

Hospital pharmacy response to COVID-19 at two UK teaching hospitals: a departmental review of actions implemented to inform future strategy

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ABSTRACT

Objectives To determine the views of pharmacy staff on a departmental response to wave 1 of the UK COVID-19 pandemic in order to inform a strategy for a second wave at two large UK National Health Service (NHS) hospitals.

Methods This study was undertaken at two large teaching hospitals in the UK. Pharmacy staff attended local departmental focus groups. Staff attendance included pharmacists, pharmacy technicians and pharmacy assistants representing all pharmacy services including aseptics, ward-based services, dispensary/distribution and procurement. Responses were transcribed and analysed using thematic analysis.

Results A total of 138 pharmacy staff attended the departmental focus groups. This study identified which pharmacy-related changes implemented in the first wave will be beneficial to take forward into a second wave. These included extending the hours of the pharmacy service to critical care, retaining the competence of pharmacists and pharmacy technicians redeployed to critical care during wave 1, development of standard operating procedures for changes in practice, delivering/posting of dispensed outpatient medication to patients' place of residence, maintenance of ward-based pharmacy services, use of the healthcare app PANDO to aid team communication, utilisation of remote-controlled drug ordering, deployment of a COVID-19 ward stocklist, procurement of ready-made bags/prefilled syringes of critical care medications, aligning the central intravenous additive service with critical care demand to reduce waste and establishment of a pharmacy response in line with the hospital's implementation plan.

Conclusions This study has provided a number of recommendations for how hospital pharmacy departments may respond to a global pandemic. These experiences derived from the pharmacy departments at two large UK NHS Trusts may be used by other healthcare providers to help inform the pharmacy response to a global pandemic.

remote outpatient consultations, and managing illness and self-isolation in the workforce.⁴

Hospital pharmacy departments have adapted to the changes observed in hospital practice as a consequence of COVID-19. These include a reduction in medication orders, increased dispensing of compounded intravenous medication, increased dispensing of critical care medication with subsequent supply chain instability, staff redeployment to the critical care unit (CCU) and managing a smaller workforce due to staff self-isolating.^{5 6} Other changes include the development of online educational material, guideline development, communication through social media, development of online medication ordering, implementing remote pharmaceutical care and managing 'off-label' prescribing.⁷

This paper describes the response to COVID-19 at two large English NHS hospitals and how adaptations made during the first wave informed readiness for a second wave.

Aim of the study

To determine the views of pharmacy staff on the departmental response to wave 1 of the UK COVID-19 pandemic in order to inform a strategy for a second wave at two large UK NHS teaching hospitals.

METHOD

Setting

This study was undertaken at two large teaching hospitals in the UK: University Hospitals Birmingham NHS Foundation Trust (UHB) which has over 2700 inpatient beds across four sites and Kings College Hospital NHS Foundation Trust (KCH), London, which has over 1300 inpatient beds across three sites. Both Trusts are part of the UK Shelford Group of Hospitals and collaborated through the convenience of existing links between the pharmacy departments.

Participant recruitment

Pharmacy staff were invited to 1 of 4 focus groups at UHB and 1 of 10 focus groups at KCH during May–August 2020. Attendance included: all grades of pharmacists and pharmacy technicians, clinical trials, medication safety, procurement/stores, home-care, dispensary/distribution, ward services, cancer services, aseptic services and outpatient services. Thus, the groups were representative of the staff and departments included in each department. A summary of staff attendance is listed in [table 1](#).

INTRODUCTION

COVID-19, caused by the SARS-CoV-2, has spread to nearly all countries in the world over a short time period.¹ While the majority of cases are in adults, a small proportion of confirmed cases are children.^{2 3}

The COVID-19 pandemic presents many challenges for the UK's National Health Service (NHS) hospitals.⁴ These include staff redeployment, working outside of expertise/practice standards, training disruption, expansion of critical care capacity, reduced routine work, increased use of



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Table 1 Staff focus group attendance

Pharmacy staff group	NHS pay band	Number
Pharmacist*	6	11
	7	21
	8a	40
	8b	13
	8c	8
	8d	5
	Pharmacist total	98
Pre-registration pharmacist	5	2
Pharmacy technician†	4	4
	5	9
	6	9
	7	1
	8a	4
	8b	1
	Pharmacy technician total	28
Pharmacy assistant	2	3
	3	6
		Pharmacy assistant total
Pharmacy administrative staff	4	1
Overall staff total		138

*For pharmacists, bands 6–7 are junior posts and band 8a and above are senior posts of increasing seniority.

