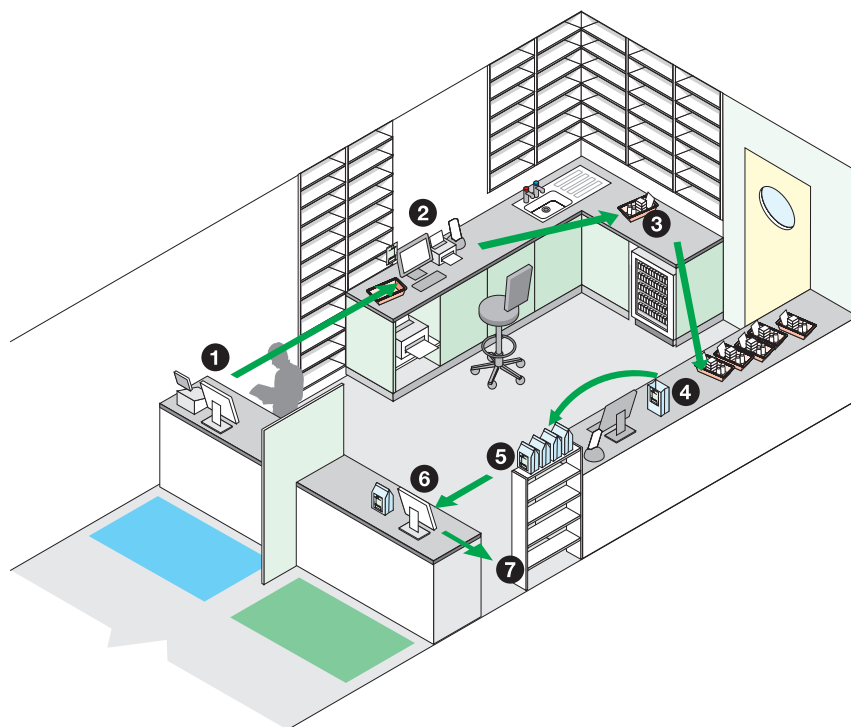


Design for patient safety

A guide to the design of the dispensing environment

Edition 1
2007



About this publication

This guide to the safer design of the dispensing environment is one of a series of design publications produced by the National Patient Safety Agency (NPSA).

Other publications in the NPSA *Design for patient safety* series:

NPSA in collaboration with the Helen Hamlyn Centre, Royal College of Arts. *A guide to the graphic design of medication packaging (second edition)*. (2007).

NPSA. *Future ambulances*. (2007).

NPSA in collaboration with Lucid Design. *A guide to the design of dispensed medicines*. (2007).

NPSA in collaboration with the Helen Hamlyn Centre, Royal College of Arts. *A guide to the design of injectable medicines*. (2008).

Research and methodology

Information in this guide was collated over a 2-year period and involved a NPSA team of pharmacists and a pharmacy technician with combined experience in community, primary care, hospital and academic pharmacy. Publications from within and outside the healthcare industry were reviewed in preparing this guide. The project team also included two designers from Lucid Design who had experience of undertaking design projects across a range of industries, including healthcare.

A wide range of stakeholders including individual healthcare professionals, professional and commercial organisations, patients, carers and patient organisations contributed to this research. Visits were undertaken to a number of community and hospital pharmacies that had been identified as using design effectively to support innovative practice.

The outcome was a design guide applying the principles of human factors design, mistake-proofing, poka-yoke and customer services to the dispensing environment.

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Foreword



Hemant Patel, President, Royal Pharmaceutical Society of Great Britain

Organisations, managers and healthcare workers involved in dispensing medicines should use this booklet as a resource to help introduce new initiatives to further minimise harms from medicines.

Sir Liam Donaldson, Chief Medical Officer for England, in his introduction to the report *Safety First*¹, identified that the pace of change to embed patient safety as a core principle in the NHS has been too slow. He recommends that the NHS redoubles its efforts to implement systems and interventions that actively and continuously reduce risks to patients.

Healthcare will always carry risks, human beings are fallible. However, harm to patients should not be viewed as an acceptable part of modern healthcare. He also recommends the need to encourage and support competent, conscientious and safety-conscious health workers in the frontline services. He supports the creation of an environment that motivates and indeed inspires healthcare workers to insist that all care must be as safe as possible.

Other safety critical industries have recognised that design is a very effective method of improving the safety, effectiveness and efficiency of their activities. Healthcare has been slow in using design to improve delivery of care to patients.

The National Patient Safety Agency (NPSA) is promoting design as an effective method to improve healthcare in a series of *Design for patient safety* booklets for a range of healthcare products and activities.

This booklet presents information concerning how better design can be used to make the dispensing process safer in community pharmacies, dispensing doctor practices and hospital pharmacies. There are a number of new factors that will impact on the dispensing process, such as: electronic prescription services; auto-id and automation technologies; more responsibilities for pharmacy technicians; and enhanced pharmacy services. These factors have been incorporated into these safer design recommendations.

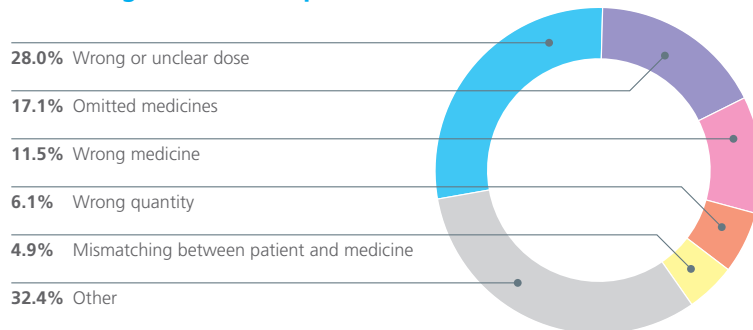
Organisations, managers and healthcare workers involved in dispensing medicines should use this booklet as a resource to help introduce new initiatives to further minimise harms from medicines. Not all of the recommendations in this booklet will be applicable to every situation, and so it is envisaged that organisations will implement those suggestions most applicable to their own circumstances as they plan for the future.

Introduction

Human beings usually make mistakes because the systems, tasks and processes they work within are poorly designed.

Effective design can deliver products, services, processes and environments that are intuitive, simple to understand, simple to use, convenient and comfortable, and consequently less likely to lead to errors.

Percentage of errors reported



The problem

Every year, more than 900 million items are dispensed in England and Wales from hospitals, community pharmacies and doctors' surgeries. The vast majority of these are dispensed accurately and patients are counselled about how to use their medicines safely and effectively. However, occasionally preventable errors do occur.

Research has found that on average 26 (0.1%) dispensing incidents occur for every 22,000 items dispensed in community pharmacies.² Of these incidents, 22 were classified as near misses, where the error was discovered before the medicine was

supplied to the patient. The remaining four (0.02%) were classified as dispensing errors, when the incorrect medicine was supplied to the patient. Extrapolating these figures to determine the rate for England and Wales indicates that around 134,314 dispensing incidents occur in community pharmacies each month; 113,953 near misses, and 20,361 dispensing errors.

One or more dispensing incidents were identified at the final check stage of 4,849 (2.1%) of 194,584 items dispensed in a UK hospital. There were 39 (0.02%) items with a dispensing error that left the pharmacy department.³

The detail of dispensing errors reported to the NPSA via the National Reporting and Learning System (NRLS), and information from two major pharmacy indemnity providers, indicates that over 80% of dispensing errors are picking errors. These errors involve the selection of the wrong strength or formulation of the correct medicine, or the wrong medicine completely.⁴

Effective communication with patients as part of the dispensing process is important. There is evidence that patient-centred advice can improve patients' adherence to medicines and prevent hospital admissions.^{5,6} There is a need for privacy and confidentiality when advice about medicines is given.⁷ Harms from medicines can occur if patients do not understand the purpose of their medicine, how to use it safely and effectively, and any special precautions or monitoring requirements. Failing to act on information in a patient's medication record or handing out an unopened bag of medicines and not counselling the patient about those medicines would also not be considered as good practice and could lead to patient safety incidents.

Not all dispensing errors and failure to counsel patients about their medicines will cause harm, and there are many other factors that contribute to patients being harmed from their medicines. However, information about the prevalence of harms from medicines is becoming clearer.

Research to measure harms from medicines in the community that cause hospital admissions found a prevalence rate of 6.5% of all admissions.⁸ In 2002, there were a total of 3.8 million acute admissions in England suggesting that harms from medicines were causing 247,000 hospital admissions and were responsible for the death of 5,700 patients every year. Harms are also caused from medicines used in hospital; including these incidents is likely to increase the number of deaths to around '10,000 a year'.⁸ The median length of hospital stay for a harm from a medicine was 4.8 days and the projected annual cost of such admissions to the NHS is £466 million each year.

A design solution

The Department of Health 2003 report *Design for patient safety*⁹ acknowledged that the use of design in other safety critical industries had produced significant improvements in safety, quality and efficiency. The report recommended that a similar approach be taken within healthcare.

Human beings usually make mistakes because the systems, tasks and processes they work within are poorly designed. Effective design can deliver products, services, processes and environments that are intuitive, simple to understand, simple to use, convenient and comfortable, and consequently less likely to lead to errors.¹⁰ There is a wealth of knowledge and methods from the design world that can be applied to improve healthcare processes.

Mistake-proofing is the use of process design to facilitate correct actions, make wrong actions more difficult, make it easier to discover errors that occur, and make it possible to reverse or undo incorrect actions. Mistake-proofing tends to be inexpensive, very effective, and based on simplicity and ingenuity.

Japanese industry is credited with creating and formalising zero quality control (ZQC), an approach to quality management that relies heavily on the use of poka-yoke (pronounced POH-kah YOH-kay) devices. Poka-yoke is Japanese for mistake-proofing. A poka-yoke device is any mechanism that either prevents an error from being made or makes the error obvious at a glance.¹¹

In his book, *The design of everyday things*,¹² Donald Norman uses the term 'user centred design' to describe design based on the needs of the users. This involves simplifying structured tasks and processes, making things visible, getting the mapping right, exploiting the powers of constraint and designing to minimise error.

The information in this booklet applies these design principles to the dispensing process. By working with stakeholders, including both patients and health professionals, and by visiting dispensaries in both primary and secondary care, the NPSA has identified good practice. There is very little research on the use of design in healthcare, and research on design in the dispensing process is no exception to this. This booklet identifies the need for more research in this area in the future.

Detailed information on 'Accommodation for pharmaceutical services' can also be found in the NHS Estates Health Building Note 29, which provides briefing and planning advice on accommodation for pharmaceutical services in hospitals.¹³ This contains many design principles that may be appropriate in all pharmacy sectors and settings.

Websites

Darnell MJ. *Bad human factors designs*. (2006). Available at: **www.baddesigns.com**

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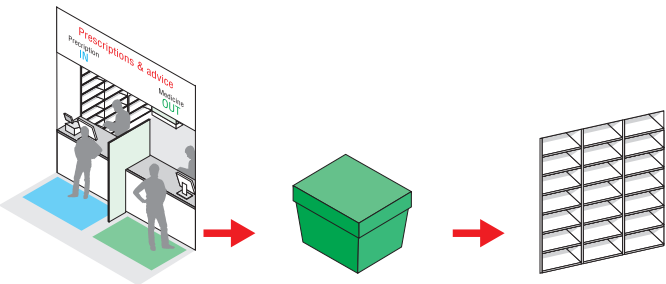
NPSA. *Mistake proofing healthcare processes*. (2004). Available at: **www.npsa.nhs.uk**

Design of the general dispensing environment and stages of the dispensing process

The design of the general dispensing environment, encompassing how medicines are delivered, stored and the layout of the dispensary, can have an effect on patient safety.

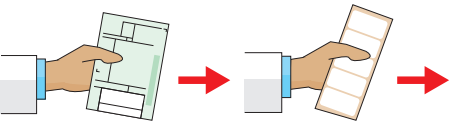
Dispensing a prescription involves many quite distinct stages. By breaking the dispensing process down into its constituent parts, each stage can be looked at individually and improved design applied to each one to make the process as safe as possible.

The general environment



Stages in dispensing a prescription

Use a design to minimise errors at each stage of dispensing a prescription for medicines.

