Issues affecting supply of palliative medicines into community pharmacy: A qualitative study of community pharmacist and pharmaceutical wholesaler/distributor perspectives

Natasha Campling a,⁎, Liz Breen b, Elizabeth Miller c, Jacqueline Birtwistle d, Alison Richardson a,e, Michael Bennett d, Susan Latter a

a School of Health Sciences, University of Southampton, Building 67, Highfield, Southampton SO17 1BJ, England, UK
b University of Bradford School of Pharmacy and Medical Sciences, M271b Richmond Building, Richmond Road, Bradford BD7 1DP, England, UK
c St Luke’s Hospice, Little Common Lane, Sheffield S11 9NE, England, UK
d Leeds Institute of Health Sciences, University of Leeds, Worsley Building, Clarendon Way, Leeds LS2 9NL, England, UK
e University Hospitals Southampton NHS Foundation Trust, Southampton General Hospital, Tremona Road, Southampton SO16 6YD, England, UK

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ABSTRACT

Background: Patient access to medicines in the community at end-of-life (pertaining to the last year of life) is vital for symptom control. Supply of such medicines is known to be problematic, but despite this, studies have failed to examine the issues affecting community pharmacy access to palliative medicines.

Objective: To identify community pharmacists’ and pharmaceutical wholesalers/distributors’ views on supply chain processes and challenges in providing access to medicines during the last year of life, to characterise supply in this UK context.

Methods: Qualitative design, with telephone interviews analysed using Framework Analysis. Coding frames were developed iteratively with data analysed separately and then triangulated to examine differences in perspectives.

Findings: Thirty-two interviews (24 community pharmacists and 8 wholesalers/distributors) were conducted. To ensure appropriate palliative medicines were available despite occasional shortages, community pharmacists worked tirelessly. They navigated a challenging interface with wholesalers/distributors, the Drug Tariff to ensure reimbursement, and multiple systems. IT infrastructures and logistics provided by wholesalers/distributors were often helpful to supply into community pharmacies resulting in same or next day deliveries. However, the inability of manufacturers to predict operational issues or accurately forecast demand led wholesalers/distributors to encounter shortages with manufactured stock levels, reducing timely access to medicines.

Conclusions: The study identifies for the first time how palliative medicines supply into community pharmacy, can be improved. A conceptual model was developed, illustrating how influencing factors affect responsiveness and speed of medicines access for patients. Work is required to strengthen this supply chain via effective relationship-building and information-sharing, to prevent patients facing disruptions in access to palliative medicines at end-of-life.

1. Introduction

The pharmaceutical supply chain exists to ensure medicines are supplied to patients within time and financial tolerances.1 However, this particular supply chain is known for its complexity,2–5 encompassing tiers of operations in a convoluted network that facilitates manufacture and distribution.6 As a result of this convoluted, extensive lead times and unpredictable production (in response to demand), fragility is often evident.5 This fragility has been highlighted during the COVID-19 pandemic,6,7 where there has been immense pressure to maintain continued supply of medicines during a challenging period in global healthcare provision. Whilst the pandemic has created product shortages, this is not a new phenomenon.7–15 The body of literature has focused on pharmaceutical supply chain management (for example16–18), global medicines supply and issues of availability, particularly medicines shortages.8–17 However, research to date has focused on types and impacts of supply issues as experienced by hospital pharmacy in the main. There is a lack of literature focused on supply into community pharmacy specifically and the views of...
Accessing supplies of palliative medicines in the community may prove burdensome and distressing for patients and their caregivers as the patient deteriorates due to symptom changes, necessitating frequent changes in the range and formulations of medicines prescribed. In addition, supply at EoL is complicated by regulations associated with the stock and supply of controlled drugs (CDs), which form a significant proportion of commonly used palliative medicines. This context is thus indicative of the significance of potential supply issues, where supply needs to be responsive to the rapidly changing, urgent needs of individuals dying at home. Given this difficulty, combined with a lack of research focused on supply of medicines into the unique and important setting of community pharmacy, the authors sought to evaluate supply in this context by interviewing community pharmacists (CPs) and pharmaceutical wholesalers/distributors (WDs). To fully understand the complexity of this supply chain a whole systems perspective was adopted. This encompassed examining how groups within the supply chain interrelate (influenced by information transfer and professional perspectives); WDs and manufacturers (from the perspective of WDs); CPs and manufacturers (from the perspective of CPs); WDs and CPs (from the perspective of both sample groups); and CPs and patients/carers (from the perspective of CPs).

Data reported here formed part of a larger study (ActMed) evaluating Access to Medicines for patients at EoL in the context of service delivery characteristics. For further details see: https://www.journalslibrary.nihr.ac.uk/programmes/hdr/165223/#/. The study has been fully reported to the National Institute for Health Research (November 2020) and will be published in their Journals Library following peer review.

2. Methods

A qualitative study design was taken; telephone interviews were sought with 20 CPs and 10 WDs to facilitate data saturation. The qualitative design was underpinned by a whole systems perspective to characterise the complexity of the supply chain, examining how various systems and influencing factors within the supply chain interrelate. Standards for reporting qualitative research (SRQR) have been utilised.

2.1. Sampling

CPs were purposively sampled via all 15 Clinical Research Networks (these networks support healthcare organisations and individuals to participate in high-quality research) in England. Key contacts within these networks distributed the invite to CPs (via research active community pharmacies, pharmacist leads or champions, and/or community pharmacy networks) and distributed one reminder six weeks later (spanning July–September 2019). Additionally, some CPs were recruited via another phase of the larger study in which CPs participated in interviews about their specialist provision of palliative medicines services. Snowball sampling also occurred where CPs gained agreement from colleagues to be approached. CPs were sought from community pharmacies across Clinical Research Network regions.

For WDs a range of approaches were utilised to purposively sample ‘elites’, those with decision-making responsibility at senior management and board level. Four routes to sampling were used to target FL and SL wholesale participants, and members of the trade association representing WDs with a distribution or wholesale role within LMs (chains). Potential participants were excluded if their expertise focused solely on hospital not community supply. Refer to Fig. 1 for further details.

2.2. Data collection

Semi-structured interviews were conducted. The study was introduced to the interviewees by outlining the focus of the wider study on patient and carer experience of access to medicines at end-of-life, and explaining that this phase of the study was focused on interviewees’ experiences of supply processes (from a whole systems perspective, how elements of the entire supply system interrelate – considering relationships, information flows, and professional perspectives) and any challenges in providing access to medicines used for symptom management during the last year of life.

Interview guides were developed by five members of the research team (NC, AB, SL, EM and LB), informed by a systematic literature review, emergent findings from other study phases (an online survey of healthcare professionals; and case studies), and study steering committee meeting discussions. Data were sought on issues such as: roles played in facilitating access to palliative medicines; experiences of supply chain processes...
including barriers and facilitators to supply; communication and information transfer between sample groups; and influences on, and related decision-making about, stock and supplies.

