

Universidade de Lisboa

Faculdade de Farmácia



Ordering medication for hospital inpatients in an English teaching hospital organisation

Pharmacy staff decisions on the type and duration of supply

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Trabalho de Campo orientado pela Professora Doutora Bryony Dean Franklin,
Categoria (não se aplica), da University College London School of Pharmacy,
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**Trabalho Final de Mestrado Integrado em Ciências Farmacêuticas
apresentado à Universidade de Lisboa através da Faculdade de Farmácia**

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Resumo

Introdução No Reino Unido, ao efetuar pedidos de medicação individual para doentes hospitalizados, profissionais de farmácia têm de decidir o tipo de dispensa, entre “*one-stop*” ou *inpatient*, e a quantidade de medicamentos a dispensar. Atualmente, as orientações fornecidas por protocolos oficiais são limitadas e os fatores envolvidos nessas decisões pouco conhecidos. O objetivo deste estudo foi explorar o processo de decisão quanto ao tipo e duração da dispensa de medicação para doentes internados, numa *trust* hospitalar inglesa.

Métodos O estudo foi aprovado como uma avaliação de serviço na respetiva organização, não exigindo aprovação ética. Dezanove fatores, identificados através de um *focus group*, foram avaliados quantitativamente na tomada de decisões quanto ao tipo e duração da dispensa de medicação. Esta avaliação foi efetuada através de um questionário online realizado por profissionais de farmácia, utilizando escalas Likert de 5 pontos, de 1 (“nada”) a 5 (“muito”). As respostas foram submetidas a análise estatística descritiva em Microsoft Excel, e um subconjunto de fatores comparado entre grupos de profissionais usando testes U de Mann-Whitney, com a aplicação da correção de Bonferroni para múltiplas comparações.

Resultados O questionário obteve 57 respostas de entre 180 profissionais elegíveis, refletindo uma taxa de resposta de 32%. Para decisões quanto ao tipo e duração da dispensa, catorze fatores foram considerados muito importantes (medianas de 4 ou 5), onde “paciente requerendo dose unitária” e “duração do tratamento” registaram medianas de 5. O fator “competências de enfermagem” foi considerado menos importante (mediana de 2).

O fator “medicação verificada por um farmacêutico” revelou menor importância para os farmacêuticos em comparação com os técnicos ($p=0.0002$ para tipo e duração da dispensa); e para os profissionais com mais de 10 anos de experiência na respetiva *trust* em comparação com aqueles com menos anos ($p=0.002$ e $p=0.001$, respetivamente, para tipo e duração da dispensa).

Discussão e conclusão Este estudo elucida os fatores envolvidos na tomada de decisão e a sua importância relativa para diferentes grupos de profissionais de farmácia. Limitações incluem poder estatístico insuficiente e a incapacidade de compreender a influência dos fatores nas decisões tomadas, a qual será investigada através de entrevistas individuais.

Palavras-chave: Profissionais de farmácia; Tipo de dispensa de medicamentos; Duração da dispensa de medicamentos; Doentes hospitalizados; Decisões

Abstract

Introduction In the United Kingdom, pharmacy staff must decide on medication supply type, between “one-stop” dispensing or inpatient supply, and on its duration, when ordering inpatient-specific medicines. Currently, official guidance in this regard is limited, and little is known about the factors at play. The aim of this study was to explore pharmacy staff decisions on the type and duration of inpatient medication supply in an English hospital trust.

Methods The study was exempt from ethical approval as it was approved as a service evaluation in the organisation concerned. Nineteen factors, identified through a focus group, were evaluated quantitatively regarding decisions on supply type and duration. This assessment was conducted via an online survey by pharmacy staff members, using 5-point Likert scales ranging from 1 (“not at all”) to 5 (“a great deal”). Responses were subjected to descriptive analysis in Microsoft Excel, and a subset of factors compared between staff groups using Mann-Whitney U tests, with the Bonferroni correction applied for multiple comparisons.

Results The survey yielded 57 responses out of 180 eligible professionals, reflecting a 32% response rate. For decisions on both supply type and duration, fourteen factors were considered very important (median scores of 4 or 5), with “patient on a multi-compartment compliance aid” and “duration of treatment” rated 5. The factor “nurse skill set on the ward” was considered least important (median score of 2).

Data analysis suggested that the factor “medication screened by a pharmacist” was less important to pharmacists than to medicines management pharmacy technicians ($p=0.0002$ for both supply type and duration); and to staff employed at the trust for over 10 years compared to those with fewer years ($p=0.002$ and $p=0.001$, respectively, for supply type and duration).

Discussion and conclusion This study offers valuable insights into the diversity of factors that play a role in decision-making and their relative importance for different pharmacy staff groups. Limitations include insufficient statistical power and inability to understand how factors influence decisions, which will be addressed through individual interviews.

Keywords: Pharmacy staff; Medication supply type; Medication supply duration; Hospital inpatients; Decisions

List of abbreviations

EDs	Staff ordering inpatient medication every day
FWER	Family-Wise Error Rate
IP	Inpatient
MCA	Multi-compartment compliance aid
MMPT	Medicines management pharmacy technician
NEDs	Staff not ordering inpatient medication every day
NHS	National Health Service
NWL	North West London
OP	Original pack
OSD	“One-stop” dispensing
POD	Patients’ own drugs
RPS	Royal Pharmaceutical Society
SOP	Standard Operating Procedure
TTA	To take away
TTO	To take out
UK	United Kingdom

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1. Introduction

1.1 The global landscape of inpatient medication distribution systems

The traditional inpatient medication distribution system worldwide was nurse-oriented, considering they were the main responsible for interpreting physicians' prescriptions, ordering, preparing, and administering medication. Nurses would order all medication as ward stock and store it unlabelled on the ward. (1,2)

As research began to focus on investigating adverse drug events and assessing the prevalence of medication errors, there was a drive to improve medication safety through the development of more effective drug distribution systems. (3)

Early unit-dose systems were developed during the 1960s in the United States and introduced several key changes. Pharmacists were responsible for interpreting medication orders and maintaining patient profiles of prescribed medication for safety checks. There were few medicines stocked on the ward as most medicines would be packed in single doses, labelled, and dispensed per patient in individual trolley drawers on a daily basis. This system has undergone adjustments in response to healthcare needs and was later adopted by other countries, including across Europe. (2)

In contrast, the United Kingdom (UK) adopted the ward pharmacy system. The next section will introduce the English healthcare system and describe the ward pharmacy system of inpatient medication management, exploring the innovations adopted to streamline the medication distribution process in the UK.

1.2 UK hospitals: the ward pharmacy system

The National Health Service (NHS) is a government-funded organisation founded in 1948, responsible for the healthcare provided in the UK. In England, the current NHS encompasses three distinct components: organisations with strategic roles, care commissioners, and care providers. At the top of the hierarchy, the Secretary of State for Health assumes responsibility for overseeing the NHS and providing leadership to the Department of Health. Among the care providers, hospitals are structured as NHS trusts, each of which may comprise one or more hospitals. (3)

In UK hospitals, commonly used medicines are kept on the ward as original packs (OPs) without a label. The pharmacy staff check the ward stock about once a week and order new supplies of these medicines as necessary. Non-stock medication is dispensed for individual patients, named on the dispensing label attached, in multi-dose containers. Pharmacists visit the wards regularly for clinical and supply purposes. (4)

Non-stock medication used to be exclusively dispensed in the UK as inpatient (IP) supplies for up to ten days, labelled with the patient's name and without administration instructions. At discharge from the hospital, patients need to be dispensed two to four weeks' supply of all medication prescribed, labelled with their name and full administration instructions, known as a "to take away" (TTA) or "to take out" (TTO) supply. Therefore, providing IP supplies requires an additional, subsequent, provision for each patient upon their departure from the hospital. (4)

However, the waiting period for the TTA medication supplies in UK hospitals contributes to discharge delays. (5) In fact, research about patient perspectives on hospital discharge corroborates the necessity to reduce TTA processing time, with the main perceived reason for delay being the medicines supply. (6)

Therefore, improving the discharge process to support patient flow and release hospital beds has been a major concern in the NHS. To address this challenge, initiatives have been introduced including "one-stop" dispensing (OSD) and patients' own drugs (POD) schemes. (7) In practice, hospitals tend to adopt combined OSD and POD schemes. (4)

OSD, sometimes known as “dispensing for discharge”, refers to combining the inpatient and discharge medication into a single supply, made early in the patient’s admission. This consists of supplying medication labelled with full administration directions besides the patient’s name. Before discharge, no additional supply would be necessary, provided that the patient has an adequate quantity of medication remaining, typically enough for seven or fourteen days, depending on the guidelines of the specific NHS trust. Pharmacy staff must check all the medication against the discharge prescription before the patient leaves the hospital. (3,4)

Conventional medicine trolleys are inadequate for managing the substantial volume of individually dispensed items. As a result, each patient is assigned a personal bedside medicines cabinet to store POD and their individual supplies. (3)

Several studies have been conducted to assess the advantages of OSD system in contrast to relying solely on IP, also known as “non-OSD” supplies. Research suggests that the implementation of OSD can reduce the discharge prescription turnaround time in approximately 120 minutes per patient, which would entail substantial savings in terms of opportunity costs in the NHS. (8) Additionally, a study conducted by Houlind et al. found that OSD did not incur higher costs compared to alternative medication distribution systems and contributed to high levels of patient satisfaction and sense of security. (9) Furthermore, research indicates that wards operating OSD schemes allocate additional time to patient-centred activities, which can enhance the accuracy of drug history collection and provide more opportunities for patient counselling. (10) A commitment to investing extra time in the medication supply process ultimately leads to improved patient care.

POD schemes encourage patients to bring the medicines taken before admission to the hospital for administration whenever eligible for use. The appropriate medication should be stored in an individual bedside medicine cabinet, rather than in a drug trolley since they are property of the patient.

Common limitations to the implementation of POD schemes include the increased workload and insufficient staff to assess the suitability of each patient’s medication on admission. (3,4,11) However, their use also yields various advantages as it minimizes medication waste, reduces dispensing time, facilitates the process of taking accurate drug histories, potentially enhances patients’ involvement in their care and saves hospital costs. (11)

When it comes to dispensing medication for inpatient administration, there are inter-hospital variations regarding the adopted medication supply systems. In a national survey conducted across the English NHS hospitals in 2011, most medical and surgical wards reported the use of ward stock, POD schemes and OSD supplies, followed by non-OSD inpatient supplies from the hospital pharmacy. A few hospitals also mentioned the use of pre-labelled packs with standard instructions and without the patient’s name; none reported the use of unit dose dispensing. A mixed supply model has become the dominant system in the UK. (12)

The forthcoming section will delve into medication errors and their wide-ranging implications, before focusing on the performance of the English medication distribution system in addressing this concern.

1.3 Medication errors: innovations for improvement

Medication errors are preventable failures occurring in the treatment process, at any stage of the drug distribution system (including prescribing, dispensing, administering and monitoring), that can result in harm to the patient. (13)

It was estimated that over 200 million medication errors happen in England each year. In secondary care, 47 million medication errors were registered annually, causing definitely avoidable adverse drug events. The subsequent hospitalisations were estimated to consume over 44 thousand bed-days per year and contribute to over one thousand deaths. Besides the potential negative clinical outcome, these preventable incidents entail substantial incremental health

costs. In fact, definitely avoidable adverse drug events are estimated to cost the NHS around 98 million pounds annually, 14.8 million of which are attributed to medication errors occurring in hospital settings. (14)

In English hospitals, the administration stage of the medication use process was found to be the most common moment where medication errors are recorded. Nevertheless, it is worth noting that over one million medication errors occur annually in the dispensing stage. (14)

Although different medication distribution systems are employed worldwide, they share a common concern: the safe and effective management of medications. The overall quality of a drug distribution system can be assessed by addressing the occurrence and severity of medication errors. (15)

Observational studies comparing the ward pharmacy system employed in the UK with unit-dose systems have offered valuable insights into the medication error rates associated with each system, although they yield contradictory results about which system exhibits a higher error rate. Nevertheless, the collective findings of these studies concur on the prevailing error types within the ward pharmacy system, primarily encompassing omissions, followed by incorrect dosages. (15,16)

OSD and POD schemes introduced in UK hospitals should also be studied based on their influence on medication errors to determine whether these changes result in positive outcomes and improvements in patient care across the NHS.

In fact, the implementation of OSD entails several opportunities for error, including changes in the patient's treatment and patients being separated from their medication during their stay. Ineffective operation of OSD supplies can result in a higher likelihood of medication loss and eventual waste compared to inpatient supplies. Furthermore, OSD is associated with an increased risk of patients being discharged with the wrong medication. (17) Nevertheless, studies indicate that OSD schemes can effectively decrease the occurrence of missed doses, particularly when coupled with the proper storage of individual medications in bedside lockable medicine cabinets. (18)

Regarding the introduction of POD schemes, an extensive analysis on medication errors has revealed no significant difference compared to the traditional system in terms of the incidence and severity of medication administration errors, contrary to initial expectations. (19) Several factors have been suggested to account for these findings, including the observation that they may inadvertently lead to other types of errors. While POD schemes appear to reduce omissions, that could stem from the medication not being available in the wards, they seem to increase the administration of incorrect dosages. Nevertheless, the study underscores the need to further evaluate the impact of POD schemes on the occurrence of medication errors, while still endorsing their use because of the cost-effective related benefits. (19)

The effective operation of a drug distribution system hinges on the expertise and responsibilities of many healthcare professionals. In the next section, attention will narrow to the dispensing stage of the medication use process, providing a closer look at the pharmacy staff's indispensable role in ensuring safe and accurate medication supply for hospital inpatients.

1.4 Pharmacy staff: ordering prescribed medications for individual inpatients

Pharmacists have evolved from traditional medication-orientated professionals to multidisciplinary health practitioners as they undertake more responsibilities to ensure the patient's best clinical outcome and provide a cost-effective healthcare service. Although some patients still see hospital pharmacists solely as medication suppliers, they should be made aware of their clinical role in order to improve healthcare provision. (20)

In fact, research suggests that extended pharmacist services, such as ward rounds, medication orders' review, and medication errors' report, are examples of successful

medication safety strategies implemented in hospitals. (21) Pharmacists are therefore recognised as an asset potentially participating in all steps of the medicines use process and contributing to reduce medication errors.

In line with the NHS Agenda for Change, hospital pharmacists are placed into distinct pay bands, each reflecting their roles and associated responsibilities. These bands range from band 5, which encompasses pre-registration trainee pharmacists, to band 9, which typically denotes the position of a chief pharmacist. (3) The complete description of pharmacists' roles per band is included in Appendix A.

Apart from pharmacists, the hospital pharmacy staff includes trainee pharmacists, assistants, medicines management pharmacy technicians (MMPTs) and other pharmacy technicians.

In the UK, the process of dispensing medication for hospital inpatients begins with a medication order issued by prescriber (doctor or non-medical prescriber). If the prescribed medication is not available in the ward stock, nurses forward a medication request to the pharmacy. If the pharmacy team agrees to supply the medication, the request is then processed and printed in the hospital dispensary for preparation.

Pharmacists, trainee pharmacists and MMPTs share the responsibility to order prescribed medications for individual inpatients. In the process of ordering a prescribed medication, pharmacy staff must decide on the type of supply, between IP or OSD, and on the duration of supply, between supplying an OP or any other specific quantity.

Appropriate decisions regarding the type and duration of inpatient medication supply require an informed judgment. For instance, when the duration of treatment is uncertain and it is unclear whether the patient will continue taking the medication after discharge, it may be advisable to provide it as an IP supply, preferably in a relatively small quantity, to minimise resource wastage. Pharmacy staff must consider multiple factors on a daily basis to ensure they make the most suitable choices.

Standard Operating Procedures (SOPs) developed by individual NHS trusts may include information to support practical decisions on the type and duration of medication supply. (22,23) Nevertheless, these procedures do not encompass comprehensive guidelines that can attain widespread applicability. This project is motivated by an apparent gap in the existing literature, which indicates a lack of in-depth understanding regarding the current pharmacy staff ordering process of inpatient non-stock medication and its implications for ensuring a cost-effective supply.

1.5 This project

Currently, little is known about how pharmacy staff decide on the type and duration of medication supply on their daily basis to each specific patient. In fact, there is no comprehensive guidance for deciding between OSD and non-OSD inpatient supplies and for determining the amount of medication to dispense for individual patients.

We therefore conducted a sequential mixed-methods evaluation with the aim of exploring how pharmacy staff decide on the type and duration of medication supply for hospital inpatients. The objectives of the present study were as follows:

- 1) to explore the range of factors that pharmacy staff consider when deciding on the type and duration of inpatient medication supply.
- 2) to assess the relative impact of each factor in pharmacy staff's daily practice.

Aligned with the aim of the project and in pursuit of these objectives, we developed the following research question: how do pharmacy staff decide on the type and duration of medication supply for hospital inpatients in an English teaching hospital organisation?

2. Methods

This study was exempt from ethical approval in the organisation concerned, considering it was approved as a service evaluation by the Trust's Audit and Service Evaluation team (reference number 808).

A sequential mixed-methods evaluation was designed, combining qualitative and quantitative research approaches. For each methodology employed, consent was obtained from participants.