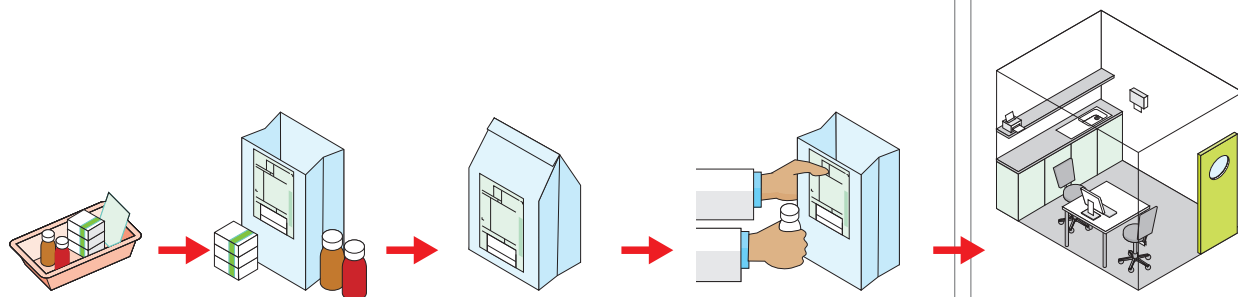


Where we can use design to reduce errors

			1	2
Layout	Delivery	Storage	Receipt of prescription and clinical check	Creation of label
• workflow • signage, lighting, noise etc. • ergonomics • managing patient waiting • private areas • supervised consumption • counselling rooms • access to terminals	• separate delivery area • room to unpack and check against delivery note • transport to dispensary	• use of drawer systems • benefit of shelf dividers • medicines storage A-Z by generic name • refrigerated medicines - two fridges • controlled drugs • waste and returned medicines • sharps	• clinical checking • medicine counter • prescription reception • use of computer • access to internet • access to patient records • computer ergonomics	• location • type of printer • printer position • prescription holders

Research has shown that workflow redesign can positively affect dispensing activity and allow pharmacists more time for patient counselling.¹⁴

The diagram below shows the different stages within the dispensing process, and each one of these stages will be looked at in more detail in separate sections of this booklet.



3

Medicines assembly

- place for interim storage
- use of robots

4

Accuracy check

- accuracy check

5

Storing dispensed medicines

- storage for collection
- storage of oiwings
- storage of completed prescriptions with queries

6

Medicines collection/ final accuracy check and patient counselling

- prescription collection
- access to patient records
- use of computer for record keeping
- information leaflets
- patient counselling

7

Patient consultation

- advanced or enhanced services e.g. medication use review (MUR; where appropriate)
- environment and behaviour to encourage good communication
- consultation room
- facilities
- supervised consumption
- private area
- improving staff safety
- reducing stress levels

Changes in the general dispensing environment that can improve patient safety

1.1 The general dispensing environment

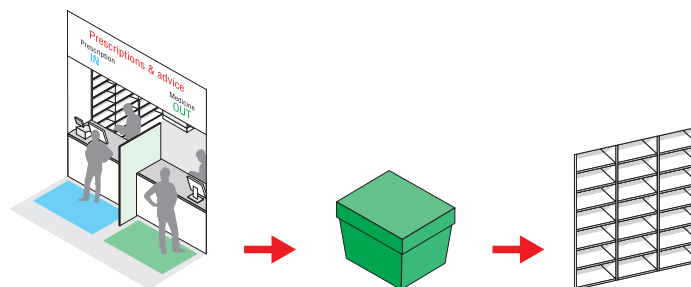
Introduction

As services and prescription volumes increase, more and more stock and activity needs to be crammed into a fixed space.

Increasing the size of a dispensary may not always be feasible, and so it is essential that the available space is used in the most efficient way possible. This may involve thinking very carefully about the flow of work as well as the general environment and ergonomic issues that will make the dispensary a safer place for both patients and pharmacy staff.

This section takes these issues in turn and suggests practical improvements that can be made to the general dispensing environment.

Most recommendations could be implemented at little or no cost, although others may require a degree of practical and financial planning.



Where we can use design to reduce errors

Layout

- workflow
- signage, lighting, noise
- ergonomics
- managing patient waiting
- private areas
- supervised consumption
- counselling rooms
- access to terminals

Delivery

- separate delivery area
- room to unpack and check against delivery note
- transport to dispensary

Storage

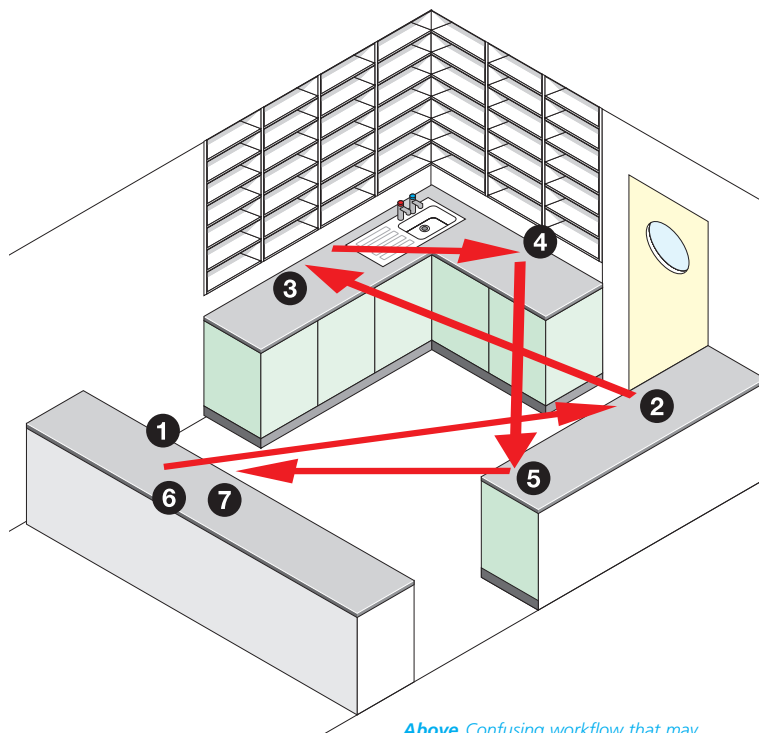
- use of drawer systems
- benefit of shelf dividers
- medicines storage A–Z by generic name
- refrigerated medicines - two fridges
- controlled drugs
- waste and returned medicines
- sharps

1.2 Workflow

Issues

- A poorly-planned workflow can result in confusion, fatigue, muddled processes and increased risk of error.
- Dispensing a prescription involves many quite distinct stages. It is important to understand each individual stage.

- 1 Receipt of prescription and clinical check
- 2 Creation of label
- 3 Medicines assembly
- 4 Accuracy check
- 5 Storing dispensed medicines
- 6 Medicines collection and final accuracy check
- 7 Patient counselling



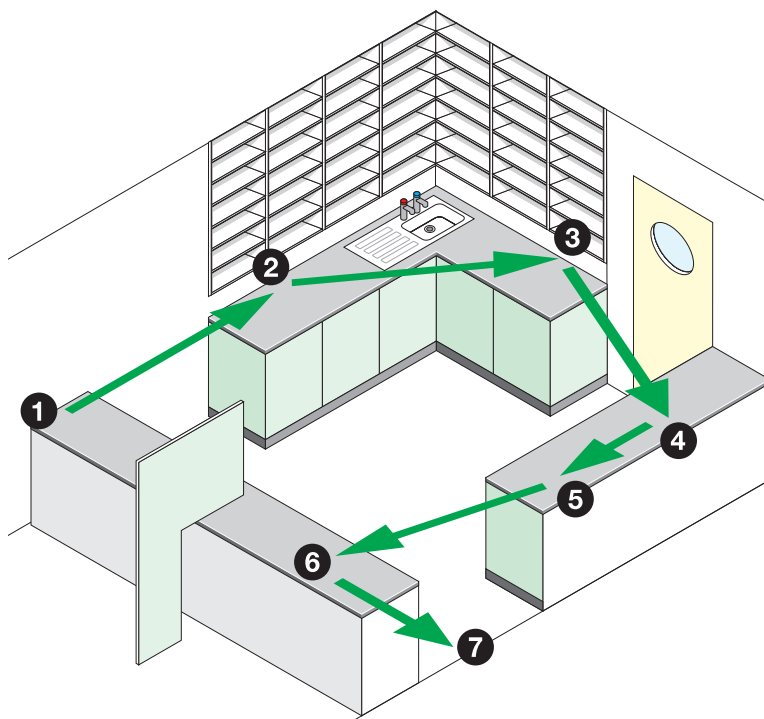
Above Confusing workflow that may increase the risk of error.

Recommendations

- Research has shown that workflow redesign can positively affect dispensing activity and allow pharmacists more time for patient counselling.¹⁴
- By breaking the process down into its constituent parts, each stage can be looked at individually and unique methods applied to each one to make the process as safe as possible.

Action

- Draw a similar diagram that reflects the workflow in your particular dispensing environment.



Above An uninterrupted and logical workflow will help to reduce errors.

1.3 Working environment

Issue

The general environment within the pharmacy can have a very large influence on how well staff cope with the pressures of working in a busy dispensary.

Recommendations

The following points, in addition to general maintenance and cleanliness issues, should all be considered when designing a dispensary that will be safe for both staff and patients:

Signing – if patients know where to go to hand in or collect prescriptions, or to ask for advice, there will be shorter queues, less confusion and improved communication. This in turn will put pharmacy staff under less pressure and allow them to concentrate without interruption. Clear signing and colour contrast to improve communications with patients with impaired vision is particularly important.

Lighting – daylight bulbs give out a much better light to work by and should be used wherever possible in the dispensary. Good lighting is particularly important directly above dispensing benches and near screens. Research has demonstrated that an illumination level of 146 foot-candles (approximately 1,460 lux) is associated with a significantly lower rate of dispensing errors compared with baseline illumination of 45 foot-candles (approximately 450 lux).¹⁵

Lighting is therefore vitally important if error rates are to be reduced. Background light should however not be as bright as that required directly over work areas, as this can lead to symptoms such as headaches and can also decrease contrast, which is needed to help direct focus on critical areas. Issues of lighting therefore need to be considered carefully.

Noise – background noise, e.g. tannoy, checkout till noise, music, etc. should be kept to a minimum by using design methods to screen staff and patients from distracting noise.

Security – staff and patients need to both be and feel secure, although a balance must be achieved between security and communication. Where this balance lies will perhaps depend on the type of dispensary concerned. For example, in a dispensary that deals with a lot of substance misusers, higher counters may be appropriate. However, increased security measures, such as glass screens or hatches, may hinder communication and be considered as less appropriate in other situations. Panic buttons and closed-circuit television (CCTV) may also help staff to feel at ease and hence more

able to communicate effectively with patients.

Privacy – many of the issues that patients will want to discuss will be confidential, so it is essential that they can receive advice without being overtly overheard.

Flooring – cushioned flooring will help to alleviate tiredness which in turn will help staff to maintain levels of concentration.

Temperature and ventilation – staff need to be comfortable if they are to work safely. Health and safety recommendations are that working temperatures should be no less than 16°C. Also medicines should not be stored at temperatures greater than 25°C.

Seating – many pharmacies provide seating for elderly or disabled customers. This area should be sited so that confidential conversations at the prescription receipt or handover areas cannot be overtly overheard.

Telephone – give some thought to where this should be sited in order to allow confidential conversations to be held without being overheard and to provide minimum disruption to the dispensing process. Research has shown that interruption and distractions are associated with an increase in dispensing errors, and so some thought should be given to who answers telephone queries and when.¹⁶

Colour of dispensary benches – white benches provide a difficult background on which to see white packaging and medication. Consider other colours such as grey or cream.

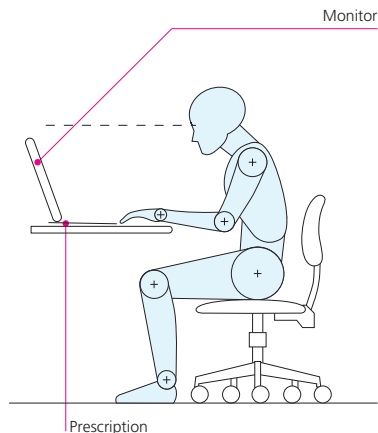
Action

- Review all of the above issues in your dispensary and consider if altering any of them needs to be built into future plans.