2.3. Data analysis

Following informed consent all interviews were audio-recorded, fully transcribed and analysed using Framework Analysis via the following phases: familiarisation, identifying a framework, indexing, charting, and mapping and interpretation.\textsuperscript{33} Coding frameworks for each sample group were developed by four members of the research team (NC, EM, LB and SL). The first three interviews in each sample were independently coded by three members of the team (NC, LB and EM). Coding was discussed with differences resolved, and coding frameworks iterated. Interviews with CPs and WDs were analysed separately and then triangulated to examine differences/similarities in perspectives.

Fig. 1. Sampling, data collection, and analysis.
3. Findings

Twenty-four interviews with CPs and 8 interviews with WDs were undertaken (n = 32 overall). CP interviews ranged from 14 to 38 min (median 30), WD interviews from 17 to 30 min (median 27).

3.1. Community pharmacist sample

Table 1 displays the CP sample. Twenty-four CPs were interviewed August–September 2019 by NC (an experienced qualitative researcher with a palliative care clinical background). Participants stated the number of WDs used and a best approximation reflecting participants’ knowledge and recollection. Between 1 and 3 FL wholesalers were used by participants in their community pharmacies (median 3). Some pharmacies (LMs) used no SL wholesalers whilst others used up to 14 (median 3), for others this was difficult to estimate as they utilised the services of a third-party to place orders via SL wholesalers. Fifteen SL wholesalers were named by participants as being used. Overall, 2–16 wholesalers (both FL and SL) were used (median 5).

3.2. Wholesaler/distributor sample

Eight WD interviews were undertaken May–November 2019 by EM (a qualitative researcher with palliative care pharmacy expertise). The 8 participants were from 6 WD companies (FL n = 5, SL n = 2, LM chain n = 1). The study findings are presented below, for further quotes see supplementary data file 1 (Table of quotes). Fig. 2 illustrates supply routes into England’s community pharmacy generated from study data.

Table 1 Characteristics of community pharmacist sample.

| Total number of pharmacies | 24 |
|----------------------------|----|
| Size of pharmacy\(^a\)    |    |
| Independent               | 11 |
| Large multiple            | 7  |
| Small multiple            | 6  |
| Provision of commissioned service for palliative care by pharmacy\(^a\) |    |
| Providing commissioned service | 5  |
| Not providing commissioned service | 19 |
| Location of pharmacy via Clinical Research Network region |    |
| North West London         | 7  |
| Eastern                   | 4  |
| North West Coast          | 3  |
| Kent, Surrey & Sussex     | 2  |
| East Midlands             | 2  |
| Greater Manchester        | 2  |
| South London              | 1  |
| North East and North Cumbria | 1  |
| Thames Valley and South Midlands | 1  |
| Yorkshire and Humber      | 1  |
| Range in number of prescriptions dispensed per month by pharmacy (Sept 2019)\(^b\) | 1469–16,918 |
| Wholesaler/Distributor usage by pharmacy |    |
| Range in number of full-line wholesalers used | 1–3, median 3 |
| Range in number of short-line wholesalers used | 0–14, median 3 |
| Range in overall number of wholesalers/distributors used | 2–16, median 5 |

\(^a\) Pharmacy size classification – Large multiples >100 pharmacies, small multiples 6–99 pharmacies, independents 1–5 pharmacies. Total United Kingdom market - large multiples 49.4%, independents 37.3%, small multiples 13.3%.\(^b\)

"…Specialist nurses, community nurses, community matrons… all call in to us, we supply them, we help them, we deliver, we call out. We do as much as we can to help them… There are strong relationships with those people…” (CP16, I).

"…I personally know all the CPs… because I’ve been around for so long… We have got a GP who is a lead palliative care GP across the area and she’s in my local practice and she and I have got a fantastic relationship. We’ll text each other; she’ll text me and say I’ve got someone who is going to need X and Y can you sort it…?” (CP21, LM).

4. Community pharmacist findings

4.1. Role played facilitating medicines access

CPs provided insight into their role facilitating medicines access at EoL. This encompassed: stock management within their pharmacy, or across numerous pharmacies; anticipating and/or triaging prescriptions for patients; dispensing of medicines to a patient/family member; providing information about medicines and how to access them to patients/family members; provision of home delivery; and where commissioned, provision of a palliative medicines service (see Table 1). Pharmacist roles were helped by experiential knowledge, some practicing for over 20 years and holding senior positions.

CPs perceived medicine supply to those in the last year of life to be central to their role. It was often an emotive issue for them:

“…These are the most vulnerable people at the most vulnerable time looking to spend time [together] at the end of their life and a prescription is no use to them nor their family…” (CP16, I).

“…All they [family members] want to do is come and pick their loved ones medication up. So in many cases I don’t even try to explain I just do my damndest to get hold of it…” (CP15, I).

To ensure continuity of medicine supply to patients, some participants pre-emptively engaged in stock management:

“…We generally take a proactive approach to medicine stock holding… we’d rather be looking at it than looking for it… we carry a significant range of controlled drug medicines and medicines that might be required in end-of-life situations…” (CP10, I).

Other CPs reported acting pre-emptively on behalf of patients, anticipating prescriptions being sent electronically (via the Electronic Prescription Service) to the pharmacy, to facilitate supply; whilst others discussed how they triaged (and prioritised) such prescriptions.

CPs emphasised that to fulfil their role facilitating medicines access, they were reliant on building relationships with patients, families, and healthcare professionals. Often embedded in their communities by virtue of them being well-established businesses, CPs sought to facilitate seamless care. Some had developed strong relationships with patients and their families over numerous years. To provide medicines access and necessary services to patients, some CPs worked to develop and maintain relationships with a myriad of relevant healthcare professionals (local GPs, community-focused palliative care nurse specialists, community nurses, and other pharmacists) with varying levels of success.

"…[Palliative care nurse]… she’ll text me and say I’ve got someone who is going to need X and Y can you sort it…?” (CP21, LM).

4.2. Facilitators of supply into community pharmacy

4.2.1. Use of key wholesalers/distributors

CPs spoke of using key WDs for supply into their pharmacies. Pharmacies were likely to use one, occasionally two, WDs as first-line options. Using key WDs could facilitate communication and relationships between the pharmacy and WD. For some pharmacies, who had their own wholesaler (i.e. owned by the respective SM or LM), supply was facilitated. Most CPs discussed their, or their employing company’s, prioritisation of WDs i.e. which they used in which circumstances (first, second, and
consecutive options). Decisions concerning which WDs to engage with hinged on cost (best price), availability, and speed of supply.

4.2.2. Information technology systems (Stock Management and/or Ordering)

Supply into community pharmacy was facilitated by IT systems for stock management within pharmacies and for placing orders with WDs. The extent to which pharmacies used IT systems to manage their stocks varied but all pharmacies placed orders with WDs via online systems. Only a few SL wholesalers did not provide any online ordering platform. Generally, online ordering systems were perceived to facilitate supply.

