

# Design Guidance

## Medications Management – Drug Administration

**Wednesday, 20 January 2010**  
**Version 3.0.0.0**

*Prepared by*  
**Microsoft**

**Microsoft®**

## PREFACE

### Documents replaced by this document

Document Title	Version
Design Guidance – Medications Management – Drug Administration	2.0.0.0
Design Guidance – Medications Management – Drug Administration	1.0.0.0

### Documents to be read in conjunction with this document

Document Title	Version
Design Guidance – Medications List	1.0.0.0
Design Guidance – Time Display	3.0.0.0
Design Guidance – Date Display	3.0.0.0
Design Guidance – Date and Time Input	3.0.0.0
Design Guidance – Patient Banner	4.0.0.0
Design Guidance – Medications Management – Search and Prescribe	3.0.0.0
Design Guidance – Accessibility Principles	1.0.0.0
Design Guidance – Accessibility Checklist	1.0.0.0
Design Guidance – Medication Line	2.0.0.0
Design Guidance – Timeline View	1.0.0.0

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# 1 INTRODUCTION

This document provides design guidance for Drug Administration. It describes the area of focus, provides guidance and recommendations and explains the rationale behind the guidance and recommendations.

To indicate their relative importance, each guideline in this document is ranked by **Conformance** and by **Evidence Rating**. Table 1 defines those terms:

Term	Definition
Conformance	<p>Indicates the extent to which you should follow the guideline when defining your UI implementation. There are two levels:</p> <ul style="list-style-type: none"> <li>■ <b>Mandatory</b> – An implementation should follow the guideline</li> <li>■ <b>Recommended</b> – An implementation is advised to follow the guideline</li> </ul>
Evidence Rating	<p>Summarises the strength of the research defining the guideline and the extent to which it mitigates patient safety hazards. There are three ratings (with example factors used to determine the appropriate rating):</p> <ul style="list-style-type: none"> <li>■ <b>Low:</b> <ul style="list-style-type: none"> <li>■ Does not mitigate specific patient safety hazards</li> <li>■ User research findings unclear and with few participants</li> <li>■ Unreferenced usability principles indicate the design is not significantly better than alternatives</li> </ul> </li> <li>■ <b>Medium:</b> <ul style="list-style-type: none"> <li>■ Mitigates specific patient safety hazards</li> <li>■ User research findings clear but with few participants</li> <li>■ References old authoritative guidance (for example, from the UK-based National Patient Safety Agency (NPSA), Institute for Safe Medication Practices (ISMP) or World Health Organization (WHO)) that is potentially soon to be superseded</li> <li>■ Referenced usability principles indicate the design is significantly better than alternatives</li> </ul> </li> <li>■ <b>High:</b> <ul style="list-style-type: none"> <li>■ Mitigates specific patient safety hazards</li> <li>■ User research findings clear and with a significant number of participants</li> <li>■ References recent authoritative guidance (for example, from NPSA, ISMP or WHO)</li> <li>■ Referenced usability principles indicate the design is significantly better than alternatives</li> </ul> </li> </ul>

Table 1: Conformance and Evidence Rating Definitions

## Note

It is also important to understand the meaning of the term ‘current’ as used in this document. Current medications refer to those that have been prescribed to a patient and have not yet been discontinued or completed. A medication can also be termed current with reference to a time in the past when the medication was current for the patient.

Refer to section 4.2 for definitions of the specific terminology used in this document.

This document is intended for use by anyone whose role involves screen design and the implementation or assessment of clinical applications. This document can therefore be used as guidance for the specification of display and interaction models for drug administration.

## Note

Since research for this guidance was based on UK conventions for medication administration, care should be taken when considering the guidance for application outside the UK.

Table 2 describes the changes made since the previous version of this guidance (Baseline version 2.0.0.0 dated 19-Dec-2007):

Change	IDs	Change Description
Deleted		This document has been significantly enhanced since the previous version. Many guidelines have been deleted, modified and added as have their associated Usage Examples and Rationales. In consequence, the list of changes is very extensive and has been relocated to APPENDIX C.
Modified		
Added		

Table 2: Updates since the Last Baseline Version

## 1.1 Customer Need

The administration (or giving) of drugs to patients has long been recognised as a safety-critical area<sup>1</sup>. It is both a complex activity in itself and the last possibility for care professionals to pick up errors made earlier in the overall process of drug management. A successful display solution must therefore perform a dual function:

- Provide sufficient information to review the intended schedule and previous history of administration
- Support the tasks at hand safely (for example, record administration events).

**Paper Charts** – Over 20 paper-based charts from a variety of locations and specialities have been assessed. The overall format of paper drug charts are broadly consistent, however there are significant differences in design, with no clearly-favoured standard for layout and organisation. Some of these design differences may well already impact patient safety as care professionals move between hospitals and have to get used to new information groupings while working in stressful environments. A key feature of paper charts is their size: they typically run to a number of sides and contain large amounts of information that needs to be viewed simultaneously for maximum comprehension.

Consistent design principles identified through these reviews are reflected in the design outlined in this document (for example, locating the information about the drug on the left hand side of the screen and the administration events on the right hand side). Much of this document will refer to this 'Typical Generic Paper' (TGP) drug chart, an example of which is shown in Figure 1:

				26/7	27/7	28/7	29/7	
				8am	AP	GP	AP	ST
				1pm	AP	GT	AP	ST
				6pm	ST	AP	SL	AP
				10pm	ST	AP	JK	
Drug (Approved Name)								
<b>paracetamol</b>								
Dose (Metric)	Route	Start Date	Pharm.					
1g	po	26/7/2008	EG					
Doctor's Signature	<b>A Doctor</b>							

Figure 1: Example of a TGP Drug Chart Format for a Regular Drug

<sup>1</sup> Building a safer NHS for patients: Improving Medication Safety, Department of Health {R1}: [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4071443](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4071443)

Points to note about this TGP drug chart style are:

- The drug details are located in a panel located on the left hand side
- Dates of administration are located along a top title bar
- Administration times are not fixed
- Administration times are located between the left hand details and the main administration event area
- Six administration timeslots are permanently available
- Drugs are often split into the following categories:
  - Once Only
  - Regular
  - As Required (also known as 'PRN', referencing the Latin *Pro Re Nata*)
  - Infusions
- There are often additional categories (such as 'Oral Anticoagulants' and 'Insulin') that have dedicated areas on the chart or are recorded on subsidiary charts

**Electronic systems** – The display formats for medicines administration information within electronic systems are much less consistent than the formats of paper charts. These differences impact both the review and task completion functions referred to above and will become a safety concern as electronic systems become more widely available. The challenge for developers of electronic systems is particularly great in this area, as there are no universally-accepted, paper-based standards to refer to and computer screens are not capable of displaying the same density of information as a sheet of paper (let alone a fold-out chart, which may cover up to three sheets). This 'information density problem' is one of the primary reasons why designers of electronic systems resort to 'creative solutions' and why display solutions inevitably diverge. The intention of this guidance is to use design principles that are common across paper drug charts so that there is a familiarity with aspects of the current paper drug charts, thus reducing the training required to move to these electronic systems.

## 1.2 Scope

The guidance in this document is for the Drug Administration View. This view is envisaged as being part of a clinical system that includes a series of views, some of which present medications information for each patient. Guidance for the display of a patient's medications is defined in *Design Guidance – Medications List {R2}*, and more detailed guidance for the layout and formatting of individual medications is defined in *Design Guidance – Medication Line {R3}*. Medications may also be displayed within another view, such as a Timeline View as defined in *Design Guidance – Timeline View {R4}*.

Figure 2 shows a simple outline of the structure and layout of elements within the Drug Administration View. This illustration is used throughout the document, with shaded sections highlighting the area to which the guidance in that section applies.

### Important

The visual representations used within this document to display the guidance are illustrative only. They are simplified in order to support understanding of the guidance points. Stylistic choices, such as colours, fonts or icons are not part of the guidance and unless otherwise specified are not mandatory requirements for compliance with the guidance in this document.

Some examples within this document are based on the requirements for the NHS within the UK. You should consider how your clinical application will need to handle information, such as patient identification numbers (shown with the label 'NHS No.' in some images in this guidance), within the country of use.

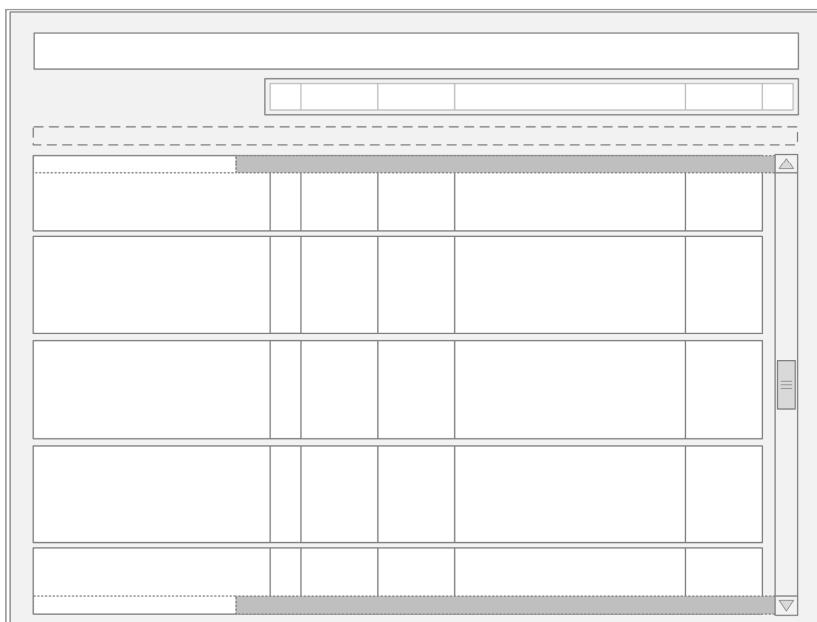


Figure 2: Drug Administration View Outline

Figure 3 contains an example of how this outline may appear when implemented in a styled application:

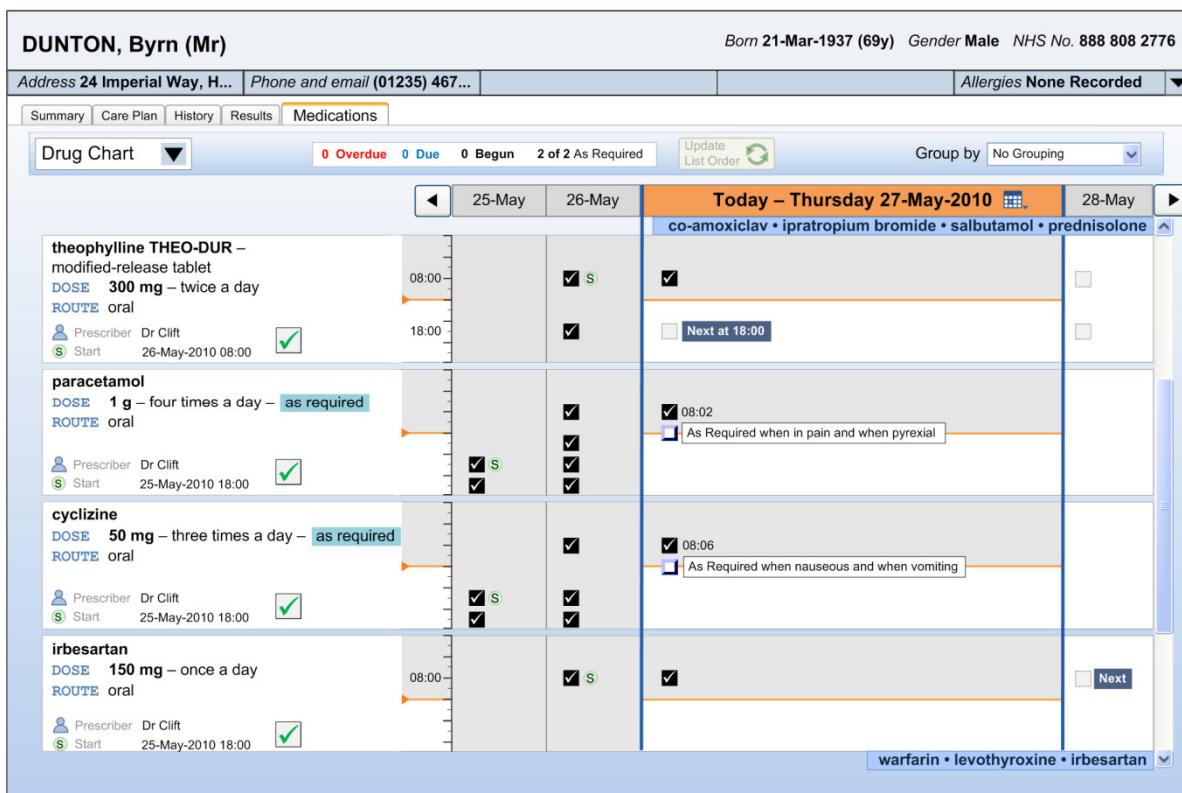


Figure 3: Example of Styled Medical Application Featuring the Drug Administration View

The guidance within this document relates to the area highlighted in Figure 4. All other areas displayed outside of this will not be discussed in this document.

