174 (100)	86 (100)	
I think the current trust PPE guidance is enough	Agree/strongly agree	131 (75.7)	70 (81.4)	0.30
	Neither agree nor disagree	42 (24.3)	16 (18.6)	
	Disagree/strongly disagree	0 (0.0)	0 (0.0)	
	Total	173 (100)	86 (100)	
I always follow trust PPE guidance	Agree/strongly agree	145 (83.8)	72 (83.7)	0.80
	Neither agree nor disagree	17 (9.8)	7 (8.1)	
	Disagree/strongly disagree	11 (6.4)	7 (8.1)	
	Total	173 (100)	86 (100)	
High workload gets in the way	Agree/strongly agree	49 (28.5)	25 (29.4)	0.99
	Neither agree nor disagree	26 (15.1)	13 (15.3)	
	Disagree/strongly disagree	97 (56.4)	47 (55.3)	
	Total	172 (100)	85 (100)	
I feel anxious that the PPE provided is not enough	Agree/strongly agree	72 (41.9)	57 (66.3)	<0.001 ^a
	Neither agree nor disagree	32 (18.6)	7 (8.1)	
	Disagree/strongly disagree	68 (39.5)	22 (25.6)	
	Total	172 (100)	86 (100)	

Table II (continued)

Questionnaire statement	Response	Contact with PPE helper		P-value
		Yes N (%)	No N (%)	
It does not matter if I do not use PPE appropriately	Agree/strongly agree	5 (2.9)	2 (2.3)	0.75
	Neither agree nor disagree	1 (0.6)	0 (0)	
	Disagree/strongly disagree	165 (96.5)	84 (97.7)	
	Total	171 (100)	86 (100)	
Other staff don't seem to use PPE appropriately	Agree/strongly agree	38 (22.2)	32 (37.2)	0.04 ^a
	Neither agree nor disagree	51 (29.8)	21 (24.4)	
	Disagree/strongly disagree	82 (48)	33 (38.4)	
	Total	171 (100)	86 (100)	
We remind each other to use PPE appropriately on this ward	Agree/strongly agree	148 (85.5)	63 (73.3)	0.03 ^a
	Neither agree nor disagree	18 (10.4)	13 (15.1)	
	Disagree/strongly disagree	7 (4)	10 (11.6)	
	Total	173 (100)	86 (100)	
It will be bad for me if I do not use PPE appropriately	Agree/strongly agree	165 (95.9)	84 (97.7)	0.10
	Neither agree nor disagree	6 (3.5)	0 (0.0)	
	Disagree/strongly disagree	1 (0.6)	2 (2.3)	
	Total	172 (100)	86 (100)	
It will be bad for other staff on the ward if I do not use PPE appropriately	Agree/strongly agree	168 (97.1)	84 (97.7)	0.37
	Neither agree nor disagree	3 (1.7)	0 (0.0)	
	Disagree/strongly disagree	2 (1.2)	2 (2.3)	
	Total	173 (100)	86 (100)	
It will be bad for the patient if I do not use PPE appropriately	Agree/strongly agree	162 (94.2)	80 (94.1)	0.76
	Neither agree nor disagree	6 (3.5)	2 (2.4)	
	Disagree/strongly disagree	4 (2.3)	3 (3.5)	
	Total	172 (100)	85 (100)	

^a Chi-squared statistic significant at 0.05 level.

facilities for donning and doffing', 'I find it easy to use PPE appropriately', 'I have had enough PPE training' and 'We remind each other to use PPE appropriately on this ward'. Furthermore, staff who did not have contact with a PPE helper were significantly more likely to agree with the following statements: 'I feel anxious that the PPE provided is not enough' and 'Other staff don't seem to use PPE appropriately' (Figure 1).

There were no significant differences in the responses of staff who had been exposed to a PPE helper compared with staff who had not been exposed to a PPE helper in relation to the following statements: 'I understand when different levels of PPE are needed', 'It is clear to me why different levels of PPE are used', 'I think the current trust PPE guidance is enough', 'I always follow trust PPE guidance', 'High workload gets in the way', 'It does not matter if I do not use PPE appropriately', 'It will be bad for me if I do not use PPE appropriately', 'It will be bad for other staff on the ward if I do not use PPE appropriately' and 'It will be bad for the patient if I do not use PPE appropriately' (see Table II).

BAME staff were significantly more anxious than White staff in relation to PPE being adequate: 42% of White staff disagreed/strongly disagreed with the statement 'I feel anxious that the PPE provided is not enough' compared with only 28% of BAME staff ($P=0.004$). Additionally, redeployed staff were

significantly more likely to agree/strongly agree with the statement 'PPE helpers have helped me to wear PPE appropriately' (77% redeployed staff vs 50% staff on usual ward; $P=0.04$).