4.2.3. Time to delivery

Another facilitator of supply into community pharmacy was time to delivery. CPs were largely satisfied with the time to delivery offered by WDs. FL wholesalers were able to provide twice daily deliveries, and SL wholesalers provided once daily delivery (with some able to provide twice daily deliveries). For many CPs there were multiple deliveries per day because of their use of numerous WDs.

CPs emphasised that where orders needed to be placed to fill a prescription, if WDs had their own stocks then delivery could be that same day (weekdays) for orders placed before the respective cut-off time. Once the cut-off time had been crossed then delivery into the pharmacy would be for the following day. Ability of WDs to provide same or following day delivery was perceived to be as good as possible, considering the need for supplies to be transported from distribution centres/warehouses. Where third parties were used then supply would be for the following day.

4.2.4. Sourcing stock from other pharmacies

On occasion where pharmacies did not hold stocks of the required medicines, nor could source them via WDs, most CPs contacted other pharmacies on behalf of patients. They spoke of contacting nearby pharmacies that were part of LMs because of their likelihood of holding more extensive stocks within store, and their ability to contact other branches within the

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Fig. 2. Supply chain routes into community pharmacy.
4.3. Barriers to supply into community pharmacy

For CPs barriers to supply into community pharmacy, and ultimately medicines access, outnumbered facilitating factors. This did not mean patients necessarily had poor experiences of community pharmacy-related medicines access, rather there were numerous hurdles that needed to be overcome, and CPs worked tirelessly to overcome these.

4.3.1. Medicine shortages

General medicine shortages were a universal challenge for CPs. Lack of information surrounding medicines shortages was problematic with CPs having to seek information via various sources (e.g. professional organisations, WDs and manufacturers). This contributed to pharmacist workload, and further delays in accessing medicines. For palliative medicines specifically, CPs reported varying levels of difficulty related to shortages “which is more distressing…” (CP07, I) but “…from the palliative care point of view and we haven’t experienced the problems that we’ve seen in other parts of our business with non-availability of drugs generally…” (CP12, SM). It appeared that for a select few (with interest and specialism in this area) they successfully weathered any shortage issues because of effort put into sourcing medicines, sometimes from all over the world.

General medicine shortages also led to quotas being imposed by WDs and/or manufacturers. These were perceived as a hurdle which CPs had to navigate to gain supplies. They were often harshly viewed by CPs as creating additional work and supply delays to patients.

“…They give you so many for the month, if you use any more than that tough ‘you can’t have them, they’requota’d’. You have to then mess around to try and get an extension on the quota, which involves faxing prescription copies to them to prove that you’ve got a prescription for that item, which again is so time consuming and a complete waste of time…” (CP14, I).

Where medicines became short in the market, some CPs believed that WDs and manufacturers prioritised hospital supply, further limiting supply into community pharmacy.

Some palliative medicines were in short supply during the data collection period but this was not a frequent occurrence, which was not the case for other medicines where shortages were more common. When palliative medicines were in short supply CPs highlighted that any shortage in the market would drive up the price of the medicine. This was a key issue due to professional obligations to supply the medicines, but prices frequently exceeded the monthly stated Drug Tariff price (i.e. purchase cost to the pharmacy exceeds reimbursement price). At the time of purchase CPs did not know whether a price concession (products listed monthly by manufacturers, triggered by conflict cultures and priorities. CPs argued they were focused on patient needs (accountability to the patient), whilst they perceived WDs and manufacturers to be focused on commercial priorities.

“…[To get access to medicines]…I have to jump through hoops, spend time which equals money, takes me away from looking after patients and all of my staff away from looking after patients to try and source medication or products…they’re commercial operations looking to make the most that they can out of what they’re doing…” (CP16, I).

4.3.3. Lack of communication and relationships with wholesalers/distributors and manufacturers

Another barrier to supply was the lack of meaningful communication (two-way information transfer underpinned by trust) with WDs and manufacturers, and the consequent lack of relationships. CPs highlighted that when they needed to speak to WDs, they did so by telephoning the respective company’s customer services team. It was relatively rare (according to CPs) for WDs to contact CPs, so communication was generally pharmacist-initiated. Ringing service centres was time-consuming, like ringing a “call centre”, not knowing who they were talking to.

The lack of clinical insight held by those answering the phones at WDs was an issue for some CPs because they did not understand the urgency of palliative care medicine supply. Furthermore, a lack of understanding could preclude WDs’ sales staff searching for alternative options and total reliance on their IT systems. Level of insight was not just an issue for customer service teams at WDs. It could be confounded by CPs delegating calls to dispensers. This meant that they were less likely to consider the following options:

“…If one thing is not available I might… say ‘is it available as a slightly different formulation, a slightly different strength’…then I can know that I can go back to the prescriber quickly and say ‘I can get this, can you please change the prescription to X...’” (CP09, LM).

This lack of meaningful communication precluded relationship development between CPs and WDs and was a fundamental barrier to supply.

“…I don’t think you do have a relationship with them, not like you used to. There are no reps that come round. I wouldn’t even know who my account managers were anymore with these big companies [FI wholesalers]. Never see them. Never ring up or anything...” (CP14, I).

Lack of meaningful communication and relationships appeared to be underpinned by mistrust on the part of the CPs towards WDs and manufacturers, triggered by conflicting cultures and priorities. CPs argued they were focused on patient needs (accountability to the patient), whilst they perceived WDs and manufacturers to be focused on commercial priorities.

4.3.4. Shortcomings of ordering systems

Despite IT ordering systems being a facilitator to supply (see ‘information technology systems’), many CPs identified shortcomings of online systems conversely acting as a barrier. CPs stated that the majority of orders could be dealt with solely online, but as soon as an issue arose such as a product being identified as out of stock with the WDs, they would need to ring the WD to find out if/when it would be back in stock. Other reasons...
for needing to phone were to find out about: specific brand availability; price of the product (as prices altered daily); where a product was low in stock if they actually had it; if the product was a switch line (switched to a different warehouse/distribution centre and therefore how long it would take to be delivered); and where a third-party order platform was used to ascertain availability (as product availability was not stated on these platforms). The phoning round, although it did not occur for most ordering, was perceived as hugely time-consuming to gain “definitive answers” and source product for the patient.

Some WDs were viewed as having more live and robust online ordering systems than others, but examples provided were frequently negative:

“…One of the [FL] wholesalers will accept the order, not tell you anything is out of stock and then it doesn’t come in and then you ring them … they say, ‘well it’s out of stock’. ‘Well why is your computer?’ ‘Oh, I don’t know’, is the answer…” (CP21, LM).

Therefore, although online ordering systems were primarily seen as a good thing, they were viewed as limited in functionality.