2.1 Mixed-methods methodology

In the recent past, mixed-methods methodology has been widely acknowledged and implemented to answer a research question within a single study, combining the strengths of qualitative and quantitative approaches. As healthcare services shift from a product-focused to a patient-centred approach, the evolving complexity of research questions often requires the adoption of mixed-methods designs to generate sustainable and robust evidence. The present study design is inspired by the exploratory and explanatory sequential designs proposed by Cresswell and Plano-Clark. (24)

In the exploratory sequential design, the process begins with the collection of qualitative data, and the analysis of these data informs the development of the quantitative phase. In this project, an initial focus group was held, which helped identify a list of factors considered important regarding decisions on type and duration of inpatient medication supply. Subsequently, an online questionnaire was conducted to assess the relative importance of these factors.

Conversely, in the explanatory sequential design, the qualitative data collection takes place after the quantitative phase, aimed at elucidating and providing insights into the findings from the quantitative component. The upcoming phase of this project consists of semi-structured individual interviews to address the underlying reasons for decision-making and understand how each factor influences decisions.

This service evaluation therefore commenced with a qualitative focus group, followed by the administration of an online questionnaire to gain more quantitative data. The next phase will involve conducting interviews, for which the interview schedule has already been prepared. In this report, results from both the focus group and the questionnaire are presented. The online questionnaire is designated as the primary data collection method due to its broader reach, capacity for generating a larger volume of data, and central role in this project's analysis.

2.2 Focus group

A focus group was first conducted during the exploratory stage of this study, aimed to explore the range of factors that pharmacy staff consider when deciding on the type and duration of medication supply for hospital inpatients.

A focus group is as a qualitative technique that has the disadvantage that participants might have reservations about articulating opposing viewpoints, especially in a workplace environment, affecting the data validity. Nevertheless, because group discussions generate a wide-ranging discussion, they tend to offer a broader range of perspectives on various issues compared to individual interviews, making them well-suited for exploratory research. (25)

The focus group was held on 16 February 2023 at one of the hospital units. A target sample was defined, including pharmacy staff members with diverse staff roles and pay bands. An email invitation was sent to specific individuals to participate in the focus group, and a convenience sample was assembled. Nevertheless, employing this non-random sampling procedure may introduce selection bias and limit the generalisability of the results. (25)

During the planning stage, a list of ten potentially relevant factors in decision-making was identified, presented in Table 1 in alphabetical order. These factors were drawn from informal discussions with pharmacy staff and preexisting knowledge of the Trust's SOP (22). They were intended to serve as prompts during the discussion in the event that they were not spontaneously addressed.

Table 1: Factors formulated before the focus group.

	Factor
1	Cost of the medication
2	Day of the week
3	Dose changing
4	Duration of treatment
5	Expiry date of the medication (e.g., reconstituted)
6	Patient on a multi-compartment compliance aid
7	Patient's own drugs at home
8	Route of administration/ formulation
9	Type of ward (e.g., admissions vs others)
10	Where the patient is being discharged to

The focus group commenced with the establishment of a set of essential ground rules. Within this context, participants were asked to refrain from disclosing the identities or comments of fellow participants outside the group, acknowledge that the focus group session would not be recorded, and grant their informed consent for hand-written notes, which would remain anonymous, to be taken for subsequent analysis.

The discussion agenda did not include icebreaker questions because of time constraints and since participants would be familiar with each other from being employed at the same workplace. Firstly, participants were asked about how they decide on the type of inpatient medication supply, specifically deciding between OSD or non-OSD inpatient supply, and secondly about how they decide on the duration of this supply. The complete topic guide for the focus group is included in Appendix B.

The notes taken were subsequently reviewed and categorised based on the relevant discussion topics, allowing the identification of both previously known factors and newly introduced factors. Additionally, any comments that extended beyond the scope of the focus group discussions were omitted from the study's analysis.

This analytical process served as a foundation for shaping the subsequent survey, allowing us to design questions that were both informed by existing knowledge and sensitive to emerging themes from the focus groups.

Following the focus group, consultations with senior pharmacy staff were conducted to select a subset of five factors for the purpose of performing statistical tests in the subsequent stage of the study. These factors were deemed the most important based on their collective expertise and judgment.

2.3 Online questionnaire

2.3.1 Qualtrics platform

An online survey was designed using Qualtrics software to assess the relative impact of the factors identified during the focus group on pharmacy staff's inpatient medication ordering. Additionally, the survey intended to investigate potential patterns when comparing different demographic groups among the respondent pool.

The Qualtrics platform (26) provides a powerful and user-friendly interface, offers a high degree of customisation, and supports various data collection modes, including online and mobile surveys. The questionnaire employed a wide range of question types, including multiple-choice, open-text and Likert scales.

2.3.2 Questionnaire design

The questionnaire was distributed via email to all individuals on the Trust's pharmacy staff email list in March 2023. Specifically, all pharmacy staff members responsible for inpatient-specific medication ordering were invited to participate, as outlined in the email communication. This encompassed 138 pharmacists, 17 trainee pharmacists and 25 MMPTs.

As part of the recruitment strategy, the email informed about a prize draw to win a *Hotel Chocolat* chocolate box after the completion of the questionnaire. Additionally, a reminder was sent five days following the initial invitation to possibly increase the response rate.

The email also indicated that the questionnaire was expected to require approximately ten minutes for completion and specified the survey's closing date. The questionnaire remained open for a duration of fourteen days.

The opening page of the questionnaire introduced the survey's purpose, provided details about eligibility criteria for participation, and offered practical instructions for completing it. Respondents were informed that by engaging in the survey, they were expressing their consent to the terms and conditions. Participation was voluntary and all response data anonymous.

The second page comprised questions with multiple-choice options, which specifically inquired about staff role, frequency of medication ordering, years since qualification, years of service in the NHS and years of service at the Trust concerned. Collecting this demographic information was intended to enable group comparisons between respondents featuring different demographic characteristics.

The subsequent pages consisted of two sets of 5-point Likert scales to assess the extent to which each of the factors was individually considered during the decision-making process, separately for type and duration of supply. Nevertheless, we opted to incorporate the identical set of factors into both sets of Likert scales to systematically analyse and compare responses.

Respondents were provided with the following options to choose from: "not at all", "a little", "a moderate amount", "a lot", and "a great deal".

During the development of the Likert scales, we employed randomisation of the question order within each set of Likert scales. This deliberate approach was adopted to minimise the potential impact of order bias on the collected data. Order bias can manifest as a tendency for respondents to consistently agree or disagree as they progress through the survey, irrespective of the specific content of individual questions. By adopting this randomisation strategy, we enhance the validity of the collected data, promoting a more precise representation of participants' opinions.

Furthermore, during our discussions, we deliberated upon the presence of left-side selection bias, which pertains to the inclination of respondents to choose the first response option for each question. Building upon this topic, we also engaged in discussions regarding the inherent tendency of individuals to exhibit agreeable behaviour, especially in the context of evaluating clinical practice. Consequently, we anticipated a higher frequency of responses favouring the importance of factors rather than categorizing them as "not at all" important.

In light of this, we took into careful consideration the possibility that individuals might exhibit an even stronger inclination to choose the option "a great deal" if it was positioned as the initial choice on the left side of the screen. As a result of our considerations, the Likert scale response options were arranged on the screen from "not at all" to "a great deal," placing them in that order from left to right.

Following each set of Likert scales, an optional text-entry box was available to add any additional factors or comments.

Upon submitting their responses, participants were extended an invitation to click on a link for a chance to win a box of chocolates. This link led them to a separate page of questions, which included a text-entry field to provide their email address for participation in the prize draw. Subsequently, participants were queried about their willingness to engage in a brief

interview aimed at delving deeper into these topics, as well as their consent to be contacted through the provided email address for that purpose.

The questionnaire underwent initial pilot testing with pharmacy staff professionals. Based on feedback from the pilot phase, enhancements were made to the initial page, including improving its visual appeal and readability and providing additional information. Participants were informed about the presence of a back button, which enabled them to review and edit their responses without the risk of data loss. Additionally, clarifications were added to specify that the first section of Likert scales pertained to the decision on the type of supply (IP or OSD), while the second set addressed the duration of supply.

Visual representations of the full online questionnaire are included in Appendix C.

2.3.3 Data analysis

All completed questionnaires returned by 16 March 2023, were included in the data analysis. Responses were subjected to descriptive statistical analysis using Microsoft Excel. Numerical codes were assigned to the Likert scale response options, ranging from “not at all” (coded as 1) to “a great deal” (coded as 5), to enable quantitative analysis.

The responses to each individual factor were separately analysed for decisions concerning both the type and duration of medication supply, by calculating the median and mode values.

The median and mode are measures of central tendency that are appropriate for this dataset, which comprises ordinal and non-normally distributed data. On the one hand, the median is robust due to its resistance to outliers, but relies solely on the data's order, disregarding their actual values. On the other hand, the mode identifies the most frequently occurring value(s) in the dataset, offering alone limited information. (27,28)

We were interested in computing both median and mode as they complement each other by collectively offering a more comprehensive perspective on the dataset. However, the median score was the preferred measure for drawing conclusions from the dataset. This preference relies on considering the median a more robust measure compared to the mode, which is highly influenced by fluctuation in the frequency of observations, particularly when dealing with small sample sizes. (28)

Initially, we analysed the entire dataset, using the total count of Likert scale responses to calculate median and mode scores for each factor and each decision.

Subsequently, the collected demographic information (including staff role, frequency of ordering, years since qualification, years of service in the NHS, and years of service at the Trust) was analysed to address the Likert scale responses in relation to demographic features.

Within each demographic characteristic, two distinct groups among the pool of respondents were formed. The decision to establish only two groups within each characteristic, despite the presence of multiple-choice response options, aimed to simplify the comparative analysis of the demographic groups. Additionally, it took into consideration the diminutive sample size, where comparing groups with extremely limited representation would render the comparisons devoid of meaningful insights.

For each demographic characteristic undergoing group analysis, groups were established following the data collection phase. This process accounted for potentially significant comparisons and the response distribution within each characteristic, aiming at an even distribution of individuals between each group of the pair being compared.

To conduct the group analysis, median and mode values of the Likert scale responses were computed for each demographic group, in each factor analysis, and individually for type and duration decisions.

Following the descriptive analysis, two-tailed Mann-Whitney U tests were conducted on a pre-selected subset of five factors to explore differences in the Likert-scale responses

between pairs of demographic groups (two independent samples), separately for type and duration of supply considerations. These tests were conducted using an online statistical calculator tailored for Social Science data. (29)

However, this study lacked the statistical power to demonstrate significance. Therefore, the statistical tests were conducted to investigate whether the results would correlate with potential patterns highlighted in the descriptive analysis.

We decided to conduct the statistical test on a subset of five factors instead of using the total of factors, as the second option would entail a larger number of tests and consequently compromise the control of the Family-Wise Error Rate (FWER), which refers to the probability of at least one of the performed tests being a false positive.

In practice, the significance level (α) is typically set at 0.05, resulting in a FWER of 0.05 when performing one single test (formula 1). This means that the probability of at least one of the performed tests being a false positive is 5%. A false positive occurs when we incorrectly reject a null hypothesis when there is no significant difference, which is known as a type I error. Bonferroni correction is employed to mitigate the increased risk of type I errors when conducting multiple tests simultaneously. (30)

Starting from the traditionally set significance level of 0.05, Bonferroni correction was used to calculate an adjusted significance level of 0.01, accounting for the comparison of five factors and addressing the potential for multiplicity (formula 2). The adjusted threshold ensured a more stringent criterion for statistical significance and maintained an acceptable FWER, assuming $n=5$ (formula 3).

$$FWER = 1 - (1 - \alpha)^n = 1 - (1 - 0,05)^1 = 0,05 \quad (1)$$

$$\alpha_{adjusted} = \frac{\alpha}{n} = \frac{0,05}{5} = 0,01 \quad (2)$$

$$FWER = 1 - (1 - \alpha_{adjusted})^n = 1 - (1 - 0,01)^5 \approx 0,05 \quad (3)$$

$\alpha_{adjusted}$: adjusted significance level
 α : significance level for a single test (0.05)
 n : number of tests performed

However, despite our selection of five factors, the final number of tests conducted amounted to forty ($n=40$), resulting in an elevated FWER. This number accounts for the comparison between demographic groups for each factor, as well as separate comparisons for type and duration considerations, resulting in a total of four comparisons per factor, repeated twice. Consequently, an adjusted significance level considering $n=40$ was discussed to account for the larger number of tests being performed. However, while considering $n=40$ would lower the chance of a type I error, it would increase the risk of a type II error, characterised by failing to reject a null hypothesis that is, in reality, false.

Therefore, we decided to use the adjusted significance level of 0.01 to attain a balance between minimising Type I errors and maintaining a reasonable sensitivity to detect true differences in our data.

The decision to select a subset of five factors for further statistical analysis, made before the questionnaire data collection, addresses concerns about reflexivity. Choosing based on questionnaire findings could introduce bias due to subjective interpretation, allowing underlying viewpoints and preconceptions to influence the study. (25) Employing a logic model aimed to maintain objectivity in the study design.

3. Results

3.1 Focus group

3.1.1 Thematic analysis

The focus group had the approximate duration of 30 minutes, and involved six members of pharmacy staff: five pharmacists (one band 6, two band 7, one band 8 and one band 7 research pharmacist) and one MMPT.

The focus group discussion provided face validity to the ten factors previously suggested as important in decisions on medication supply type and duration. The idea generation process led to the identification of nine additional factors, listed in Table 2 in alphabetical order.

Table 2: Factors introduced after the focus group.

	Factor
1	Drug history completed
2	Expected stay on the ward (e.g., short vs long)
3	Familiarity with clinical speciality
4	High risk medication
5	Medication screened by a pharmacist
6	Nurse skill set on the ward
7	Patient with risk factors (e.g., renal impairment)
8	Size of original pack
9	Stock level in pharmacy

A list of nineteen factors was therefore developed and arranged into four categories: patient-related, medication-related, treatment-related, and miscellaneous. This categorisation served as an organisational framework for our research approach and offered a foundation for potential analytical purposes. Table 3 presents the list of factors displayed in alphabetical order within each category. For visual simplicity in subsequent analysis, a number was assigned to each factor.

Table 3: List of factors affecting decision-making.

Factor category	Factor	Factor number
Patient-related	Drug history completed	F1
	Patient on a multi-compartment compliance aid	F2
	Patient with risk factors (e.g., renal impairment)	F3
	Patient's own drugs at home	F4
	Where the patient is being discharged to	F5
Medication-related	Cost of the medication	F6
	Dose changing	F7
	Expiry date of the medication (e.g., reconstituted)	F8
	High risk medication	F9
	Medication screened by a pharmacist	F10
	Route of administration/formulation	F11
	Size of original pack	F12
	Stock level in pharmacy	F13
Treatment-related	Duration of treatment	F14
	Expected stay on the ward (e.g., short vs long)	F15
	Type of ward (e.g., admissions vs others)	F16
Miscellaneous	Day of the week	F17
	Familiarity with clinical speciality	F18
	Nurse skill set on the ward	F19

Note: This data is replicated in Appendix D.

During the focus group, it was necessary to clarify that “type of supply” referred to decisions between OSD or IP supply. Participants used the terms OSD, TTA, TTO, and “dispensing for discharge” interchangeably when discussing supply type.

Overall, there was a high level of agreement among participants regarding the factors considered important in decision-making. However, participants noted the absence of a standardised protocol outlining considerations for practical decisions, emphasising the importance of enhancing consistency in this regard. This raised the question of how they produce these decisions, to which participants responded that their knowledge, acquired through experience within the dispensary and on specific wards, coupled with common sense, guided their decision-making.

Additional comments highlighted specific ward practices, where a labelling system allowed for the supply of medications as OSD, accommodating changes in instructions without the need for returns and reorders. Furthermore, participants discussed ward-specific guidelines, such as the cardiac ward's policy against supplying titration-required drugs as OSD. Other challenges were also discussed, including limited access to essential information for informed decision-making.

3.1.2 Factor selection for statistical tests

From the provided list of nineteen factors, presented in Table 3, a specific subset of five factors was carefully chosen for the performance of Mann-Whitney U tests, comparing responses from distinct staff groups. The selected factors include: “patient on a multi-compartment compliance aid (MCA)” (F2), “patient’s own drugs at home” (F4), “dose changing” (F7), “medication screened by a pharmacist” (F10), and “route of administration/formulation” (F11).

3.2 Online questionnaire

The online survey yielded a total of 57 responses, out of 180 eligible professionals, reflecting a 32% response rate.

3.2.1 Grouping participants based on demographic information

The survey collected demographic information on staff role, frequency of ordering, years since qualification, years of service in the NHS, and years of service at the Trust concerned, through multiple-choice questions. The analysis of the response distribution for each demographic characteristic informed the process of establishing two groups within each demographic feature for further analysis.

Specifically, when evaluating the frequency distribution of responses within the staff role category (Figure 1), it was evident that the majority of respondents were pharmacists. Despite the division not providing a balanced number of respondents, we decided to compare responses of pharmacists (together with trainee pharmacists) and technicians (MMPTs and others). This comparison was motivated by the distinct backgrounds and responsibilities associated with the two professional groups that order inpatient specific medication.