†For pharmacy technicians, band 4 are junior posts with band 5 and above senior posts of increasing seniority.

NHS, National Health Service.

Data collection

Each focus group was led by a senior pharmacist or technician who verbally administered the question guide listed in [box 1](#) to the group. The questions/themes were based on the authors' experiences of service provision during wave 1 and were reviewed by the departments' leadership teams. Group responses were transcribed during the sessions by the session leader.

Data analysis

Responses were analysed by thematic analysis using the stages described by Braun and Clarke: familiarisation, coding, search for themes, review of themes, defining/naming themes and finalising analysis.⁸

RESULTS

Staff identified many reflections on their experience of the pharmacy departments' response to wave 1 of the COVID-19 pandemic. These are summarised below under common themes.

Extended staff rota

Staff identified the benefits of implementing an extended hour 7-day working rota to all wards at UHB and specifically to the CCUs at KCH. The pharmacy teams were onsite earlier and finished later and the weekend service closely matched the weekday service. This was particularly beneficial for the CCUs—extending the provision of clinical pharmacy review, access to specialist pharmacist advice, protocol updates following medication shortages and risk management. Non-specialist clinical pharmacists were trained in basic critical care pharmacy to provide support. Pharmacy technicians supported the CCU through managing medication orders including controlled drug (CD) ordering, stock counts and CD register entries to release nursing time.

The rota at UHB was established as two teams working 4 long days 'on' and 4 days 'off'. At Kings, five teams operated a rolling work pattern with each team working 5 consecutive days with 2 days 'off'. Staff within each team at UHB and KCH did not mix and thus were at reduced risk of transmitting infection between teams. At KCH, staff were additionally assigned specific wards, further reducing the risk of COVID-19 transmission.

Staff identified a number of challenges associated with the new rota. These included insufficient work towards the end of the day, limited benefit to non-CCU areas and staff fatigue. A large CCU pharmacy team was established at KCH, however, the anticipated CCU patient numbers were not reached and managing the large number of CCU pharmacy staff was challenging. Experienced CCU pharmacy staff recommended a more limited pharmacist pool to provide a 7-day service to CCU for any second wave. This was also considered to provide resilience for continuing elective activity.

Pharmacy ward-based profile

Electronic prescribing and medicines administration systems enabled pharmacists and technicians to work remotely at both UHB and KCH. This reduced ward footfall and the risk of virus transmission between areas by pharmacy staff. At UHB, pharmacy staff who were shielding/self-isolating were able to review prescribed medication from home. A smaller ward team was established by floor at UHB for face-to-face interactions, for example, to ask patients about their medication history. While these benefits were acknowledged by staff, they described the limitations of working geographically away from clinical areas. These included: reduced face-to-face contact with staff and patients, insufficient clinical oversight and a reduction in ward medication handling standards. The retention of ward presence by pharmacy was considered essential for a second wave by both Trusts.

The development of a COVID-19 ward stocklist was identified as important to respond to wards changing from their original speciality to mostly treating COVID-19. However, the implementation of an average remote ward stock 'top-up' at UHB led to both overstocking and understocking of medications. This caused additional workload when wards reverted back to their usual activity. A process of stock replenishment based on actual use was preferred.

To reduce the movement of CD order books from COVID-19 wards at UHB, an electronic CD ordering system was established. This was welcomed as beneficial through freeing up nursing/pharmacy time and from an infection control perspective.

Box 1 Staff feedback session question themes

- ▶ What worked well during wave 1?
- ▶ What didn't work well during wave 1?
- ▶ What would you have done differently?
- ▶ What would you suggest we put into place if there is a second wave as large as the first (from an operational perspective)?
- ▶ What would you suggest we put into place if there is a second wave as large as the first (from a personal perspective)?
- ▶ How do you think we can provide a service that supports the provision of a regular and COVID-19 workload at the same time?

Outpatient pharmacy services

At UHB and KCH, staff described how postal/courier services were used to provide medication to patients due to a rapid transition to virtual outpatient appointments. Additional resource, using temporary administrative staff, was required to manage the increase in workload to prepare medications for posting/courier delivery. The postal/courier service also provided a new cost pressure. At the beginning of the UK pandemic, staff recalled a rapid increase in prescriptions, including where patients had sufficient supplies at home. This placed additional pressure on the outpatient pharmacy and the medication supply chain. While advice not to prescribe beyond what was required for patients was issued, this required greater enforcement. At KCH, outpatient letters included a section describing what to do if patients required further supplies of medication.