4.3.5. Disincentives to stocking palliative medicines

Another barrier to supply was disincentives to stocking palliative medicines. Pharmacies from which CPs operated varied widely in the number of prescriptions dispensed per month (refer to Table 1), so for some, a lack of turnover of palliative medicines was a strong disincentive for stocking such medicines.

“…The hurdle is that the medications are usually high value, so pharmacists don’t tend to keep them in stock. They’re also not commonly prescribed, you don’t know which strength they’re going to be…” (CP17, LM).

Related to this potential lack of stock turnover were the associated costs of the medicines and the lack of a long shelf-life for some (only those operating commissioned services for palliative care were reimbursed for expired medicines, refer to Table 1). These were services funded to provide locally or regionally determined stocks of “core” lists of palliative medicines and community pharmacy extended hours of opening where possible). CPs could also be concerned of the risk of medicines not being collected by patients or their families.

Some CPs discussed disincentives specific to stocking CDs often used in palliative care. These were: legal requirement to store in locked cupboards (and limited CD cupboard capacity); inability to return CDs to WD where the medicines were not collected by the patient/family; and requirements around destruction of out-of-date CDs. In the main, disincentives revolved around implications, including cost, of medicines not being collected. Disincentives to stock CDs did appear to influence thinking and behaviours of some CPs, meaning sufficient CDs were less likely to be held in stock than other medicines.

4.3.6. Lack of weekend ordering and sunday deliveries

CPs who worked at weekends emphasised that supply over weekends could be an issue for patients. Although pharmacies usually had one delivery (per WD) on a Saturday the inability to place orders over the weekend, and the requirement to wait for Monday’s deliveries was a barrier to supply into pharmacies, and ultimately medicines access over the weekend.

4.3.7. Issues with wholesaler/distributor deliveries

Some CPs referred to issues such as road accidents precluding deliveries. Usually, they were described as an occasional occurrence. For other delivery issues appeared more frequent, particularly in relation to missing products from an order which were not known until the delivery arrived.

5. Wholesaler/distributor findings

5.1. Role played facilitating medicines access

WDs discussed strategic elements in supplying palliative medicines to community pharmacies. These comprised commercial and quality ‘value-added’ services to win community pharmacy business from WD competitors through use of Solus contracts and quality improvement of facilities and infrastructure to improve WD volume of stock in the marketplace. Three national wholesalers provided a FL service of all pharmaceuticals including palliative medicines, in contrast SL wholesalers provided a partial range usually at a competitive price. Competition in the branded medicines market was more limited than within the generic market with the three FLs competing for manufacturers’ business. Some participants discussed Solus or dual arrangements which according to WDs assured continuity of supply in the market due to WD close relationship with manufacturer. These arrangements were also perceived to generate more secure business.

“…Commericially it’s better for us to get all of the volume where you get 100% market share [Solus contract]. We’re in a volume-based business so this brings us volume…” (WD03, FL).

Despite this perception, Solus contracts were reported by SLs as increasing the risk of supply failure since the product could not be accessed via other WDs. Commercial drivers also dictated the discount awarded to pharmacies based on the volume of stock purchased from WDs. However, within Solus contracts there was arguably less need to be competitive, being the sole supplier.

Inability to secure sufficient stock levels was considered a commercial ‘faux pas’ as it had a negative impact for the business as a commercial enterprise, not having assets to sell, but also not being able to offer the expected service to CPs. WDs struggled to differentiate within the market, offering very similar services and so needed to differentiate in other ways, stock availability to ensure service continuity potentially being one of these. Quality improvement of customer service, IT ordering, storage facilities and logistics infrastructure were reported as key means to maintain a WDs’ competitive position and increase the volume of stock sold.

Strategic improvement and control of the supply chain were also seen as priorities as there was less risk attached to a streamlined supply chain with fewer companies in the sequence of activity, enabling “a very tight and secure, assured supply chain” (WD05, FL). Regular auditing of partners and by the Government’s medicines regulatory agency also ensured WDs focused on regulatory compliance and patient safety. In addition, working with pharmacies to respond to their service complaints was important as complaints challenged working relationships.

5.2. Facilitators of supply into community pharmacy

5.2.1. Relationship-building

WDs noted the importance of relationship-building in facilitating medicines access whether through formal agreements or contracting arrangements with manufacturers, day-to-day relationships with community pharmacies (via sales and customer service teams) or informal communications and networks. Relationships were stated to support regular dialogue with a two-way flow of information and feedback on problems up and down the supply chain.

5.2.2. Upstream relationships with manufacturers/suppliers

Contracts or agreements with manufacturers/suppliers could provide assurance of inbound stock to WDs, however formal contracts were not universally used due to manufacturers/suppliers not being able to guarantee supply against an order e.g. adverse weather, shortage of raw materials or quality audit failure. Due to this reason, WDs collaborated closely with manufacturers/suppliers often through designated account managers to try and assure product availability. When supply disruptions were envisaged, manufacturers were responsible for communicating this to the Department of Health and Social Care (a Government department responsible for policies on health and social care in England).

5.2.3. Downstream relationships with pharmacies

WDs reported community pharmacies accessed information on medicines shortages from on-line ordering systems and customer services
teams. This was viewed as two-way conversation, with telesales representa-
tives providing feedback to WDs and manufacturers. WDs reported they
had a strategic role to put pressure on manufacturers when shortages
were identified by pharmacies. They asserted they benefited from their role
in this triad by transferring information from pharmacies upstream to
manufacturers e.g., regarding changes in prescribing patterns. This could
instigate proactive responses from manufacturers regarding production
plans/stock level holding.

5.2.4. Collaborative relationships
Some WDs discussed good practice in supply chain management where
severe (high impact) medicines shortages, such as with diamorphine 5 mg
injection, had been co-ordinated nationally via the Department of Health
and Social Care’s Medicines Supply Team and NHS England & NHS Im-
provement’s Commercial Medicines Unit. In such situations, there was a
willingness to work collaboratively to get medicines to patients, setting
aside competitive relations in response to the shortage.

Relationships between WDs, manufacturers and community pharma-
acies were viewed as extremely important in supplying palliative medicines,
WDs reported acting as a point of mediation in the supply chain.

5.2.5. Investment in logistics infrastructure
WDs identified logistical issues in the pharmaceutical supply chain as
critical in ensuring medicines access at EoL. There was emphasis on the re-
quirement to deliver on time and in full so they could be responsive to com-
Munity pharmacy and patients’ needs. This was facilitated by contracting
with reputable haulage firms familiar with regulatory governance,
investing in logistics infrastructure and by having clear visibility of stock
levels.

WDs reported high-quality logistics infrastructure ensured stock could
be delivered with increased certainty, and orders delivered on the same
or next day, on time and complete. Some participants across FL and SL
wholesalers discussed the value of twice daily deliveries to community
pharmacies in expediting medicines access.

“…Wholesalers deliver stock eleven times a week to pharmacies…so actually
what a wholesaler does is provide access…we deliver twice a day and every
weekday to all of those customers…” (WD03, FL).