1.4 Ergonomic issues

Issues

- Computer screens and keyboards laid out in a haphazard manner.
- Very low dispensary work surfaces.
- Dispensary staff expected to climb shelves or benches to reach stock in high storage locations.



Above Poor consideration of ergonomic issues can lead to poor posture, stress and increase the chance of error through tiredness.

Action

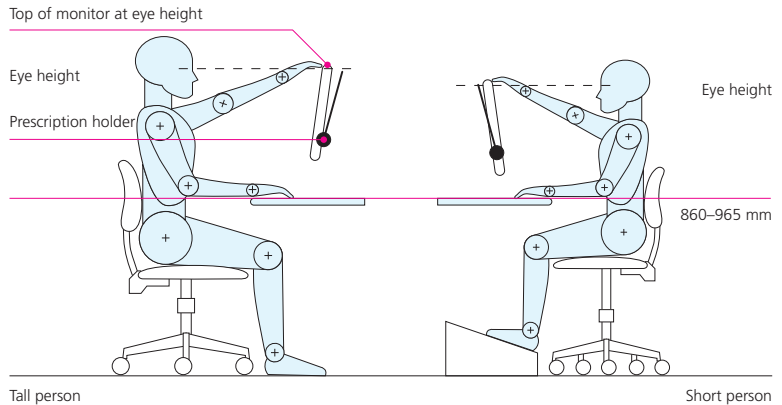
- Check the ergonomic issues in your dispensary against the Health & Safety Executive (HSE) recommendations (www.hse.gov.uk)
- Make use of prescription holders to ensure prescriptions are at eye level when labelling.

Recommendations

- Computer ergonomics, printer position, shelf heights, work surface height, and the position and working height of dispensary fittings and equipment should follow the advice of the HSE.
- Particular attention needs to be paid to stations where staff work for long periods, such as labelling or prescription reception areas.
- Computer screens and keyboards should not be laid out in a haphazard manner.
- Very low dispensary work surfaces should not be used.
- Dispensary staff should not be expected to climb shelves or benches to reach stock in high storage locations.

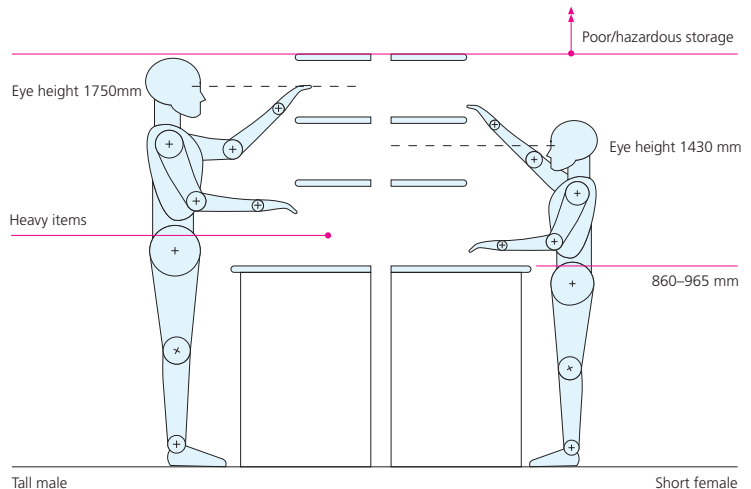
Right The bulk of medicines should be kept at easy reaching distance, taking into account staff height variations.

Errors are more likely if stock is difficult to reach; heavy items should be kept at a height that reduces the need to bend down to lift.



Above Screens should be at arms' length. Screens should have prescription holders, which should be at eye height so that staff do not have to continually look up and down.

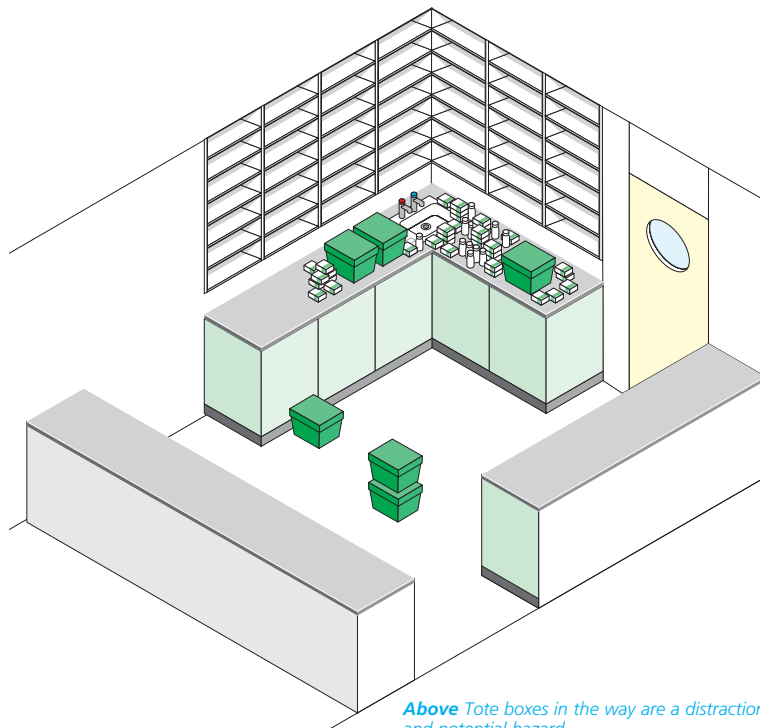
There should be space under the desk for legs. Simple ergonomic solutions can make workstations suitable for employees of different heights.



1.5 Delivery of stock

Issues

- If newly delivered stock is mixed with current stock before it is checked off, there is a risk of it being put away in the wrong storage area.
- Involuntary automaticity (the skilled action that people develop through repeatedly practising the same activity, e.g. driving a car, which takes place largely independent of conscious control and attention) increases the risk of these medicines being mis-selected.¹⁷



Above Tote boxes in the way are a distraction and potential hazard.

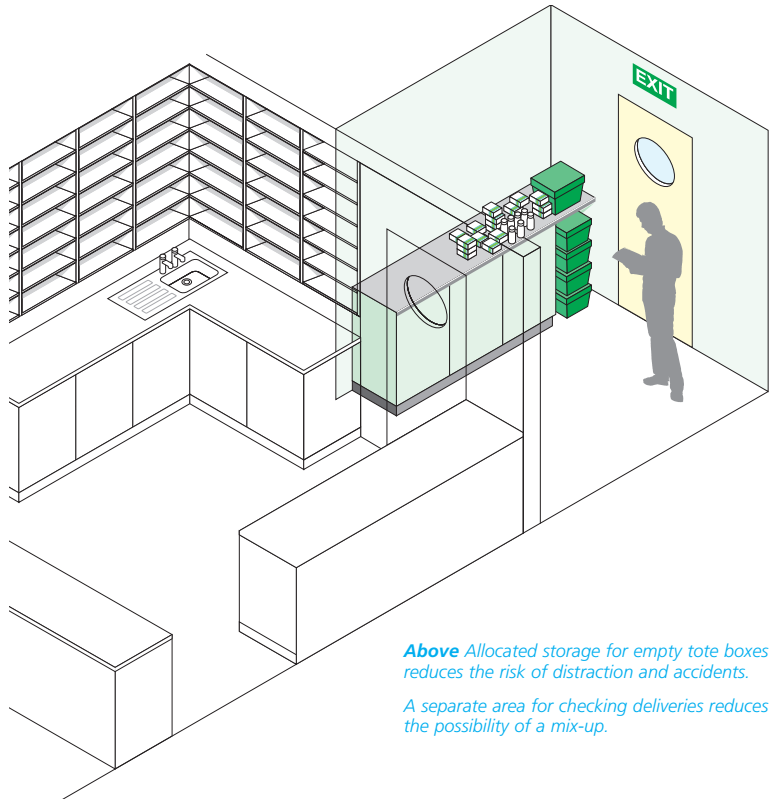
Newly-delivered medicine in the dispensary could potentially be incorrectly selected and mixed with medicines to be dispensed.

Recommendations

- Assign a temporary storage area for delivered stock before it is put away.
- Have a dedicated bench, or part bench, where unpacking and checking off can occur.
- Some stock replenishment systems are direct-to-shelf, requiring no checking off space.

Action

- Identify an area (preferably outside the dispensary) where delivered stock can be temporarily stored and then checked off before being put into the dispensary for use.

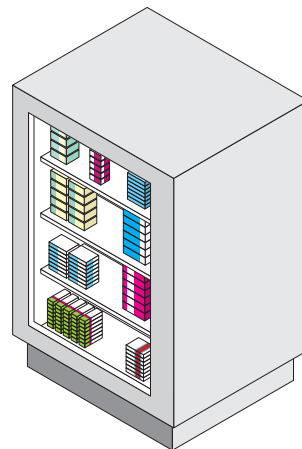


Above Allocated storage for empty tote boxes reduces the risk of distraction and accidents.

A separate area for checking deliveries reduces the possibility of a mix-up.

1.6.1 Refrigerators

- Cluttered and overstocked refrigerators make selecting the correct medicine for dispensing very difficult.
- Completed prescriptions could get mixed up with stock if kept in the same refrigerator.



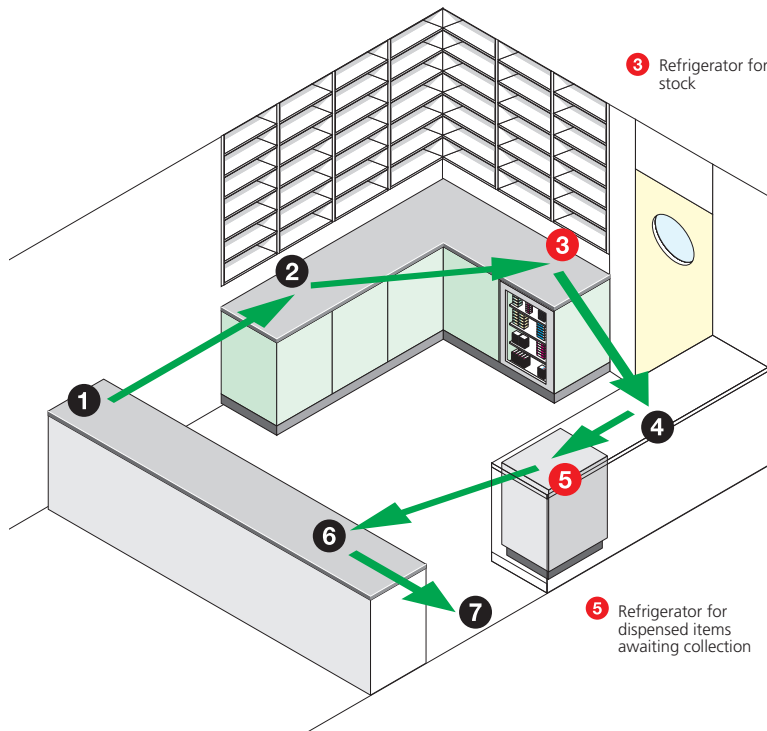
Right A carefully stocked, glass-fronted refrigerator makes the selection of the right medicine easier.

Recommendations

- Have separate refrigerators for stock and completed prescriptions.
- Glass-fronted refrigerators allow you to easily see what is inside.
- Have the second refrigerator containing dispensed items awaiting collection near the dispensed medicines collection point. (If space is an issue find an effective way of separating dispensed medicines from stock, such as the use of a refrigerator with sliding drawers.)
- Remember to monitor and record refrigerator temperatures daily.

Action

- Plan to purchase or replace refrigerators where necessary.
- Consider moving existing refrigerators to improve workflow and safety.



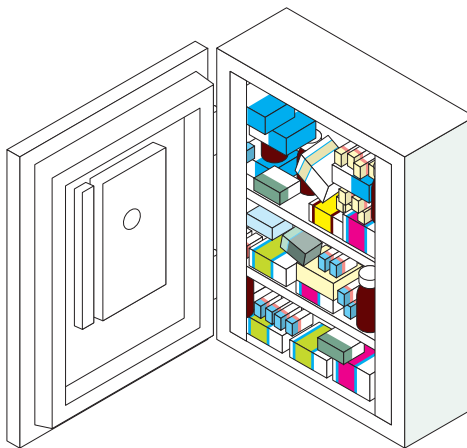
Above Separate refrigerators for stock and medicines awaiting collection keep the process of assembly and collection apart, reducing the possibility of error.