Across all statements, non-clinical staff tended to be more positive about PPE helpers than nurses and doctors/AHPs (Table III). Non-clinical staff were significantly more likely to agree/strongly agree with the following statements: 'PPE helpers have been there to answer my questions about PPE', 'PPE helpers have helped me to wear PPE appropriately', 'Overall, PPE helpers have made a difference in how I use PPE' and 'Overall, PPE helpers have made me feel less anxious'.

Free-text findings

PPE supply and guidance

Although a small number of staff made positive comments about the level of PPE and training they had received, most of the free-text comments conveyed concern about at least one of the following aspects of PPE: adequacy and/or equity of supply across clinical areas and across professions, inconsistent advice and guidance, and level of training provided. The most commonly expressed concerns were about the supply of PPE, often linked with negative comments about the guidance issued. Staff expressed frustration, confusion and anxiety

Table III

Responses to questions on impact of personal protective equipment (PPE) helpers, by professional group

Questionnaire statement	Response	Nurses	Doctors/AHPs	Non-clinical staff	P-value
		N (%)	N (%)	N (%)	
PPE helpers have supported me to better understand why different levels of PPE are needed for different situations	Agree/strongly agree	57 (52.3%)	10 (43.5%)	17 (68.0%)	0.17
	Neither agree nor disagree	28 (25.7%)	10 (43.5%)	6 (24.0%)	
	Disagree/strongly disagree	24 (22.0%)	3 (13.0%)	2 (8.0%)	
	Total	109 (100%)	23 (100%)	25 (100%)	
PPE helpers have supported me to understand how to use PPE appropriately	Agree/strongly agree	54 (50%)	13 (56.5%)	19 (76.0%)	0.09
	Neither agree nor disagree	29 (26.9%)	8 (34.8%)	4 (16.0%)	
	Disagree/strongly disagree	25 (23.1%)	2 (8.7%)	2 (8.0%)	
	Total	108 (100%)	23 (100%)	25 (100%)	
PPE helpers have not provided helpful information about PPE	Agree/strongly agree	21 (19.4%)	5 (21.7%)	6 (24%)	0.41
	Neither agree nor disagree	31 (28.7%)	8 (34.8%)	3 (12%)	
	Disagree/strongly disagree	56 (51.9%)	10 (43.5%)	16 (64%)	
	Total	108 (100%)	23 (100%)	25 (100.0%)	
PPE helpers have been there to answer questions about PPE	Agree/strongly agree	57 (53.3%)	10 (43.5%)	20 (80.0%)	0.02 ^a
	Neither agree nor disagree	29 (27.1%)	11 (47.8%)	4 (16.0%)	
	Disagree/strongly disagree	21 (19.6%)	2 (8.7%)	1 (4.0%)	
	Total	107 (100%)	23 (100%)	25 (100%)	
PPE helpers have helped me to wear PPE appropriately	Agree/strongly agree	55 (51.4%)	15 (65.2%)	20 (80.0%)	0.02 ^a
	Neither agree nor disagree	33 (30.8%)	8 (34.8%)	2 (8.0%)	
	Disagree/strongly disagree	19 (17.8%)	0 (0.0%)	3 (12%)	
	Total	107 (100%)	23 (100%)	25 (100%)	
PPE helpers have not motivated me to use PPE more appropriately	Agree/strongly agree	12 (11.1%)	4 (17.4%)	5 (20.0%)	0.56
	Neither agree nor disagree	40 (37.0%)	9 (39.1%)	6 (24.0%)	
	Disagree/strongly disagree	56 (51.9%)	10 (43.5%)	14 (56.0%)	
	Total	108 (100%)	23 (100%)	25 (100%)	
Overall, the PPE helpers have made a difference in how I use PPE	Agree/strongly agree	48 (45.3%)	7 (30.4%)	18 (72.0%)	0.03 ^a
	Neither agree nor disagree	38 (35.8%)	12 (52.2%)	3 (12.0%)	
	Disagree/strongly disagree	20 (18.9%)	4 (17.4%)	4 (16.0%)	
	Total	106 (100%)	23 (100%)	25 (100%)	
Overall, PPE helpers have made a difference to how other staff on the ward use PPE	Agree/strongly agree	48 (45.3%)	10 (43.5%)	16 (66.7%)	0.34
	Neither agree nor disagree	42 (39.6%)	10 (43.5%)	7 (29.2%)	
	Disagree/strongly disagree	16 (15.1%)	3 (13.0%)	1 (4.2%)	
	Total	106 (100%)	23 (100%)	24 (100%)	
Overall, the PPE helpers have made me feel less anxious	Agree/strongly agree	38(35.8%)	9 (39.1%)	18 (72.0%)	0.02 ^a
	Neither agree nor disagree	45 (42.5%)	11 (47.8%)	6 (24.0%)	
	Disagree/strongly disagree	23 (21.7%)	3 (13.0%)	1 (4.0%)	
	Total	106 (100%)	23 (100%)	25 (100%)	

AHPs, allied health professionals.