5.2.6. Demand and stock management
WDs sought to ensure supply continuity into community pharmacy. A
key element in providing medicines to community pharmacies was WDs
having access to stock within the UK market, or if a shortage, their ability
to source alternative product elsewhere (outside of the UK). Where the
product was generic there tended to be a greater source of alternative
suppliers. If a product could not be sourced, it was because it could not be
(as opposed to no attempt made).

“…Majority of time that shortages occur are about not having the product
available for supply and that’s down to maybe raw material, maybe choice
and allocations to different countries, maybe production issues…” (WD05,
FL).

“…If we can’t get hold of one drug, we’d probably work with another company
that had got a competitor drug…” (WD02, FL).

WDs advised they shared their demand profile and activity with manufac-
turers, to inform manufacturing capacity management. This information
transfer aimed to ensure stock levels were as needed, and medicines short-
ages did not develop.

The majority of WDs described complex systems for managing stock in
response to forecasted demand. Stock management was crucial to WDs’
ability to supply medicines. WDs considered stock issues could occur
through ineffective capacity planning (manufacturer) or excessive demand
(pharmacy). Most medicine shortages were perceived to derive from insuf-
ficient ‘inbound’ stock from manufacturers, but problems could occur when
demand from pharmacies exceeded supplies, leading WDs to introduce
quota systems to ration medicines.

“…Unfortunately, the stock that you may require is finite in quantity, you
may not always get as much as you forecast you may need…” (WD08, SL).

Intelligence regarding customer demand patterns, stock holding levels
and locations of stock meant WDs could adjust stock levels throughout
the country in distribution centres to respond to demand spikes e.g.
where stock was switched at a regional scale causing other products to be
in demand.

5.2.7. Buffer stock availability

Most participants discussed how buffer stocks, stocks within the UK and
Western Europe, had an important role in adding resilience to the supply
chain to facilitate medicines access. Holding buffer stock could be recom-
mended by the manufacturer to the pre-wholesaler if they expected a prod-
uct shortage or it could involve the WD transferring stock between
distribution centres (ensuring quicker response times for orders and equita-
ble distribution).

WDs reported that stock availability was always dependent on manufac-
turer production schedule and lead time for distribution. SL wholesalers
were noted to fill a gap when FL wholesalers were devoid of stock to main-
tain supplies into community pharmacies.

5.3. Barriers to supply into community pharmacy

WDs discussed barriers to supply of palliative medicines which were
often outside of their control. Such barriers included: supply chain disrup-
tions caused by product shortages or recalls; manufacturer strategic drivers
such as manufacturers’ quota or export quota; and downstream issues such
as export trading by pharmacies, speculative stockholding by pharmacies
and stockpiling by patients in case of anticipated shortages e.g. UK exit
from Europe (Brexit). Alternatively, some barriers were reported to be
within the WDs’ control to ameliorate. These included: the use of generics
(which the WD procures); and WD decision to limit supplies to pharmacies
through quotas (where supplies from manufacturers were limited, quotas
were used to equitably share supply).

5.3.1. Supply chain disruptions

Manufacturers’ commercial decisions on where to send their product
worldwide (influenced by UK regulations, medicines pricing and the
value of sterling) impacted supply. These commercial decisions, together
with globalisation of manufacturing sites, meant WDs could have limited
supplies into community pharmacies.

Many of the WDs referred to shortages impacting their ability to supply
customers. Shortages and medicines out of stock at manufacturer sites
required WDs to respond by sourcing alternatives and increasing stock
holdings of other products. WDs expressed concern about supply
assurance regarding palliative medicines.

“…We’re concerned…that manufacturers will…choose not to supply the
drugs to the UK because they will be able to make more money supplying it
elsewhere in the EU. So…the supply chain…is a really big worry and for pal-
lliative medicines that’s especially important. This isn’t something where you
can order something in and wait 2 months…it’s being ordered because it is
needed there and then and once you’ve missed that chance to support the
patient at that crucial moment in their lives that moment has gone…”
(WD06, LM).

5.3.2. Strategic drivers

Strategic supply influences that acted as barriers included: generic med-
icines, quotas and storage capacity, all of which influenced WDs’ decision-
making. WDs identified the supply of generics as a commodity market, in
contrast to the branded medicines channel. High demand for generics was
perceived as created through NHS commissioning/incentive schemes as
well as community pharmacy purchasing. In contrast, non-availability of
a generic was viewed as the result of low demand worldwide or low profit margins, leading manufacturers to withdraw the product from the market. Most participants referred to introducing quotas to ration medicines and assure equitable distribution. Supply quotas could be put in place by Governments in other countries, limiting parallel importation of medicines (such as branded medicines brought in from other European countries to sell at a higher price in the UK). Product quotas could be put in place by WDs to prevent over-ordering and trading by pharmacies.

Some participants asserted that WDs’ storage capacity for secure and temperature-controlled medicines could impact on the supply chain. This was perceived to be a barrier in relation to the volume and space for storage of palliative care CDs:

“…Because we don’t want too much stock particularly when we are talking about controlled drugs of course there is a limitation on how much space you can actually have…” (WD03, FL).

5.3.3. Downstream issues
Participants reported instances of downstream issues which affected the supply chain. These included export trading by pharmacies; product switches; geographical differences in palliative medicines lists; speculative stockholding by pharmacies; changes in prescribing habits and stockpiling by patients due to lack of understanding about the supply chain.

5.3.4. Upstream issues
The inability of manufacturers to adequately predict operational issues or forecast demand led to production issues and shortages of manufactured stock. WDs considered the notice period and delay in release of information from manufacturers/Department of Health and Social Care, reportedly due to commercial sensitivity, problematic. They considered there was not always enough time to make alternative arrangements e.g. order in alternative products to maintain supplies into pharmacies and endeavoured to work closely with manufacturer account managers to assure product availability. Product recalls also undermined confidence in specific products and the supply chain. Manufacturing errors caused an increase in pharmacy workload via recovering specific batched products and re-dispensing new products (same or alternatives) which could lead to temporary medicines shortages, reducing access to medicines.

6. Summary of facilitators and barriers to supply

The findings highlight issues affecting access to medicines used during the last year of life, as relayed by two major stakeholders in the pharmaceutical supply chain, CPs and WDs. Table 2 provides a summary of facilitators and barriers to supply to community pharmacy as perceived by these groups.

7. Discussion

As globalisation of manufacture increases shortages are more likely, coupled with increasing demand for supplies of palliative care medicines in the community due to ageing populations and more people wanting and actually dying at home, challenges sustaining supplies will persist. Key issues raised in our findings, via two hard-to-reach sample groups were: the impact of medicines shortages; supply chain performance issues; and lack of information sharing via effective relationships; each is discussed in turn with recommendations suggested.