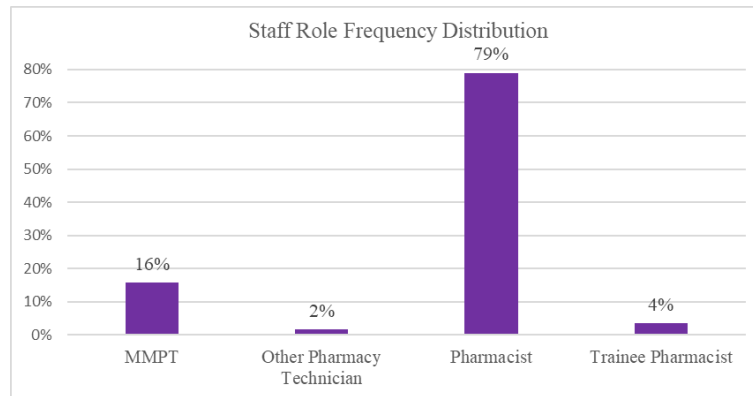


Figure 1: Distribution of responses regarding staff role among participants.
(MMPT: medicines management pharmacy technician.)

When assessing the distribution of responses on frequency of order, our focus was on distinguishing participants that order daily to their counterparts that do not. This differentiation considered significant variations in practical experience and different access to patient information between these two groups. Furthermore, this division established two groups with a balanced distribution of participants, considering the response distribution on participants' frequency of order (Figure 2).

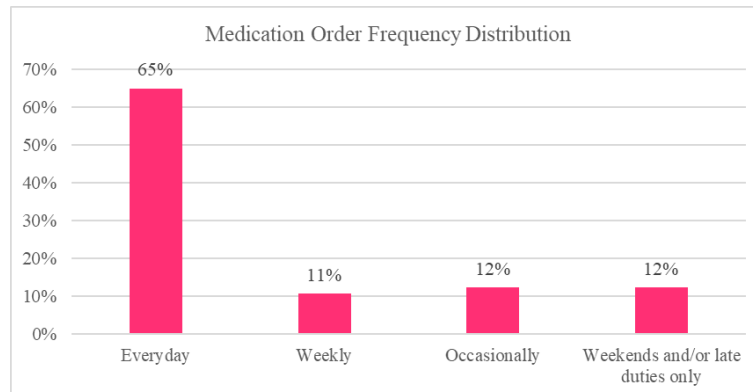


Figure 2: Distribution of responses regarding medication order frequency among participants.

The exception to this analysis approach was observed for the demographic characteristic "years since qualification", where we did not perform any group comparison, because the response distribution of "years since qualification" (Figure 3) aligned with that of "years of service in the NHS" (Figure 4). In both categories, the predominant responses were "More than 10 years", followed by "1 to 5 years", and subsequently "6 to 10 years".

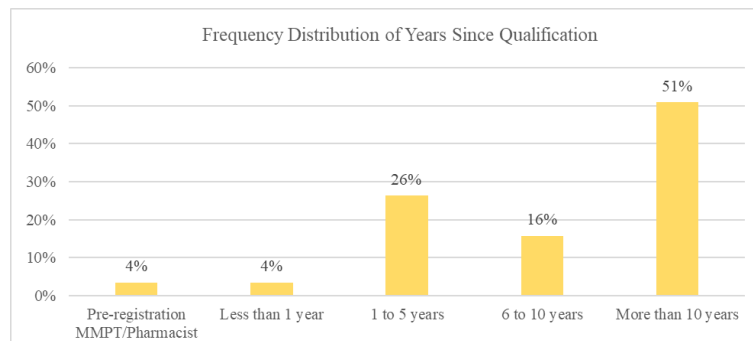


Figure 3: Distribution of responses regarding years since qualification among participants.
(MMPT: medicines management pharmacy technician.)

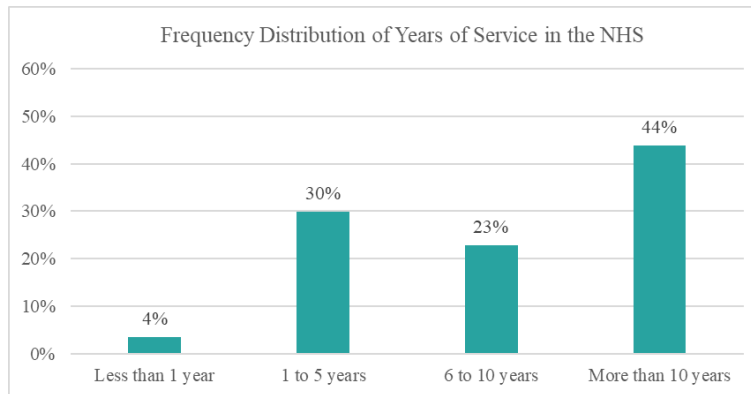


Figure 4: Distribution of responses regarding years of service in the NHS among participants.
(NHS: National Health Service.)

Finally, we analysed the response distributions for “years of service in the NHS” (Figure 4) and “years of service at the Trust” (Figure 5).

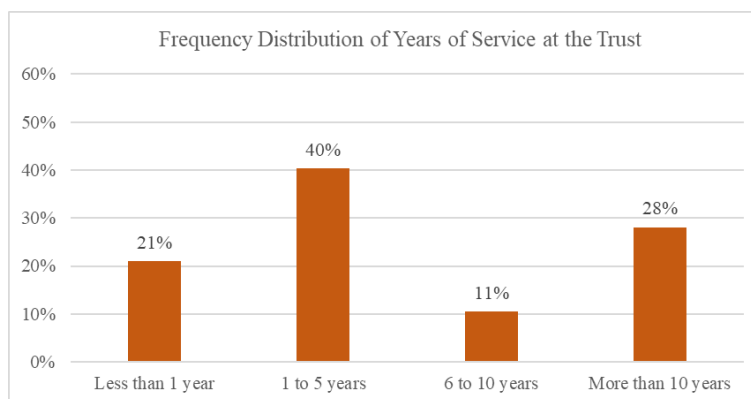


Figure 5: Distribution of responses regarding years of service at the Trust among participants.

Within both categories, we deliberated on two options for grouping participants: the first option involved categorizing respondents as having “5 or fewer years” versus “more than 5 years” of service, while the second option entailed grouping participants into “10 or fewer years” versus “more than 10 years” of service. Comparative analysis of response distribution between the two grouping approaches for NHS experience and Trust experience is presented in Appendices E to H. This allowed us to explore varying perspectives and experiences of participants within these distinct service duration brackets.

After careful consideration of the response distribution comparisons, we decided to focus on the comparison using the 10-year threshold for further analysis. This decision was based on the observation that the differences among these two groups appeared to be more pronounced, when compared to the 5-year threshold, suggesting that it would provide a more informative and meaningful basis for our subsequent analysis.

For instance, upon close examination of the charts, we observed that “a great deal” is the highest occurrence response for several factors within the groups with less years of experience, encompassing both those with 5 or fewer years and those with 10 or fewer years of experience. However, the charts representing more than 10 years of service, compared to those representing more than 5 years of service, tended to exhibit a reduced frequency of “a great deal” responses for most factors, displaying a greater level of separation from responses of the group with the least experience.

An emerging concern was whether participants with less experience in the NHS aligned with those with less experience at the Trust and, similarly, participants with more experience in the NHS corresponded to those with more experience at the Trust, given the same division criteria used for both groups based on 10 years of experience.

However, an analysis of the distribution of responses based on NHS experience levels within the context of Trust experience (Figure 6) revealed that, besides the 28% of respondents with more than 10 years of Trust experience that inevitably also possess more than 10 years of NHS experience, another 16% of respondents with over a decade of NHS experience have their Trust experience distributed across various duration categories.

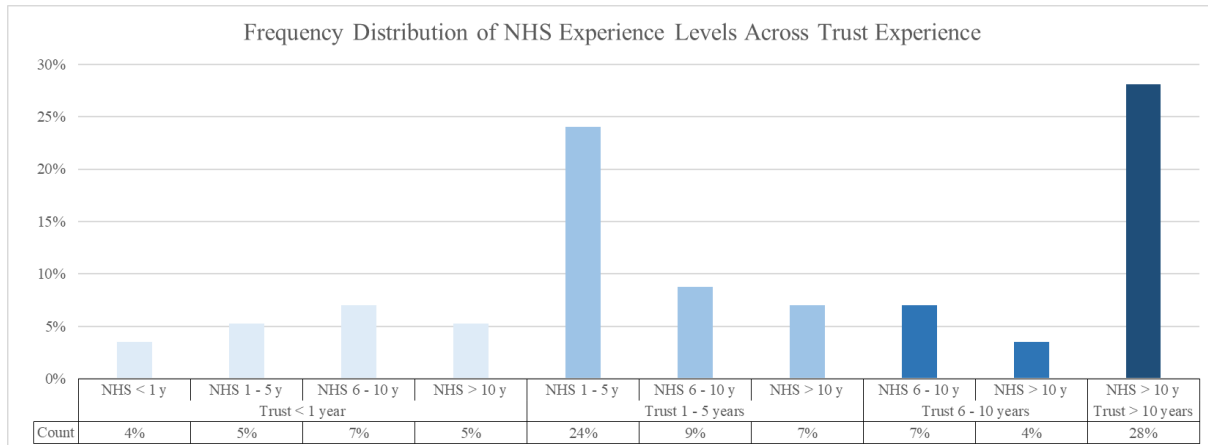


Figure 6: Distribution of responses regarding NHS experience levels across Trust experience.
(NHS: National Health Service; y: years.)

In summary, the following groups were defined for further comparative analysis:

a. Pharmacists vs. MMPTs.

Responses provided by “MMPTs” and “other pharmacy technicians” were combined and collectively referred to as MMPTs’ responses. Responses from both “pharmacist” and “trainee pharmacist” were merged and categorised as pharmacists’ responses.

b. Staff ordering inpatient medication every day (EDs) vs. Staff not ordering inpatient medication every day (NEDs).

Respondents who specified their medication ordering frequency as "weekly", "occasionally", or "weekends and/or late duties only" were consolidated into a single category labelled as NEDs.

c. 10 or fewer years of service in the NHS vs. More than 10 years in the NHS.

Respondents selecting "less than 1 year", "1 to 5 years", or "6 to 10 years" as their duration of employment within the NHS were grouped together under the designation “10 or fewer years of service in the NHS”.

d. 10 or fewer years of service at the Trust vs. More than 10 years at the Trust.

Respondents selecting "less than 1 year", "1 to 5 years", or "6 to 10 years" as their duration of employment at the Trust were grouped together under the designation “10 or fewer years of service at the Trust”.

3.2.2 Data analysis

Throughout the following sections, the numerical scoring system was employed to describe the responses to Likert scale questions. To clarify, “not at all” corresponded to a score of 1, “a little” to a score of 2, “a moderate amount” to a score of 3, “a lot” to a score of 4, and “a great deal” to a score of 5. This system allowed for a more concise presentation of the data without the need for repetitive elaboration on the meaning of each score.

I. Total response count analysis

Analysing the median and mode values of the cumulative response count (Figure 7) revealed similar patterns in the factors considered for decisions on both the type and duration of supply. Specifically, the median scores for each factor were the same for both considerations.

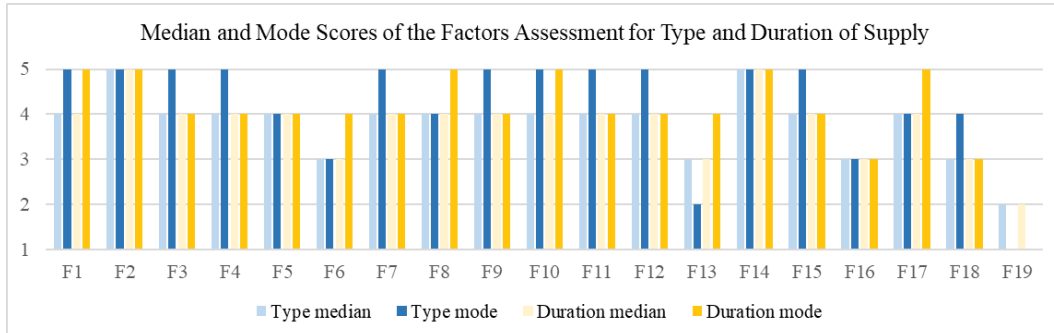


Figure 7: Median and mode scores of the factors assessment for decisions on type and duration of medication supply.
To correspond the factor number with the respective factor, please refer to Table 3.

The majority of median scores clustered around the value of 4. Fourteen out of the nineteen factors were considered very important, with median scores of 4 for twelve factors and 5 for two factors.

The factors most agreed upon as being highly important were “patient on a MCA” (F2) and “duration of treatment” (F14), with median and mode scores of 5 for type and duration considerations. In contrast, the factor “nurse skill set on the ward” (F19) was widely agreed upon as the least important, with median scores of 2 and mode scores of 1, for decisions on both type and duration of supply.

The factor “stock level in pharmacy” (F13) showed a two-point difference in mode scores, specifically 2 and 4, for decisions on supply type and duration, respectively.

II. Demographic group comparisons

Descriptive analysis of responses by demographic groups provided insights into potential differences within the respondent pool.

We established a specific criterion for highlighting results in our descriptive analysis, one that, to the best of our knowledge, had not been identified in prior studies. Our approach centred on identifying median and mode variations between demographic groups that exceeded a 1-point difference, which we deemed as relevant. This decision, reached through consultation with a senior pharmacist, aimed to ensure the conciseness of the report by focusing on pronounced differences rather than listing every observed variation in the presented charts.

We will present findings from the descriptive analysis alongside the results of the Mann-Whitney U tests conducted for the following factors: “patient on a MCA” (F2), “patient’s own drugs at home” (F4), “dose changing” (F7), “medication screened by a pharmacist” (F10), and “route of administration/ formulation” (F11).

Sections IIa to IId display the results for each of the four demographic group comparisons. In Section IIe, all findings from the Mann-Whitney U tests are consolidated into a table.

IIa. Pharmacists vs. MMPTs.

When determining the type of supply (Figure 8), there were considerable differences among the respondent groups for several factors in terms of median and mode scores.

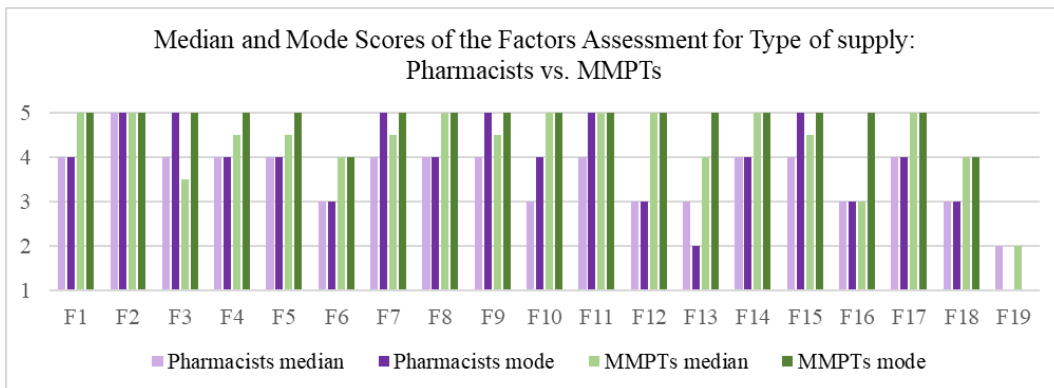


Figure 8: Staff role comparison for type of supply: median and mode scores per demographic group. (MMPT: medicines management pharmacy technicians.)

To correspond the factor number with the respective factor, please refer to Table 3.

When it comes to median score analysis, the factor, “medication screened by a pharmacist” (F10) displayed a 2-point difference with median scores of 3 and 5 for pharmacists and MMPTs, respectively. Accordingly, the comparison using the Mann-Whitney U test for F10 resulted in a significant p-value of 0.0002, falling below the $p < 0.01$ threshold.

The factor “size of the original pack” (F12) showed median scores of 3 and 5, respectively, and modes scores of 3 and 5, respectively for pharmacists and MMPTs.

Pronounced variations in mode scores within these demographic groups were also observed for: “stock level in pharmacy” (F13), displaying mode scores of 2 and 5; and “type of ward” (F16), with mode scores of 3 and 5, respectively for pharmacists and MMPTs.

For decisions regarding the type of medication supply, the additional factors subjected to Mann-Whitney U tests to compare pharmacists' and MMPTs' responses showed non-significant results at $p < 0.01$, with p-values as follows: $p = 0.09$ for "patient on a MCA" (F2), $p = 0.09$ for "patient's own drugs at home" (F4), $p = 0.99$ for "dose changing" (F7), and $p = 0.41$ for "route of administration/ formulation" (F11).

In terms of determining the supply duration (Figure 9), pharmacists and MMPTs exhibited notable median score differences for some factors.