Aseptic services

The increased number of CCU patients, reduced nursing to patient ratios, redeployment of non-specialist nurses to CCU and the greater need for standard CCU medication regimens placed a huge demand on nursing time for preparing medication. The aseptic laboratory team were used to reduce this burden. The aseptic team were supported with redeployed pharmacy staff, who had prior experience of working in aseptic services, and benefited from a reduced demand for aseptically prepared chemotherapy. At UHB, norepinephrine and morphine/midazolam were batch produced. At KCH, batch production was established for norepinephrine, propofol, atracurium and fentanyl. Unfortunately, some wastage was experienced at both sites. Staff feedback reinforced the importance of close working between CCU and aseptic pharmacy teams to ensure supply and demand were synchronised. The teams also identified the value of national advice around batch production and staff making up intravenous medication outside of an aseptic unit.

The pharmacy aseptic team identified a number of initial challenges at UHB which included the range of intravenous syringes used on wards and identifying which was required, time to set up products on the production unit software and the timeliness of being informed of product changes. KCH staff described a high workload with the need to ensure staff rested and cases of repetitive strain injury. For a second wave, the teams have COVID-19-ready isolator rooms and aim to source ready-made infusion bags/prefilled syringes of frequently used critical care medications.

Clinical trials

Most current clinical trials were paused at UHB and KCH. Pharmacy clinical trials staff described a large number of new studies relating to treating COVID-19 being opened at a greater pace than usual. This required additional staff to support the trials team at KCH. At UHB, the redeployment of some trials staff into clinical roles aided the COVID-19 trials providing expertise at the point of prescribing and dispensing.

Leadership and teamworking

A number of staff not in formal leadership roles demonstrated this skill which highlighted the adaptability and resilience of the pharmacy workforce both at UHB and KCH. General observations were made of a sense of camaraderie and teamworking beyond that previously experienced.

Senior pharmacist attendance at the Trusts' COVID-19 command meetings allowed the pharmacy response to escalate alongside the Trusts' activity levels.

Staff described feeling anxious regarding working in COVID-19 'hot' areas and raised the importance of having their concerns acknowledged and responded to. Staff well-being was supported at both Trusts through 'well-being hubs', referrals to staff support services and at KCH the #OnlyHuman campaign. KCH developed local pharmacy staff well-being sessions while staff at UHB requested further support.

Communication

During the early stages of the COVID-19 pandemic, staff recalled many changes to information being received. At both UHB and KCH, regular written communications were mentioned as beneficial. At UHB, floor leads attended a twice daily huddle for updates on workload, medication shortages and changes to policy. At KCH, the twice daily huddle was moved to an online format supplemented with a medication shortages bulletin. At KCH, staff requested a weekly 'wrap-up' of any policy/pathway/operational changes for a second wave.

Ward pharmacy staff at UHB created floor teams and communicated using the PANDO app which enabled group messages to be sent securely. This allowed home workers to be updated in 'real time' enabling integration with onsite colleagues.

At both UHB and KCH, pharmacists and technicians additionally felt that greater written direction around expectations for working remotely, including home working, was required to ensure consistency. At KCH, staff described the benefits of being assigned roles from a task log.

Regional and national supply chain

Group feedback at both organisations identified the benefit of a daily medication stock report which calculated the number of days of treatment available for commonly used CCU medication. Liaison with NHS regional procurement leads enabled movement of stock across regions to manage shortages. Senior pharmacist attendance at the Trusts' COVID-19 command meetings facilitated the dissemination of prescribing guidance on changes to medications in response to shortages. Whilst UHB maintained their supply of first-line critical care medications, regional variation meant that KCH required multiple changes to prescribing guidelines due to supply chain instability.