7.1. The impact of medicines shortages

Lack of access to medicines was found to be problematic within the pharmaceutical supply chain and caused strain on community pharmacies. Palliative medicines supply into community pharmacy was perceived by CPs to function satisfactorily; except when unable to get hold of supplies due to products being unavailable (similarly noted by Kuruvilla et al relative to palliative medicines). Medicines shortages therefore led to additional work for CPs to access products for patients via multiple routes and systems, and it was their professional obligation to do this work that masked inherent difficulties. Whilst they had a preferred WD (primary wholesaler, also demonstrated in the work of Sengun & Wasti) who they worked closely with, they engaged with numerous WDs to gain supplies of medicines, endlessly having to shop “around from one to another” (CP14, I) to do so. The efforts of CPs in accessing medicines propped up a fragile supply chain at times when medicines were in short supply. They were doing their “damnest” to get medicines for patients (CP15, I). Studies focusing on hospital pharmacists and technicians underlined the additional workload incurred by product shortages, via having to investigate and source alternatives. Careful consideration of skill mix in the pharmacy will help release CPs from some of this additional workload but there needs to be recognition that not all such activity can be successfully delegated as CPs’ clinical insight and knowledge may be required. The relative success of skill mix alterations will depend on NHS funding and pharmacy chain/contractor investment in staff and education.

One of the main problems reported by WDs (like CPs) was medicines shortages from manufacturers perceived to be outside the WDs’ control, despite sharing information on product demand. Supply disruptions and shortages can lead to WD reputational damage. However, despite having sophisticated materials management systems to secure stock and fulfil customer orders, WDs reported common-place downstream issues such as trading by pharmacies, regional or local product switches and stockpiling of drugs (by pharmacies and patients), causing problems. These led to enforcement of stock restrictions via quotas, to ration medicines supplies and restrict these activities, limiting access to medicines. CPs navigated a challenging interface with, and often competing pressures between: WDs (via customer service centres); the Department of Health and Social Care (via the Drug Tariff) to ensure cost reimbursement of medicines; and multiple systems (e.g. regulatory, legal, contractual, organisational and IT based). In doing so they were mindful of their duty to patients despite competing ethical and commercial pressures (pressures highlighted by other researchers in relation to professional duty of care and autonomy vs retail pressures of open markets, monopolies and economic autonomy). Professional diligence compounded the onerous levels of work undertaken, which has also been observed as exacerbated in the face of shortages in other contexts, such as for hospital pharmacists and GPs. Crucially, this level of work may detract from CPs embracing wider patient-facing roles in palliative care, for example as palliative medicines’ information-giving specialists as advocated by Royal Pharmaceutical Society Wales, and could cause further role conflict.

7.2. Supply chain performance issues

In business, alliances between trusted partners are critical, reducing vulnerabilities and risk thereby offering greater capacity and capability. For example, direct alignment with a WD means supply into community pharmacy should be assured across key product lines (e.g. Pfizer’s partnership with Alliance Healthcare WD and AstraZeneca’s with AAH WD). Partnerships need to be purposeful, with the right partners who are loyal and committed. Sinkovics et al reported collaborations to be an issue and these were raised in our study as an area of weakness and ineffective-ness, impacting on medicines availability. Stakeholders within the pharmaceutical supply chain work together to a common agenda and as such there is an innate dependency on each other, but levels of influence and power can shift depending on the stakeholder relationship and situation. Access to palliative medicines in this situation had left CPs regarding themselves as being “at the end of the chain,” unable to get hold of products at the beginning of the chain. This put CPs in a vulnerable situation and has been experienced in other contexts. WDs partnered with manufacturers, acting in an intermediary capacity to source stocks and ensure availability of these with numerous regional storage locations/distribution centres. In the current climate, when considering medical supply chains, regional holding of stock is considered essential to enable supply chain responsiveness
Table 2 Facilitators and barriers to supply into community pharmacy.

| Community pharmacist findings | Wholesaler/distributor findings |
|-------------------------------|---------------------------------|
| **Facilitators (+)**          | **Facilitators (+)**            |
| Relationship building – with patients, families and myriad of relevant healthcare professionals (embedding in communities and local healthcare services) | Relationship-building – importance of methods, contractual/informal communications and creation of feedback channels. |
| Use of key wholesalers/distributors – 1-2 WDs used as first-line options, protocol driven prioritisation of WDs (which to use when). | Upstream relationships with manufacturers/suppliers – contractual relationships, information-sharing, supply certainty. |
| Online information technology systems for stock management and ordering | Downstream relationships with pharmacies – responsibility to assure supply, timely information, middleman position. |
| Time to delivery – same or next weekday delivery, multiple deliveries per day via multiple WDs. | Collaborative relationships – collaborative good practice, working to common agenda, patient safety, roles of other parties. |
| Sourcing stock from other pharmacies – networks run via instant messaging apps. | Investment in logistics infrastructure – choice of partners, development of logistics equipment, impact on service responsiveness. |
| Medicine shortages – a universal challenge, related requirement to seek out information via professional organisations. Lead to quotas (rationalisation), price rises and last resort a prescription change. | Demand and stock management – access to stock pools, supply continuity, impact of generics, sharing of demand patterns (WD and pharmacies). |
| Need to use multiple WDs – creates complexity (multiple supply routes) and onerous workload. Required because of Solus agreements and medicine shortages. | Buffer stock availability – in UK and Western Europe, additional resilience in the supply chain, changing roles of full and short-line wholesalers during stock shortages. |
| Lack of communication and relationships with WDs and manufacturers – lack of meaningful two-way communication underpinned by trust with WDs and manufacturers, consequent lack of relationships. CP contact with WDs via telesales service centre staff, with no clinical insight and reliance on information technology systems. | |
| Shortcomings of ordering systems – despite the systems being a facilitator to supply, they could also act as a barrier ac: systems not sufficiently live, CPs needed to phone WDs to try to find out information on a vast array of issues e.g. when a product would be back in stock, how long a product would take to be delivered if it had been switched to a different warehouse, brand availability, expiry dates. | |
| Disincentives to stock palliative medicines – for some CPs lack of stock turnover of such medicines (associated costs and lack of long shelf life), added issues with controlled drugs (e.g. need to store in locked cupboard, inability to return controlled drugs to WDs). | |
| Lack of weekend ordering and Sunday deliveries – requirement to wait for Monday’s deliveries led to problematic supply over weekends. | |
| Issues with WD deliveries – medicines missing from the delivery (usually when the medicines had become out of stock at the WDs, but CPs did not know this until the delivery arrived), occasional other issues e.g. delivery drivers doing too many hours (so return to base without making deliveries). | |

| Barriers (−)                          | Barriers (−)                          |
|--------------------------------------|--------------------------------------|
| Relationship building – with patients, families and myriad of relevant healthcare professionals (embedding in communities and local healthcare services) | Supply disruptions – United Kingdom regulations, pricing and value of sterling; medicine shortages. |
| Use of key wholesalers/distributors – 1-2 WDs used as first-line options, protocol driven prioritisation of WDs (which to use when). | Strategic drivers – demand for generics, quotas and WD storage capacity. |
| Online information technology systems for stock management and ordering | Downstream issues – export trading by pharmacies, geographical differences in palliative care medicine lists, speculative stockholding by pharmacies, stockpiling by patients. |
| Time to delivery – same or next weekday delivery, multiple deliveries per day via multiple WDs. | |
| Sourcing stock from other pharmacies – networks run via instant messaging apps. | |
| Medicine shortages – a universal challenge, related requirement to seek out information via professional organisations. Lead to quotas (rationalisation), price rises and last resort a prescription change. | |
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Abbreviations: WD – wholesaler/distributor; CP – community pharmacist.