1.6 Storage of medicines

1.6.2 Controlled drug (CD) cupboards

Issue

- Overcrowded CD cupboards make it difficult to see stock properly, leading to a possible increase in selection errors.



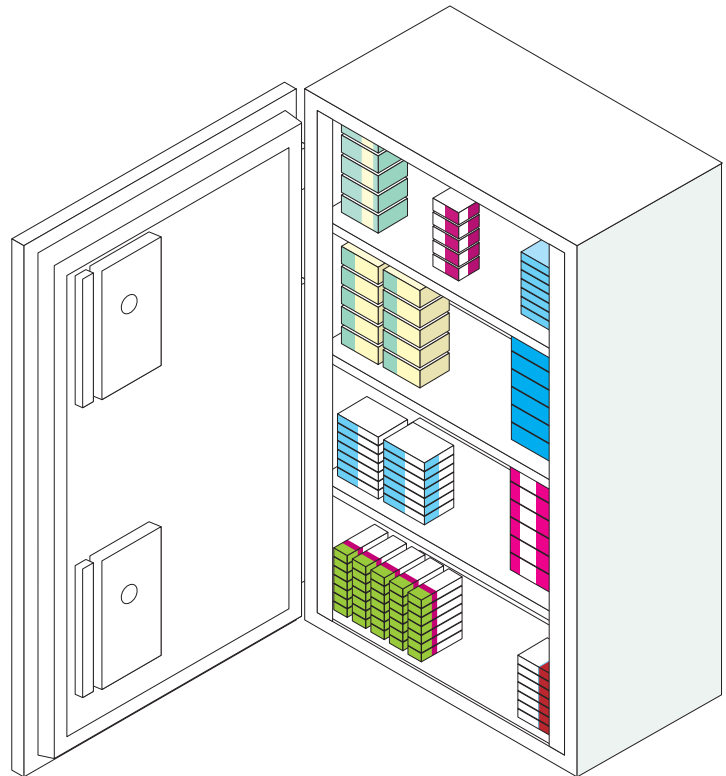
Above An overstocked and disorganised CD cupboard makes picking errors more likely.

Recommendation

- Ensure that CD cupboards are large enough to meet the workload of the dispensary and allow stock to be well spaced and easily seen.

Action

- Review size of CD cupboard in line with workload.



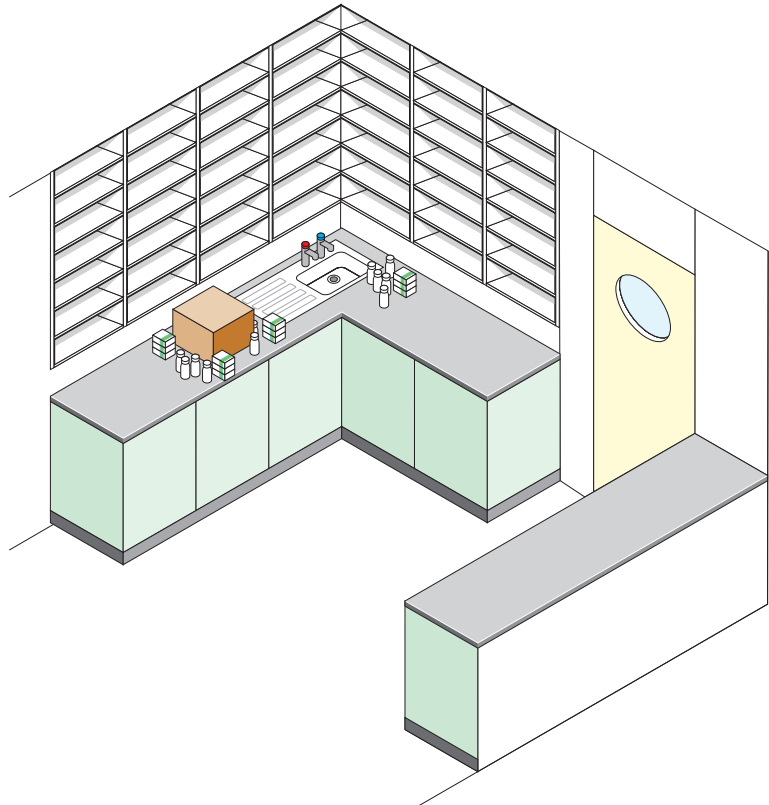
Above Increasing the size of your CD cupboard allows stock to be clearly separated, reducing the possibility of picking errors.

1.6 Storage of medicines

1.6.3 Waste and returns

Issue

- Returned or expired medicines may be confused for medicine stock if stored in the same area of the dispensary.

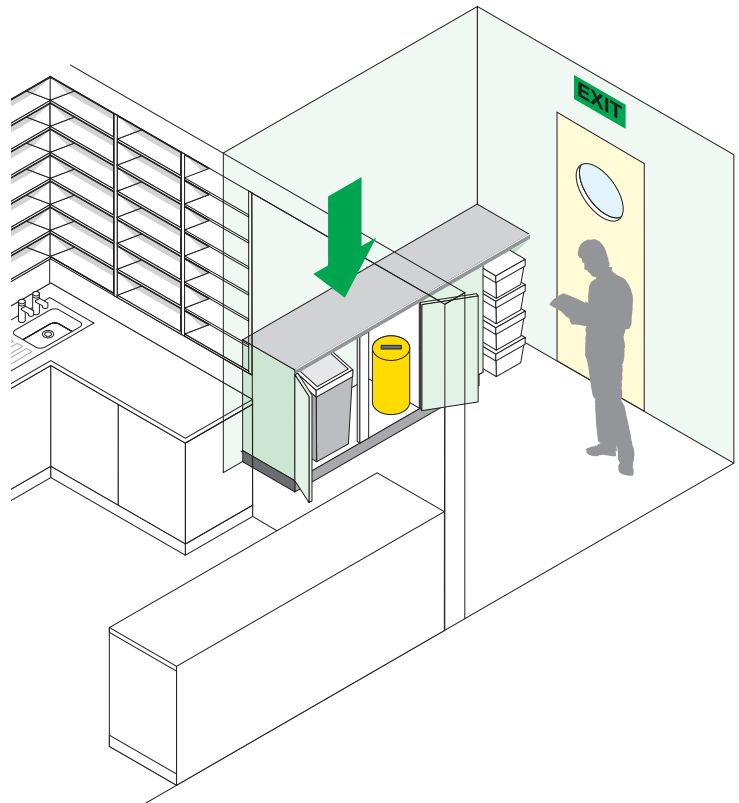


Recommendations

- Returned or expired stock should be stored in a separate section of the dispensary to clearly differentiate it from medicine stock.
- If possible, keep waste and returns in a separate room from the main stock or in designated cupboards or under bench areas.
- Sharps bins, etc. should also have a designated area for storage and should be separated from stock.

Action

- Review the layout of your dispensary and consider if you can make improvements in your handling of waste.
- If feasible, consider making use of a separate room.



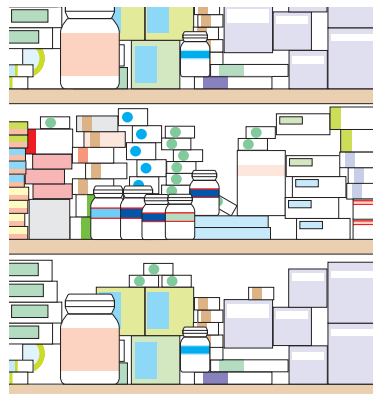
1.6 Storage of medicines

1.6.4 Separation of stock

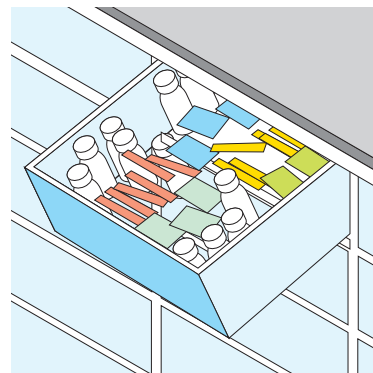
Issue

- Stock that is unseparated and muddled can increase the risk of selection errors.

Right Mixed-up stock increases the possibility of picking errors.



Right Domestic drawer units tend to be easily cluttered.



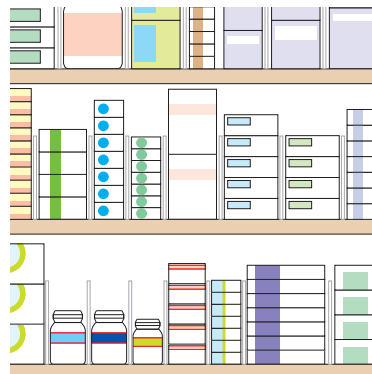
Recommendations

- The use of shelf dividers helps ensure that different products, strengths and formulations do not become mixed and confused.
- The use of sloping pull-out drawers that enable stock to be seen and easily retrieved may also help reduce selection errors.

Action

- Ensure that medicines are well differentiated in medicine storage areas to avoid selection errors. Consider purchasing shelf dividers for shelves, drawers, fridges, etc.
- When next refitting the dispensary, review the benefits of using sloping open drawer systems.

Right Flexible shelf dividers separate the stock.



Right Sloping pull-out drawers make selection easier and medicines easily accessible.

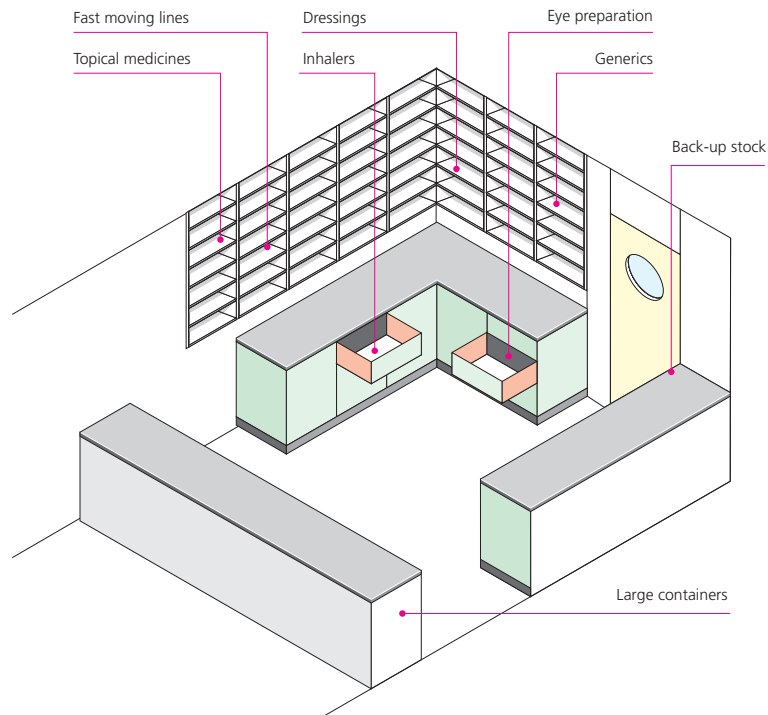


1.6 Storage of medicines

1.6.5 Location of stock

Issues

- Not being able to find medicines may contribute to selection errors.
- Dispensaries often have random areas allocated to different categories of stock.