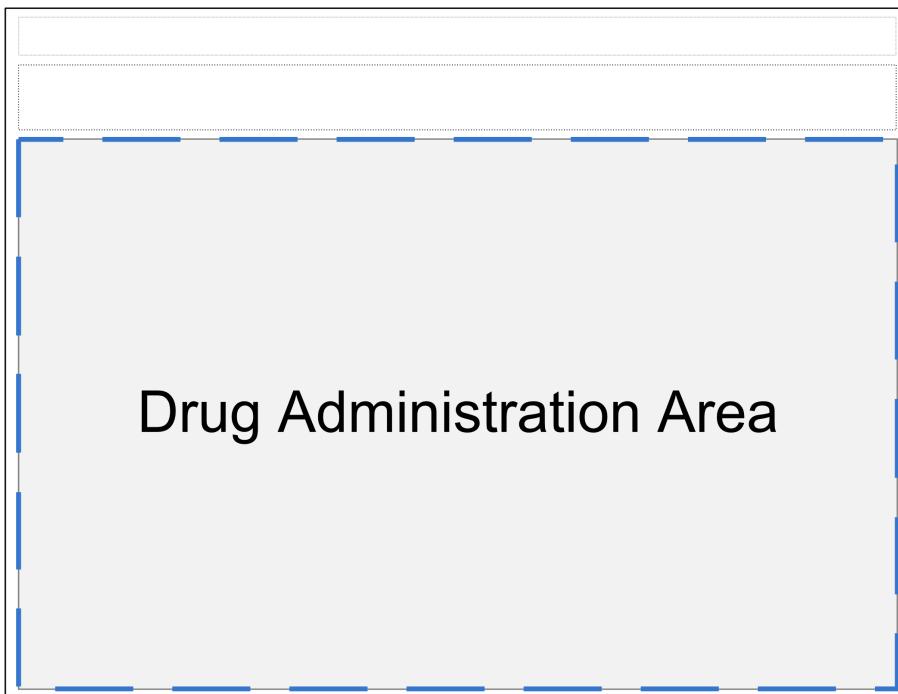


Figure 4: Outline Displaying Drug Administration View Area

Figure 5 provides an overview of the Drug Administration View structure. **Drugs** are presented in the Drug Administration View as a set of horizontal strips within a list. Controls for manipulating the list are positioned above the Drug Administration View in an area called the **Toolbar** and controls for changing the days in view (time navigation) are in the area labelled **Navigation Controls**.

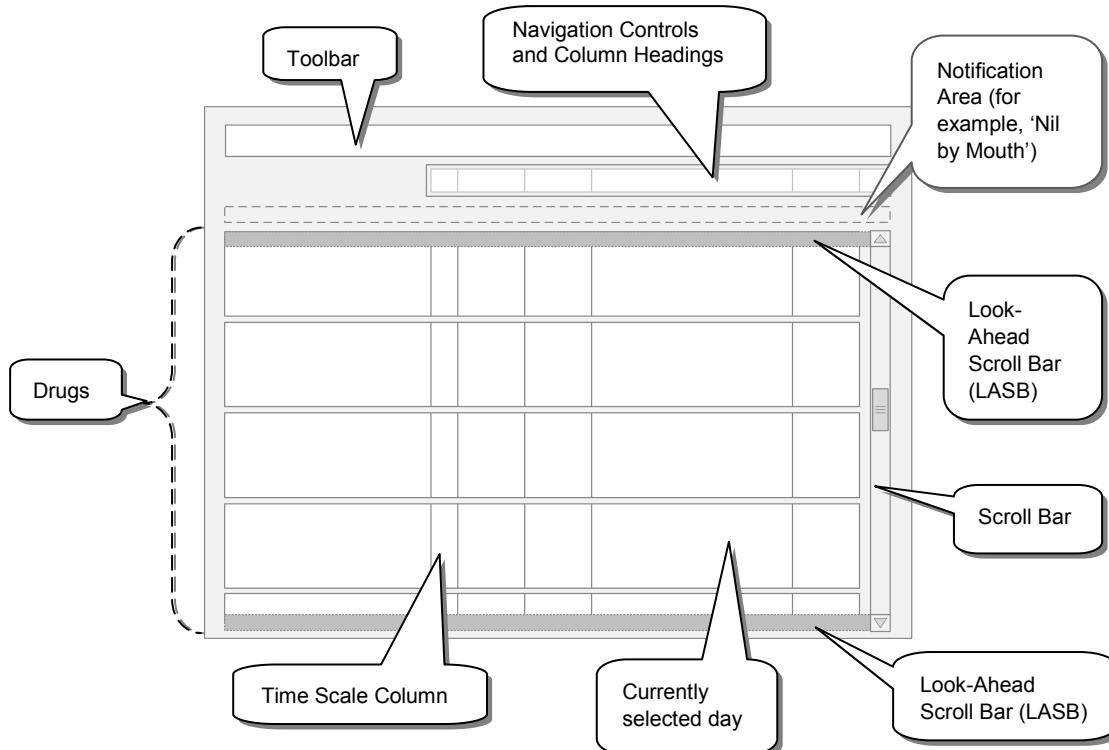


Figure 5: Overview of the Drug Administration View Areas

Figure 6 indicates two key areas of the Drug Administration View: the **Left-Hand Panel** (LHP) and the **Chart Area**. Broadly speaking, information about the drug's prescription is displayed in the Left-Hand Panel and the drug's administration schedule is represented in the Chart Area.

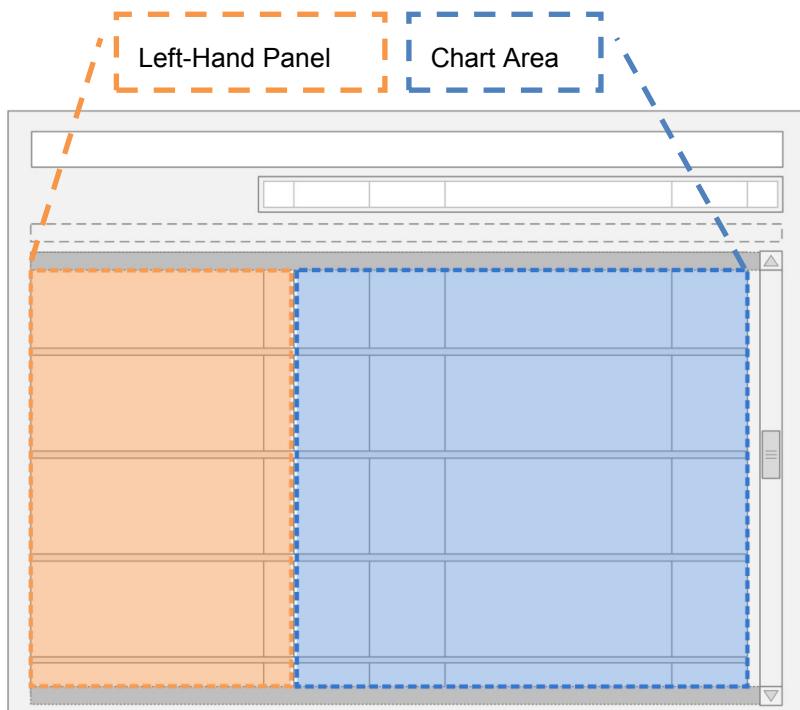


Figure 6: The Left-Hand Panel and Chart Area in the Drug Administration View

The Drug Administration View displays four days of the administration schedule at any one time. Days are represented by columns and drugs by rows, as shown in Figure 7:

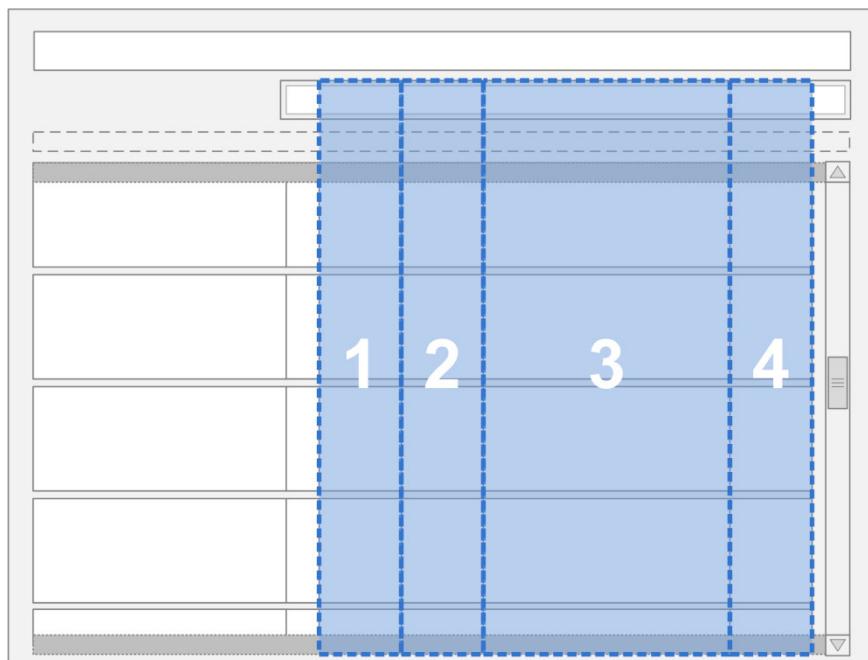


Figure 7: Outline Display of the Four Day View

Column three is the widest column and is often referred to in this document as being ‘in focus’ or ‘selected’ (see Figure 8). This column uses the additional width to display more detail than can be viewed in the surrounding narrower columns.

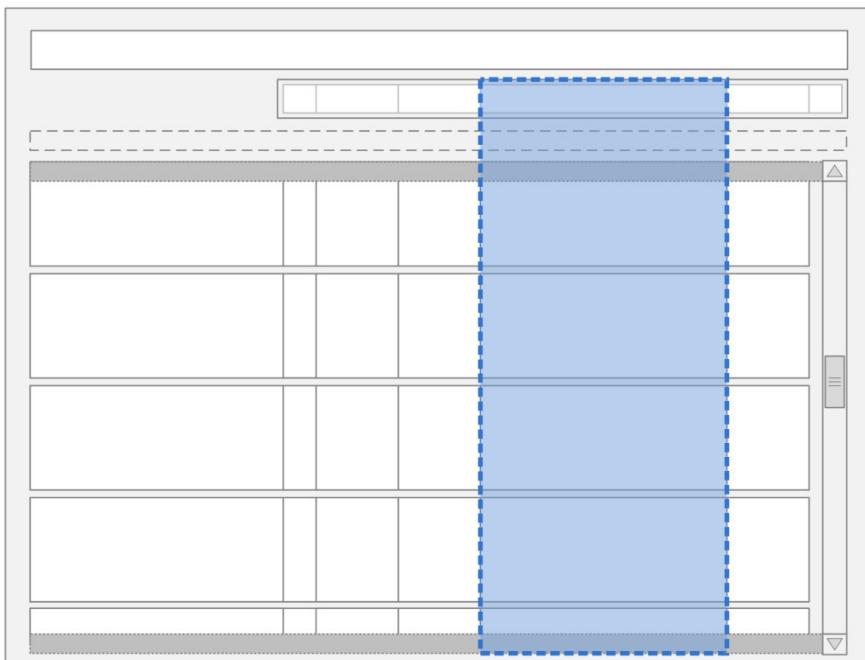


Figure 8: The Location of the Currently Selected Day in the Drug Administration View

Columns one and two display the administration information for the two days prior to the day ‘in focus’, with column one displaying the information for two days prior and column two displaying the information for one day prior. The fourth column displays the details for the day after, as shown in Figure 9:

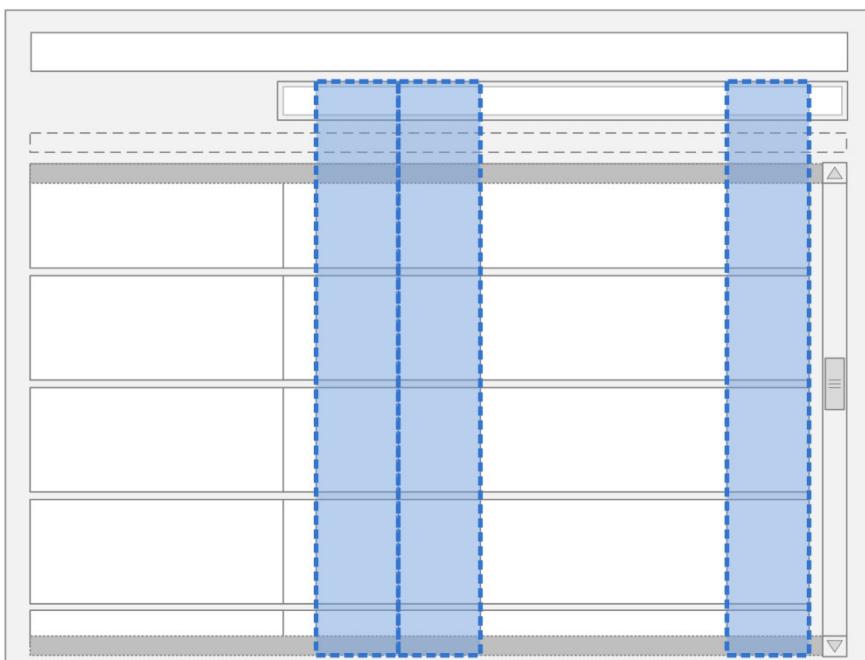


Figure 9: The Location of the Unfocused Days in the Drug Administration View

### 1.2.1 In Scope

This guidance has been developed for, and is supported by research in, short-term acute managed care settings. The guidance is relevant to the presentation of, and interaction with, drug information for a single patient. This is specifically to support the detailed review of administration events and to record drug administrations.

Although this view has been developed for a particular setting, the design has been created so that it can be used in other settings. There are some areas where the detail required is more than the space available in the Chart Area. In this case, the user should be able to click in the relevant area to view more detail. The Drug Administration View remains a valid overview. The drugs referred to in the out of scope section (section 1.2.2) will either fit into the summary view or require an additional level of detail that the user can navigate to so are catered for by the generic design principles in this document.

The guidance in this document covers the following features:

- Recording a successful drug administration for a single patient
- Recording an unsuccessful drug administration for a single patient
- Reviewing details of an individual administration event (past administrations) for a single patient

The following users are covered in this guidance:

- Doctor
- Nurse
- Pharmacist

The following care settings are covered in this guidance:

- Acute managed care (Inpatient)

The following types of drugs are covered in this guidance:

- Oral solids and liquids
- Inhalers and sprays
- Eye/ear/nose drops
- Topical liquids
- Creams, ointments and gels
- Enemas and rectal solutions
- Granules and powders
- Suppositories and pessaries
- Topical patches
- Nebules
- Patients own drugs (PODs)
- Drugs prescribed by independent prescribers

Other situations considered in this document:

- When a patient is Nil by Mouth

## 1.2.2 Out of Scope

### Note

Listing an item as out of scope does not classify it as unimportant. Project time and resource constraints inevitably restrict what can be in scope for a particular release. It is possible that items out of scope for this release may be considered for a future release.

The guidance in this document does not cover the following features:

- Prescribing a drug
- Reviewing what drugs a patient is prescribed
- Checking the accuracy of a prescription
- Adjusting a prescription
- Diagnosing a patient's condition
- Reviewing drugs for a handover
- Recording administrations without a prescription
- Supporting dose calculation
- Making changes to drugs
- Reconciliation
- Verification
- Compliance
- Discharge
- Drug stock checking
- Multi-patient tasks
- Views framework for a single patient (for example, access to the Care Plan)
- Microsoft Health CUI Medications List View
- Microsoft Health CUI Timeline View
- Monitoring chart view
- Selection and action in mixed views
- Drugs in other views
- Display of observations and test results
- Single day view (and additional levels of detail)
- Recording administered doses different from those prescribed
- Incomplete administration
- Partial dose administration
- Administration errors
- Partially-logged administrations
- Management of adverse reactions
- Recording administrations on behalf of another clinician
- Recording self-administrations
- Preparation and administration instructions

The following users are not covered in this guidance:

- Patients
- Ward managers (multiple patient use)
- Non-clinical staff
- Other health professionals
- Anaesthetists

The following care settings are not covered in this guidance:

- Outpatients
- Clinics
- Pharmacies
- Emergency
- Intensive care
- High-Dependency Units (HDU)
- Primary care (including GP practices)
- Community and home visits

The following types of drugs are not covered in this guidance:

- Enteral feeds
- Dressings and devices
- Implants and sticks
- Intrauterine devices (IUDs)
- Cements
- Homeopathic products (including complementary and alternative therapies)
- Dialysis drugs
- Injections
- Anaesthetics
- Insulin
- Warfarin
- Infusions and fluids (these are partially addressed by Section 3.13)
- Combination Infusions
- Total Parenteral Nutrition (TPN)
- Gases
- Blood and platelet products
- Radio-pharmacy
- Foams
- Radioactive agents
- Controlled drugs
- Unlicensed drugs

- Regimens and order sets
- Foodstuffs and other products specially formulated for medical use
- Over the counter (OTC)
- Under the counter
- Recreational
- Unscheduled drugs, other than unscheduled As Required (for example, drugs to be administered two hours before surgery where the date and time of surgery is unscheduled)
- Drugs with titrating doses
- Discharge drugs – to take out (TTO)
- Variable dose drugs
- Drugs prescribed by medication instructions for a named patient (sometimes called Patient Specific Direction (PSD))
- Drugs prescribed by medication instructions for defined groups of patients (sometimes called Patient Group Direction (PGD))
- Drugs supplied under homely remedy protocols
- Drugs prescribed by prescribers other than clinicians (sometimes called supplementary prescribers)

The following are not covered in this guidance:

- Restricted parts of the clinical record (sometimes referred to as 'sealed envelope')
- Decision support (see section 1.2.3)
- Knowledge support
- Alerts and warnings
- Allergies and adverse reactions

### **1.2.3 Decision Support Statement**

Some of the guidance points in this document might be interpreted as implying that the system offers a degree of decision support (for example, time lockouts on As Required medication). However, a full definition of decision support is out of scope for this document.

### **1.3 Assumptions**

ID	Assumption
A1	The Drug Administration View is one of a set of drugs views within a medications framework that assumes the presence of a drugs section within a patient record.
A2	This guidance assumes that the clinical application will have a complete record of drugs for each patient and that the application can access and combine information about current and previous drugs.
A3	This guidance assumes that the user can access any allergy information recorded about the patient.

Table 3: Assumptions

## 1.4 Dependencies

ID	Dependency
D1	The display of dates and time and the controls used to input them are defined by the guidance in the <i>Time Display {R5}</i> , <i>Date Display {R6}</i> and <i>Date and Time Input {R7}</i> documents.
D2	This guidance is informed by the UK NHS National Programme for Information Technology (NPfIT) document <i>dm+d Implementation Guide (Secondary Care)</i> <sup>2</sup> referred to in this document as the NHS Connecting for Health (NHS CFH) Medication Types Rules. Changes to this work may trigger changes to this guidance
D3	This guidance is informed by the UK NHS CFH ePrescribing Functional Specification <sup>3</sup>
D4	This project is in turn informed by <i>The Dictionary of Medicines + Devices</i> <sup>4</sup> (referred to as 'dm+d').
D5	The display of the drug details (name, dose, form, route, frequency and so on) in the Left-Hand Panel conforms to the guidance in the <i>Medication Line {R3}</i> document.

Table 4: Dependencies

<sup>2</sup> NHS NPfIT – dm+d Implementation Guide (Secondary Care) {R8}:  
<http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/refdocs/index.html>

<sup>3</sup> NHS CFH – ePrescribing Functional Specification for NHS Trusts {R9}:  
<http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/baselinefunctsSpec.pdf>

<sup>4</sup> The Dictionary of Medicines + Devices {R10}: <http://www.dmd.nhs.uk/>

## 2 GUIDANCE OVERVIEW

The guidance in this document describes a view for displaying a single patient's drug administration schedule and history and for the recording of individual drug administration events. This **Drug Administration View** supports the tasks of drug administration recording and drug administration review from a single view.

The structure of the full end-to-end process of drug administration has been considered when designing this guidance. However, only the items listed in section 1.2.1 are in scope for this document. Section 2.2 summarises the guidance points detailed in the rest of this document.

### Important

Though it is not explicit guidance, the illustrations in this document and in *Medications List {R2}* follow the secondary care convention of having each fixed dose prescription on a new line, rather than, for example, putting all prescriptions for the same medication on the same line. Variable dose prescriptions may follow different conventions

In several of the usage examples, notional icons are illustrated by placeholders. Figure 10 shows examples of such notional icons:

- Icon A
- Icon B
- Icon C

Figure 10: Examples of Notional Icons

### 2.1 Rationale Summary

The guidance in this document works towards reducing patient safety risks arising from the information used to administer drugs.

General Principles:

- The identification of specific drugs that are due for administration
- Supporting the safe recording of drug administrations
- Must be able to record what actually happened
- Aim not to introduce any additional risks from current paper practice

Usability Principles:

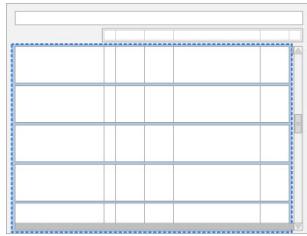
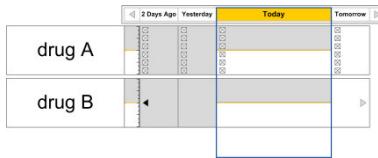
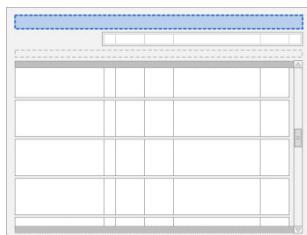
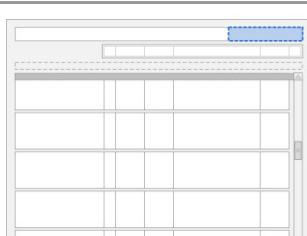
- Highlight the primary functions to support accurate recording of what happened for an administration event
- Display safety critical elements to the clinician without requiring user action
- Promote the primary functions to support quick recording of an administration event
- Support access to secondary functions without introducing screen clutter
- Transfer key design principles from the paper drug charts studied to reduce the need for training and increase familiarity when users move to electronic systems.