Facilitators and barriers to supply into community pharmacy. Alongside public-private partnerships e.g. the NHS and pharmaceutical manufacturers and optimal stock holding levels.66

Overall, CP views of the performance of the pharmaceutical supply chain into community pharmacy and availability of palliative medicines were negative. Practices that were put in place to facilitate stronger supply routes: from the manufacturer (Solus agreements); reimbursement structures (Drug Tariff) and equitable supply (quota systems); paradoxically appeared to increase the risk of delays and/or shortages. Sengun & Wastin when discussing pharmacy/wholesaler alliances, stated that these partnerships benefit from competency in role, goodwill, the ability to manage conflict resolution, trust and a level of formal control; some of which appeared lacking in the relationships explored in our study. CPs were critical of supply chain processes, perceiving them as a series of challenging hurdles that needed to be circumnavigated. All of which had the potential to undermine trust among supply chain stakeholders, confidence in the system itself and disruptions in medicines deliveries, leaving patients vulnerable; correspondingly demonstrated in the work of Bhattacharyya et al.48 and Revilla et al.49

7.3. Lack of information sharing via effective relationships

Information sharing is critical in the pharmaceutical supply chain to effect responsiveness and share risks and benefits.46 CPs ability to respond to medicine shortages were hampered by having no consistent source that informed them of shortages, they needed to collate relevant information from sources including pharmaceutical wholesalers, manufacturers, pharmacy press, other pharmacies, colleagues, and social media. Overall, WDs were aware of challenges in the supply chain, particularly meeting unexpected demand, and claimed to act as a point of liaison in the triadic relationship between manufacturer, WD and community pharmacy, which has been seen to be an expectation in this role elsewhere.46 They felt they managed relationships with manufacturers on behalf of CPs, as well as on their own behalf, as also found by Sinkovics et al.66 WDs viewed relationships with CPs as effective, despite CPs doubting the commercial motivations and actions of WDs (as also observed in the work of Wong et al.66). In contrast, CPs argued where contact did occur with WDs (via telesales staff) this was not the result of productive or satisfactory relationships. Such contact was perceived as not that helpful, as the information transfer from WDs was only as good as the information on the IT system.

Improved information sharing regarding supply issues and shortages would benefit CPs and reduce unnecessary work. During COVID-19 information has been informally shared via multiple routes such as professional networks, email, and messaging services. Whilst this has been helpful greater centralisation of information via a single route would reduce work further. Key to further releasing CPs time (alongside the skill mix
7.4. A conceptual model of supply into community pharmacy

Bhaskar et al.,6 when discussing medical supply chains during the COVID-19 pandemic, asserted further coordination, integration, and management of global supply chains are needed. This premise can equally be applied to global pharmaceutical supply chains, to build resilience via a well-functioning supply chain and reduce failures such as medicines shortages. In this study, the interplay of stakeholders at macro, meso and micro levels and influencing factors (positive and negative) were found to affect palliative medicines supply into community pharmacy. This inter-relationship is captured in a conceptual model representing and characterising the impact of supply of palliative medicines into community pharmacy as shown in Fig. 3. The model developed following data triangulation across the sample groups, analysing the factors facilitating speed of supply and the contextual systems that influence these factors.

The ‘whole system’ of supply was influenced by macro (legal, regulatory and economic external conditions nationally and internationally), meso (local organisational factors and influences such as organisational culture and incentives) and micro (individual interaction, both helped and hindered by IT) level systems. At the macro level increasing globalisation of pharmaceutical manufacturing and supply, amplified the likelihood of medicine shortages nationally, with supply additionally bounded by national pricing and reimbursement mechanisms.

Table 3 depicts a logic model which contextualises the impact (and mechanisms of impact) of activity undertaken at the macro, meso, and micro levels on palliative medicines availability. Each level interrelated via a cascade of effects, from the macro through the meso and micro levels. For example, national legislation and regulatory systems on pricing and reimbursement (macro level) framed and influenced ‘contractual’ agreements operating at the meso level (e.g. discount agreements WDs offered to CPs based on stock volumes purchased; prioritisation of WDs by community pharmacies based on medicine prices offered) and agreements influenced transactions at the individual (micro) level (e.g. the WD customer service centres CPs and dispensers need to interact with). As can be observed the interaction between mediating factors within the macro and meso levels was complex, both positively and negatively impacting the responsiveness of medicines supply. In contrast, at the micro level the interplay of transactional roles appeared to have a solely negative impact on supply, limiting responsiveness.

Within the context of macro, meso and micro level systems, effective relationship-building, meaningful information transfer, effective stock management and robust logistics infrastructure lead to a resilient and more responsive supply chain, potentially enabling faster medicines access for patients at EoL.

Given the influence of the globalisation of medicines manufacturing (a macro level system) on supply into community pharmacy, the COVID-19 pandemic has underlined that shortages of palliative medicines, such as alfentanil, and medicines more widely49–52 will continue. Therefore, development of resilient supply chains which secure access to palliative medicines is crucial. To this end macro level manufacturing and logistics practices are required to prevent medicines shortages e.g., investment in national manufacturing capability. Micro level systems such as individual transactional roles which influence the supply chain are perhaps easier and less costly, to change. Therefore, a focus on developing and implementing methods to promote relationship development (between WDs and CPs) and meaningful two-way information transfer would be pragmatic. Such a focus would facilitate patient and carer feedback on medicines supply up the supply chain.

8. Strengths and limitations

This is the first study investigating the views of community pharmacists and wholesalers/distributors on supply into community pharmacy of palliative medicines. Supply of these medicines into community pharmacy will continue to be critical going forward due to the likelihood of a sustained increase in those dying at home over the next decade. Despite both sample groups being hard-to-reach and recruit (CPs were difficult to contact, and workloads meant that to participate the majority did so in their own time), sufficient participants were recruited to gain rich, detailed perspectives.

Study limitations were the non-involvement of manufacturers of palliative medicines in the study, the small sample size of WDs and the timing of data collection. Data were collected in 2019, so views shared were impacted by Brexit, but this facilitated shortage issues and the supply chain to be brought into sharp focus, just prior to the impact of COVID-19. Accessing WD participants was extremely problematic; some were only accessible by account holders; invitations to participate were made several times of day.