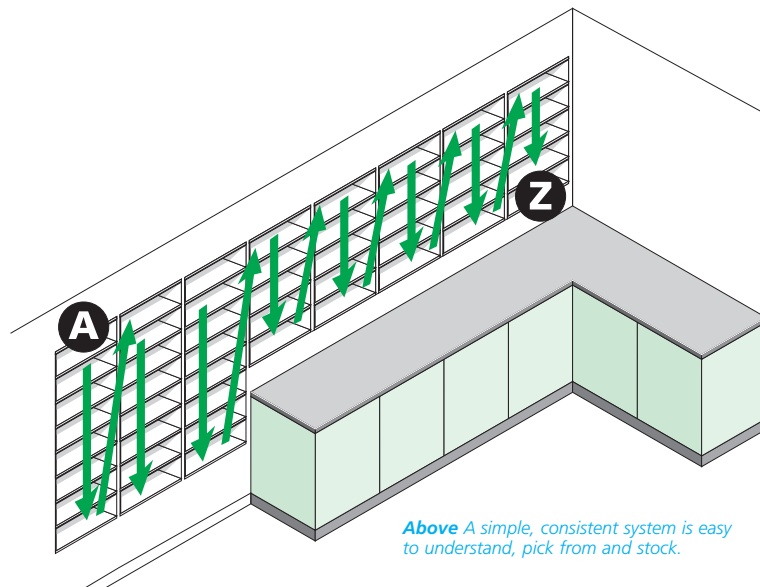
Above Idiosyncratic storage of stock takes time for new employees or locums to become familiar with, and can lead to more picking errors.

Recommendations

- As far as possible, use a simple A–Z stock storage system.
- Use A–Z by proprietary or generic name as appropriate for your particular sector. (Some medicines such as oral hypoglycaemics should be stored separately in marked areas, as recommended by the Royal Pharmaceutical Society of Great Britain (RPSGB)).

Action

- Review the layout of stock in your dispensary.

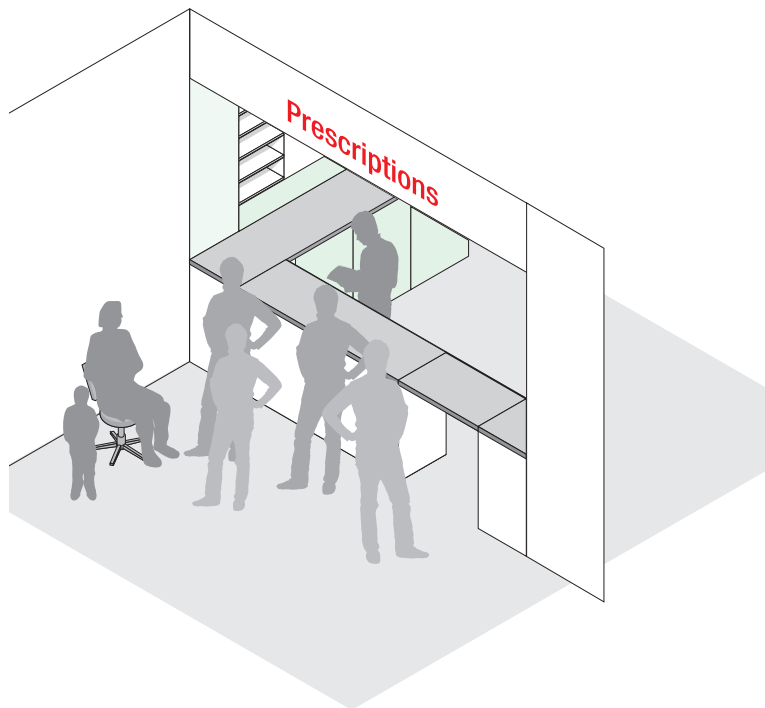


Above A simple, consistent system is easy to understand, pick from and stock.

1.7 Patient areas

Issues

- Confidentiality is essential when talking to patients about their medicines.
- Waiting patients should not be crowding the counter and be able to overtly overhear confidential conversations. This may also inhibit both staff and patients, preventing them from communicating effectively.
- Disorderly queuing can cause confusion and distract both patients and staff.



Above Patients are not sure where to stand, confidential conversations may be overheard.

Recommendations

- Ensure that patient waiting areas are away from areas where confidential conversations may take place.
- Use good signage, and techniques such as different coloured flooring and counter dividers, to demarcate areas where confidential conversations will take place.

Action

- Review signage, flooring and counter dividers, to demarcate confidential counselling areas.
- Separate the patient waiting area from the prescription receipt and medicines collection areas.



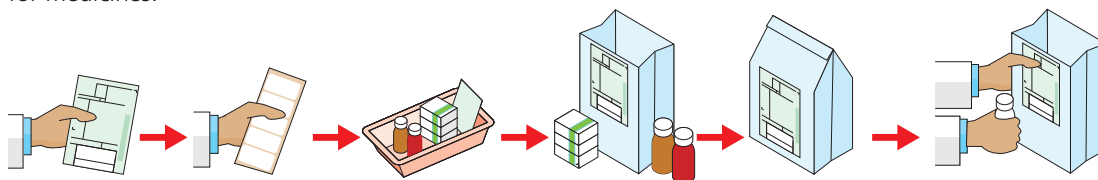
***Above** Clear signposting eases congestion, and counter dividers help to separate handover and collection whilst supporting confidentiality.*

Design changes to stages in dispensing a prescription that can help reduce errors

2.1 Stages in dispensing a prescription

Stages in dispensing a prescription

Use design to minimise errors at each stage of dispensing a prescription for medicines.



1

Receipt of prescription and clinical check

- clinical checking
- medicine counter
- prescription reception
- use of computer
- access to internet
- access to patient records
- computer ergonomics

2

Creation of label

- printer position
- prescription holders
- location
- labelling machines
- type of printer

3

Medicines assembly

- place for interim storage
- use of robots

4

Accuracy check

- accuracy check

5

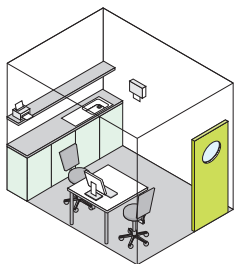
Storing dispensed medicines

- storage for collection
- storage of oiwings
- storage of completed prescriptions with queries

6

Medicines collection/final accuracy check and patient counselling

- prescription collection
- access to patient records
- use of computer for record keeping
- information leaflets
- patient counselling



7

Patient consultation

- advanced or enhanced services e.g. medication use review (MUR; where appropriate)
- environment and behaviour to encourage good communication
- consultation room
- facilities
- supervised consumption
- private area
- improving staff safety
- reducing stress levels

Introduction

Once a patient has presented a prescription for dispensing, that prescription will go through a series of stages before the medicine is finally handed to the patient. It is important that these individual stages are well thought out and flow in a logical and efficient manner around the dispensary.

This chapter takes each of these stages in turn and looks at the design features that may help produce an efficient and ordered process, resulting in the patient receiving the correct medication and the correct advice on how to use that medicine.

Electronic prescription systems

Electronic prescription systems (EPS) will soon be introduced into practice. For a time this may result in dispensaries having to run two separate systems (paper and electronic).

Most of the design ideas in this chapter will apply to both paper and electronic prescription processing. However, it may be that as EPS become commonplace, workflow will need to be adapted to allow for the fact that a hard copy prescription will not exist.

This may require additional or repositioned computer terminals to allow access to an electronic copy of the prescription at each stage of the dispensing process.

Electronic prescribing systems will also introduce different models of interaction with patients, for example patients collecting medicines with no prescription or a prescription token.

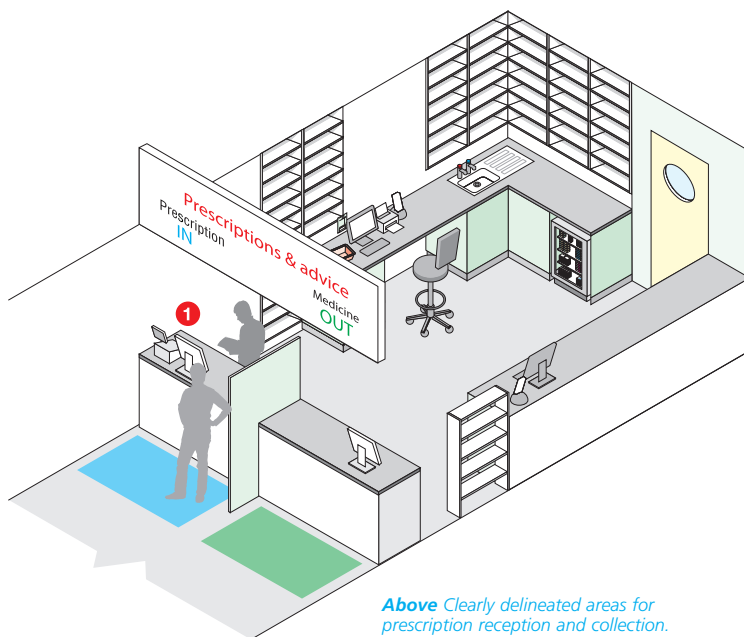
Consideration will need to be given to ensuring that any processes take account of these different models, in particular when handing out medication, and that the potential for the wrong patient to receive the wrong medicines does not increase.

2.2 Prescription reception and clinical check

1 2 3 4 5 6 7

Issues

- Having a single point for prescription reception and medicines collection can lead to overcrowding, lack of confidentiality, and customer and staff frustration.
- Clinical checking, if carried out at the start of the dispensing process: allows conversation between the pharmacist and the patient; identifies queries early; allows separation of the clinical and the accuracy check; and results in less rework when amended prescriptions have to be redispensed.
- Lack of information at prescription reception points makes clinical checking at this stage more difficult.
- Prescription workload can be poorly prioritised and planned at this stage.

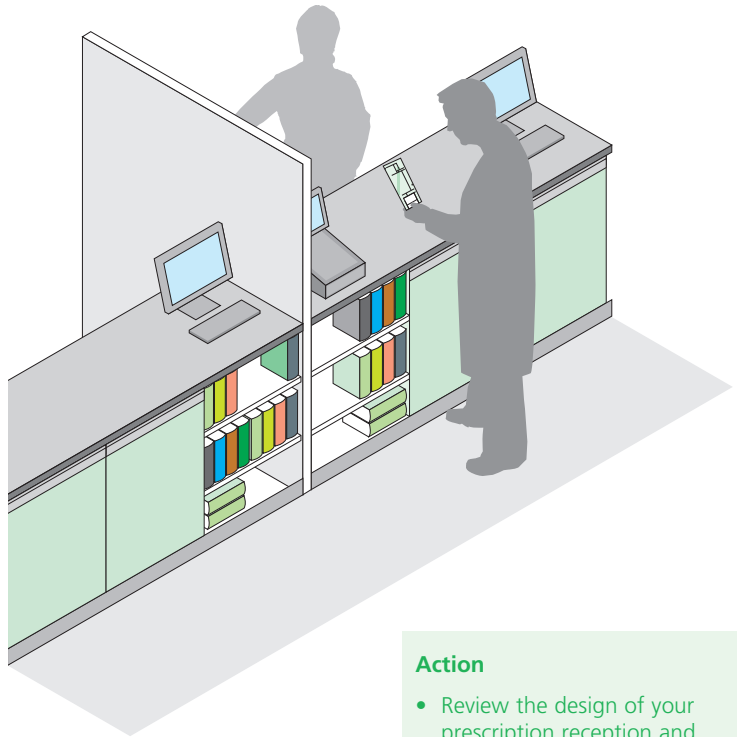


Above Clearly delineated areas for prescription reception and collection.



Recommendations

- Separate prescription reception from medicine collection areas using signage, counter dividers, coloured flooring, etc.
- Make a pen and paper available for those unable to clearly express themselves verbally.
- Carry out clinical checks at the prescription reception point in consultation with the patient.
- Ensure computer terminals and up-to-date reference sources are available at the prescription receipt point, making sure computer screens are not visible to other members of the public.
- Consider taking patients who may have difficulty communicating to a quiet area to discuss their needs and requirements.
- Plan and prioritise prescription workload to make effective use of dispensing resources.



Above Clinical checks carried out at prescription reception allow queries to be identified early, avoiding rework and reducing the probability of error.