^a Chi-squared statistic significant at 0.05 level.

about the frequent changes, and a lack of trust in the PHE guidance, which sometimes translated into a lack of faith in leaders and managers in relation to PPE provision. Several comments by staff reflected concerns that lack of stock, rather than scientific evidence, was behind the guidance.

Others expressed unease because they perceived that the supply of PPE was not consistent across clinical areas and

across professions. Some openly said that this had affected morale and sickness levels. One member of staff commented:

There was also different wards, some wearing more PPE than my staff who were following the PHE and local guidance, which caused a lot of stress and anxiety. It made it difficult for managers to lead the team and have the trust from staff with guidance changing so frequently. (Nurse)

A junior doctor expressed feelings of guilt at wearing PPE and said that there was a real need for 'More PPE on the non-critical care wards'.

Several members of staff stated that supplies had been inadequate during early stages of the pandemic. A small number described problems related more to the environment than the supply of PPE or the guidance around it (e.g. inadequate donning and doffing areas).

Training and communication

Many of the staff comments suggested a need for more training on PPE and infection control. Some felt that information and training materials were provided too late, or they had not been made aware of sources of information at the appropriate time. A few intimated that they had been infected with COVID-19 because of a lack of education.

Suggestions for further training included ward-based teaching, incorporating PPE/IPC training at induction/statutory mandatory learning and in redeployment study days, and regular training updates when new guidance is issued. One person wanted more information and advice about maintaining well-being while wearing PPE, including wearing wipeable shoes and maintaining skin integrity and hydration.

Many of the suggestions made about training and communication had been incorporated into the PPE Helper Programme, but not all staff had met a PPE helper.

Feedback on PPE helpers

Several positive comments were made about the PPE helpers, including:

PPE helpers are very good to point out good and bad practice of PPE on the ward – how to don and doff appropriately. (Nurse)

Nothing beats having a person observing and reminding staff. (Non-clinical support staff)

The team were lovely and did pick up on inappropriate use of PPE by visitors to the ward. (Nurse)

However, many staff suggested that the programme would have been more beneficial at an earlier stage. A few said they had found the presence of the PPE helpers unhelpful, for example:

It feels intimidating when PPE helpers are watching over you, especially when you're busy. Feels uncomfortable. Maybe less frequent visits or come at less busy times of the shift. (Nurse)

The manner, approach and consistency of PPE helpers was seen as important. As one person said:

When a PPE helper does the job well, not just in terms of the explanation and reminders they give but also in terms of the way they relate to different people and gain their confidence, then no improvement is necessary (some helpers need better people skills). (Non-clinical support staff)

Suggestions for improving the programme included more frequent visits, particularly at the start of the morning shift, when the first donning and doffing was taking place, and during the night shift. Staff felt that the PPE helpers needed to be more visible and identifiable (e.g. through a uniform), and they also wanted to be able to contact them via e-mail or 'phone. Some commented on the need for PPE helpers in departments

such as pharmacy, and for staff groups who were 'visiting' wards (e.g. phlebotomists), so that they were better prepared for PPE on the wards. It was also suggested that link nurses on wards could be PPE helpers.

Overall, the free-text comments conveyed a strong desire for better levels of PPE, more consistent guidance, support and education throughout the pandemic. It was apparent that staff felt that both PPE supplies and help came considerably later than needed.

Discussion

At the peak of the COVID-19 pandemic in London, a novel, theory-based IPC intervention was developed and deployed focused on supporting staff knowledge, attitudes, emotions and behaviours about the correct use of PPE. It was possible to reach a large number of 'at-risk' clinical areas in a relatively short time. The survey results suggest that the PPE Helper Programme had a positive impact on knowledge, attitudes, concerns and behaviours among staff.

Staff exposed to a PPE helper reported more positive knowledge and attitudes towards PPE, including confidence in the use of PPE, satisfaction with the availability and visibility of PPE in clinical areas, and less anxiety around PPE and the burden of COVID-19-related work on staff. The benefits of the PPE helpers were greater among redeployed staff and non-clinical workers (e.g. porters, catering staff, cleaners). Although the number of non-clinical respondents was relatively small in comparison with nurses, doctors and AHPs, this is an important finding. It could reflect gaps in adequate PPE training or access to PPE educational resources for these staffing groups, including the effectiveness of current information channels such as the intranet. Redeployed staff had been separated from usual work support networks and were often working in unfamiliar environments. As such, these staff benefited particularly from the 'hands on' support and advice provided through the PPE Helper Programme. Consideration should be given as to how hospitals better support these occupational groups when developing PPE interventions [14].