Infection control

At both UHB and KCH, staff described frequently changing personal protective equipment (PPE) advice. Pharmacy staff at UHB identified a number of infection control practices they felt should have been introduced more quickly. These included PPE fit testing, the mandating of wearing PPE within the pharmacy department, clearer instructions around attending wards and the implementation of social distancing in the dispensary and break-rooms. While social distancing in the dispensaries was a challenge, this did not change how the service was delivered. Social distancing markers were used at UHB and KCH along with one-way systems and plastic screens between workspaces. Unused part-packs of stock medication and patients' own medication were discarded at ward level. Any returned stock medication from COVID-19 ward areas was cleaned with disinfectant wipes. The benefits of having an infection control link pharmacist at both UHB and KCH were described.

DISCUSSION

This study has described the challenges placed on pharmacy services at two UK NHS Trusts, how each responded and recommendations for a second wave. The experiences described at

UHB and KCH are similar to those observed in other hospitals including increased CCU bed numbers, repurposing of areas into CCUs, staff redeployment, medication shortages, reduction in usual clinical activity and using technology to deliver non-patient facing care.⁴⁻⁷

The responses of hospital pharmacy to COVID-19 have been described in the USA,^{6,9} China,⁷ Australia¹⁰ and Malaysia.¹¹ While many of these responses matched those employed at UHB and KCH, there were examples of differing practice.

In Australia, the establishment of a dedicated COVID-19 pharmacist supported a COVID-19 medical team.¹⁰ They attended virtual ward rounds, promoted long half-life medication to reduce staff/patient contact, undertook medicines reconciliation, managed patients' own medication and ensured the availability of time-critical medications. In an example from the USA, a team of clinical pharmacists were repurposed to provide specific support to patients with COVID-19 through reviewing medication including antimicrobial and antithrombotic stewardship.⁹ An expert group, including a clinical pharmacist, was also used in a hospital in Shanghai.¹² Their role included providing guidance on medication supply chain, dispensing, intravenous compounding, audit, medication reconciliation, therapeutic drug monitoring and patient education.¹² At UHB and KCH, a dedicated COVID-19 pharmacy team was not established and patient review was undertaken by clinical pharmacists covering their usual wards as patients were widely dispersed across the hospitals. The promotion of specific medication regimens at UHB and KCH was led by supply chain availability.

At UHB and KCH, a senior pharmacist attended the Trusts' command meetings where information on medication was disseminated including availability, aseptic services capacity and guidance on changes to practice. This model allowed both support to front-line healthcare staff while enabling input at a strategic level.

Cheong researched the experiences of clinical pharmacists whose ward-based role was withdrawn, due to COVID-19, in Malaysia.¹¹ Concerns were raised about the perception of the need for a clinical pharmacy service by the wider hospital. This concern was not observed at UHB or KCH and may be due to well-established clinical pharmacy services in the UK. A number of disadvantages of not being on the wards, relating to medicines management and communication with staff and patients, were described and mirrored at UHB and KCH. A full ward service will be retained at UHB and KCH for future waves.

The posting/couriering of medications to patients at UHB and KCH reduced the opportunities for pharmacist counselling. In Shanghai, on discharge, patients were provided with access to an online platform where they could ask a pharmacist about their medication.¹² Online consultations were also provided at six internet hospitals with pharmacist-led online follow-up, dispensing and delivery from electronic prescriptions direct to patients. An online telehealth pharmacist counselling service in Beijing was established where patients and the public receive medication-related advice.¹³ Further work is required to support the counselling of outpatients seen remotely at both UHB and KCH.

There are few published studies describing hospital pharmacies' response to COVID-19. This current study has identified which changes implemented in the first wave will be beneficial to take forward for future waves. These include:

- ▶ Extended hours for a smaller staff group to support CCUs.
- ▶ Written standard operating procedures and communication around changes to practice.
- ▶ The use of the PANDO app for team communication.

- ▶ Maintenance of competence for pharmacists redeployed to critical care.
- ▶ Establishment of a pharmacy response in line with the hospital's implementation plan.
- ▶ Continued ward pharmacy services.
- ▶ Utilisation of remote CD ordering for COVID-19 'hot areas'.
- ▶ Deployment of a COVID-19 ward medication stocklist.
- ▶ Procurement of ready-made formulations of critical care medications and aligning any central intravenous additive service with CCU demand.

COVID-19 has possibly changed how pharmacy services are delivered long term. For example, the greater use of technology at both UHB and KCH enabled more flexibility in the workforce through virtual meetings, remote consultations and home working. The education and training of UK pharmacists is currently undergoing review to meet the needs of the expanding clinical expectations on the profession.¹⁴ This could include how pharmacists' skills were used during the COVID-19 pandemic, especially where additional training could enhance their role, to provide a workforce able to respond to future challenges impacting on healthcare delivery.