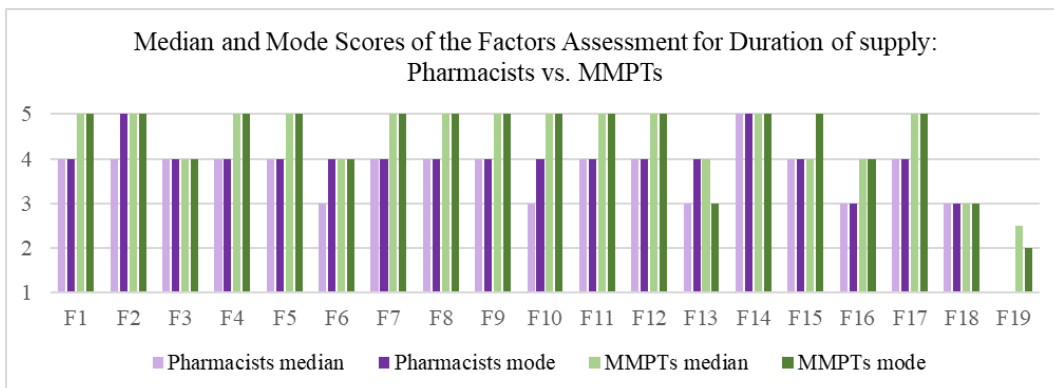


Figure 9: Staff role comparison for duration of supply: median and mode scores per demographic group. (MMPTs: medicines management pharmacy technicians.)

To correspond the factor number with the respective factor, please refer to Table 3.

Similarly to the earlier observation concerning supply type decisions, for supply duration decisions, the factor "medication screened by a pharmacist" (F10) displayed median

scores of 3 and 5 for pharmacists and MMPTs, respectively, and the Mann-Whitney U test produced the same p-value of 0.0002.

Additionally, the factor “nurse skill set on the ward” (F19), showed median scores of 1 and 2.5, respectively for pharmacists and MMPTs.

For decisions on the duration of medication supply, results from the other Mann-Whitney U tests conducted indicated non-significance at $p < 0.01$, with p-values as follows: $p = 0.13$ for "patient on a MCA" (F2), $p = 0.09$ for "patient's own drugs at home" (F4), $p = 0.03$ for "dose changing" (F7), and $p = 0.02$ for "route of administration/ formulation" (F11).

Overall, pharmacists’ responses exhibited a notable skew towards the score 4, with the majority of factors registering mode scores of 4. In contrast, MMPTs’ responses reflected a distinct preference for the score 5, with most factors recording mode scores of 5.

IIb. EDs vs. NEDs.

In the process of deciding on the type of medication supply (Figure 10), responses from staff who order inpatient medication on a daily basis and those who do not do so every day did not show pronounced differences in terms of median scores.

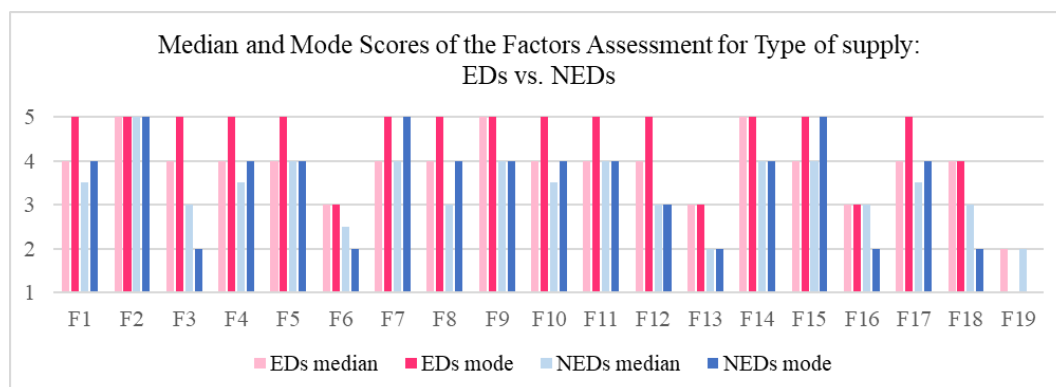


Figure 10: Frequency of order comparison for type of supply: median and mode scores per demographic group. (EDs: staff ordering inpatient medication every day; NEDs: staff not ordering inpatient medication every day.) To correspond the factor number with the respective factor, please refer to Table 3.

Regarding the comparison of mode scores, the three following factors displayed the most significant deviations: “patient with risk factors” (F3), showing mode scores of 5 and 2; “size of original pack” (F12), with mode scores of 5 and 3; and “familiarity with clinical speciality” (F18), displaying mode scores of 4 and 2, respectively for EDs and NEDs.

When it comes to decisions on the medication supply type, all conducted Mann-Whitney U tests comparing these demographic groups yielded results indicating non-significance at the $p < 0.01$ level, with the following p-values: $p = 0.63$ for "patient on a MCA" (F2), $p = 0.18$ for "patient's own drugs at home" (F4), $p = 0.42$ for "dose changing" (F7), $p = 0.06$ for “medication screened by a pharmacist” (F10), and $p = 0.49$ for "route of administration/ formulation" (F11).

While determining the duration of medication supply (Figure 11), similar to our observations for supply type decisions, the only relevant differences observed for some factors among these demographic groups pertained to mode scores.

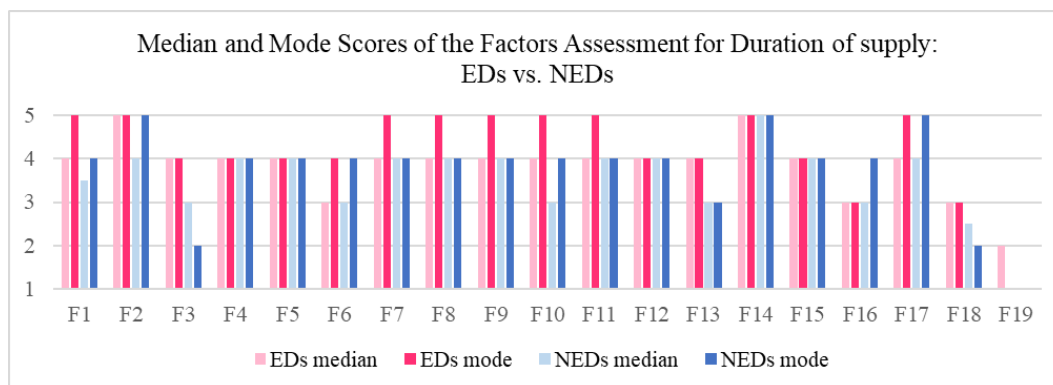


Figure 11: Frequency of order comparison for duration of supply: median and mode scores per demographic group. (EDs: staff ordering inpatient medication every day; NEDs: staff not ordering inpatient medication every day.) To correspond the factor number with the respective factor, please refer to Table 3.

In terms of mode score analysis, “patient with risk factors” (F3) displayed the most prominent discrepancy, with values of 4 and 2, respectively for EDs and NEDs.

The results from the Mann-Whitney U tests comparing these demographic groups, conducted for decisions on supply duration, also revealed non-significance at the $p < 0.01$ level, with the following p-values: $p = 0.66$ for "patient on a MCA" (F2), $p = 0.69$ for "patient's own drugs at home" (F4), $p = 0.87$ for "dose changing" (F7), $p = 0.13$ for “medication screened by a pharmacist” (F10), and $p = 1.00$ for "route of administration/ formulation" (F11).

In general, comparing the two groups of respondents, EDs showed a strong leaning towards the score of 5, with most factors displaying mode scores of 5. Conversely, NEDs exhibited a preference for the score 4, registering mode scores of 4 for most factors.

Iic. 10 or fewer years of service in the NHS vs. More than 10 years.

When comparing considerations on the type of supply between employees with less experience in the NHS with those with more than 10 years of service in the NHS (Figure 12), substantial differences were observed among the respondent groups for various factors in relation to median and mode scores.

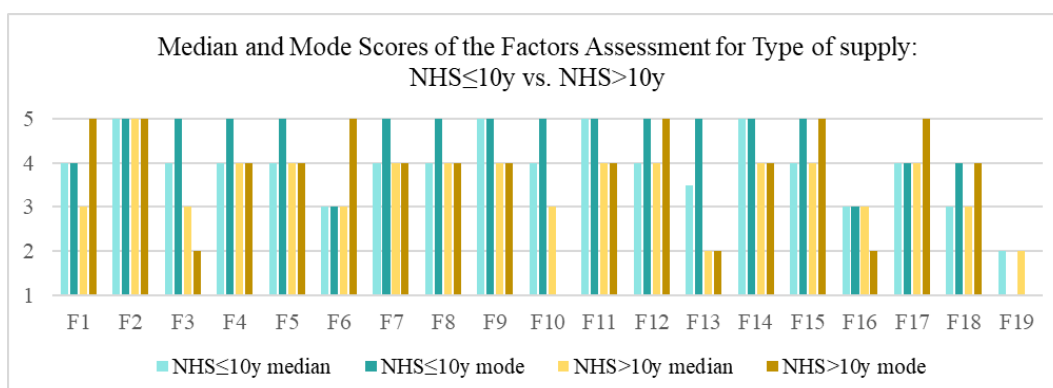


Figure 12: NHS experience comparison for type of supply: median and mode scores per demographic group. (NHS: National Health Service.) To correspond the factor number with the respective factor, please refer to Table 3.

The factor “stock level in pharmacy” (F13) showed discrepancies in both median scores, with values of 3.5 and 2, respectively, and mode scores, with values of 5 and 2, respectively for participants with up to 10 years of work in the NHS and their counterparts with more than 10 years.

Additional factors revealed pronounced variations in terms of mode scores: “patient with risk factors” (F3), showing mode scores of 5 and 2, respectively; “cost of the medication” (F6), with mode scores of 3 and 5, respectively; and “medication screened by a pharmacist”

(F10), displaying mode scores of 5 and 1, respectively for staff employed for 10 or fewer years in the NHS and those employed for more than 10 years. Although F10 exhibited a 4-point difference in mode scores for supply type decisions, the Mann-Whitney U test result for this comparison yielded a result of $p=0.06$, which is not significant at $p<0.01$.

Results from the other Mann-Whitney U tests conducted between these groups for decisions on supply type indicated non-significance at $p<0.01$, with p-values as follows: $p=0.59$ for "patient on a MCA" (F2), $p=0.42$ for "patient's own drugs at home" (F4), $p=0.66$ for "dose changing" (F7), and $p=0.46$ for "route of administration/ formulation" (F11).

When determining the duration of supply (Figure 13), these demographic groups displayed pronounced variations in mode scores for certain factors.

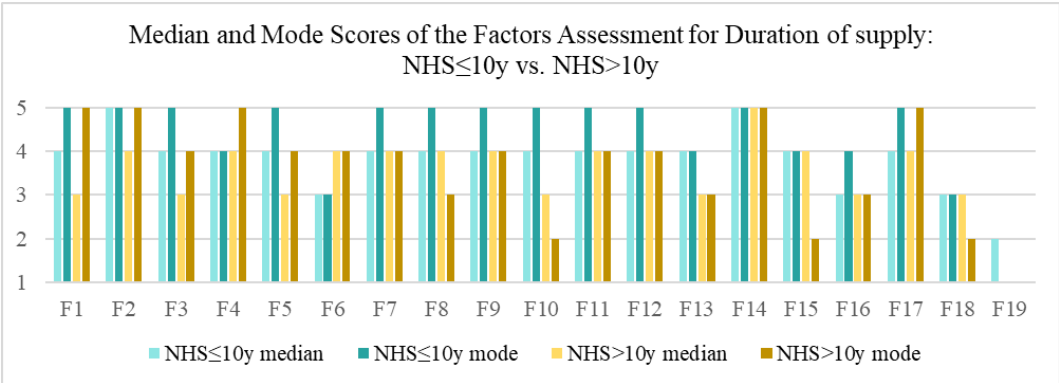


Figure 13: NHS experience comparison for duration of supply: median and mode scores per demographic group.
(NHS: National Health Service.)

To correspond the factor number with the respective factor, please refer to Table 3.

The following factors registered different mode scores for participants with up to a decade of work in NHS and their counterparts with over 10 years' experience: "expiry date of the medication" (F8), with mode scores of 5 and 3, respectively; "medication screened by a pharmacist" (F10), showing mode scores of 5 and 2, respectively; and "expected stay on the ward" (F15), displaying mode scores of 4 and 2, respectively. Although F10 exhibited a 3-point difference in mode scores for supply duration decisions, the Mann-Whitney U test for this comparison yielded a result of $p=0.05$, which is not significant at $p<0.01$.

Results from the other Mann-Whitney U tests conducted between these groups for decisions on supply duration indicated non-significance at $p<0.01$, with p-values as follows: $p=0.36$ for "patient on a MCA" (F2), $p=0.71$ for "patient's own drugs at home" (F4), $p=0.47$ for "dose changing" (F7), and $p=0.51$ for "route of administration/ formulation" (F11).

IId. 10 or fewer years of service at the Trust vs. More than 10 years.

When deciding on the type of medication supply (Figure 14), responses from staff employed at the Trust for up to a decade and staff working there for more than 10 years showed pronounced differences in median and mode scores for some factors.

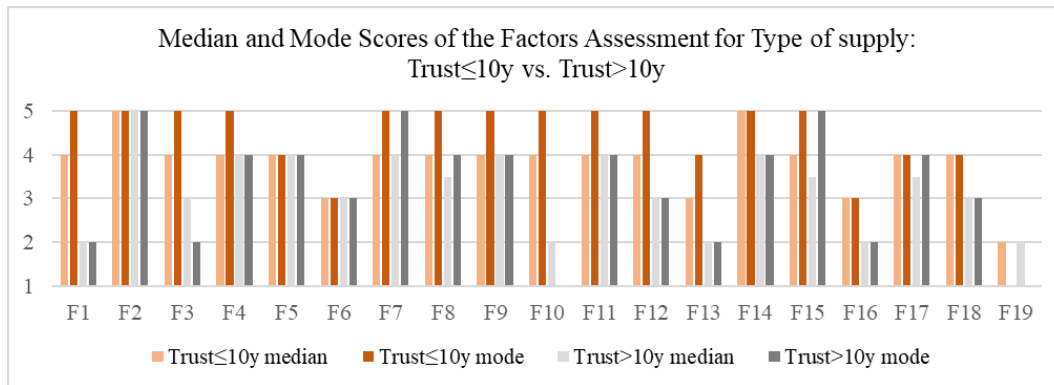


Figure 14: Trust experience comparison for type of supply: median and mode scores per demographic group.
To correspond the factor number with the respective factor, please refer to Table 3.

The factors “drug history completed” (F1) and “medication screened by a pharmacist” (F10) exhibited relevant discrepancies in both median and mode scores between the demographic groups. When contrasting employees with less work experience at the Trust against those with more than a decade of service at the Trust, F1 showed median scores of 4 and 2, respectively, and mode scores of 5 and 2, respectively; whereas F10 displayed median scores of 4 and 2, respectively, and mode scores of 5 and 1, respectively. The variation between these groups observed in the assessment of F10 for supply type decisions was supported by the result from the Mann-Whitney U test of $p=0.002$, which is significant at $p<0.01$.

Additionally, there were pronounced variations in mode scores for the following factors: “patient with risk factors” (F3), showing mode scores of 5 and 2; “size of original pack” (F12), displaying mode scores of 5 and 3; and “stock level in pharmacy” (F13), with mode scores of 4 and 2, respectively for participants with up to 10 years of work at the Trust and their counterparts with over 10 years’ experience.

The additional Mann-Whitney U tests conducted among these groups for decisions on supply type yielded non-significant results at $p<0.01$, with the associated p-values being as follows: $p=0.83$ for "patient on a MCA" (F2), $p=0.63$ for "patient's own drugs at home" (F4), $p=0.73$ for "dose changing" (F7), and $p=0.67$ for "route of administration/ formulation" (F11).

When deciding on the duration of medication supply (Figure 15), there were also found relevant differences in median and mode scores between these demographic groups.

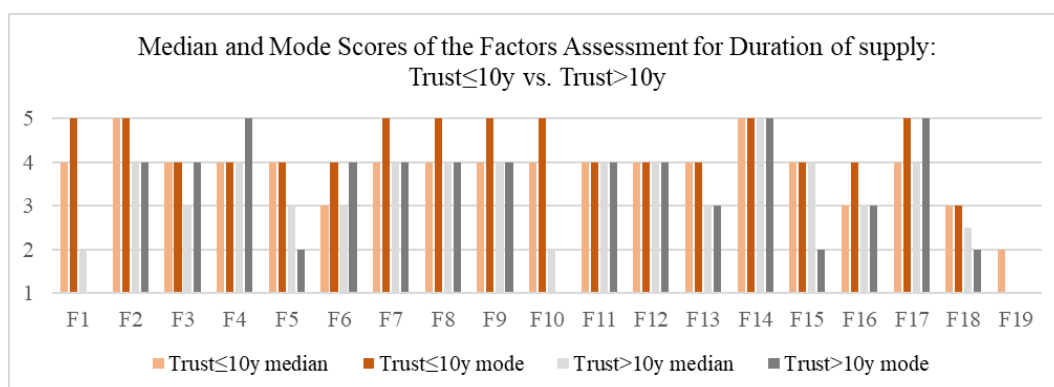


Figure 15: Trust experience comparison for duration of supply: median and mode scores per demographic group.
To correspond the factor number with the respective factor, please refer to Table 3.