Perhaps unsurprisingly, concerns about PPE and high workload were greater among BAME staff. This may reflect concerns about the emerging evidence regarding worse outcomes for COVID-19 in BAME communities [15], and/or known and pre-existing inequalities and inequities in BAME staff [16]. The results of the survey do not suggest that BAME staff benefited from the PPE Helper Programme any more or less than White staff. Further attention needs to be given to engaging with the concerns of BAME staff, enabling them to speak up, supporting training and development, and specifically addressing any issues related to religious clothing that may have an impact on their ability to wear PPE safely.

The results must be framed within certain limitations. The cross-sectional design prevents the authors from directly attributing the results to the effect of PPE helpers. There was no baseline comparison, and it is not known whether the apparent beneficial effects of the programme have been maintained beyond the project. The evaluation focused on staff opinions, perceptions and emotions using a modified survey tool which, although underpinned by well-established evidence, remains unvalidated. In addition, the views of the

staff who completed the survey may not be representative. However, the implementation of the programme and the evaluation of the perceptions of over 250 staff was extremely timely and has a number of implications.

The excess capacity afforded by redeployed clinical staff and volunteers from academic and support areas enabled rapid implementation of the PPE Helper Programme. Organizations interested in adopting or scaling up a similar model must consider its feasibility and sustainability in their local setting and workforce. Commissioners exploring an economic evaluation of the programme should account carefully for such resourcing. PPE helper roles could be embedded in existing posts such as link nurses, or formalized in patient safety or IPC practitioners. The results of the survey suggest that using PPE helpers who were external to the wards had some benefits, in that staff appeared to respect their knowledge and contribution, and felt safe talking to them about concerns. Whichever staff groups are used, it is important that skilled communication, training and support are at the heart of the intervention.

The implementation of assistant or 'buddy' roles to promote and support optimal IPC practices, including PPE donning and doffing, has been seen in comparable pandemic surges and high-consequence infectious diseases in various settings [17–19]. Although the IPC buddy system is generally advocated as a useful failsafe, there is a lack of evidence about its individual contribution to better infection prevention performance. The PPE Helper Programme not only supported the correct use of PPE, but also addressed staff concerns and emotional burnout – both of which are singled out increasingly for their impact on healthcare workers [20]. In designing the PPE Helper Programme, it was recognized that staff decisions to use the most appropriate PPE for the given clinical situation were unlikely to be shaped by existing evidence alone [21]. Indeed, some of the staff who engaged with the programme were sceptical about the evidence and viewed it with suspicion. This was particularly the case in the context of rapidly changing and sometimes contradictory guidance, issued in parallel to reports of national shortages in PPE supply. The uncertainty about recommended PPE behaviours could be further compounded by the stressful working conditions [22] and societal alarm [23,24] created by the COVID-19 pandemic.

Communal perceptions about the quality, availability and suitability of PPE could also have influenced the knowledge and opinions of staff. As reflected in other scenarios, the mandates of practice guidelines are often reformulated into 'mindlines' (internalized and collectively reinforced tacit guidelines) [25], which can lead to dissonant or outlying behaviours [26]. More concerning in relation to COVID-19, these behaviours can fuel further scepticism about institutional recommendations on PPE, fostering suboptimal and risky practices and incurring wastage. The PPE helpers were able to provide reassurance, explain the institutional decision-making process and the evidence used for it, and dispel myths and disinformation. The PPE helpers also served as a conduit for information between staff on the ground, the IPC and more senior management, activating a rapid feedback mechanism and providing a cohesive narrative about PPE changes [27].

In conclusion, the authors have shown how an intervention to improve PPE practice in hospitals can be developed and

implemented rapidly during a pandemic in response to concerns over PPE practice and staff trust in guidance. This type of 'hands on' intervention appears to have the greatest benefit among difficult-to-reach staffing groups, where adequate PPE knowledge and training may be lacking. For a PPE Helper Programme to be most effective, and in planning for a second wave of COVID-19 or another infectious disease outbreak, it is recommended that establishing such a programme should be prioritized early in the response. In addition, a more sustainable programme of PPE and hand hygiene support is recommended between outbreaks of infectious disease.

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Conflict of interest statement

None declared.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <https://doi.org/10.1016/j.jhin.2020.12.004>.

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