![Fig. 3. Conceptual model of supply into community pharmacy.](image-url)
## Table 3

| Mechanism | Positive influencing factors | Negative influencing factors |
|-----------|-----------------------------|-----------------------------|
| Globalization of manufacturing | Increased outsourcing of manufacturing and resulting supply routes | Global medicines shortages may be induced by limited active ingredients/raw materials globally may limit production |
| National pricing and reimbursement mechanisms | Price concession levels not known at time of stock procurement by CPs, products returned to WD if price deemed too high or CPs refused | Price concessions via the Department of Health and Social Care in England; increased reimbursement prices for certain medicines (for the month in which they are granted) |
| Contractual agreements | Solus agreements - sole WD for some manufacturers | WDs required to use multiple WDs to accommodate Solus agreements, add complexity to supply chain routes |
| Logistics and supply systems | WDs may be implemented by Governments in other countries | International trade limited by quotas imposed abroad |
| Commercial trade | Withdrawal from the European Union (Brexit) | Global medicines shortages may be induced by limited active ingredients/raw materials globally may limit production |
| Government | Domestic availability via the Department of Health and Social Care in England | Domestic availability via the Department of Health and Social Care in England |
| Regulatory bodies | Medicines regulatory agency ensures compliance with regulations | Medicines regulatory agency ensures compliance with regulations |
| Contracting agreements | Solus agreements - sole WD for some manufacturers | WDs required to use multiple WDs to accommodate Solus agreements, add complexity to supply chain routes |
| WTO | WDs may be implemented by Governments in other countries | International trade limited by quotas imposed abroad |
| International supply | WDs may be implemented by Governments in other countries | International trade limited by quotas imposed abroad |
| Strategic partnerships | Solus agreements - sole WD for some manufacturers | WDs required to use multiple WDs to accommodate Solus agreements, add complexity to supply chain routes |
| Community pharmacy | WDs may be implemented by Governments in other countries | International trade limited by quotas imposed abroad |
| Care homes | Solus agreements - sole WD for some manufacturers | WDs required to use multiple WDs to accommodate Solus agreements, add complexity to supply chain routes |
| Healthcare providers | WDs may be implemented by Governments in other countries | International trade limited by quotas imposed abroad |
| Healthcare providers | Solus agreements - sole WD for some manufacturers | WDs required to use multiple WDs to accommodate Solus agreements, add complexity to supply chain routes |
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| Healthcare providers | WDs may be implemented by Governments in other countries | International trade limited by quotas imposed abroad |
| Organisational cultures and incentives | Contrasting cultures between WDs and CPs | • Lack of meaningful two-way communication  
• Lack of relationship building  
• Mistrust on part of CPs of WDs motivations and actions | Less responsive medicines supply due to ineffective information sharing with upstream supply chain stakeholders (community pharmacies to manufacturers via WDs).  
Or less responsive medicines supply as manufacturers are not provided with direct feedback from CPs.  
Less responsive medicines supply |
| Commercial priorities of WDs | | • Lack of meaningful two-way communication  
• Lack of relationship building  
• Mistrust on part of CPs of WDs motivations and actions | Less responsive medicines supply |
| Patient facing focus of CPs (accountability to the patient) but underlying commercial incentives for CPs | | • Lack of meaningful two-way communication  
• Lack of relationship building  
• Mistrust on part of CPs of WDs motivations and actions | Less responsive medicines supply |
| Information technology stock management and ordering systems | Information technology systems facilitate sophisticated stock management by WDs (accounting for demand patterns, stock holding levels and locations of stock) | • Stock volumes at WDs managed across distribution centres/warehouses  
• Liaison with manufacturers based on recent demand | More responsive medicines supply, except where an increase in demand exceeds recent demand |
| Information technology systems generally facilitate CP ordering and time to delivery | WD deliveries Mon-Sat | • CP orders Mon-Fri only  
• Cut-off times for CP ordering must be met for same or next day delivery  
• Ordering systems may be insufficiently live or be limited in functionality | Impact depends on the balance of positive and negative influencing factors, but more responsive medicines supply is likely overall |
| Micro level systems Transactional roles | Use of telesales agents (lack of clinical insight/understanding of palliative medicines) | | Less responsive medicines supply |
| | Delegation of customer service interaction with WDs to dispensers in community pharmacy | | Less responsive medicines supply |
| | Information transfer from WD customer centres to CPs limited to that contained within the information technology system | | Less responsive medicines supply |

Abbreviations: WD – wholesaler/distributor; CP – community pharmacist.
times (via multiple routes including directly and via the trade association) with no response. This may have been due to the work pressures associated with preventing medicines shortages surrounding Brexit; political sensitivities about medicines shortages; and commercial sensitivities. Nevertheless, we managed to secure important insights from a group of WDs serving different elements of the supply chain. WD perspectives are seldom included in supply chain research and therefore this study presents an important, unique perspective. The respondent profile in the study was weighted in favour of CPs, as the potential sample pool was significantly greater than for WDs, enabling data saturation to be achieved for this sample.

Future research in this field should extend to interviewing manufacturers and examination of alternative models of community supply of palliative medicines such as locality-based hubs (e.g. within Acute Trusts or Out-of-Hours centres facilitating 24/7 access to pharmacists and required medicines) or through rapid response teams.

9. Conclusions

The aim of this study was to identify community pharmacists’ and pharmaceutical wholesalers/distributors’ views on supply chain processes and challenges in providing access to medicines during the last year of life in the UK context. The study demonstrated for the first time the issues community pharmacies encounter in relation to access to palliative medicines. A conceptual model for supply into community pharmacy resulting, demonstrating the complex interplay between influencing factors and the effect on responsiveness of supply and ultimately speed of medicines access for patients. This has the potential to be used by practitioners, policy makers, wholesalers/distributors, and researchers to inform and evaluate changes to improve the pharmaceutical supply chain for all medicines but particularly palliative medicines. This study also highlighted the vital role community pharmacists and pharmaceutical wholesalers/distributors play in ensuring access, and community pharmacists’ willingness to undertake arduous and time consuming ‘work-arounds’ to navigate the supply chain to gain products for patients. Future work is required to integrate and manage this supply chain, facilitating effective relationship-building and essential information-sharing between stakeholders. With this in place patients will be less likely to endure the impact of medicines shortages and disrupted access at EoL, and community pharmacists will be freed up to undertake the extended roles in this area advocated by professional bodies.

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Author contributions

NC, SL, AR, MB and JB contributed to the concept and design of the work; NC and EM acquired all data; NC, EM, LB and SL contributed to data analysis; NC and LB drafted the article; all authors revised it critically for intellectual content; all authors have participated sufficiently in the work for appropriate portions of the content. All authors approved the submission of the manuscript for publication.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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