“Drug history completed” (F1) and “medication screened by a pharmacist” (F10) also revealed noteworthy differences among the groups for considerations on duration of supply. Comparing participants with less years at the Trust against those with over 10 years’ experience, F1 showed median scores of 4 and 2, respectively, and mode scores of 5 and 1, respectively; whereas F10 displayed median scores of 4 and 2, respectively, and mode scores of 5 and 1, respectively. Similar to our observations for supply type decisions, the identified difference

between these groups in evaluating F10 for supply duration decisions was supported by the Mann-Whitney U test result of $p=0.001$, indicating statistical significance at $p<0.01$.

Moreover, there were notable differences in mode scores for: “where the patient is being discharged to” (F5) and “expected stay on the ward” (F15), both displaying scores of 4 and 2, respectively for staff employed at the trust for up to 10 years compared to those employed for more than 10 years.

The additional Mann-Whitney U tests conducted between these groups for decisions on supply duration revealed non-significance at $p<0.01$, with the following p-values: $p=0.24$ for "patient on a MCA" (F2), $p=0.67$ for "patient's own drugs at home" (F4), $p=0.55$ for "dose changing" (F7), and $p=0.84$ for "route of administration/ formulation" (F11).

IIe. Compilation of Mann-Whitney U Test results

Table 4 compiles the previously mentioned Mann-Whitney U Test results for the demographic group comparisons. In summary, the tests compared the assessment of each of the five pre-selected factors between the four demographic groups. Each factor was evaluated in relation to two different decisions: medication supply type and medication supply duration. In total, 40 tests were conducted, therefore 40 p-values are presented.

Table 4: Statistical analysis for the subset of five factors. Statistical significance of $p<0.01$.

Factor (Factor number)	Group comparison performed	p-values (supply type/duration)
Patient on a multi-compartment compliance aid (F2)	Pharmacists vs. MMPTs	$p=0.09/0.13$
	Everyday ordering vs. not every day	$p=0.63/0.66$
	NHS experience ≤ 10 years vs. >10 years	$p=0.59/0.36$
	Trust experience ≤ 10 years vs. >10 years	$p=0.83/0.24$
Patient's own drugs at home (F4)	Pharmacists vs. MMPTs	$p=0.09/0.09$
	Everyday ordering vs. not every day	$p=0.18/0.69$
	NHS experience ≤ 10 years vs. >10 years	$p=0.42/0.71$
	Trust experience ≤ 10 years vs. >10 years	$p=0.63/0.67$
Dose changing (F7)	Pharmacists vs. MMPTs	$p=0.99/0.03$
	Everyday ordering vs. not every day	$p=0.42/0.87$
	NHS experience ≤ 10 years vs. >10 years	$p=0.66/0.47$
	Trust experience ≤ 10 years vs. >10 years	$p=0.73/0.55$
Medication screened by a pharmacist (F10)	Pharmacists vs. MMPTs	$p=0.0002/0.0002$
	Everyday ordering vs. not every day	$p=0.06/0.13$
	NHS experience ≤ 10 years vs. >10 years	$p=0.06/0.05$
	Trust experience ≤ 10 years vs. >10 years	$p=0.002/0.001$
Route of administration/ formulation (F11)	Pharmacists vs. MMPTs	$p=0.41/0.02$
	Everyday ordering vs. not every day	$p=0.49/1.00$
	NHS experience ≤ 10 years vs. >10 years	$p=0.46/0.51$
	Trust experience ≤ 10 years vs. >10 years	$p=0.67/0.84$

(MMPTs: medicines management pharmacy technicians; NHS: National Health Service.)

III. Optional text-entry box

The survey yielded a total of thirteen comments, distributed across various aspects of supply type and duration considerations. Most respondents provided comments on specific factors from the nineteen presented. These responses offered more in-depth insights into the decision-making processes, including how these factors influenced their choices between OSD or IP supply and between supplying an OP or splitting it.

Below, we present a selection of illustrative examples extracted from the responses:

- “I order 95% of items as IP unless it is a pre-admission medication that they will continue at a dose that will not change then I order this as OSD/TTA”.
- “I try to order as labelled for discharge whenever possible, in line with size of original packet where possible”.
- “I usually order an OP for most patients on ICU [Intensive Care Unit] if there are no stock concerns in pharmacy as it is easier to return”.
- “Try to avoid splitting packs unless it is relatively high cost and patient likely to come off the medication soon. I think we spend too much time/ effort packing down packs of medication”.

Regarding the choice of supply type, the comments indicated a degree of divergence among pharmacy staff members. It appeared that there were two primary approaches: some professionals tended to default to OSD, with exceptions that justified IP including cases of limited stock, while another group seemed to follow the opposite pattern.

Concerning the duration of supply, ordering OPs seemed to be the preferred choice, primarily for the sake of saving time and facilitating the return of unopened medications. However, there were exceptions, notably for high-cost medications, short treatment durations, and limited pharmacy stock.

Additionally, one comment raised the issue of remote screening during weekends, while another highlighted the challenge of considering all these factors for individual patients during weekend or late duty shifts.

Notably, only one respondent mentioned the Trust's policy and SOPs as novel factors for supply type considerations.

4. Discussion

4.1 Summary of key findings

4.1.1 Focus group

The focus group discussion yielded valuable information about the perspectives of pharmacy staff about decisions on type and duration of medication supply for hospital inpatients. It provided reassurance of the ten pre-formulated factors while also unveiling nine previously unrecognised elements emphasised by participants, rendering a total of nineteen factors.

Additionally, the findings highlighted the need for consistent guidelines in practical decision-making. Participants relied on their experience and common sense, emphasising the importance of combining their expertise with established protocols to improve efficiency and consistency in the dispensary and ward practices.

4.1.2 Online questionnaire

Most factors were considered important in decision-making. In fact, each factor yielded the same median score for decisions regarding type and duration of inpatient medication supply. The factors “patient on a MCA” and “duration of treatment” were widely agreed upon as being important to a great extent, whereas “nurse skill set on the ward” was assessed as the least important. Several factors showed discrepancies in importance between demographic groups.

Among the five factors subjected to Mann-Whitney U tests, only "medication screened by a pharmacist" yielded statistically significant results at $p < 0.01$, in the context of comparisons between groups with different staff role and years of Trust experience, for decisions on both type and duration of medication supply. The analysis of median and mode scores suggested that, when compared to pharmacists, MMPTs tended to assign greater importance to this factor, and, in comparison to employees with more than 10 years of service at the Trust, those with less experience tended to attribute greater importance.

Additional factors exhibiting noteworthy differences in assessment among demographic groups, as indicated by the descriptive analysis of median scores, comprised:

- “Size of original pack” for decisions on the type of medication supply, which seemed to be more important for MMPTs than for pharmacists;
- “Drug history completed” for decisions on both type and duration of medication supply, which seemed to be of greater value to professionals with up to 10 years of service at the Trust, compared to their counterparts with more experience.

Analysis of the comments submitted in the optional open-entry box of the survey suggested tangible practical discrepancies in how the factors impact decision-making.

4.2 Interpretation

4.2.1 Focus group

The focus group successfully achieved the intended objective by investigating the considerations influencing pharmacy staff's decisions on inpatient medication supply type and duration, resulting in the identification of a comprehensive list of nineteen factors.

The discussed factors extended beyond the recommendations outlined in the Trust's SOP (22), including additional practical considerations, such as “medication screened by a pharmacist”, “size of original pack”, “stock level in pharmacy”, among other factors. The fact that these considerations are not part of a standardised set, allegedly acquired through experience, raises questions about their general awareness and applicability in decision-making, especially when considering the bias introduced by using a non-random sampling procedure.

The additional comments obtained from the focus group discussion contribute to our understanding of the diversity across various hospital wards. This diversity, even within a single hospital, poses challenges when developing guidelines with broad applicability.

4.2.2 Online questionnaire

The online questionnaire attained its objective by evaluating the relative importance of nineteen factors in pharmacy staff's decisions regarding medication supply type and duration. The assessment of each individual factor was conducted using a 5-point Likert scale ranging from "not at all" (scored 1) to "a great deal" (scored 5).

The finding that most factors were deemed important in decision-making aligns with the expectations, considering that the list of nineteen factors was derived from information found in the Trust's SOP (22) and insights obtained during the focus group discussion with pharmacy staff.

The similar response patterns for decisions about supply type and duration suggests that these factors play a role in both considerations. However, it is possible that some respondents did not effectively comprehend the use of two different sets of Likert scales to address supply type and supply duration considerations separately, compromising the validity of the response data.

The most notable distinction was observed in the category of "stock level in pharmacy", which appeared to hold more significance in discussions regarding supply duration than in those concerning supply type. However, this finding provides only limited information.

Notably, the factors "patient on a MCA" and "duration of treatment" were found to be the most important in decision-making, showing a focus on patient needs and course of treatment. In contrast, most respondents rated "nurse skill set on the ward" as the least important, possibly due to concerns about crossing into the responsibilities of another professional group and its effects on the workplace.

When comparing demographic groups with distinct staff roles, notable differences were apparent in the assessment of several factors, including "medication screened by a pharmacist", "size of original pack" and "stock level in pharmacy". The mentioned factors pertain to medication-related considerations, and consistently, MMPTs' responses achieved higher scores compared to pharmacists' assessments. One possible explanation for this pattern could be attributed to the professional background, with MMPTs primarily focused on medicines management.

In general, preferences for the scores 4 and 5 were observed when comparing, respectively, pharmacists' and MMPTs' mode scores. This prompts speculation on whether MMPTs tend to attribute greater importance to most of assessed factors than pharmacists do.

When comparing the factors' assessment between groups with varying order frequencies, differences in median scores were consistently within a 1-point range for either supply type or duration considerations, which suggests a similarity in the central tendencies of responses across these groups. Differences in mode scores were observed for the following factors: "patient with risk factors", "size of original pack" and "familiarity with clinical speciality". Consistently, the group of participants that order medications every day exhibited the higher mode scores.

Concurrently, most factors revealed mode scores of 5 in EDs' assessment, while mode scores of 4 in NEDs' assessment. Considering that people ordering exclusively on weekends are included in the "NEDs" category, one plausible interpretation of this pattern relates to the limited staffing levels on weekends, which may impose time constraints, hindering the comprehensive consideration of all proposed factors. In fact, the comments provided in the optional text-entry box emphasised this challenge. Decisions on supply type and duration are

not solely influenced by clinical considerations but are also significantly affected by operational factors such as staffing and resource availability, especially during non-standard working hours. Addressing these issues may involve developing tailored guidance that considers the prioritisation of a subset of factors and streamlined access to patient information.

In the comparison of demographic groups with varying years of NHS experience, distinctions were identified in the assessment of several factors, including “stock level in pharmacy”, “patient with risk factors”, “medication screened by a pharmacist”, “expiry date of the medication” and “expected stay on the ward”. In each of these cases, the group of participants with less work experience in the NHS achieved the higher scores.

The observed pattern leads to conjecture about whether individuals who have worked in the NHS for over a decade attribute less importance to most of the factors assessed. One speculated reason for this apparent pattern is that, with increased expertise, professionals may tend to assess factors not only theoretically but also based on their own practical experience. In this context, attributing great importance to nineteen factors in each practical decision may seem excessive.

On the contrary, the factor "cost of the medication" demonstrated an opposite pattern when comparing these demographic groups, as pharmacy staff professionals with over 10 years of experience in the NHS displayed a higher mode score compared to their counterparts with less experience in the NHS. Additional research is required to draw any conclusion from this finding.

When contrasting demographic groups with differing lengths of experience at the Trust, noticeable differences were noted in the assessment of the following factors: “drug history completed”, “medication screened by a pharmacist”, “patient with risk factors”, “size of original pack”, “stock level in pharmacy”, “where the patient is being discharged to” and “expected stay on the ward”.

The identified differences between the compared groups displayed a similar pattern to the ones observed when addressing years of experience in the NHS, with consistently higher scores achieved by the group of participants with 10 or fewer years of service at the Trust, compared to pharmacy staff with more than a decade of experience at the Trust. The observed trend raises questions about whether individuals with over a decade of experience at the Trust assign reduced value to most of the factors. Considering that these participants consist of a subgroup of the staff working in the NHS for more 10 years, a possible explanation could also relate to their increased expertise in the profession.

Descriptive analysis served as the initial step in identifying preliminary distinctions into how participants assessed the various factors. Combining our Mann-Whitney U test results and descriptive analysis corroborated differences in the evaluation of the factor “medication screened by a pharmacist” among the compared groups with distinct staff roles (pharmacists vs. MMPTs) and years of experience at the Trust (10 or fewer years vs. more than 10 years of service at the Trust).

On the other hand, for the remaining factors subjected to Mann-Whitney U-tests, specifically "patient on a MCA" (F2), "patient's own drugs at home" (F4), "dose changing" (F7), and "route of administration/formulation" (F11), none displayed statistically significant results. Concurrently, the descriptive analysis did not reveal any substantial apparent difference in median or mode scores between the compared demographic groups for these factors. These insights suggest that the mentioned factors are uniformly evaluated within the respondent pool.

Regarding the optional text-entry box, the survey collected only 13 responses out of 57 completed questionnaires, which may not be representative of the entire sample. Nevertheless, the fact that only one respondent mentioned the Trust's policy and SOPs as additional factors

points to an opportunity to increase awareness and adherence to institutional recommendations, as well as the need to update them with more practical and comprehensive guidelines. Furthermore, the results revealed some disagreement regarding how these factors influence decisions on supply type and duration, reinforcing the importance of delving deeper into their practical implications as a basis for ongoing process improvement in healthcare settings.

4.3 Relevance

To our knowledge, no previous studies have explored the factors influencing pharmacy staff's decisions regarding the type and duration of medication supply for hospital inpatients.

The results of this study provide valuable insights into the factors that affect decision-making. We elaborated on a list of nineteen factors, which were assessed in terms of their relative importance and compared among groups of participants with distinct demographic characteristics. Our findings demonstrate the complexity of the decision-making process and suggest variations in the considerations made among groups of pharmacy staff within an English NHS Trust.

This study reinforces the importance of gaining a deeper understanding of how pharmacy staff manage the ordering of inpatient medication supply. Such insights not only help identify existing challenges within the process but also provide a valuable foundation for future research and for healthcare facilities to refine their practices, striking a balance between clinical and operational factors in the medication supply process.

4.4 Limitations

The primary limitation of this study is the insufficient statistical power, which compromises the validity of our results.

In the case of the focus group, a non-random sampling procedure was employed to gather a convenience sample of a small size. This approach may introduce selection bias and limit the broader applicability of our findings.

For the online questionnaire, the response rate was only 32%, resulting in a relatively small sample size, potentially compromising the generalisability of the results for the entire English NHS trust from where data was collected.

In fact, the analysis of the questionnaire data primarily relied on descriptive procedures, such as median and mode calculations. While these methods allowed patterns to emerge, the inherent limitations of descriptive analysis prevented us from establishing causal relationships or drawing definitive conclusions.

Although we conducted some sub-group statistical analysis within the respondent pool to gain insights and understand the data, it only encompassed five out of the nineteen factors addressed in this study. The constraint of this analysis to five factors was influenced by the application of the Bonferroni correction, which is a subject of debate for its perceived conservatism. Additionally, due to limitations in expertise and resources, the calculation of confidence intervals and the application of inferential statistics were not feasible for this project. As a result, the Mann-Whitney U test results are unable to demonstrate significance in the broader population of pharmacy staff within the Trust.

The study design involved data collection from a single NHS trust. Therefore, these results may not be generalisable to other trusts and, consequently, to the overall population of pharmacy staff in the UK. Furthermore, we could not find any other studies addressing pharmacy staff decision-making on inpatient medication supply in the UK to compare our findings and assess the extent to which they are consistent. This limitation may compromise the content validity of the study results, and raises uncertainty about their reliability.

Another limitation lies in our approach to understanding the factors that influence decision-making. We primarily focused on identifying and assessing the factors potentially important to pharmacy staff, rather than delving into how these factors are used to guide decisions. This limitation restricted our ability to provide a comprehensive view of the decision-making process.

4.5 Implications for practice

This work holds practical applications for real-world healthcare settings. Pharmacy staff could significantly benefit from the development of training programs and comprehensive guidelines addressing the multitude of factors affecting decisions on the type and duration of medication supply and providing clear instructions on how they should inform decision-making. Such professional materials, along with the SOPs, have the potential to enhance consistency across the NHS Trust, improve resource management and patient outcomes, ultimately increasing the quality and cost-efficiency of the healthcare provided.

4.6 Implications for future research

The subsequent phase of this project involves conducting individual interviews to delve into pharmacy staff decisions on the type and duration of inpatient medication supply, exploring the reasons that underlie each consideration and understanding how factors influence decisions. This additional qualitative data will complement the current study findings and serve as a formal check on their reliability.

Participants will be recruited through the email address provided in the link invitation at the conclusion of the online questionnaire. Considering the ethical frameworks of the survey, each participant's questionnaire responses will remain anonymous and unlinked to their identity.

The interview schedule and support material, provided in appendices I and J, respectively, underwent a pilot test and were developed in April 2023. A consent form has been designed, requesting permission to record the interview and conduct anonymous data analysis.