The advantage of this current study is that it presents a number of options for delivering a hospital pharmacy service during a global pandemic. These options are based on experience in practice during COVID-19 and represent the experiences of the pharmacy departments at two large hospitals.

Study limitations include how generalisable the results are. Undertaking the research at two large hospitals provides greater assurance that the results may be applied to other UK hospitals. While healthcare may differ between countries, experiences described in the literature are similar to those in this current study. The measures in this current study reflect a plan for wave 2 based on experiences in wave 1. However, it is not possible to determine how plans may operate concurrently with increasing 'business-as-usual' activity.

CONCLUSION

This study has provided a number of recommendations for how hospital pharmacy departments may respond to a global pandemic. These include employing different working patterns, amending ward-based services, accommodating virtual outpatient appointments, communication, managing the medication supply chain and the role of aseptic services. These experiences and recommendations may be used by other healthcare providers to help inform the pharmacy response to a global pandemic.

What this paper adds

What is already known on this subject

- ▶ The global COVID-19 pandemic had an unprecedented impact on healthcare services including hospital pharmacies.
- ▶ Little is known about how hospital pharmacy departments should respond to the impact of a global pandemic on operational and clinical activity.
- ▶ This study was undertaken to evaluate the hospital pharmacy response to COVID-19 at two large UK hospitals during the first wave.

What this study adds

- ▶ This study provides a strategy for how hospital pharmacy departments may respond to future waves of COVID-19 based on experiences derived from wave 1.

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REFERENCES

- 1 Van Damme W, Dahake R, Delamou A, *et al.* The COVID-19 pandemic: diverse contexts; different epidemics-how and why? *BMJ Glob Health* 2020;5:e003098.
- 2 Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA* 2020;323:1239–42.
- 3 Ladhani SN, Amin-Chowdhury Z, Davies HG. COVID-19 in children: analysis of the first pandemic peak in England. *Arch Dis Child*.
- 4 Willan J, King AJ, Jeffery K, *et al.* Challenges for NHS hospitals during covid-19 epidemic. *BMJ* 2020;368:m1117.
- 5 Bragazzi NL, Mansour M, Bonsignore A, *et al.* The role of hospital and community pharmacists in the management of COVID-19: towards an expanded definition of the roles, responsibilities, and duties of the pharmacist. *Pharmacy*;8:140.
- 6 McConachie S, Martirosov D, Wang B, *et al.* Surviving the surge: evaluation of early impact of COVID-19 on inpatient pharmacy services at a community teaching hospital. *Am J Health Syst Pharm* 2020:zxaa189.
- 7 Ying W, Qian Y, Kun Z. Drugs supply and pharmaceutical care management practices at a designated Hospital during the COVID-19 epidemic. *Res Social Adm Pharm* 2021;17:1978-1983.
- 8 Braun V, Clarke C. *Successful qualitative research*. London: SAGE, 2013.
- 9 Ahuja T, Merchan C, Arnouk S. COVID-19 pandemic preparedness: A practical guide from clinical pharmacists' perspective. *Am J Health-Syst Pharm* 2020.
- 10 Nguy J, Hitchen SA, Hort AL, *et al.* The role of a coronavirus disease 2019 pharmacist: an Australian perspective. *Int J Clin Pharm* 2020;42:1379–84.
- 11 Cheong MWL. 'To be or not to be in the ward': The Impact of Covid-19 on the Role of Hospital-Based Clinical Pharmacists - A Qualitative Study. *J Am Coll Clin Pharm* 2020.
- 12 Liao Y, Ma C, Lau AH, *et al.* Role of pharmacists during the COVID-19 pandemic in China - Shanghai Experiences. *J Am Coll Clin Pharm* 2020;3:997–1002.
- 13 Li H, Zheng S, Liu F, *et al.* Fighting against COVID-19: innovative strategies for clinical pharmacists. *Res Social Adm Pharm* 2021;17:1813–8.
- 14 Pharmacyregulation.org [Internet]. London: The General Pharmaceutical Council; Update to MPharm students about reforms to the initial education and training of pharmacists. Available: <https://www.pharmacyregulation.org/news/update-mpharm-students-about-reforms-initial-education-and-training-pharmacists> [Accessed 18 Oct 2020].

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