Existing Standards:

- UK NPfIT ePrescribing Functional Specification for NHS Trusts {R9}
- UK Nursing and Midwifery Council (NMC) Standards<sup>5</sup>
- UK NHS NPfIT dm+d Implementation Guide (Secondary Care) {R8}

## 2.2 Summary of Guidance

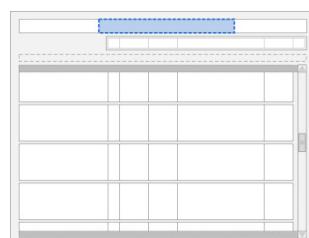
Table 5 summarises the content of this document by outlining each area of guidance (along with a cross reference to the relevant section) and providing a visual example to illustrate how it might be implemented:

Areas of Guidance	Visual Summary
3.3.1 Composition of the Drug Administration View	
3.3.2 Inclusion Criteria	
3.4 List Order	 <ul style="list-style-type: none"> <li><b>OVERDUE for 06:30</b></li> <li>DUE 06:11-08:30</li> <li>Start DUE at 08:00</li> <li>DUE at 08:00</li> <li>DUE at 08:00</li> <li>As Required</li> <li>In Progress</li> <li>Next at 10:00</li> </ul>
3.5.1 Controls in the Drug Administration View	
3.5.2 Grouping	

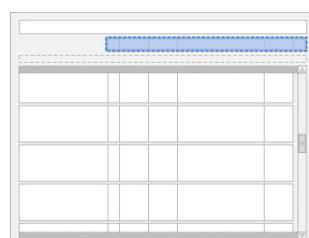
<sup>5</sup> Standards for medicines management {R11}: <http://www.nmc-uk.org/aDisplayDocument.aspx?DocumentID=6228>

**Areas of Guidance****Visual Summary**

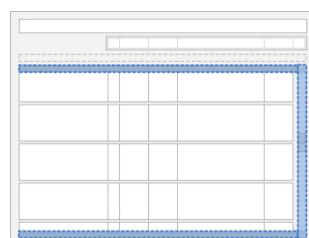
3.5.3 Status Bar



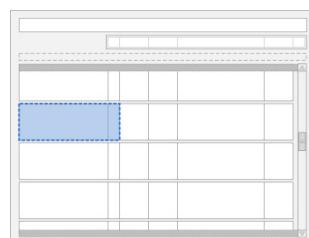
3.6 Navigation



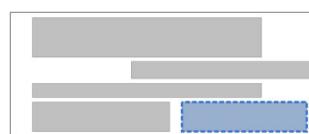
3.7 The Look-Ahead Scroll Bar



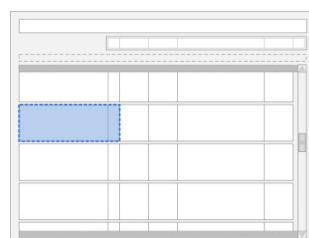
3.8.1 LHP Structure and Contents



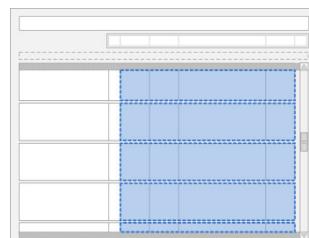
3.8.2 LHP Icons



3.8.3 LHP Information Panel

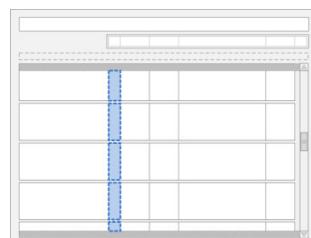


3.9.1 Chart Area Structure and Layout

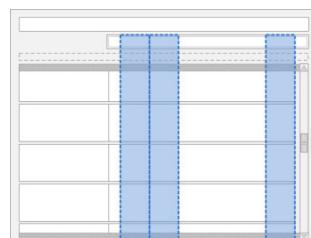


**Areas of Guidance****Visual Summary**

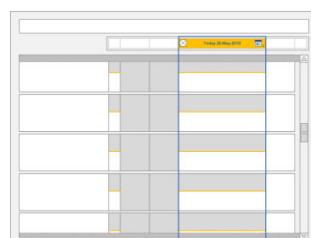
3.9.2 Time Scale



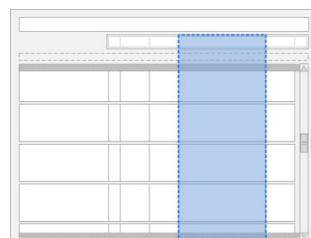
3.9.3 Indicating Past and Future



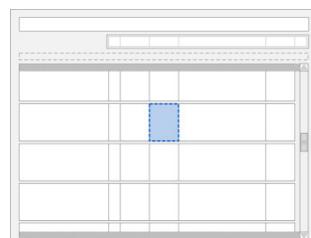
3.9.4 Indicating Today



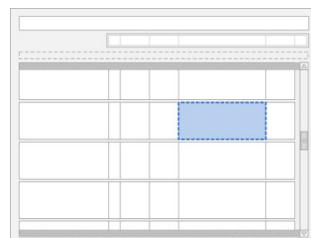
3.9.5 Indicating the Currently-Selected Day



3.9.6 Information Display

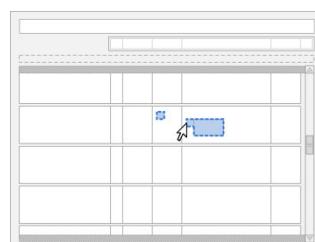


3.9.7 Information Display for the Currently-Selected Day

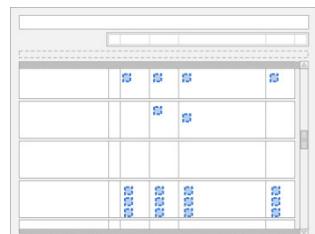


**Areas of Guidance****Visual Summary**

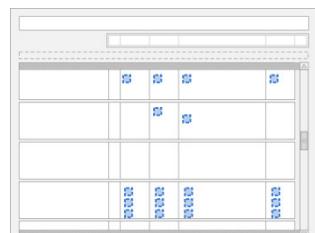
3.9.8 Chart Area Access to More Details



3.9.9 Symbols and Icons



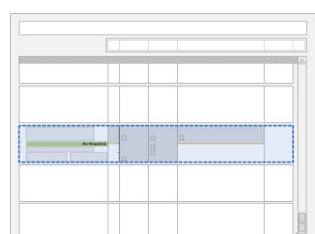
3.10.1 Overdue Drugs



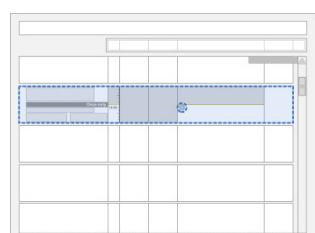
3.10.2 Past Overdue



3.11 Displaying As Required Administration Events

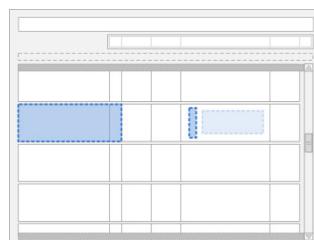


3.12 Displaying Once Only Administration Events

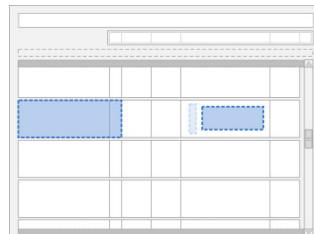


**Areas of Guidance****Visual Summary**

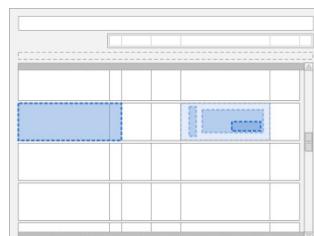
3.13.1 Displaying Significant Duration Drugs



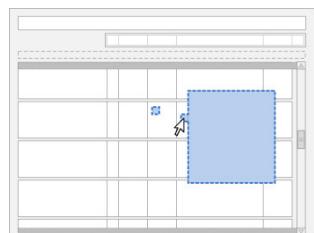
3.13.2 Status Box



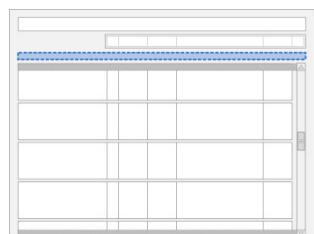
3.13.3 Detailed View



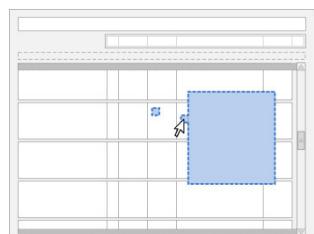
3.13.4 Recording Significant Duration Drug Administrations



3.14.1 Displaying Nil by Mouth Status

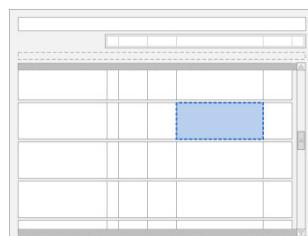


3.14.2 Supporting Administrations While a Patient is Nil by Mouth

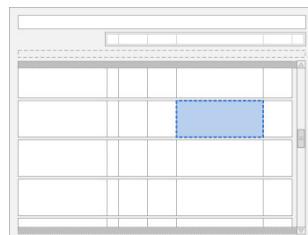


Areas of Guidance	Visual Summary
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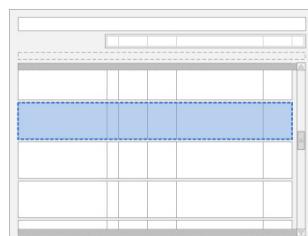
3.15.1 Variable Dose Drugs



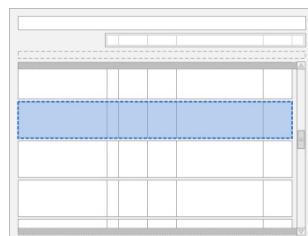
3.15.2 Preconditions



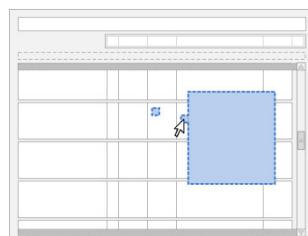
3.15.3 Time-Critical Administration Events



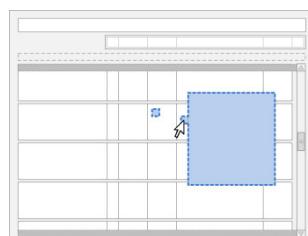
3.15.4 Witnessed, Role-Specific and Self-Administrations



3.16.1 Recording Administration Events



3.16.2 Structure of the Form



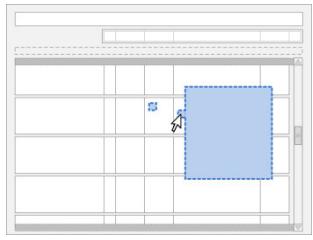
Areas of Guidance	Visual Summary
3.16.3 Recording Administrations	
3.17 Medication Updates	No Visual Summary associated with this guidance

Table 5: Summary of Guidance

## 3 DRUG ADMINISTRATION GUIDELINES

### 3.1 Introduction

This section of the document presents the guidance for the Drug Administration View split by component or topic area.

### 3.2 Principles

The following key principles inform this guidance:

- Provide a visually-rich chart of information relevant to, and prioritised for, the administration of drugs
- Support the presentation of drugs with different characteristics (such as Significant Duration, Once Only or As Required drugs) within one view
- Display sufficient information for an accurate interpretation of the administration schedule (past, current and planned) and status of administration events within a relevant time interval
- Restrict the display of unnecessary information to reduce clutter and prioritise the information most likely to require action
- Provide access, in context, to further details on demand
- Mitigate the potential for action to be taken without sufficient information by presenting carefully selected information and explicit labels to clarify what information is displayed and the extent to which it is complete
- When dynamically presenting information (such as status information, error messages or warnings), display the information in context and facilitate action where necessary by clearly providing associated controls
- Support efficient and accurate recording of administration events with enough flexibility for differences in drugs and working practices

### 3.3 Structure and Contents

This section of the guidance document looks at the general composition of the Drug Administration View. It describes the rules concerning the overall structure and contents required.