The interview script begins with questions to collect participant's demographic information, following which participants are guided through a series of questions focused on the intricacies of their ordering process. The semi-structured format is anticipated to foster consistency, laying the groundwork for a methodical analysis of the forthcoming data.

Due to time constraints, the interviews were not conducted in time for inclusion in this report.

The findings from this stage of analysis suggest directions for future research. This study employed statistical methodology for sub-group analysis, yet it faced limitations due to insufficient statistical power. Nevertheless, while this analysis alone cannot establish statistical significance, it does reveal patterns that suggest potential implications of differing experiences or opinions within the pharmacy staff.

Future research could benefit from enhanced methodology, including a power calculation. Another interesting methodological improvement would involve establishing an ethical means to connect questionnaire responses with individual interviews for each participant. This approach would enable the exploration of outlier perspectives identified in the quantitative analysis.

Expanding the scope of the study to include multiple NHS trusts would enhance representativeness and allow us to draw conclusions about the population of pharmacy staff across the NHS.

Nevertheless, other key questions remain unanswered, including the impact of pharmacy staff decision-making on clinical and financial outcomes. Assessing these outcomes is imperative to draw conclusive insights into how these factors should properly inform decision-making, ultimately enhancing the healthcare services provided.

5. Conclusion

In conclusion, decision-making for determining the type and duration of medication supply for hospital inpatients is intricate, involving a multitude of factors. This study offers valuable insights into the considerations of pharmacy staff during this process, revealing the varying degrees of importance associated with these factors.

The focus group discussion with pharmacy staff informed about the range of aspects that influence decision-making, and nineteen factors were identified as potentially playing a pivotal role. The online questionnaire revealed that most of the nineteen factors held a great level of influence for decisions on type and duration of supply, and several factors showed variations in relative importance among different demographic groups.

Individual interviews are currently underway to probe the motivations behind pharmacy staff's considerations and to examine how these factors shape decisions on the type and duration of medication supply.

This project contributes to the growing body of research by addressing specific decision-making considerations related to pharmacy staff ordering of non-stock inpatient medication supplies, adding a valuable perspective to the existing literature. Nevertheless, limitations of this study include its insufficient statistical power that compromises the wider applicability of our findings and the inability to fully comprehend how each factor influences decision-making.

The results from this study can provide valuable insights for future research on this topic. Subsequent studies could benefit from incorporating a power calculation to determine the minimum sample size required for assessing how various factors are differently considered among groups of pharmacy staff. Additionally, further investigation is needed to explore how the range of factors should effectively guide decision-making considering patient and economic outcomes.

Ultimately, research on this topic aims at improving the overall quality of healthcare services. Meeting this end relies on the recognition of the fundamental role played by the pharmacy staff in ensuring safe and effective medication supply for hospital inpatients, as they must navigate numerous considerations when determining both the type and duration of each supply.

Finally, these findings facilitate a more profound comprehension of the factors at play in the medication ordering process for hospital inpatients and their implications, rendering us better equipped to streamline the supply process and improve patient care. The outcomes of this study thus resonate beyond the confines of research, offering a tangible path towards the advancement of healthcare services.

6. Dissemination of work

In order to share our findings and contribute to the broader academic and professional community, we have submitted abstracts of this work to two distinguished conferences in the field. These abstracts have been accepted for poster presentations. Details about each conference are provided below.

- I. North West London (NWL) Research Symposium 2023
 - Date: 27th of September 2023
 - Conference Overview: The symposium is aimed at nurses, midwives, allied health professionals, healthcare scientists, pharmacy Staff, psychologists and academics, including both aspiring researchers and established academics in the field of healthcare. This conference connects researchers and academics within Imperial College Academic Health Science Centre and broader NWL areas, providing a valuable platform for researchers and practitioners to exchange ideas and insights related to clinical research. The programme includes poster displays, interactive workshops and research presentations. (31)
 - Submission Details: The submitted abstract and poster are included in Appendices K and L, respectively.

- II. Royal Pharmaceutical Society (RPS) Annual Conference 2023 – Working Together: Empowering the Workforce to Transform Patient Care
 - Date: 10th of November 2023
 - Conference Overview: The RPS Annual Conference unites hundreds of pharmacists from the UK to address healthcare challenges and promote networking. This year's conference is dedicated to exploring the impact of strong leadership and collaboration on advancing the health and well-being of society. The programme includes poster displays, workshops, multiple content streams and over seventy expert speakers. (32)
 - Submission Details: The submitted abstract and poster are included in Appendices M and L, respectively.

We view the dissemination of our work at these conferences as a pivotal step in discussing pharmacy staff decisions on the type and duration of medication supply for hospital inpatients in the UK. We look forward to further engaging in discussions with healthcare professionals, including researchers and practitioners, who share our commitment to advancing knowledge and improving patient outcomes across the NHS.

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Appendices

Appendix A: Pharmacists posts in the National Health Service.

Reference: Stephens M. Hospital pharmacy. 2nd ed. Pharmaceutical Press; 2011.

Pharmacist band	Role
5	Preregistration trainee pharmacist.
6	Pharmacist actively in practice, while simultaneously undergoing training.
7	Specialist pharmacist. Refining expertise in a particular service area and potentially holding management responsibilities.
8 a-b	Advanced pharmacist. More experienced professional who may lead a department or provide specialized services.
8 b-c	Pharmacist team manager. Job description similar to band 8 a-b but involves leading a section with defined management role.
8 b-d	Consultant pharmacist.
8 c-d or 9	Chief pharmacist.

Appendix B: Focus group topic outline.

Topic guide	Time
<p>Welcome the participant and express gratitude. Self-presentation. Introduce the project and objective of the focus group. Explain ground rules. Questions before starting.</p>	5 mins
<p>First question: How do you decide on the type of inpatient medication supply? Specifically deciding between inpatient supply or “one-stop” dispensing supply. Prompts:</p> <ul style="list-style-type: none"> - How might X affect your decision? - Would X influence your decision and how? - What about X? <p>X = Cost of the medication X = Day of the week X = Dose changing X = Duration of treatment X = Expiry date of the medication (e.g., reconstituted) X = Patient on a multi-compartment compliance aid X = Patient’s own drugs at home X = Route of administration/ formulation X = Type of ward (e.g., admissions vs others) X = Where the patient is being discharged to</p>	10 mins
<p>Second question: Regardless of type of supply, how do you decide on the duration of inpatient medication supply? Prompts:</p> <ul style="list-style-type: none"> - How might X affect your decision? - Would X influence your decision and how? - What about X? <p>X = Cost of the medication X = Day of the week X = Dose changing X = Duration of treatment X = Expiry date of the medication (e.g., reconstituted) X = Patient on a multi-compartment compliance aid X = Patient’s own drugs at home X = Route of administration/ formulation X = Type of ward (e.g., admissions vs others) X = Where the patient is being discharged to</p>	10 mins
<p>Any other comments. Wrap up and express gratitude. Introduce the next steps: a questionnaire will be sent out shortly. Invite additional comments or ideas via email.</p>	5 mins

Appendix C: Visual representations of the online questionnaire.

You have been invited to participate in this survey that is designed to understand how pharmacy staff at Imperial College Healthcare NHS Trust (ICHNT) decide on the **type and duration of medication supply for hospital inpatients**. This has been approved as a service evaluation (reference number 808).

You are eligible to take part if you:

- are part of the pharmacy staff at ICHNT;
- order medicines from pharmacy for hospital inpatients.

The questionnaire should take maximum 10 minutes to complete.

It is comprised of 3 pages:

- the first page contains demographic questions;
- the second page addresses the type of medication supply (inpatient or one-stop dispensing supply);
- the third page addresses the duration of the supply made.

Your participation is completely voluntary, and all response data is **anonymous**.

Please note that you can go back to a previous page without losing data.

You also have the right to withdraw at any point by simply abandoning the survey and no data will then be saved.

Once you have completed the questionnaire you can enter to win a box of chocolates and let us know if you would be happy to talk further about this project!

By continuing to complete this survey it is assumed that you **consent to these terms**.

>>

Appendix C 1: Introduction page of the questionnaire.

What is your staff role?

Medicines Management Pharmacy Technician (MMPT)

Other Pharmacy Technician

Pharmacist

Trainee Pharmacist

Other

Appendix C 2: Demographic question about staff role.

How often do you order medications?

Every day

Weekly

Occasionally

Weekends and/or late duties only

Appendix C 3: Demographic question about order frequency.

How long have you been qualified?

Pre-registration MMPT/Pharmacist

Less than 1 year

1 to 5 years

6 to 10 years

More than 10 years

Appendix C 4: Demographic question about years since qualification.

How long have you been working in the NHS?

Less than 1 year

1 to 5 years

6 to 10 years

More than 10 years

Appendix C 5: Demographic question about years of service in the National Health Service (NHS).

How long have you been working at Imperial College Healthcare NHS Trust?

Less than 1 year

1 to 5 years

6 to 10 years

More than 10 years

Appendix C 6: Demographic question about years of service at the Trust.

<<

>>

When deciding on the type of inpatient medication supply, how much do you consider the following:

	Not at all	A little	A moderate amount	A lot	A great deal
Patient with risk factors (e.g. renal impairment)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Route of administration/ formulation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Day of the week	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stock level in pharmacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Type of ward (e.g. admissions vs others)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Where the patient is being discharged to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost of the medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Familiarity with clinical speciality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expected stay on the ward (e.g. short vs long)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size of original pack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High risk medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nurse skill set on the ward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient on a multi-compartment compliance aid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expiry date of the medication (e.g. reconstituted)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duration of treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medication screened by a pharmacist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dose changing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient's own drugs at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drug history completed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other factors and comments

<< >>

Appendix C 7: Likert scale for decisions on supply type.

When deciding on the duration of inpatient medication supply, how much do you consider the following:

	Not at all	A little	A moderate amount	A lot	A great deal
Dose changing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient on a multi-compartment compliance aid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Route of administration/ formulation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drug history completed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost of the medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duration of treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient with risk factors (e.g. renal impairment)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Familiarity with clinical speciality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nurse skill set on the ward	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expected stay on the ward (e.g. short vs long)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Day of the week	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expiry date of the medication (e.g. reconstituted)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stock level in pharmacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medication screened by a pharmacist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Where the patient is being discharged to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High risk medication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Size of original pack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patient's own drugs at home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Type of ward (e.g. admissions vs others)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other factors and comments

<< >>

Appendix C 8: Likert scale for decisions on supply duration.

Thank you for your time spent taking this survey.
Your response has been recorded.

If you would like to enter to win a box of chocolates, please access [this link](#).

Appendix C 9: Final page of the questionnaire.

Thank you for your participation in our survey!

In order to be entered into a competition to win a box of chocolates, please leave your email below.

We would like to further understand the reasons that underlie the decision-making process by pharmacy staff regarding the **type and duration of medication supply for hospital inpatients** at Imperial College Healthcare NHS Trust. Therefore, the next step of our project will be to conduct individual or group interviews to further understand decision making.

Would you be willing to do a short interview? If so, we may contact you via email with the details.

Yes

No

>>

Appendix C 10: First page of the link invitation.

We thank you for your time spent taking this survey.
Your response has been recorded.

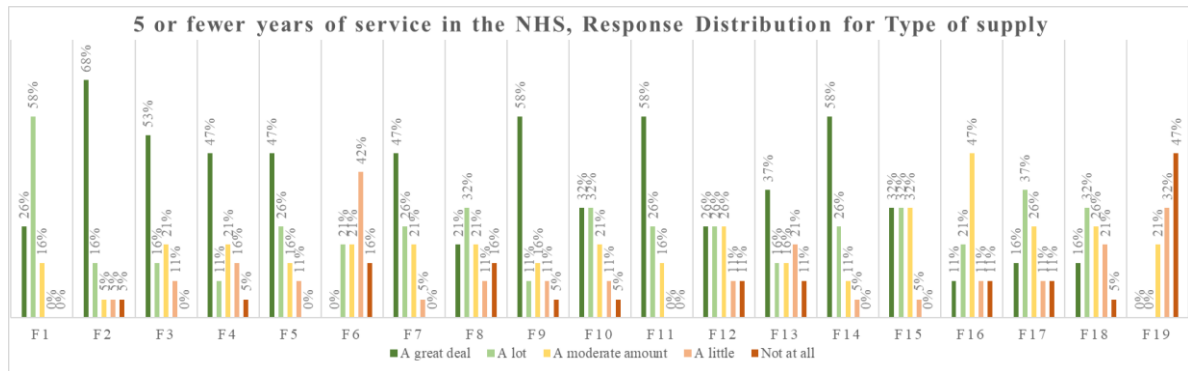
Appendix C 11: Final page of the link invitation.

Appendix D: List of factors and respective factor number.

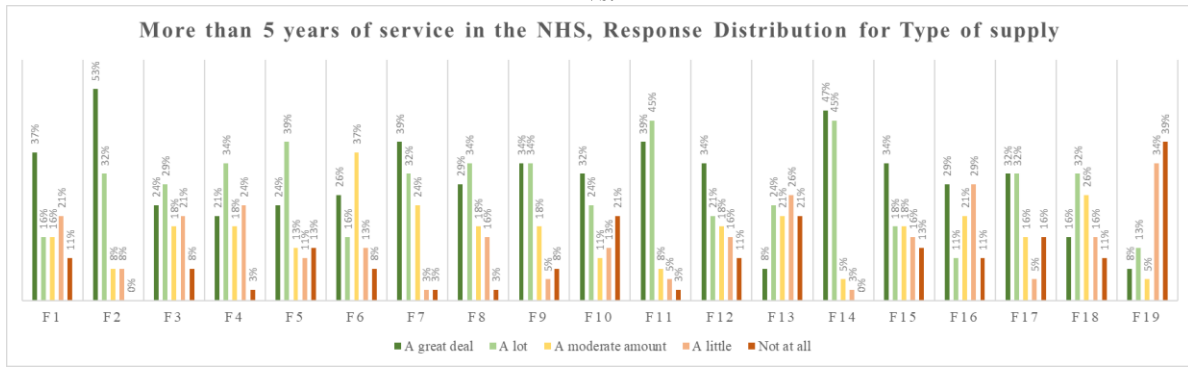
Factor category	Factor	Factor number
Patient-related	Drug history completed	F1
	Patient on a multi-compartment compliance aid	F2
	Patient with risk factors (e.g., renal impairment)	F3
	Patient's own drugs at home	F4
	Where the patient is being discharged to	F5
Medication-related	Cost of the medication	F6
	Dose changing	F7
	Expiry date of the medication (e.g., reconstituted)	F8
	High risk medication	F9
	Medication screened by a pharmacist	F10
	Route of administration/formulation	F11
	Size of original pack	F12
	Stock level in pharmacy	F13
Treatment-related	Duration of treatment	F14
	Expected stay on the ward (e.g., short vs long)	F15
	Type of ward (e.g., admissions vs others)	F16
Miscellaneous	Day of the week	F17
	Familiarity with clinical speciality	F18
	Nurse skill set on the ward	F19

Appendix E: Likert scale response distribution for type of supply across groups with varying years of experience in the NHS. (NHS: National Health Service.) To correspond the factor number with the respective factor, please refer to the Appendix D.

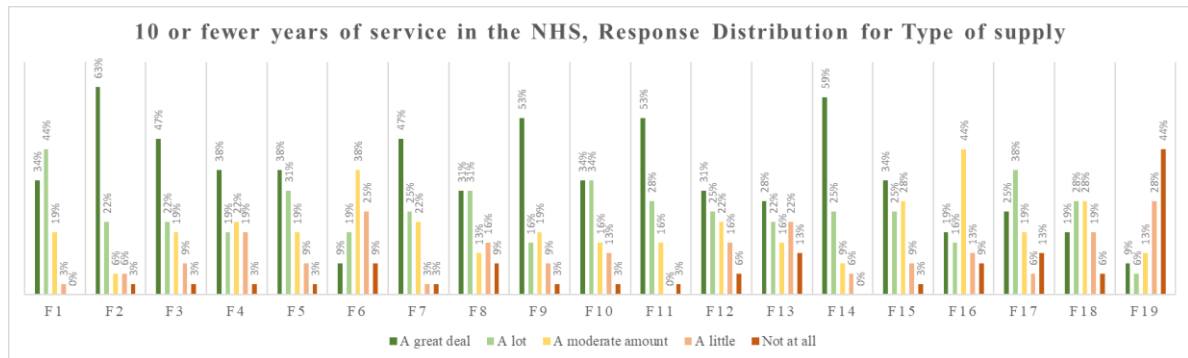
5-year cutoff: 5 or fewer years vs. More than 5 years



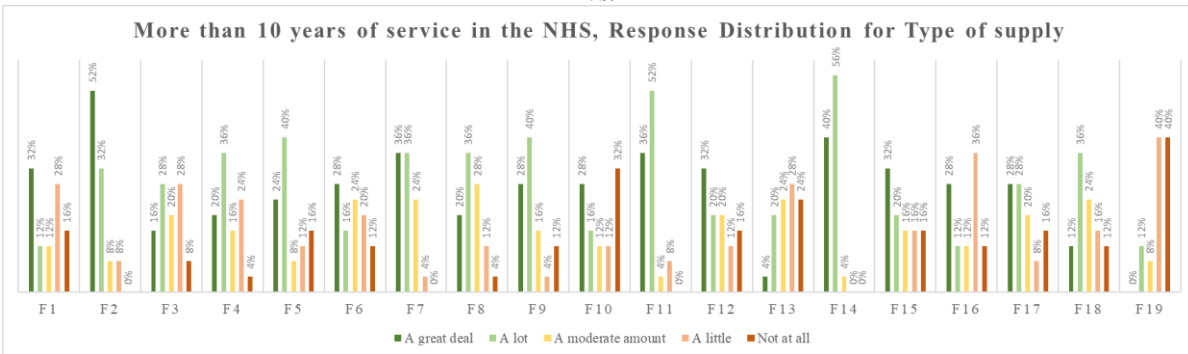
vs.