Action

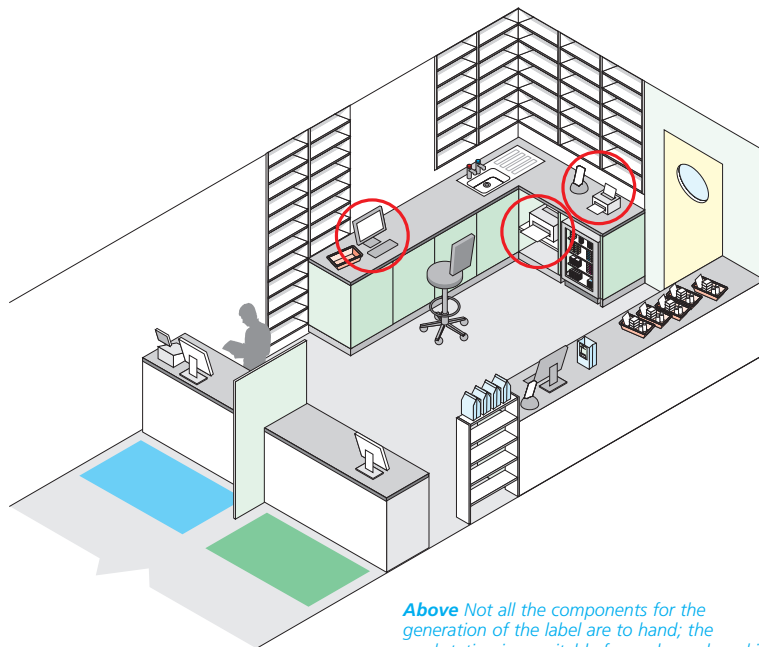
- Review the design of your prescription reception and medicines collection points.
- Review where you carry out clinical checks and decide if it is possible to complete them at the prescription reception point.

2.3 Generating medicine labels



Issues

- Transcription and selection errors may occur when generating a dispensing label.
- Generating a batch of dispensing labels for multiple patients may lead to the wrong label being attached to a medicine or a patient receiving a medicine intended for another patient.



Above Not all the components for the generation of the label are to hand; the workstation is unsuitable for prolonged working.

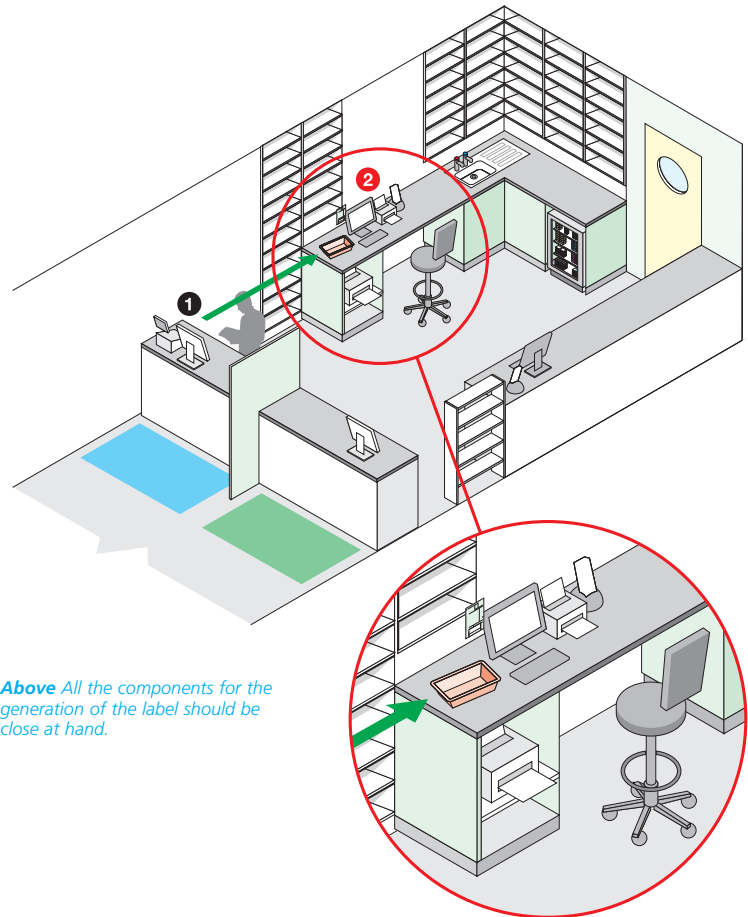


Recommendations

- Dispensing labels should normally be printed before the medicine packs are selected for assembly.
- Generate dispensing labels for one patient at a time. Avoid batch-printing of dispensing labels for multiple patients.
- Use baskets to keep prescriptions and labels together. (For EPS see comments on pages 41 and 47)
- Ensure labelling station complies with HSE ergonomic regulations.
- Use prescription holding clips to ensure prescription is at eye level when typing dispensing labels.

Action

- Review position of labelling station.
- Explore purchase and use of baskets and prescription holding clips.

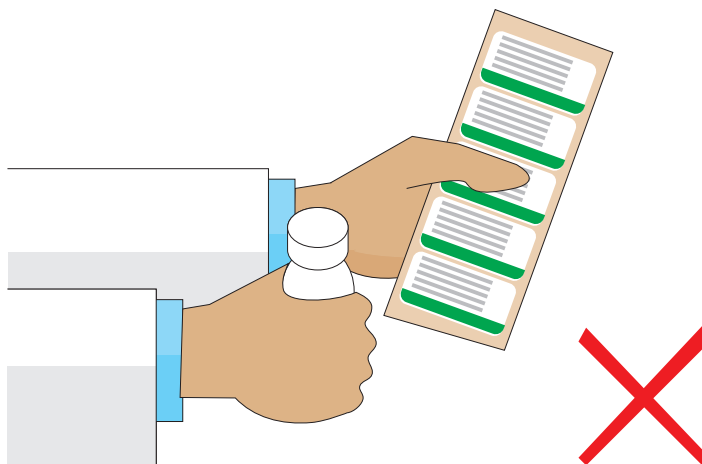


2.4 Assembling medicine products and labels



Issues

- Using dispensing labels rather than the prescription form to select medicine products for assembly may increase risk if a labelling error has been made.
- If an electronic prescribing system is in use there is no paper prescription form to use in the assembly stage and this may increase the risk of mis-selection.
- The area for assembling medicines should be a suitable size to minimise overcrowding and ensure a safe method of working at this stage.
- If one dispenser assembles the medicines for multiple patients at the same time, this increases the risk of the wrong medicine being assembled and labelled.
- There is a risk that assembled and labelled items will be unintentionally put back into stock and the medicine will not be supplied to the patient.

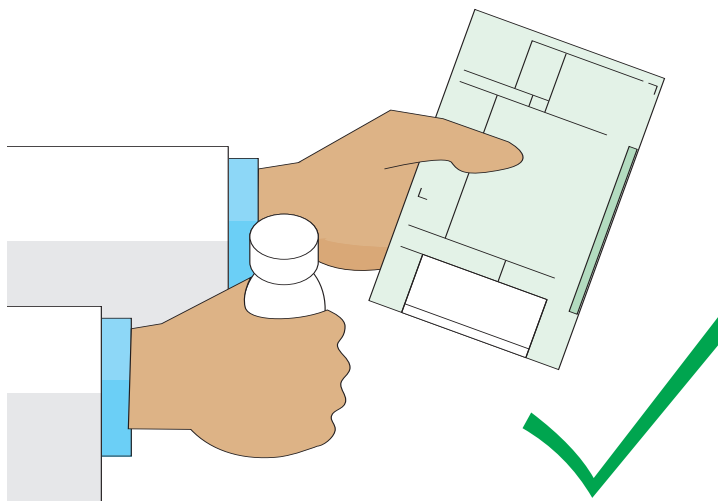


Above Do not assemble the medicines from labels.

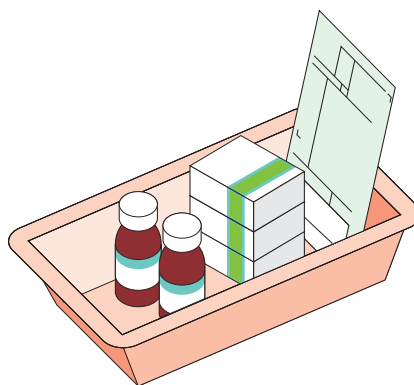


Recommendations

- Use the prescription form to select the correct medicine products for assembly.
- For electronic prescription systems, use a computer screen, or an appropriate hard copy, to confirm the correct medicine product for assembly.
- The dispenser assembling the medicine should check the accuracy of the dispensing label against the prescription before applying the dispensing label to the medicine product.
- Assemble the medicines for one patient at a time.
- There must be sufficient space to assemble medicines safely.
- Use baskets to keep all items for an individual patient together.
- Once medicines have been assembled they should be moved to the accuracy checking area.
- Use boxes or baskets for items of stock to be returned to shelves or drawers.
- Return stock to shelves or drawers as soon as possible after use.



Above Assemble the medicines from the prescription.



Above Trays or baskets can be used to keep items together.

Action

- Review standard operating procedures (SOPs) to ensure stock is selected using prescription form or computer screen as a basis for selection.
- Consider use of baskets for individual prescriptions and returning stock to shelves or drawers.

2.4 Assembling medicine products and labels

2.4.1 Accuracy check and use of auto-id technologies



Issues

- Clinical checking and dispensing accuracy checking are different stages in the process. If these stages are combined, there is a risk that the focus will be on dispensing accuracy checking rather than on clinical checking (the appropriateness of what has been prescribed for the individual patient).
- The most frequently reported dispensing errors involve wrong dose, medicine and formulation.
- The pharmaceutical industry provides the majority of the medicine packs with a linear barcode containing a GS1 (EAN) code, which is seldom used in dispensing software systems to ensure that the correct product is dispensed.
- Barcodes are often overlabelled with the dispensing label. In the future these barcodes may be used to identify medicines after they have been dispensed.



Above A misplaced label will make it impossible to check the barcode.



Recommendations

- Separate clinical and dispensing accuracy checks.
- Wherever possible, the dispensing accuracy check should be undertaken by a different dispenser to the one who assembled the medicine.
- Do not overlabel barcodes with dispensing labels wherever possible.
- Greater use should be made of barcodes incorporating GS1 codes on medicine products to confirm that the correct medicine is being dispensed for the patient.¹⁸
- The use of 2D barcodes and radio frequency identification (RFID) tags in the future should enable expiry date, batch number and unique serial numbers of medicine packs to be scanned and checked as an integral part of the dispensing process.



Above Barcode readers can quickly and accurately confirm the correct medicine is being dispensed.

Action

- Review SOPs to ensure clinical and dispensing accuracy checks are separate processes.
- Consider the use of dispensing software that allows the use of auto-id technologies as part of the accuracy check.

2.4 Assembling medicine products and labels

2.4.2 Use of automation



Issues

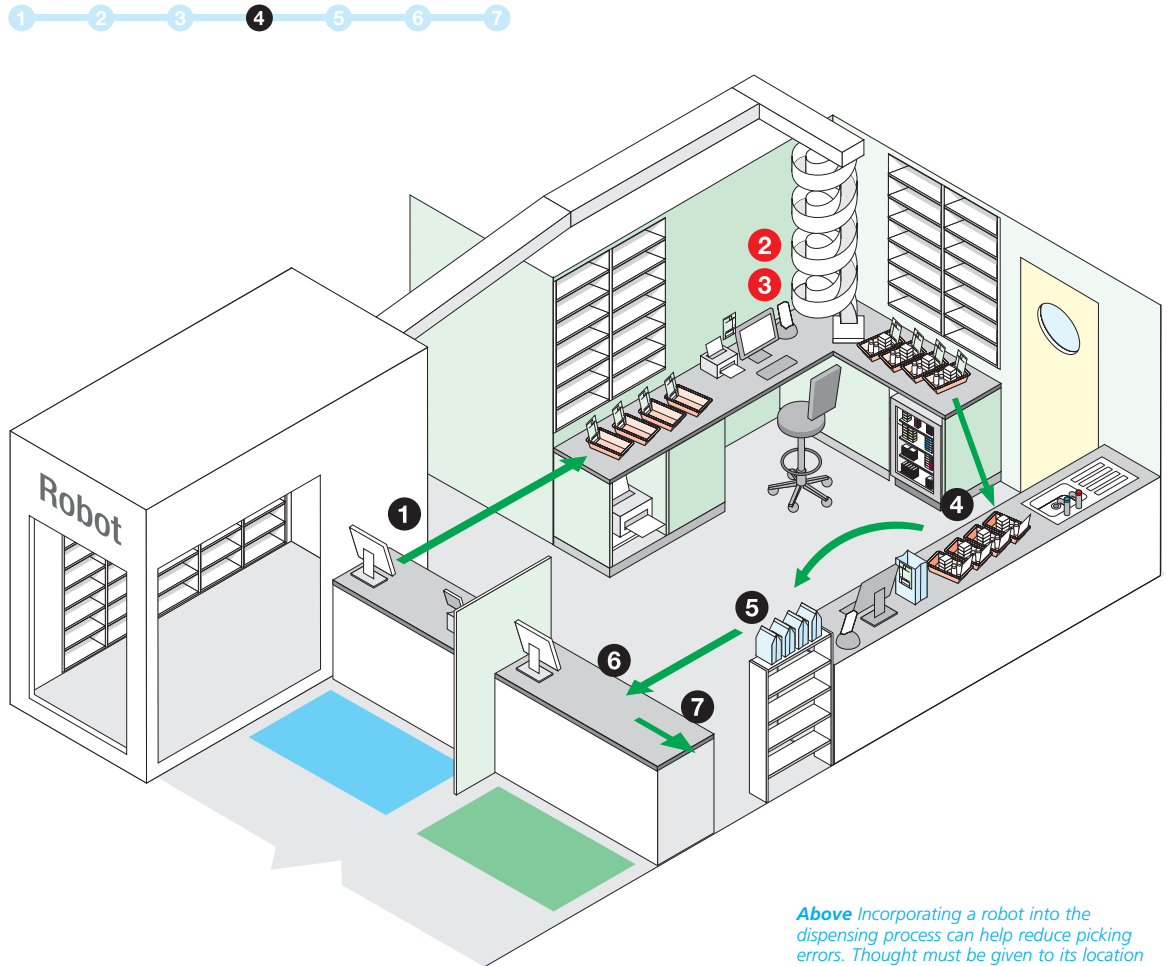
- Automated dispensing systems are being introduced into large dispensaries in both primary and secondary care.
- The majority of dispensing errors are picking errors.
- Manual loading of stock into a robot can be a source of error where putting the product in a particular location is dependent on the operator.
- Few automated systems attach dispensing labels and mislabelling still remains a source of error.