#### 3.3.1 Composition of the Drug Administration View

The guidance points in this section relate to the whole Chart Area used to display the medication lines in the Drug Administration View. Figure 11 highlights this area:

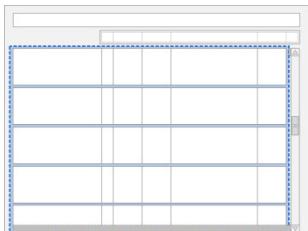


Figure 11: Drug Administration View Area

ID	Description	Conformance	Evidence Rating
MEDA-0001	In the Drug Administration View, present a list of discrete drugs equivalent to medication lines in the Medications List View as described in the <i>Medications List</i> document {R2}	Mandatory	Medium
MEDA-0002	Ensure that each drug in the Drug Administration View is bounded by a border	Mandatory	Medium
MEDA-0003	Ensure that medication lines are separated by 'white space' (that is, clear space unused for other purposes)	Mandatory	Medium
MEDA-0246	Allow a medication line to be selected by clicking any part of it except those parts that are clicked to perform other actions (for example, an information icon)  See section 3.8.2 for guidance relating to the information icons	Mandatory	Medium

#### Usage Examples

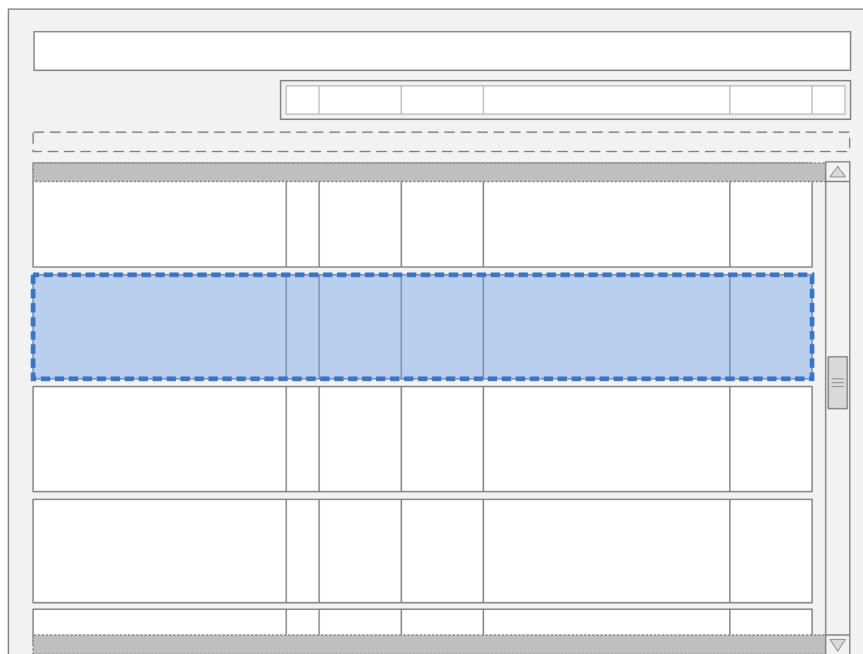


Figure 12: Example of a Single Selected Medication Line

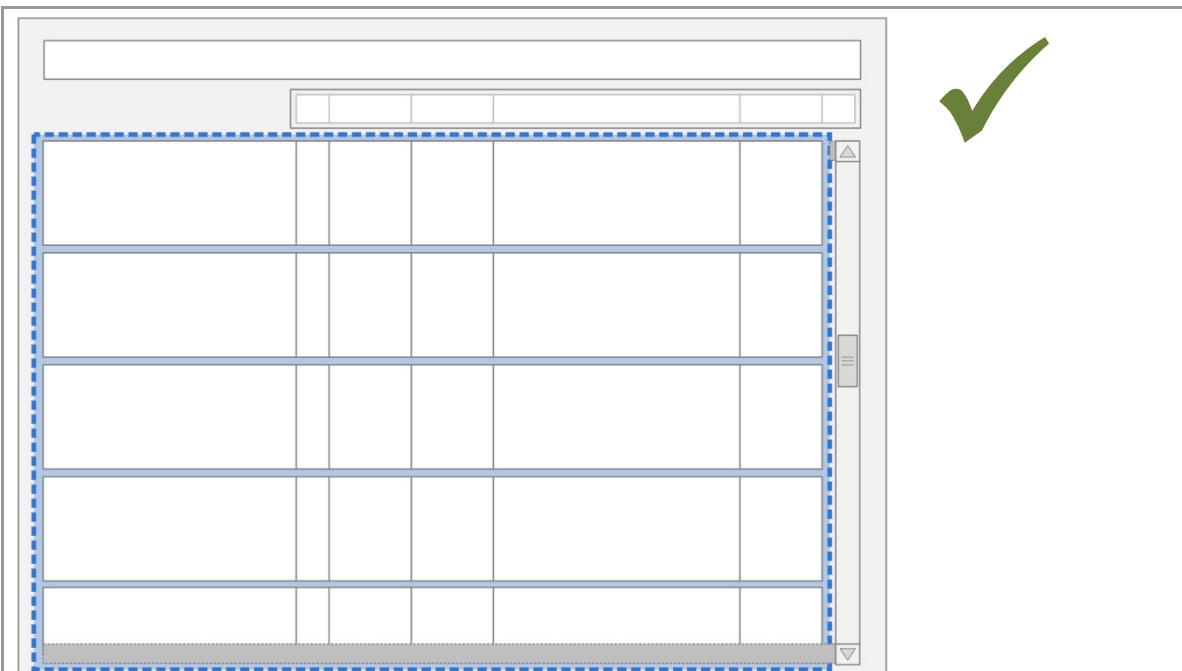


Figure 13: List of Single Discrete Drugs Bounded by a Border and Separated by White Space (Shown in Blue)

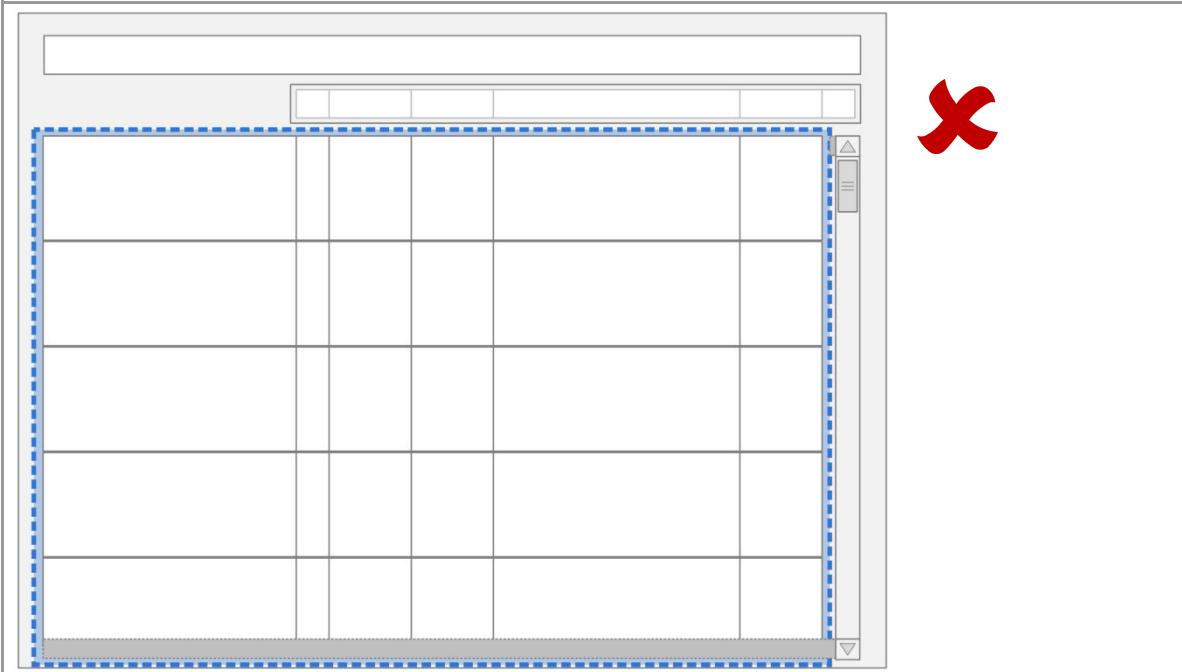


Figure 14: List Not Separated by White Space (Shown in Blue)

### Rationale

MEDA-0001

The rows on the Drug Administration View should be consistent with the rows on the Medications List View so that clinicians can switch between the two views and easily understand which rows correspond. If the rows did not match up between the two views, clinicians may be confused and assume a medication is 'missing' from one of the views or take longer to find particular medications when switching between the two. For example, confusion could arise if two sequential bags of an Infusion were shown as two lines in one view but aggregated as only one in another.

MEDa-0002

Though it is not explicit guidance, the illustrations in this document and in *Medications List {R2}* follow the hospital and acute care convention of having each fixed dose prescription on a new line, rather than, for example, putting all prescriptions for the same medication on the same line. Variable dose prescriptions may follow different conventions.

Medication 'lines' in the Drug Administration View are collections of text, lines and symbols. Medication lines need to be clearly demarcated from each other in order to prevent misreading between the lines. For example, misassociating the left hand drug details with another line's administration events. Alternative means of demarcating the lines (such as alternate row shading or keylines) would not on their own be sufficient to distinguish the medication line.

MEDa-0003

Medication lines are separated by 'white space' to provide a clear but uncluttered division between the lines to reduce the risk of misreading.

### 3.3.2 Inclusion Criteria

The guidance points in this section relate to when a medication line is included in the available list in the Drug Administration View. Figure 15 displays an example of this list:

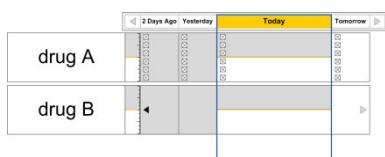


Figure 15: Inclusion Criteria Area

#### Note

In this document, 'current' medications refer to those that have been prescribed to a patient and have not yet been discontinued or completed. A medication can also be termed current with reference to a time in the past when the medication was current for the patient.

ID	Description	Conformance	Evidence Rating
MEDA-0262	Always show all medications that were or are current for the patient at any point during the visible time window. As such, when a medication is discontinued, it should remain in the list only as long as the visible time window includes a time when the medication was current for the patient.	Mandatory	High
MEDA-0263	When the user navigates through time (for example, scrolling into the past) retain those medications which are current as of 'now'.	Recommended	Medium
MEDA-0007	Dynamically update the drugs in the Drug Administration View list as the navigation controls are used to change the days visible in the Chart Area	Mandatory	Medium

#### Usage Examples

Figure 16, Figure 17 and Figure 18 show a list of three drugs and how the view behaves as the clinician scrolls into the future (MEDa-0262, MEDa-0007):

- Figure 16 – A completed medication (Drug C) is shown in the view because it was current for some time still in view (yesterday and two days ago). Drug B is also displayed because it is still current, even though it only has one administration event a week
- Figure 17 – The clinician has advanced the view by one day so tomorrow is now the currently selected day. Drug B is still displayed in the list because it is still current, despite it having no administration events visible in the four day time window
- Figure 18 – The clinician has advanced the view by four days. Drugs A and B are still current and so included. Drug C has been removed from the list because it is completed and the time period in view (plus two days to plus five days) does not cover a time when the drug was current. Drug C is still accessible by scrolling back in time, or by using an alternative medications view

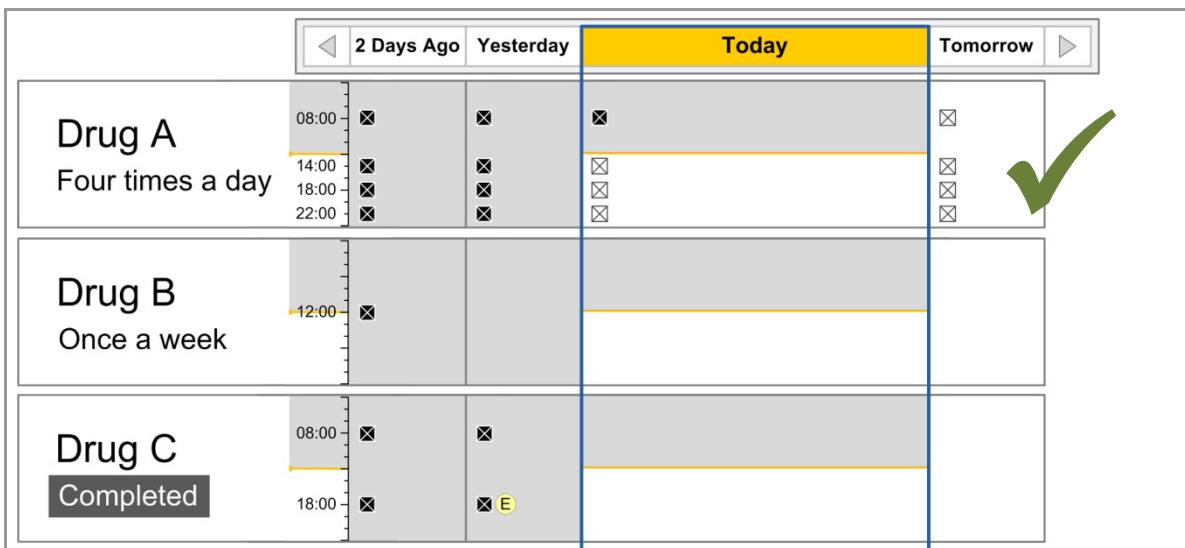


Figure 16: Step One – Displaying All Drugs That Were Current for the Time in View (A, B and C)