10-year cutoff: 10 or fewer years vs. More than 10 years

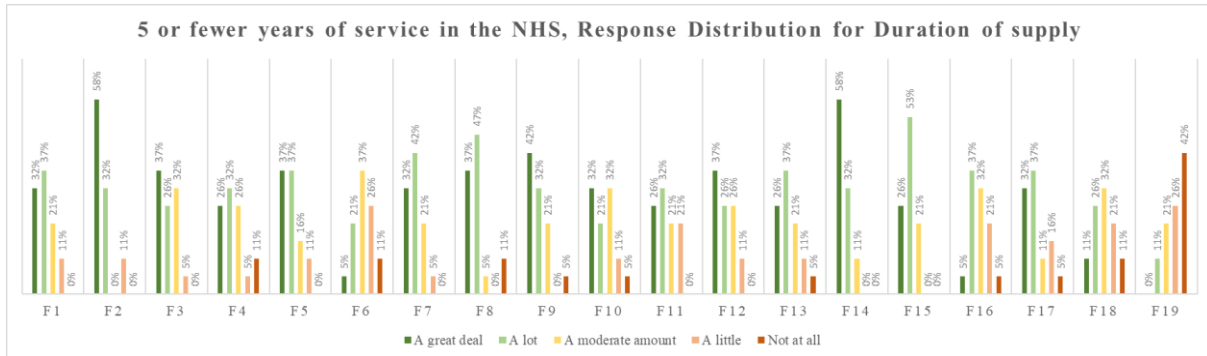


vs.

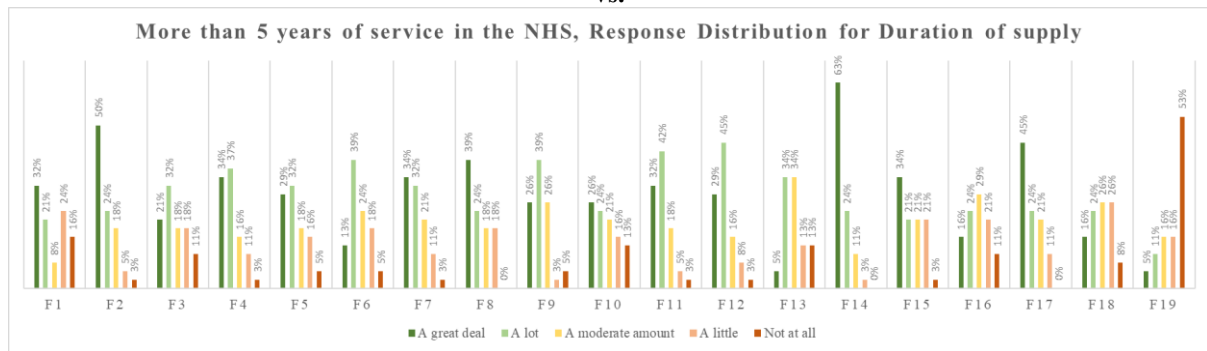


Appendix F: Likert scale response distribution for duration of supply across groups with varying years of experience in the NHS. (NHS: National Health Service.) To correspond the factor number with the respective factor, please refer to the Appendix D.

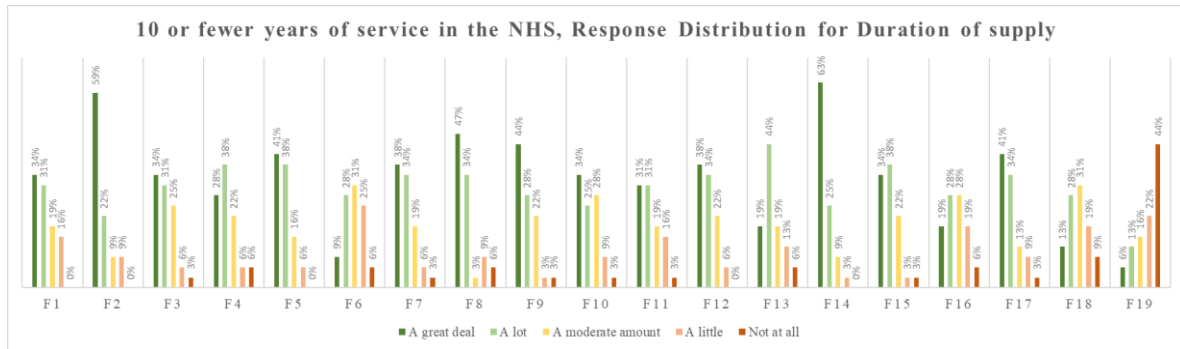
5-year cutoff: 5 or fewer years vs. More than 5 years



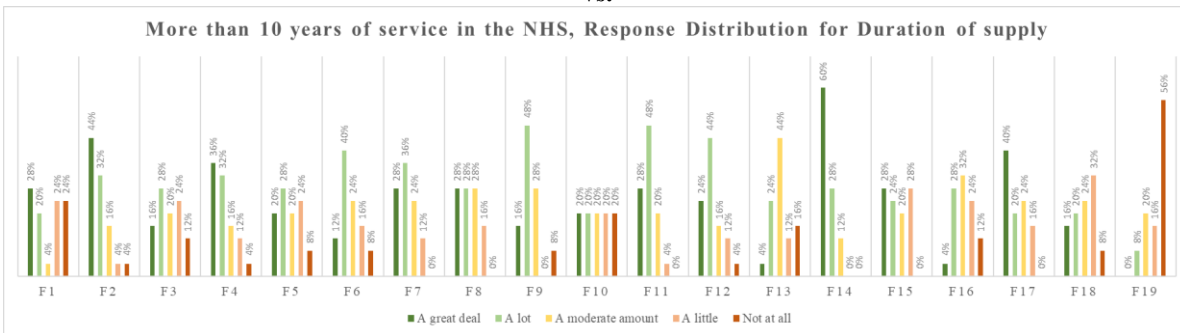
vs.



10-year cutoff: 10 or fewer years vs. More than 10 years

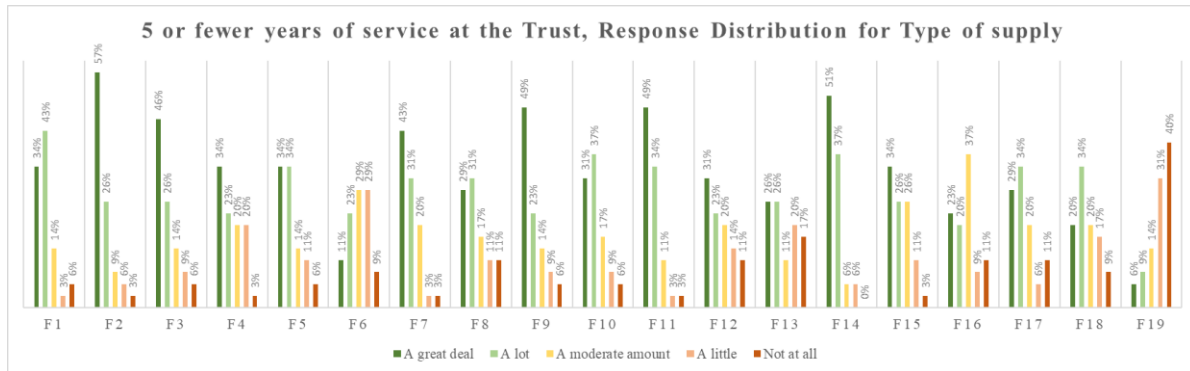


vs.

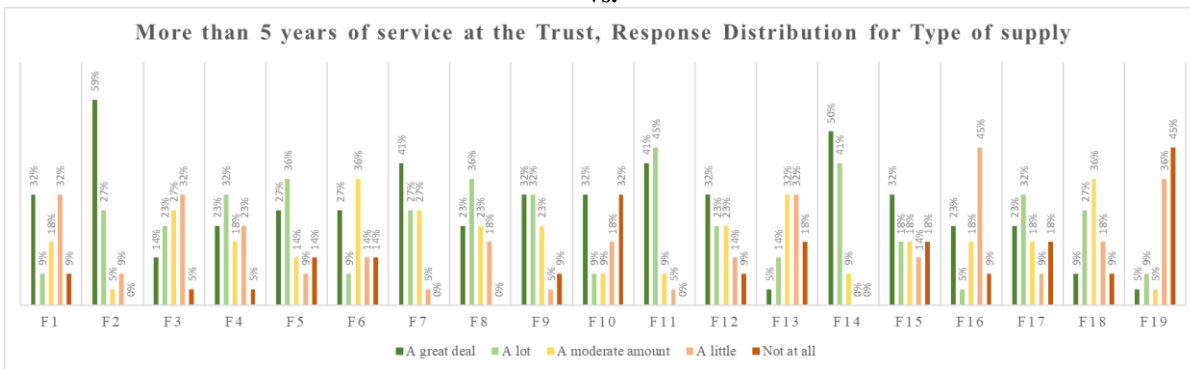


Appendix G: Likert scale response distribution for type of supply across groups with varying years of Trust experience. To correspond the factor number with the respective factor, please refer to the Appendix D.

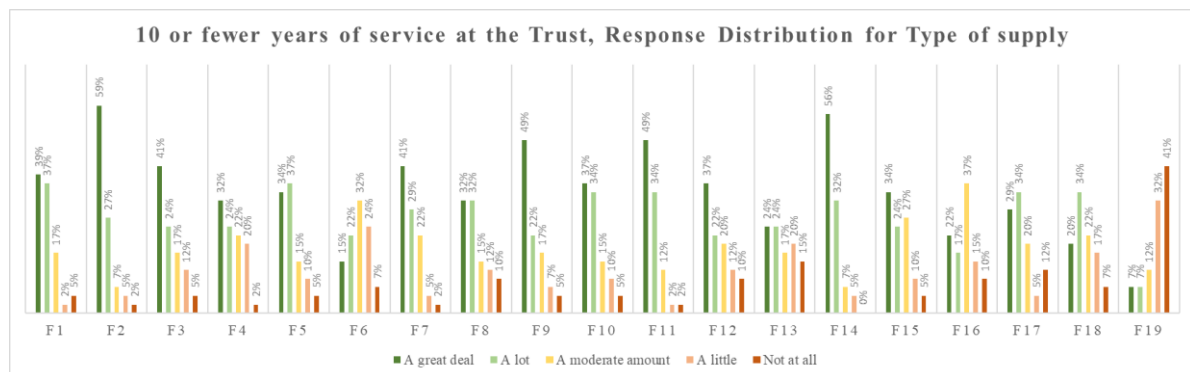
5-year cutoff: 5 or fewer years vs. More than 5 years



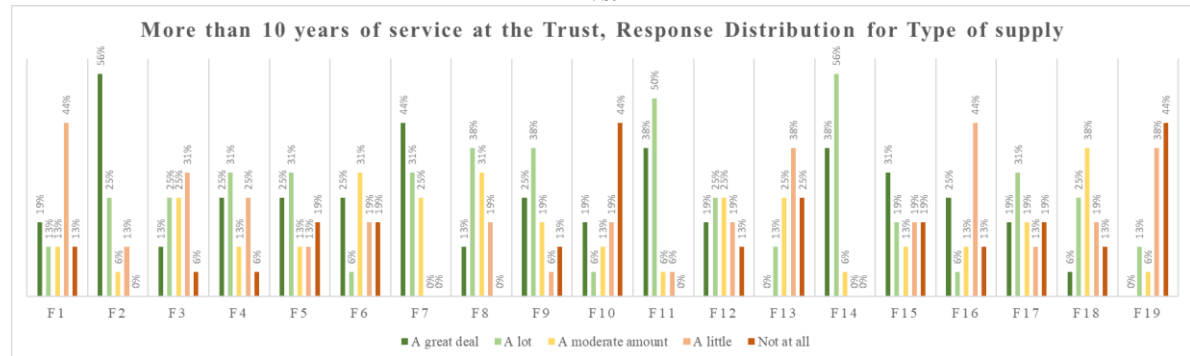
vs.



10-year cutoff: 10 or fewer years vs. More than 10 years

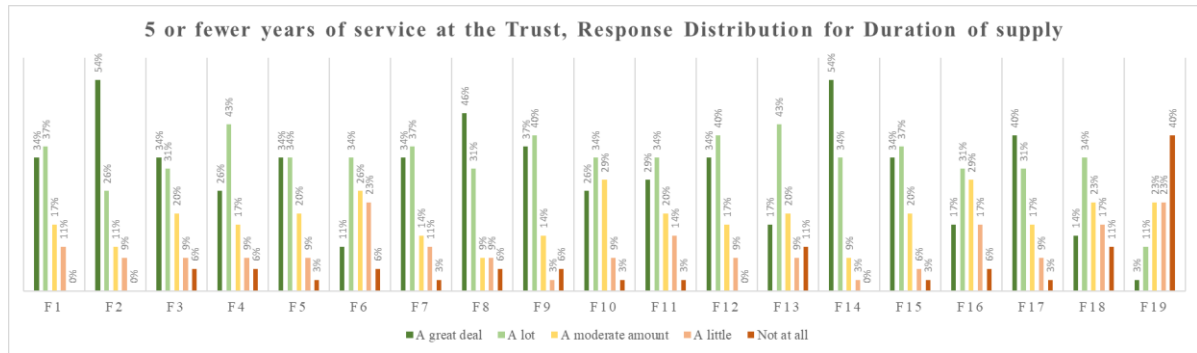


vs.

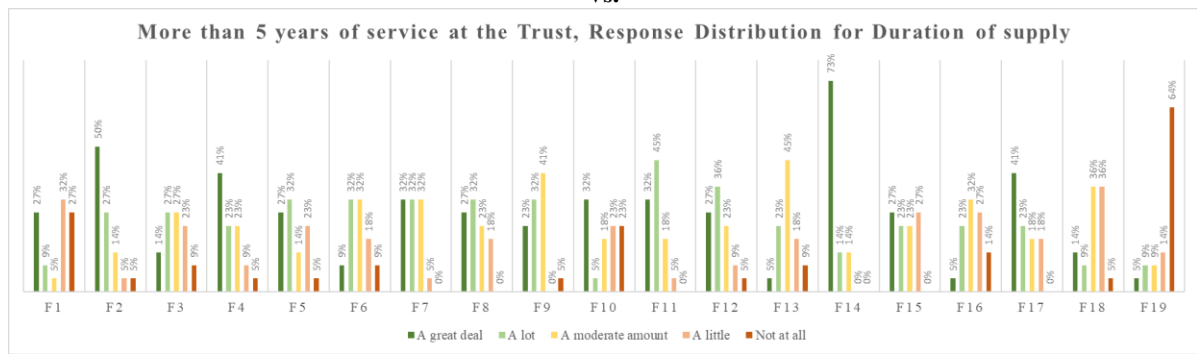


Appendix H: Likert scale response distribution for duration of supply across groups with varying years of Trust experience. To correspond the factor number with the respective factor, please refer to the Appendix D.

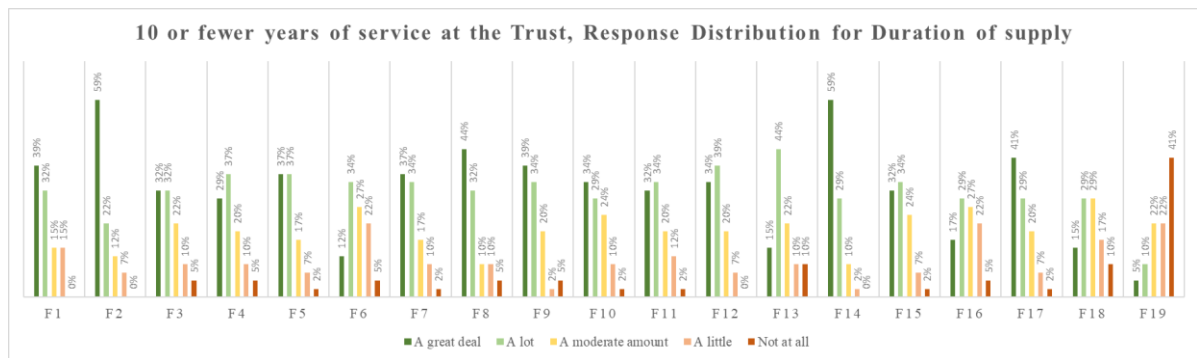
5-year cutoff: 5 or fewer years vs. More than 5 years



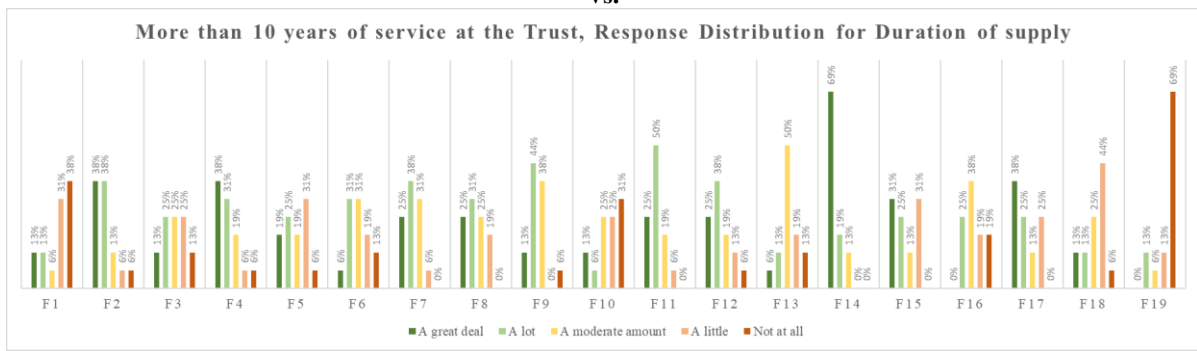
VS.