Recommendations

- The use of automation may reduce picking errors and have a role to play in the storage of medicines.
- Automated loading, incorporating auto-id technology, may help reduce errors in stock location.
- Automated labelling with automated stock selection and auto-id technology can help reduce both selection and labelling errors.

Action

- Investigate the feasibility of incorporating automation into your dispensary.
- Carefully consider different types of automation and their advantages and disadvantages.



Above Incorporating a robot into the dispensing process can help reduce picking errors. Thought must be given to its location and integration within the workflow.

2.5 Dispensed and to follow medicines awaiting collection



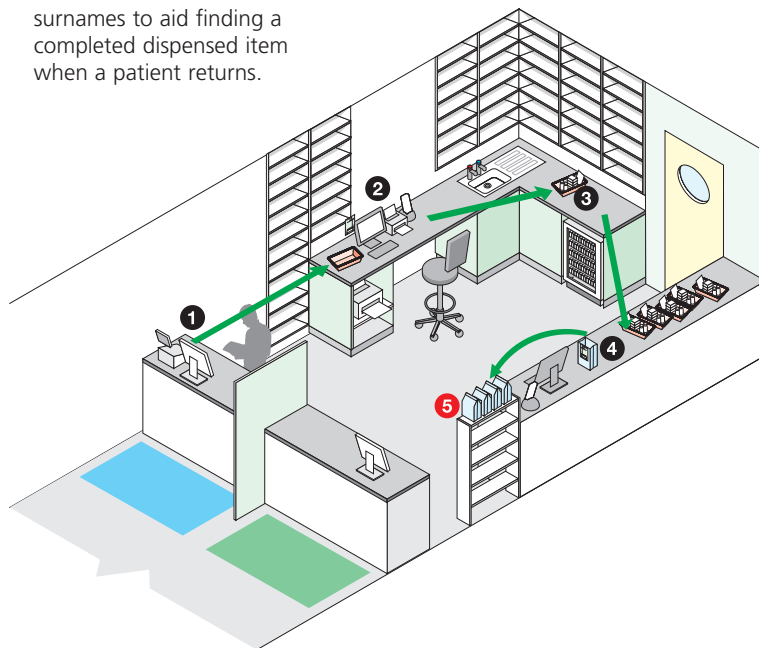
Issues

- Patients may receive the wrong medicines or those intended for another patient.
- Medicines may be supplied before outstanding queries have been dealt with.
- Patients may not receive all the medicines prescribed. This may be caused by medicines awaiting collection being stored in multiple locations in the dispensary (e.g. refrigerator and controlled drug cupboard) or additional medicines having to be ordered.
- Prescriptions may be separated from the bag of dispensed medicines, making the final check with the patient more difficult.

Recommendations

- Keep prescriptions attached to the bag of medicines awaiting collection – check patient identity against the information on the prescription.
- Use some method, such as moveable lettered cubes, to indicate the initial letters of surnames to aid finding a completed dispensed item when a patient returns.

Below Ensure prescriptions that are ready for collection are stored separately in the dispensary and that they are not visible to the patients.





Recommendations (continued)

- Keep prescriptions attached to bag of dispensed medicines to enable final check with patients during medicine collection (see section 2.7).
- Have a separate storage area or shelf for dispensed items with outstanding queries that require further discussion with the prescriber or patient.
- Use some form of marker (e.g. coloured stickers) to indicate additional stock in a separate location.

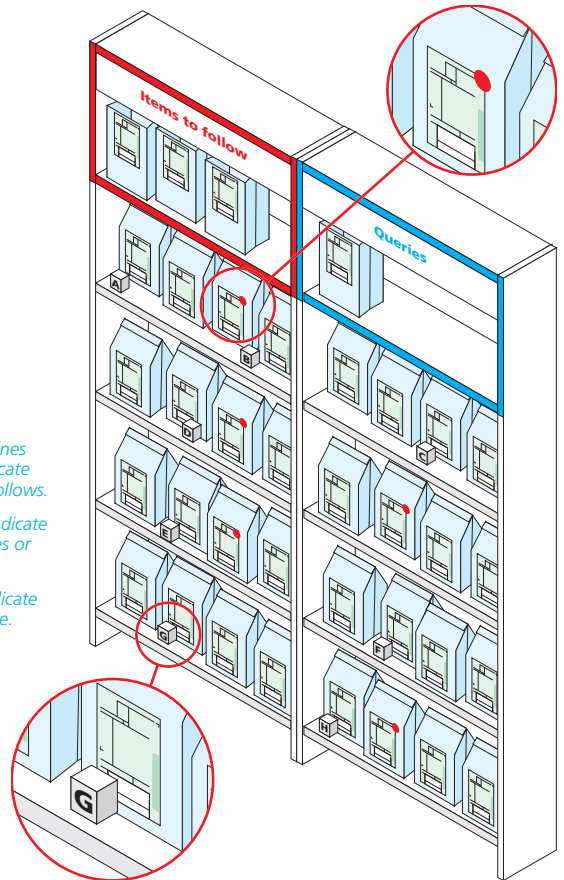
Action

- Review location and separation of items awaiting collection.
- Review how dispensed items stored in a separate location are linked to other dispensed items for an individual patient.

Right Differentiate medicines awaiting collection to indicate those with queries or to follows.

Use coloured stickers to indicate additional refrigerated lines or controlled drugs.

Use movable blocks to indicate the initial letter of surname.



2.6 Medicines collection



Issues

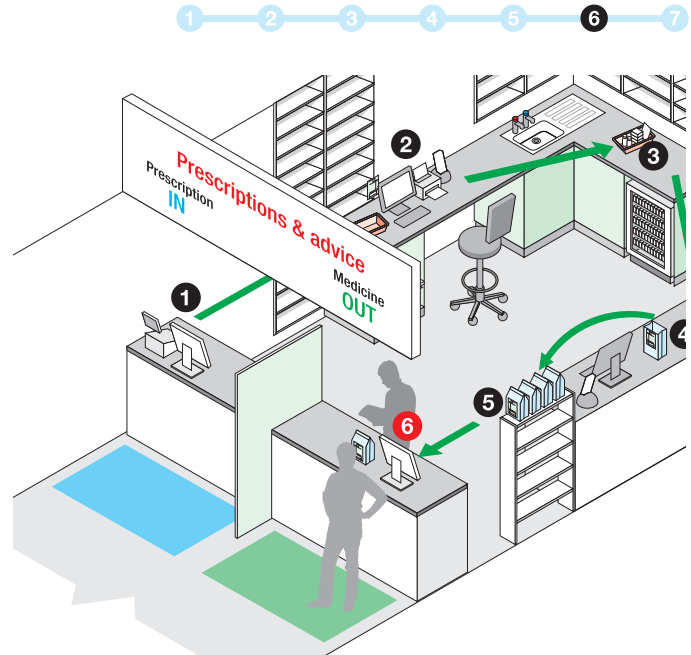
- Having a single point for prescription reception and medicines collection leads to confusion, overcrowding and lack of confidentiality, which can inhibit effective communication.
- When medicines are not collected by the patient, important information may not be exchanged.



Above Patients are not sure where to stand; confidential conversations may be overheard.

Recommendations

- Separate medicine collection from prescription receipt areas using signage, counter dividers, coloured flooring, etc.
- Utilise design to achieve different levels of privacy depending on the level of confidentiality required.
- For home deliveries, or where a representative collects a prescription, the pharmacist has a responsibility to ensure that they comply with guidance set out by the RPSGB.¹⁹ To help in this respect, it should be made very clear, perhaps by drawing attention to it on the bag of dispensed medicines, that the pharmacist is available for advice about the dispensed medicines. Details of how they can be contacted should be provided.
- MUR may be of particular use for patients receiving home delivery who have not had an opportunity for counselling at the point of collection.



Action

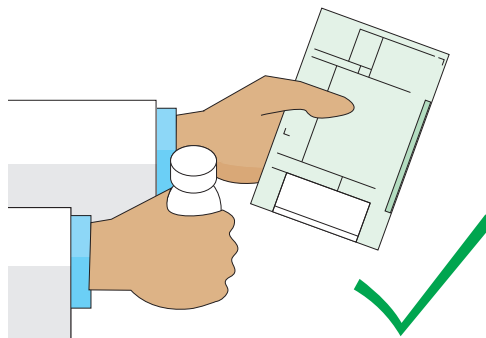
- Review the layout, signage and demarcation of your medicines collection point.
- Build the additional provision of semi-private counselling points into your business plan where necessary.

2.7 Final accuracy check and patient counselling



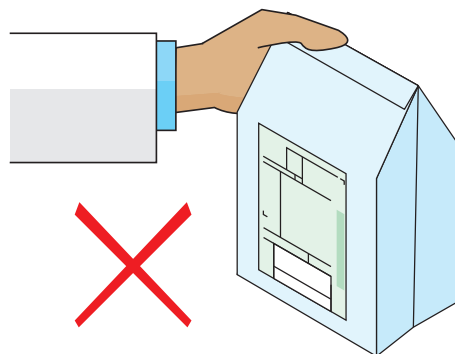
Issues

- Checking dispensed medicines with the patient or representative is the final accuracy check.
- This final accuracy check is bypassed every time a bag of medicines is handed to a patient or representative unopened.
- Even when a patient has been on the same repeat prescription for many years, it is still worthwhile checking that the medicines being dispensed are what is expected and that the patient is not experiencing any problems using their medicines.



Issues that arise at this stage include:

- confusion following a change of labelling and packing of medicine;
- proactively ensuring that the patient can open and use their medicine as intended;
- identification and management of side effects of medicines.





Recommendations

- Routinely open the bag of dispensed medicines.
- Check the dispensed medicines with the patient or representative.
- Counsel the patient about their medicine.
- Offer to make simple adjustments to make medicine taking easier for patients with physical or sensory disabilities.

Action

- Audit the extent to which medicines are shown to and discussed with patients.
- Update SOPs to promote and prioritise these recommendations.
- Review the reference sources readily available to the pharmacist.
- Consider making the offer of advice and contact details prominent on the dispensing bag.