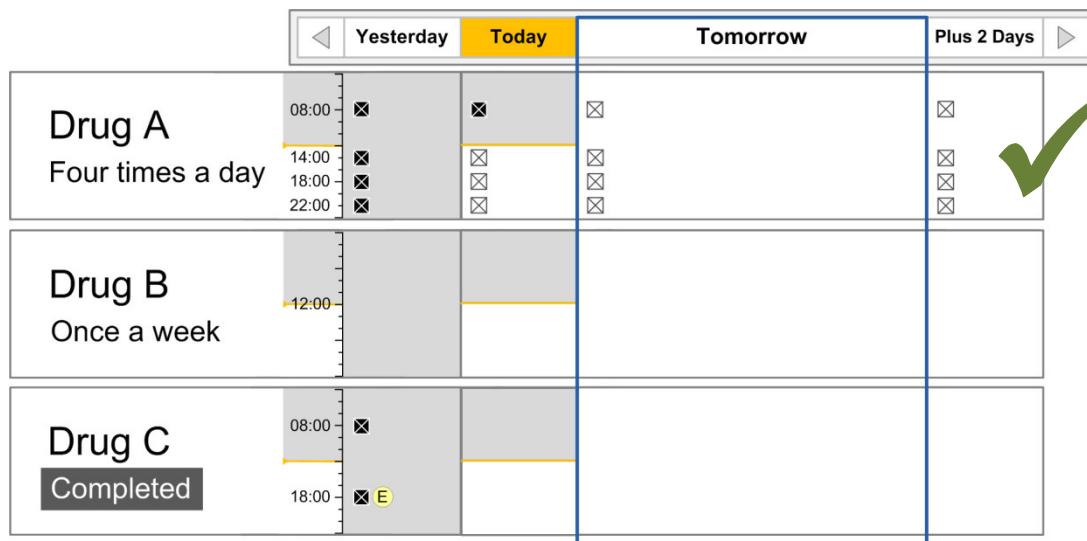


Figure 17: Step Two – Displaying All Drugs That Were Current for the Time in View

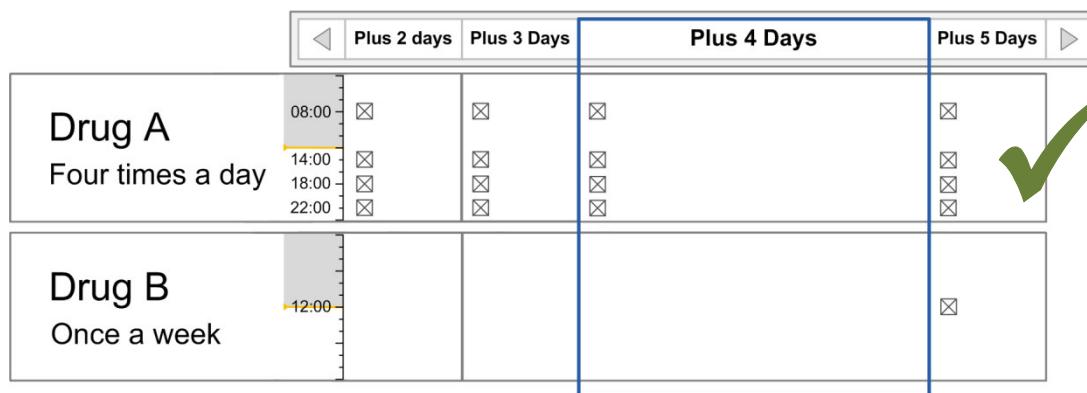


Figure 18: Step Three – Displaying Only Drugs A and B as Drug C Is No Longer Current in the Four Days in View

## Rationale

MEDA-0262

The drug Chart Area (in the default four day window) must always accurately reflect the state of the patient's medications during that time, otherwise the clinician may be misled. All the medications that were or are current during that time must be included in the list. This includes medications that may be or may have been current but have no administration event. For example, it may be important to know that the patient has been on As Required analgesia for the past five days but has not required any administration of it.

Medications that have been completed or discontinued within the visible time window may still be relevant to current administration concerns. A clinician may need to be able to review the administration history of past medications as well as current ones. As per the guidance on list ordering (see section 3.4), current medication is always sorted above past medication.

User feedback with a small number of clinicians unanimously agreed that the Drug Administration View should always display the 'complete' list of drugs that were administered during the time window that is currently visible (if the data exists in the system) {R12}.

Including past medications only when their 'current' period falls within the four day window in view avoids the issue of processing and displaying the potentially hundreds of past medications.

As the list is 'filtered' by the four days in view, rather than by status, it avoids the need for additional filter indication. For example, if the view only showed the current medications, and never the past, this implies the need for an indication of filtering, an explanation of filter criteria and a way to access the filtered out medications.

MEDA-0263

It is recommended to always display drugs current as of now so that they are easily accessible while navigated into the past or future enabling comparison of the current medications with those prescribed in the past.

## 3.4 List Order

The guidance points in this section relate to the hierarchical list order for the drug lines in the Drug Administration View. Figure 19 displays an example of this list using just the labels:

```
OVERDUE for 06:30
DUE 08:15-08:30
Start DUE at 08:00
DUE at 08:00
DUE at 08:00
As Required
In Progress
Next at 10:00
```

Figure 19: List Order

This section includes guidance that defines the rules for determining the list order for drugs in the Drug Administration View. This guidance assumes that the system will have access to information about when the drugs are scheduled to be administered and what is considered to be a safe threshold of time tolerance for how early or late a drug can be given before it is not considered to have been given on time.

### Note

Time tolerances will be down to local governance and are not defined in this document.

The terms defined in Table 6 are used in this section and later in the document to refer to states of scheduled administrations:

Event Schedule State	Quick Definition	Description	Possible Administration Status If Recorded
Empty	Future	The event is scheduled but is not Due, Overdue or Next	Depends on context
Next	Next event to be Given	The event is the Next chronological event for that drug that is not Due or Overdue	If administered while Next, the administration might be categorised as Given Early
Due	Ready to be Given	The event is within the tolerances for the drug administration schedule (example time tolerances could be one hour before and after the scheduled administration time)	If administered while Due, the administration might be categorised as Given
Overdue	Should have been Given by now	The event is later than the time constraints of the drug administration schedule	If administered while Overdue, the administration might be categorised as Given Late.
Begun	Drug administration underway	A Significant Duration drug such as an infusion (see section 3.13), for which a start date and time have been recorded, is scheduled to still be running and has nothing recorded to indicate that it has stopped.	Depends on context
Unscheduled As Required	A drug that is administered according to patient need	A drug that has not been given a regular schedule and therefore is only given on an as needed basis based on clinical judgement and preset criteria. For more on As Required medication see section 3.9.1.	If administered As Required, the administration might be categorised as Given

Table 6: Scheduled Administration Terms

In summary, the list-ordering rules place:

- Overdue drugs at the top of the list
- Drugs with scheduled administrations that are not yet Due lower in the list
- Drugs with only past administrations (and no further planned administrations) at the bottom of the list

#### Note

The list order is based on the time of Next scheduled administration and not on any clinical decision support.

ID	Description	Conformance	Evidence Rating
MEDA-0023	<p>Order the list of drugs in the Drug Administration View according to the scheduled time of the Next administration, such that the most Due drugs appear at the top.</p> <p>Order Overdue drugs higher in the list than those that are Due only</p> <p><b>RISK</b></p> <p>There is an unmitigated risk that clinicians may mistakenly assume that the medications in the Drug Administration View are ordered by clinical priority as opposed to by scheduled time. If desirable, ordering by clinical priority would be by clinical decision support, which is out of scope</p>	Mandatory	Medium
MEDA-0025	For drugs that share the same Next administration time, place those with a higher priority of administration (for example, those with more stringent time tolerances) higher in the list	Mandatory	Medium
MEDA-0026	<p>Place Regular drugs higher in the list than unscheduled As Required drugs that:</p> <ul style="list-style-type: none"> <li>■ Share the same Next administration time as the Regular drugs</li> <li>■ Are available for administration (in that they have not been 'locked out' due to a time constraint)</li> </ul> <p><b>RISK</b></p> <p>There is an acknowledged risk with placing As Required drugs below Regular drugs. This risk is that the As Required drugs may be missed by the clinician if they are off screen. However, on balance, it is felt more important to display Regular drugs at the top of the list and that presenting the As Required drugs in the same list is superior to them being in a separate section where they would always be out of immediate view.</p>	Mandatory	Medium
MEDA-0027	Place unscheduled As Required drugs that are unavailable for administration due to a time constraint, below those drugs with administrations that are scheduled before the active time constraint ends	Mandatory	Medium
MEDA-0028	Place Significant Duration drugs that have Begun (and not been discontinued or stopped) below drugs that are Due	Mandatory	Medium
MEDA-0029	Place drugs that have no Due administrations below those 'Significant Duration' drugs that have Begun (and not been discontinued or stopped)	Mandatory	Medium
MEDA-0030	Place past drugs with more recent administration events higher in the list than past drugs whose last administration events are further in the past	Mandatory	Medium
MEDA-0031	Place past drugs lower in the list than current (including not started) drugs	Mandatory	Medium
MEDA-0032	Maintain the order of the list until it is refreshed manually or the patient record is closed and the Drug Administration View re-opened	Mandatory	Medium
MEDA-0252	An administration event should become 'Next' when the following conditions are met: <ul style="list-style-type: none"> <li>■ It is not an event for an unscheduled 'As Required' drug</li> <li>■ The event is for a drug that does not have either a Due or an Overdue administration event</li> <li>■ The event is the Next chronological event for that drug</li> </ul>	Mandatory	Medium
MEDA-0264	Use the label 'Begun' when referring to Significant Duration drugs that have been recorded to have started and have not been stopped or discontinued	Recommended	Low

## Usage Examples

Figure 20 shows how the list order of three drugs might change over time using simplified medication lines. The icons and time tolerances used are notional. These demonstrate the list order guidance for Due, Overdue and As Required medications.

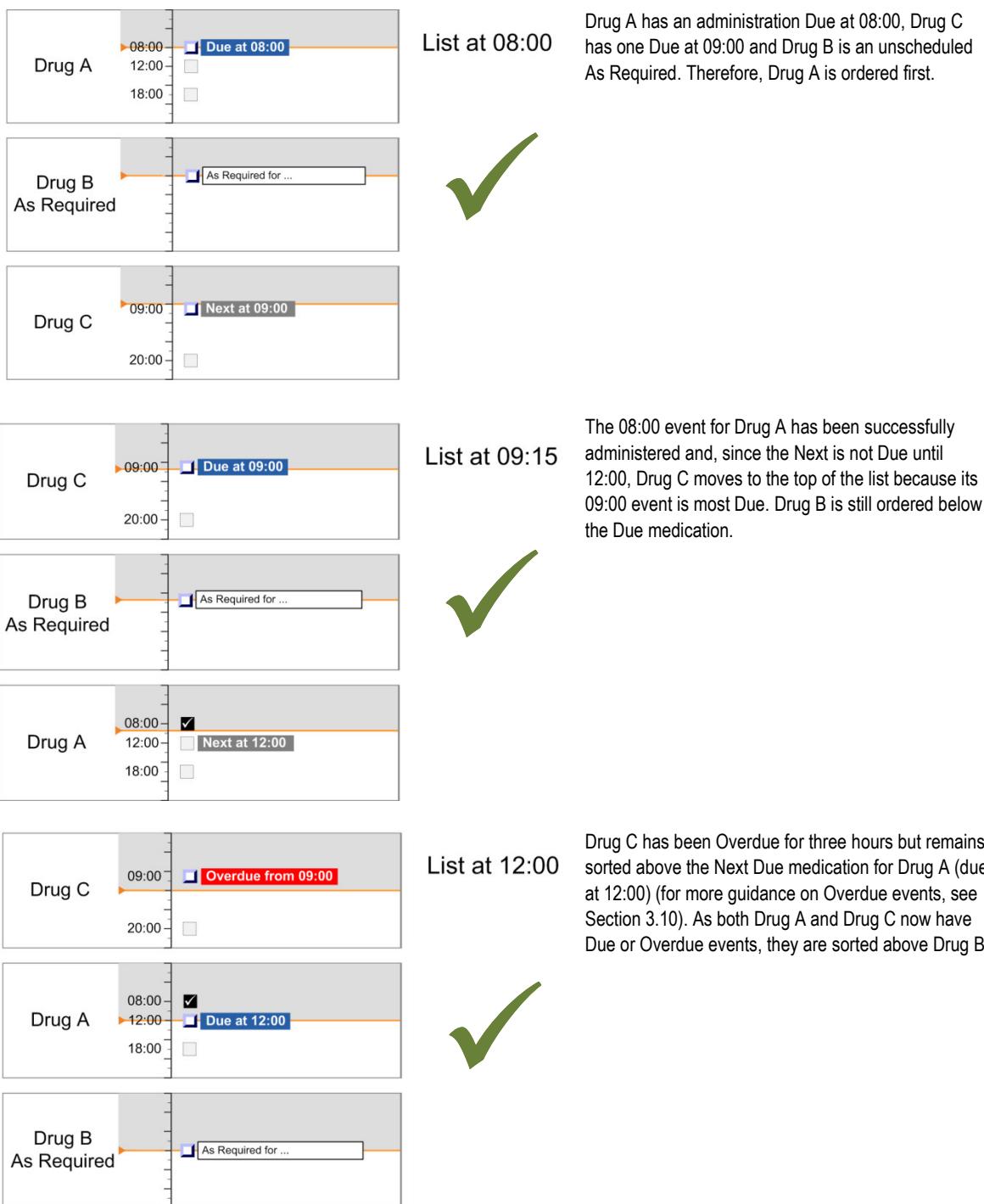


Figure 20: Examples of How the Order of Three Medications Might Change Over Time

The list of event statuses in Figure 21 demonstrates the effect of the list ordering guidance. Figure 21 shows a list of 11 example medication lines with different statuses present in a Drug Administration View at the same time. The Overdue medications are sorted to the top and the Next medications are towards the bottom. As per the guidance, medications with only Future events and no status would be sorted beneath those and medications that have been completed or discontinued would be sorted below them.