10-year cutoff: 10 or fewer years vs. More than 10 years



VS.



Appendix I: Interview schedule. (D: Demographic question; Q: Question.)

Interview schedule	Time
<p>Welcome the participant and express gratitude. Self-presentation. Introduce the project and objective of the interview. Questions before starting.</p>	2 min
<p>D1: What is your staff role? D2: How often do you order medications? D3 (If participant does not order medications everyday): How long has it been since you have ordered medications every day? D4: How long have you been working in the NHS? D5: How long have you been working at this Trust?</p>	4 min
<p>Q1: When you are endorsing the supply for an inpatient order how do you decide if you are going to supply IP or OSD, and also how much are you going to supply? Probing questions: You mentioned... Can you tell me more about this? Please could you explain...? Notes: Ensure the participant links a factor to a specific decision on type and duration. Explore both type and duration considerations.</p>	4 min
<p>Q2A (If participant orders medications everyday): How might your decision-making process differ between what you do as part of your daily clinical role compared to what you do when you are on late duties or weekends? Q2B (If participant has recently ordered medications everyday): You mentioned you order medications occasionally. How might the decision-making process differ comparing what you do now and what you did when you ordered medications every day?</p>	3 min
<p>Q3: When we did the survey, the data suggests that there might be different considerations between people who only order medication occasionally (such as on late duties or weekends) compared to those who have an everyday clinical role. Do you have any thoughts on why that might be?</p>	3 min
<p>Q4: How do you think your ordering practice has changed since you started working in the NHS? Prompt: - How has this affected the factors that you consider?</p>	3 min
<p>Q5 (If participant has worked in the NHS for more than 10 years): How do you think the ordering practice has changed since you started working in the NHS? Rephrase: How do you think changes in the NHS have affected the factors you consider when making decisions over the last 10 to 15 years?</p>	3 min
<p>Q6 (If participant has worked in a different trust within the last 10 years): How is the ordering at this Trust different to ordering in your previous Trust? Prompt: - How has this affected the factors that you consider?</p>	3 min
<p>Q7 (Share support material – presented in Table IV below) When we did the online survey, we identified these factors as being important to varying degrees when deciding type or duration of inpatient medication supply. Looking at this list are there any other factors that you strongly agree or disagree with?</p>	3 min
<p>Any other comments. Wrap up and express gratitude. Invite additional comments or ideas via email.</p>	2 min

Appendix J: Support material for the interviews.

Factor category	Factors
Patient-related factors	Drug history completed Patient on a multi-compartment compliance aid Patient with risk factors (e.g., renal impairment) Patient's own drugs at home Where the patient is being discharged to
Medication-related factors	Cost of the medication Dose changing Expiry date of the medication (e.g., reconstituted) High risk medication Medication screened by a pharmacist Route of administration/formulation Size of original pack Stock level in pharmacy
Treatment-related factors	Duration of treatment Expected stay on the ward (e.g., short vs long) Type of ward (e.g., admissions vs others)
Miscellaneous factors	Day of the week Familiarity with clinical speciality Nurse skill set on the ward

Appendix K: Abstract submitted to the North West London Research Symposium 2023.

<p>Ordering medication for hospital inpatients in England: pharmacy staff decisions on the type and duration of supply</p>
<p>Introduction</p> <p>UK hospitals currently use a mixture of inpatient drug supply types, including ward stock, “one-stop” dispensing (OSD) and non-OSD patient labelled dispensing.</p> <p>There is no current guidance for deciding the type and duration of inpatient supply, and little known about the factors that influence pharmacy staff decisions.</p>
<p>Aim</p> <p>To explore how pharmacy staff decide on type and duration of medication supply for hospital inpatients in an English teaching hospital organization.</p>
<p>Methods</p> <p>A list of 19 factors was developed through focus group and discussions. These were arranged into four categories: medication, patient, treatment, and miscellaneous.</p> <p>An online survey was designed using Qualtrics. This explored staff perceptions of the importance of each factor when making decisions, separately for type and duration of supply, using a 5-point Likert scale ranging from 1 (“not at all”) to 5 (“a great deal”). A free-text box was available to add any additional factors.</p> <p>Responses were subjected to descriptive statistical analysis using Microsoft Excel. A pre-selected subset of factors was compared using Mann-Whitney U tests.</p> <p>The study was approved as a service evaluation in the organisation concerned.</p>

Results

There were 47 pharmacist and 10 medicines management pharmacy technician responses (response rate of 32%).

The table shows the median score for each factor type and duration. P-values were included for the pre-selected subset of factors that were statistically analysed.

Table 1: Results of survey. Statistical significance of $p < 0.01$
(MMPT: medicines management pharmacy technicians)

Factor category	Factor	Median score	Group comparison performed	Significance - supply type/duration
Patient-related	Patient on a multi-compartment compliance aid	5	Pharmacists vs. MMPTs	$p=0.09492/0.12602$
			Everyday ordering vs. not every day	$p=0.63122/0.65994$
			Working in the NHS ≤ 10 years vs. >10 years	$p=0.58920/0.36282$
			Employed at ICHNT ≤ 10 years vs. >10 years	$p=0.83366/0.24200$
	Patient's own drugs at home	4	Pharmacists vs. MMPTs	$p=0.08544/0.09492$
			Everyday ordering vs. not every day	$p=0.18024/0.68916$
			Working in the NHS ≤ 10 years vs. >10 years	$p=0.42372/0.71138$
	Where the patient is being discharged to	4	NA	NA
	Patient with risk factors (e.g. renal impairment)	4		
	Drug history completed	4		
Medication-related	Route of administration/ formulation	4	Pharmacists vs. MMPTs	$p=0.41222/0.01828$
			Everyday ordering vs. not every day	$p=0.49020/1.00000$
			Working in the NHS ≤ 10 years vs. >10 years	$p=0.45930/0.50926$
			Employed at ICHNT ≤ 10 years vs. >10 years	$p=0.67448/0.84148$
	Dose changing	4	Pharmacists vs. MMPTs	$p=0.99202/0.03000$
			Everyday ordering vs. not every day	$p=0.41794/0.87288$
			Working in the NHS ≤ 10 years vs. >10 years	$p=0.65994/0.47152$
	Medication screened by a pharmacist	4	Employed at ICHNT ≤ 10 years vs. >10 years	$p=0.72786/0.54850$
			Pharmacists vs. MMPTs	$p=0.00020/0.00022$
			Everyday ordering vs. not every day	$p=0.05876/0.13362$
			Working in the NHS ≤ 10 years vs. >10 years	$p=0.06148/0.04550$
	High risk medication	4	NA	NA
	Size of original pack	4		
	Expiry date of the medication (e.g. reconstituted)	4		
Cost of the medication	3			
Stock level in pharmacy	3			
Duration of treatment	5			
Expected stay on the ward (e.g. short vs long)	4			
Treatment-related	Type of ward (e.g. admissions vs others)	3		
	Miscellaneous	Day of the week	4	
		Familiarity with clinical speciality	3	
Nurse skill set on the ward		2		

Discussion and Conclusion

Results of this study provide valuable insight into the factors pharmacy staff consider when deciding on the type and duration of inpatient medication supply.

Limitations include small sample size, and the inability to understand how factors influence decision making.

We conducted some sub-group analysis, but the project was not powered to demonstrate statistical significance. This could be addressed with the results of this survey enabling a power calculation.

Semi-structured interviews are currently underway to further explore how the factors influence decisions.

Ordering medication for hospital inpatients: pharmacy staff decisions on the type and duration of supply

B. Fonseca, UCL School of Pharmacy; Z.E. van Zuylen, Imperial College Healthcare NHS Trust and B.D. Franklin, UCL School of Pharmacy

Introduction

Hospitals in the United Kingdom currently use a mixture of inpatient drug supply types, including ward stock, "one-stop" dispensing (OSD) and non-OSD patient labelled dispensing. There is no current guidance for deciding the type and duration of inpatient supply, and little is known about the factors that influence pharmacy staff decisions.

Aim

To explore how pharmacy staff decide on type and duration of medication supply for hospital inpatients at Imperial College Healthcare NHS Trust.

Methods

The study was approved as a service evaluation by the Trust's Audit and Service Evaluation team.

1. A list of nineteen factors was created through a focus group and discussions.
2. An online survey was developed using Qualtrics to gauge the importance of these factors in decision-making, using a 5-point Likert scale ranging from 1 ("not at all") to 5 ("a great deal").
3. The responses were analysed descriptively using Microsoft Excel, and a pre-selected subset of factors was compared using Mann-Whitney U tests.

Results

There were 47 pharmacist and 10 medicines management pharmacy technician (MMPT) responses (for a response rate of 32%).

Most factors were considered important in decision making. Several factors showed discrepancies in importance between demographic groups.

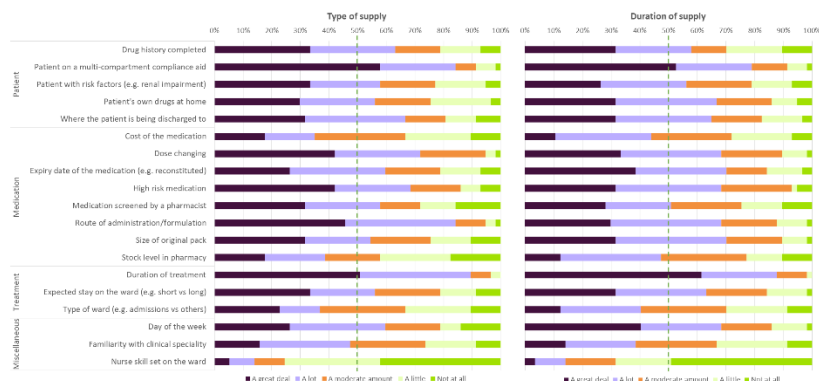


Chart 1: Relative frequencies of Likert scale responses for type and duration of supply

Factor	Group comparison	Pharmacists vs. MMPTs		Everyday order vs. not every day		NHS < 10 years vs. >10 years		ICHHT < 10 years vs. >10 years	
		Type	Duration	Type	Duration	Type	Duration	Type	Duration
Drug history completed	Left-side group median	4	4	4	4	4	4	4	4
	Right-side group median	5	5	3.5	3.5	3	3	2	2
	p-value	NA	NA	NA	NA	NA	NA	NA	NA
Patient on a multi-compartment compliance aid	Left-side group median	5	4	5	5	5	5	5	5
	Right-side group median	5	5	5	4	5	4	5	4
	p-value	0.09492	0.12602	0.63122	0.65994	0.58920	0.36282	0.83366	0.24200
Patient's own drugs at home	Left-side group median	4	4	4	4	4	4	4	4
	Right-side group median	4.5	5	3.5	4	4	4	4	4
	p-value	0.08544	0.09492	0.18024	0.68916	0.42372	0.71138	0.63122	0.66720
Dose changing	Left-side group median	4	4	4	4	4	4	4	4
	Right-side group median	4.5	5	4	4	4	4	4	4
	p-value	0.99202	0.03000	0.41794	0.87298	0.65994	0.47152	0.72796	0.54850
Medication screened by a pharmacist	Left-side group median	3	3	4	4	4	4	4	4
	Right-side group median	5	5	3.5	3	3	3	2	2
	p-value	0.00920	0.00022	0.05876	0.13362	0.05148	0.04550	0.00236	0.00108
Route of administration/formulation	Left-side group median	4	4	4	4	4	4	4	4
	Right-side group median	5	5	4	4	4	4	4	4
	p-value	0.41222	0.01878	0.49020	1.00000	0.40930	0.50926	0.67448	0.84148
Size of original pack	Left-side group median	3	4	4	4	4	4	4	4
	Right-side group median	5	5	3	4	4	4	3	4
	p-value	NA	NA	NA	NA	NA	NA	NA	NA

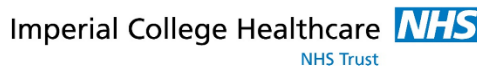
Chart 2: Median scores of Likert scale responses per demographic group and statistical analysis. Statistical significance of p<0.01, MMPT= Medicines Management Pharmacy Technician, NA= Not Applicable; : a 2-step difference in median scores; : the result is significant at p<0.01

Discussion and Conclusion

Results of this study provide valuable insight into the factors pharmacy staff consider when deciding on the type and duration of inpatient medication supply. Limitations include small sample size, and the inability to understand how factors influence decision making. We conducted some sub-group analysis, but the project was not powered to demonstrate statistical significance. This could be addressed with the results of this survey enabling a power calculation. Semi-structured interviews are currently underway to further explore how the factors influence decisions.

References

1. McLeod M, Ahmed Z, Barber N, Franklin BD. A national survey of inpatient medication systems in English NHS hospitals. *BMC Health Serv Res.* 2014 Feb 27;14:93.
2. Hall G, Bourne T, Halborg J. One-stop dispensing has had its day — time to embrace technology [Internet]. *The Pharmaceutical Journal.* [cited 2023 Jan 16]. Available from: <https://pharmaceutical-journal.com/article/opinion/one-stop-dispensing-has-had-its-day-time-to-embrace-technology>
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**Ordering medication for hospital inpatients in England:
pharmacy staff decisions on the type and duration of supply**

Keywords: Supply, decisions, inpatient, pharmacy, ordering

Ethical approval: The study was approved as a service evaluation in the organisation concerned.

Introduction

In the last few decades, hospital pharmacies have introduced new medication supply systems to increase safety and cost-efficiency (1). Hospitals currently use a mixture of inpatient supply types, including ward stock, “one-stop” dispensing (OSD) and non-OSD patient labelled dispensing. A mixed supply model has become the dominant system in the UK1 despite some criticism (2) and has been introduced in other countries (3).

There is no current guidance for deciding the type and duration of inpatient supply, and little known about how pharmacy staff make this decision.

Aim

To explore how pharmacy staff decide on type and duration of medication supply for hospital inpatients in an English teaching hospital organization.

Methods

A list of 19 factors was developed through a focus group and discussions with pharmacy staff. These were arranged into four categories: medication, patient, treatment, and miscellaneous.

An online survey was designed using Qualtrics. This explored staff perceptions of the importance of each factor when making decisions, separately for type and duration of supply, using a 5-point Likert scale ranging from 1 (“not at all”) to 5 (“a great deal”). A free-text box was available to add any additional factors.

All pharmacy staff responsible for ordering patient-specific medication were invited to take part. Demographics were collected, participation was voluntary and all response data anonymous.

Responses were subjected to descriptive statistical analysis using Microsoft Excel. A pre-selected subset of factors was compared using Mann-Whitney U tests.

The study was approved as a service evaluation.

Results

There were 47 pharmacist and 10 medicines management pharmacy technician (MMPT) responses (response rate 32% for each group).

For decisions both about supply type and duration, 14 factors were considered important (median score 4 or 5) with “patient on dosette box” and “duration of treatment” rated 5. Others with a median of 4 included “high risk patient”, “medication route/formulation”, “day of the week” and “drug history completed”. Only one factor, “nurse skill set on ward”, was considered unimportant (median score 2). The remainder were considered moderately important (median score 3).

Statistical analysis suggested that some factors were significantly more important in certain groups. The factor “medication screened by a pharmacist” appeared less important to pharmacists versus MMPTs ($p=0.0002$) and less important to staff employed at the trust for longer than 10 years versus those employed less than this ($p=0.0011$).

Discussion and Conclusion

Results of this study provide valuable insight into the factors pharmacy staff consider when deciding on the type and duration of inpatient medication supply.

To our knowledge, no previous studies have explored the factors influencing this kind of decision-making.

Limitations include a small sample size, and that we focussed on which factors were more or less important rather than how they were used to guide decisions.

We conducted some sub-group analysis, but the project was not powered to demonstrate statistical significance. This could now be addressed with the results of this survey enabling a power calculation.

Further work using semi-structured interviews is currently underway to further explore how the factors influence decision making.

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