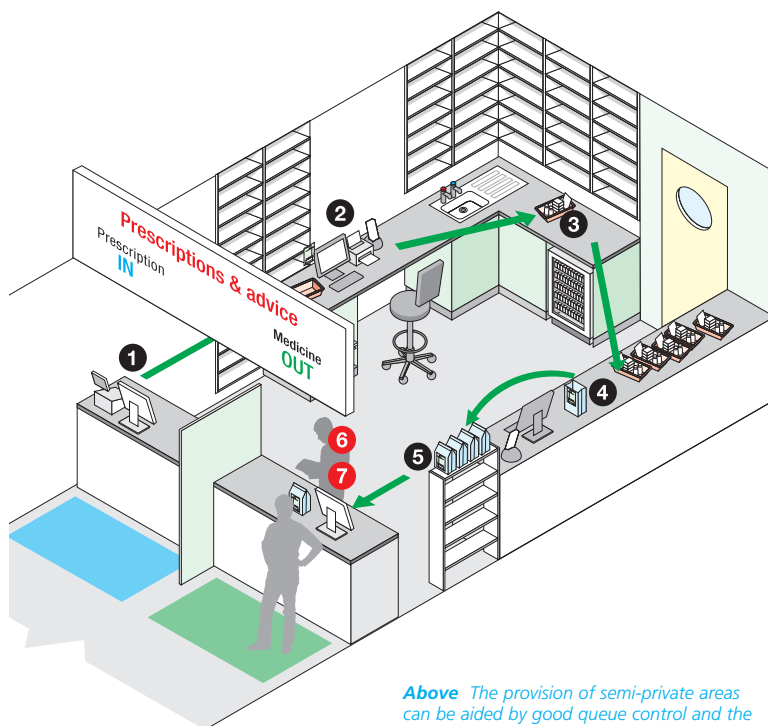
Above Make sure you show the medicines to the patient and discuss them with the patient.

2.8 Patient consultation and advanced/enhanced services



Issues

- Different types of consultation require different facilities.
- Requirements for space in which a MUR can take place are different to those required for routine prescription handover.



Above The provision of semi-private areas can be aided by good queue control and the use of counter dividers and signage, etc. to demarcate areas for specific activities.



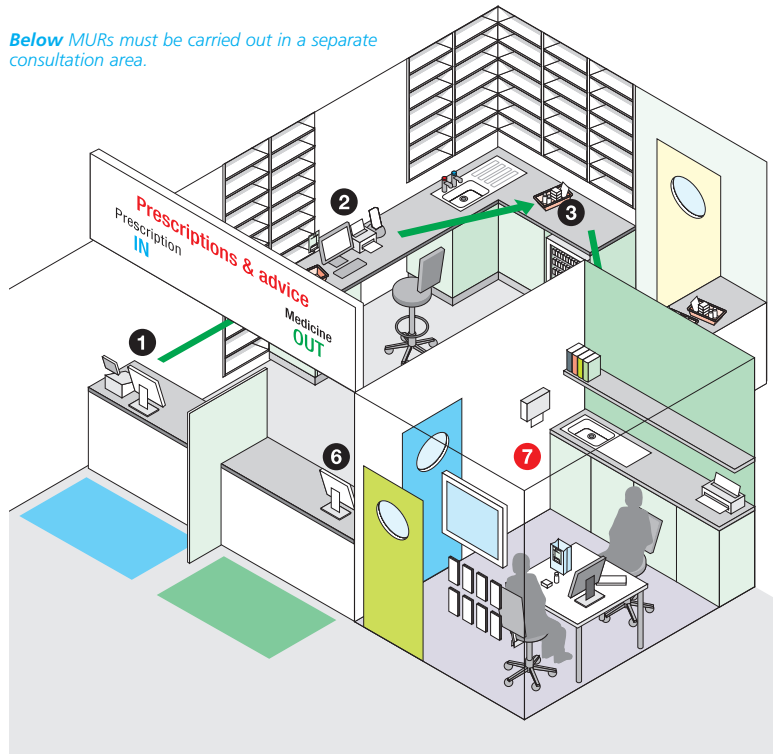
Recommendations

- Consider design changes to enable different types of consultation e.g. include seating where an extended consultation is being conducted.
- Semi-private areas can be aided by good queue control and the use of counter dividers, etc. to demarcate specific areas.
- MURs must be carried out in a separate consultation area that conforms to requirements for confidentiality, etc. as set out in the *Directions for enhanced and advanced services*. Future services may also require use of this facility.

Below MURs must be carried out in a separate consultation area.

Action

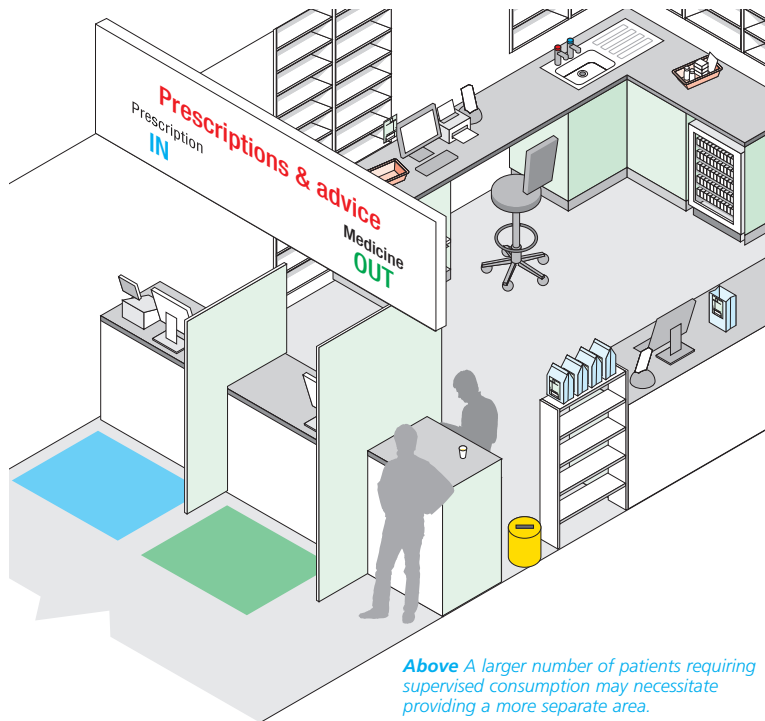
- Consider how existing infrastructure could be adapted to provide a range of counselling areas allowing for differing levels of privacy.
- Build substantial modifications into future business plans and consider at next refit.
- Consider future possible enhanced services when developing plans.



2.9 Supervised consumption

Issues

- It may not be possible to provide a sufficient level of privacy for the self administration of medicines in the pharmacy.
- Poor communication may be caused by patient overcrowding and poor design.
- Patient and staff security may be inadequate.



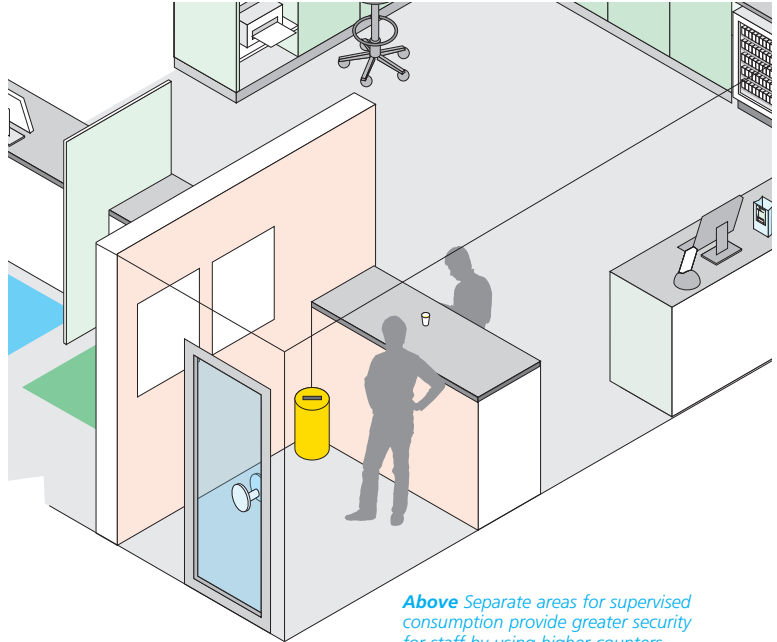
Above A larger number of patients requiring supervised consumption may necessitate providing a more separate area.

Recommendations

- Ideally have a separate area for supervised consumption and other activities associated with substance misusers e.g. needle exchange.
- Consider the provision of security measures, such as panic buttons and CCTV.
- Consider higher counters in these areas whilst not compromising communication between staff and patients.
- Ensure sharps bins, etc. are inaccessible to other patients.

Action

- Ensure you have the capacity (in terms of premises, staff numbers and equipment) appropriate to the volume of activity.
- Consider any physical changes you can make to your dispensary that will allow you to provide services for substance misusers in a way that is safe for both patients and staff.
- Build any required investment into future business plans.



Above Separate areas for supervised consumption provide greater security for staff by using higher counters.

Summary and conclusion

This design guide has identified risks and design initiatives associated with the design of the dispensing environment and stages in the dispensing process.

The NPSA recommends that, after reading this booklet, you look at your own dispensing environment with a critical eye. Think about the small changes that you can make and plan for some of the larger ones.

Many of the recommendations made in this booklet can be implemented quickly and at little cost. By making some of these relatively easy changes, a real difference can be made to the safe functioning of a dispensary. Good design reduces errors in practice, as has been demonstrated in many other industries, and these design principles apply equally to dispensing as to other environments and processes.

There is often no single correct way of operating a dispensary. It is up to individuals and organisations how they choose to adopt these recommendations and adapt them to their particular circumstances.

If some of the design recommendations in this booklet are put into practice the NPSA believes a significant contribution can be made towards improving patient safety.

The NPSA would be keen to receive your feedback on this publication to build on its knowledge and inform future revisions.

References and acknowledgements

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Further reading

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 Cegedim
 Commission for Social Care Inspection
 Deafblind UK
 Department of Health – England
 Diabetes UK
 Essex Rivers NHS Trust
 Lloyds Pharmacy
 National Pharmacy Association
 Patients Association
 Pharmaceutical Services Negotiating Committee
 Pharmacists' Defence Association
 Primary and Community Care Pharmacy Network
 Royal Pharmaceutical Society of Great Britain

Royal Pharmaceutical Society of Great Britain – Wales
 Sainsbury's
 Scottish Intercollegiate Guidelines Network
 SIGN
 Systems Solutions Ltd
 Wales Hospital Pharmacy
Patient workshop attendees

Action against Medical Accidents (AvMA)
 Age Concern
 British Limbless Ex-Service Men's Association
 British Thyroid Foundation
 Cancerbackup
 Carers First
 Central Nottinghamshire MIND
 Deafblind UK
 Diabetes UK
 Multiple Sclerosis Society
 National Society for Epilepsy
 Parkinson's Disease Society
 Patient Information Forum
 Royal National Institute of Blind People
 SIGN
 Sunfield Children's Homes
 The Royal National Institute for Deaf and Hard of Hearing People

Professional expert reference group attendees

Association of Independent Multiples
 Association of Pharmacy Technicians UK
 Boots The Chemist
 British Association of Pharmaceutical Wholesalers
 Company Chemists Association
 Co-op Chemists
 Dispensing Doctors Association
 Guild of Healthcare Pharmacists
 Lloyds Pharmacy
 Morrison's
 National Pharmacy Association
 Pharmaceutical Services Negotiating Committee
 Pharmaceutical Society of Northern Ireland
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 Rowlands
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Carlisle's Pharmacy

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Boots The Chemist

Steve Lutener

Pharmaceutical Services Negotiating
Committee

Sue Newton

Hammersmith Hospital

Susan Grieve

Department of Health – England

NPSA project team

Bruce Warner

Catherine Dewsbury

Colum Lowe

David Cousins

Isobel Nesbit

Linda Matthew

Peter Mansell

Colin Goodhew (Lucid Design)

Tim Farrer (formally of Lucid Design)

For further details or comments regarding this resource please contact:

Safe Medication Practice Team
National Patient Safety Agency
4-6 Maple Street
London
W1T 5HD

Tel: 020 7927 9356

Email: dispensing-design@npsa.nhs.uk

The National Patient Safety Agency

4 - 8 Maple Street
London
W1T 5HD

T 020 7927 9500

F 020 7927 9501

Ref: 0586a

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