The examples in Figure 21 are predicated on the current time being 08:15:

<b>OVERDUE for 04:30</b>	A drug that was Due to be administered at 04:30 and that is now Overdue as a result of its time tolerances	
<b>OVERDUE for 06:30</b>	A drug that was Due to be administered at 06:30 and that is now Overdue as a result of its time tolerances. This is less Overdue than the Overdue item above	
 <b>DUE 08:15-08:30</b>	A drug that is now Due for administration and has specific time tolerances (the notional icon represents a specific time tolerance)	
<b>DUE at 08:00</b>	A Significant Duration drug that was Due to be started at 08:00 (15 minutes ago). Using an additional 'Start' label is not part of guidance	
<b>DUE at 08:00</b>	A drug that is now Due	
<b>DUE at 08:00</b>	A drug that is Due for administration at the same time as the previous drug, is within time tolerances and is listed second as a result of ordering by a second attribute (such as drug name). Guidance does not specify what these second attributes should be	
 <b>Begun</b>	'Begun' indicates a Significant Duration drug that has been started, is scheduled to still be running and has not been recorded as being stopped or discontinued	
<b>As Required</b>	An unscheduled As Required drug that is available for administration	
<b>Next at 10:00</b>	The Next scheduled administrative event that is not yet Due	
 <b>As Required</b>	An unscheduled As Required drug with a pre-condition (represented by the icon) that has an advisory lockout. The advisory lockout indicates that the minimum time interval from the previous administration has not yet been reached	
<b>Next at 20:00</b>	The Next scheduled administrative event that is further in the future, is not yet Due	

Figure 21: List Order of an Example Set of Event Schedule Statuses

## Rationale

MEDA-0023, MEDA-0025—MEDA-0031, MEDA-0252

The ordering of the list in the Drug Administration View, together with the dynamic status information and the Look-Ahead Scroll Bar, helps to bring drugs that are most likely to require attention for administration concerns to the top of the list.

Based on the administration event schedule status, this continual reordering of the list has been introduced to address two main issues:

- The reduced amount of space for data on standard computer screens compared to TGP drug charts
- The effort currently required with paper drug charts to determine which medications are Due for administration at a particular time and the errors that occur when the difficulty of this process causes administration to be delayed or missed altogether

By bringing those medications which most require attention to the top of the view, clinicians do not have to scan the view to find those Due and administration can be prioritized. For example, an Overdue administration would have most prominence in the view and so encourage the clinician to attend to it.

Reordering does not prevent clinicians from viewing or administering medication in any order they choose, as there may be additional clinical factors affecting which medication should be given first.

Given that reordering of drug lists is unfamiliar to the vast majority of current healthcare staff, the feature was the subject of repeated clinician assessment. Three rounds of user feedback with small numbers of clinicians showed support for a dynamic ordering by 'dueness' as the most appropriate order for supporting the task of drug administration, as opposed to a fixed sort order (for example, by start date) ({R12, R13}, see APPENDIX A and APPENDIX B). Those responses were based on the assumption that users would be able to access a 'fixed' sort order (for example, by start date) if required. Staff who use the administration schedule and history for tasks other than drug administration (such as pharmacists) felt the ordering by dueness was less appropriate (see APPENDIX A). Though positive about the concept of dynamic ordering, clinicians were generally concerned that it would require training to explain its use.

Another approach to bringing Due and Overdue medications to the clinician's attention would have been to filter the list (or provide access to a filtered list) of only those medications which are Due or Overdue. However, this approach was felt to reduce the clinician's awareness of the patient's other medications. In addition, reordering can provide a more fine-grained distinction between medication priorities than pure filtering (for example, by ordering Overdue above Due and more Due above less Due).

Though not specified in guidance, use of reordering would allow additional rules to support local administration conventions. For example, some wards may have a convention to administer intravenous (IV) medications after non-IV medications if both are scheduled for the same drug round time. In this case, an additional setting (which has not been hazard assessed) might be that for medications Due at the same time, non-IV should be ordered above IV.

#### MEDA-0032

The list reordering should not be totally dynamic. It should only reorder when:

- It is manually refreshed
- The view is re-opened
- A medication is added or updated (by anyone)

This is so users retain control and can see feedback from the actions they perform that trigger a change in order. For example, when a clinician records a Due administration as Given, a totally dynamic reordering would immediately move the medication further down the list. The medication would seem to 'disappear' from view and another medication 'appear' in its place. This potential confusion is removed by not allowing automatic reordering while the list is open.

#### MEDA-0264

The label of 'Begun' is only recommended as it was only suggested late in the guidance development process and has not been evaluated or formally risk assessed. The challenges for this label are that it has to be unambiguous such that:

- It is associated only with Significant Duration drugs ('Start' is used as a label associated with all medications courses)
- It only conveys that the medication has been started and not that it is running to plan (the system does not know this at this point)
- It is not confused with the 'To Start At' indicator for Significant Duration medications

## 3.5 Drug Administration View Controls

### 3.5.1 Controls in the Drug Administration View

The guidance points in this section relate to the main controls for the Drug Administration View. Figure 22 highlights the area in which they are located:

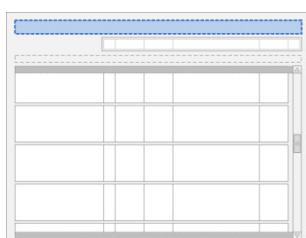


Figure 22: Main Controls

Guidance for the controls for navigating between different views of drugs and for manipulating the Drug Administration View is defined in the *Medications List* document {R2}. The guidance in this section is for the controls associated specifically with the Drug Administration View.

ID	Description	Conformance	Evidence Rating
MEDA-0247	Within the Drug Administration View, as a minimum, provide the following two controls: Status Bar and Grouping Control	Mandatory	Medium
MEDA-0248	Do not provide filtering controls in the Drug Administration View	Recommended	Medium

### Usage Examples

The shaded area (blue with a thick broken border) in Figure 23 shows where the Drug Administration View controls are positioned:

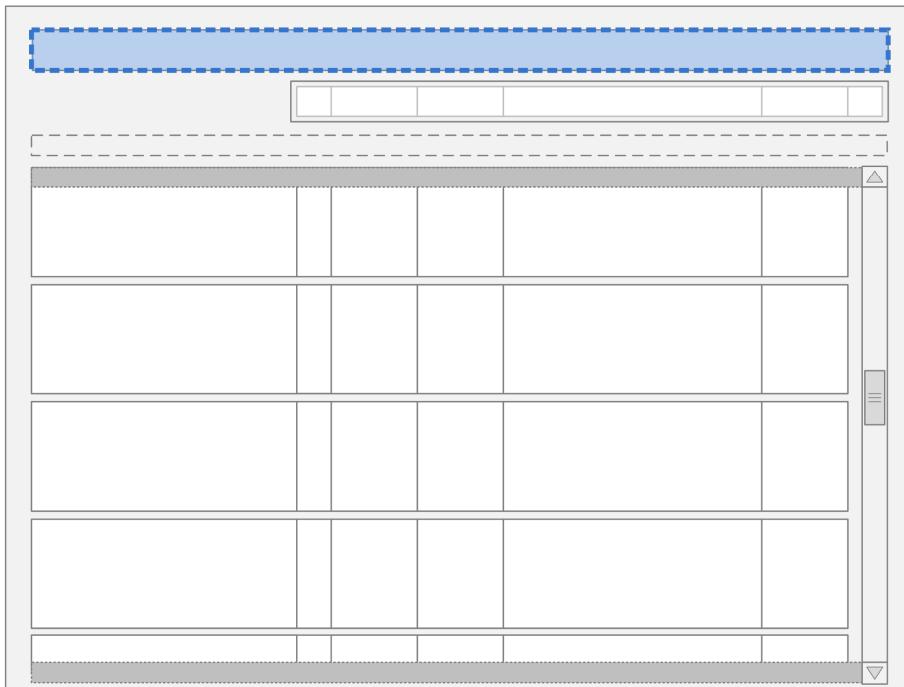


Figure 23: Drug Administration View Area – Controls

Figure 24 shows how the Drug Administration View controls could be displayed on the Toolbar. The **Grouping Control** and **Status Bar** are defined in sections 3.5.2 and 3.5.3 respectively.

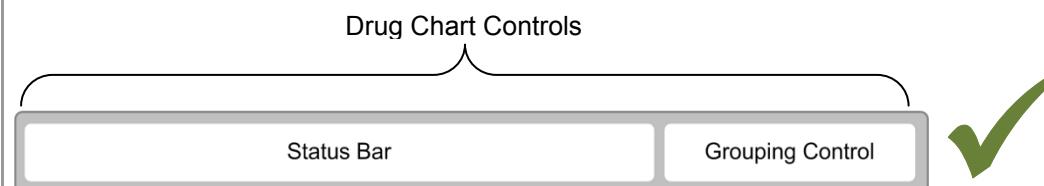


Figure 24: Drug Administration View Controls on the Toolbar

### Rationale

MEDA-0247

Rationale for inclusion of the Status Bar is described in section 3.5.3.

The Grouping Control (further defined in section 3.5.2) is included in the Drug Administration View because of the universal convention on current TGP drug charts to group medication in related sets. A common grouping being: Once Only (stat), As Required (PRN), Regular and Infusions. Whether or not the view is grouped by default, and irrespective of what grouping sets are available, clinician feedback was that it should at least be possible to group the medications in the list. In particular, some clinicians would likely want to be able to arrange the view in a way familiar from their trust's paper charts (R12) and see APPENDIX B).

Grouping the list is also a feature common to the Medications List View.

Though grouping the list would disrupt the dynamic list ordering, on balance the risks of clinician rejection of the system through unfamiliarity of the view (by not being able to group the list) are thought to outweigh any risks that might be caused by ordering within groups rather than across the whole list.

## MEDa-0248

Filtering of the view introduces the risk that a clinician may miss a medication or administration event when looking at the chart and, as a result, he or she may potentially not perform or delay an administration. This guidance assumes that longer, scrollable lists are less likely to cause the clinician to overlook items. This principle is similar to that used in the *Medications List* document {R2}.

User controlled filtering of the view is also not permitted as:

- The list is already filtered to those medications current within the four days in view
- It would be difficult to clearly communicate further filtering
- The view is already visually rich and further filtering controls and indications might overwhelm a user

### 3.5.2 Grouping

The guidance points in this section relate to the Grouping Control for the Drug Administration View. Figure 25 highlights the area in which it is located:

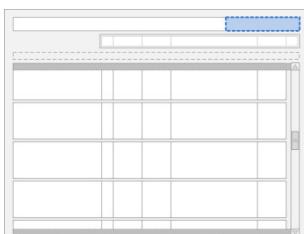


Figure 25: Grouping Control

The Grouping Control is a standard control that is also used in the Medications List View and may be used in other drug views. Generic guidance for this control, including examples of grouping that may be applied, is defined in the *Medications List* document {R2}.

ID	Description	Conformance	Evidence Rating
MEDA-0012	Do not apply a grouping to the Drug Administration View by default	Mandatory	Medium
MEDA-0013	When grouping is applied in the Drug Administration View, maintain the order of items in the list within each group according to guidance on the List Order (section 3.4)	Mandatory	Medium
MEDA-0218	Provide an option in the Grouping Control to provide a static sort on medication start date and time. This should be clearly labelled (for example, with 'Start Date and Time List Order'). This static sort order should override the dynamic list order described in section 3.4	Recommended	Medium
<b>RISK</b> Though the requirement to have this feature has been established, the means of providing it has not been risk assessed			
MEDA-0219	Provide an option in the Grouping Control to group by Once Only, Regular, As Required and Significant Duration. (For guidance on Significant Duration medication, please see section 3.13.)	Recommended	Low
MEDA-0261	Provide an option to remove an applied grouping option for the Drug Administration View	Recommended	Medium
MEDA-0249	When grouping is applied, use a display style for the group headings that is consistent with other drugs views such as the Medications List View	Mandatory	Medium

## Usage Examples

Figure 26 and Figure 27 show how a Grouping Control could be displayed:



Figure 26: Grouping Control Example

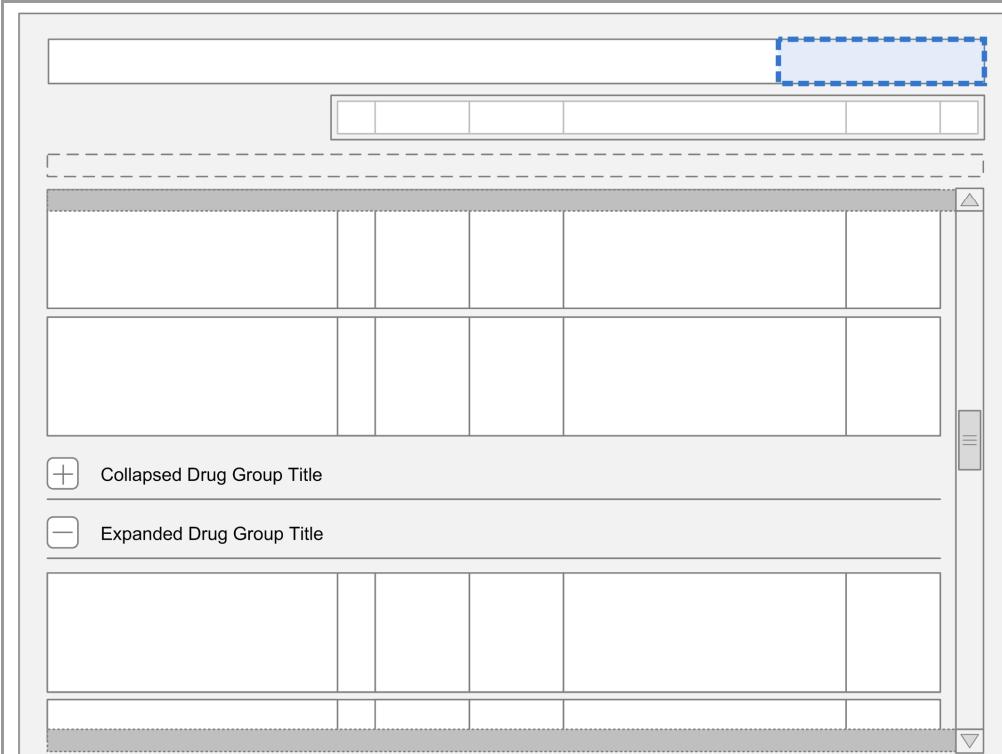


Figure 27: Example Location of the Grouping Control and the Collapsible Grouping Controls Applied to This List

## Rationale

MEDA-0012

User feedback on whether the Drug Administration View should be grouped by default has been divided (R12) and see APPENDIX B).

Some clinicians felt that the safety benefits of having reordering across the whole list meant that the list should not be grouped when the clinician first opens it, as long as the grouping settings are easy to apply. The disadvantage of grouping by default is that both Due and Overdue medications may be below the bottom of the screen (depending on the number of medications in the list). Though they are at the top of their group, the group may not be at the top of the list. These Due and Overdue medications may then be overlooked. With no grouping by default, the prioritised medications are always towards the top of the list so more likely to be immediately in view.

Other clinicians felt that the conventions, mental models and administration practices derived from the paper chart groupings are so ingrained that clinicians would be significantly disrupted or confused by their removal. This was even if clinicians could apply the grouping setting once they had opened the view.

There was also the view that the classic TGP groupings supported a beneficial process of considering groups in turn for each patient. For example, check the Once Only first, then the Regular, then the Infusions and then the As Required. However, this sequence might also be partially supported by the ordering rules. Examples might include:

- An ordering rule where a medication with a scheduled time is above an As Required medication
- An ordering rule where a medication with a narrower time tolerance (for example, some Once Onlys) is above 'normal' Regulars
- With additional rules (not covered in this guidance), an ordering where IV medication is below non-IV medication

The decision to mandate not grouping by default was taken on the basis that use of the Grouping Control can mitigate initial clinician confusion or unfamiliarity. However, the patient safety risk of important Due medication not being seen could only be mitigated by not grouping by default.

**MEDA-0218**

As described in the section 3.4 rationale, the reordering of drug lists was the subject of repeated clinician assessment as it is unfamiliar to the vast majority of current healthcare staff. User responses showed support for a dynamic ordering by 'dueness'. However, those responses were based on the assumption that users would be able to access a 'fixed' order (for example, by start date) if required, as this was more familiar ({R12, R13}, see APPENDIX A and APPENDIX B). *Medications List {R2}* defaults to a static sort order by start date and time.

**MEDA-0219**

Of the 20 or so paper drug charts from different medical organizations analysed, the majority had a core set of groups:

- Once Only
- As Required
- Regular
- Infusions

But, many had further subdivisions including variable medications, oral anticoagulants, syringe drivers, IV regulars and so on. That is, there is no current, universal convention for the exact groups to use but a fairly standard minimum set does exist. Furthermore, observations of chart usage showed that the 'Infusions' group was used differently by different clinicians.

### 3.5.3 Status Bar

The guidance points in this section relate to the Status Bar control for the Drug Administration View. Figure 28 highlights the area in which it is located:

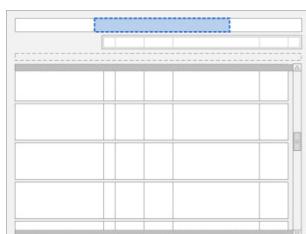


Figure 28: Status Bar Control

The Status Bar serves two main functions:

1. It highlights drugs with important states, such as those that have administrations that are Overdue
2. It provides controls that allow drugs in the list to be reordered according to a predefined set of rules that are designed to bring drugs that need attention to the top of the list

ID	Description	Conformance	Evidence Rating
MEDA-0015	Display a real-time indicator of the numbers of items that may require attention from the administrator	Mandatory	Medium
MEDA-0016	Within the Status Bar in the Drug Administration View, display counts for at least drugs with administrations that are: Overdue, Due, As Required and Begun	Mandatory	Medium
MEDA-0017	In the Drug Administration View, use formatting to draw attention to the Overdue and Due items in the Status Bar and to differentiate between them	Mandatory	High
MEDA-0018	Use similar formatting to draw attention to Overdue and Due items in the Status Bar, Chart Area and Look-Ahead Scroll Bar. For example, the background for the Overdue label for the administration events in Figure 21 is the same as for the drug name in the Look-Ahead Scroll Bar in Figure 40 and the count in Figure 42. The colour of the Overdue label on the chart is shared with that in the Status Bar in Figure 29	Mandatory	Medium
MEDA-0020	Provide a control for refreshing the order in which drugs are listed in the Drug Administration View	Mandatory	Medium

MEDA-0021	Disable the control that is used to refresh the order of the list of drugs in the Drug Administration View until there is a change that affects the order in which the drugs should be displayed (for example, when a drug is administered and so changes status from Due to Given)	Mandatory	Medium
MEDA-0257	The As Required status should contain two pieces of information: <ul style="list-style-type: none"> <li>■ A count of how many As Required drugs are in the list (as per MEDA-0016)</li> <li>■ A count of how many As Required drugs do not have a current lockout (that is, that are available for administration)</li> </ul>	Recommended	Low

## Usage Examples

Figure 29 illustrates how the Status Bar could look:

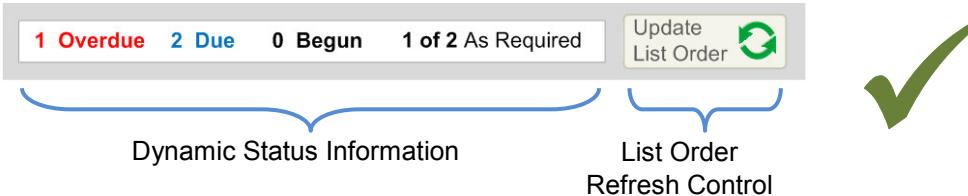


Figure 29: The Status Bar

Dynamic status information is presented on the left of the Status Bar. This information updates in response to changing states of the drugs in the list.

The **Update List Order** button on the right of the Status Bar becomes enabled when a system or user initiated action has been conducted, which means that the current order is out of date according to the list-ordering rules. The status of drugs can change as time passes or as administrations are recorded. The **Update List Order** button indicates whether the order of the list is likely to be current or to need reordering. This control is provided for re-applying the list-ordering rules to the list, thus reordering the list.

Figure 30 is an example of how a Status Bar may change as the states of drugs change and as administration events are recorded. It shows how the Status Bar would behave with a drug chart containing four medications:

- Drug A – Regular – Next administration at 08:00
- Drug B – Infusion – Next administration at 08:00
- Drug C – As Required – Comes off lockout at 08:00
- Drug D – As Required – Comes off lockout at 10:00

The notional time tolerances are:

- Due status begins at the intended time of administration
- Overdue status begins one hour after the intended time of administration

At 07:40, none of the drugs are Due and both of the As Required are still locked out. The list order update button is disabled because there are no order changes pending:



At 08:00, Drugs A and B become Due and Drug C comes off lockout:



At 08:09, the clinician administers Drug A and so it is no longer Due. As this would change the list order, but the list order does not dynamically update while the list is open, the **Update List Order** button is enabled to indicate a pending change:



At 08:13, the clinician administers Drug B, closes the view and then reopens it at 08:15. The Status Bar now shows that there are:

- No Due administrations
- One Significant Duration drug has begun (Drug B)
- One As Required is available for administration (Drug C) and one is still locked out (drug D)

As closing and reopening the view updates the list sort order, there are no pending updates and the **Update List Order** button is therefore disabled:



Figure 30: Changing States of the Status Bar

### Rationale

MEDA-0015—MEDA-0018, MEDA-0020, MEDA-0021

Many drug details were reported to be important for this view and as a consequence the Drug Administration View contains a lot of information on the screen at any one time, often with the need to scroll the view to see all details. Since the Medications List View is designed to support an overall review of drugs, the Drug Administration View does not duplicate this function by having its own summary view. Therefore the Status Bar was created in order to give clinicians a very high level summary of the information most pertinent to the task of administration. Clinicians can see just enough information to draw attention to important drugs without displaying a high-level summary (which would take up much needed screen space).

The Status Bar is intended to highlight the presence of, and draw attention to, drugs in the list with important time-based states. Part of the function of the Status Bar, together with the Look-Ahead Scroll Bar (LASB), is to draw attention to important drugs that are out of view (above or below the visible section of the list) and require action.

The states used in Figure 30 (Overdue, Due, Begun and As Required) are examples of important categories of drugs that may require attention. Whether a drug is Due or Overdue is based solely on the time of scheduled administration and the time tolerance threshold for the drug. These specific examples are not a complete set for all contexts, since in some areas other drugs (such as Once Only drugs) may need to be highlighted in this way. This guidance offers a ‘model’ of states and dueness based upon general principles but these may need to vary in specific practice.

MEDA-0021, MEDA-0257

User feedback (see APPENDIX B) showed support for including a count of As Required medications in the Status Bar. Anecdotal reports suggest that As Required medications are not always given as often as needed because they may be forgotten and so not considered for administration. However, since As Required medications may be subject to lockouts (for example, paracetamol cannot be administered repeatedly with no time gap between administrations), some As Required medications may not be administrable at a particular time. User feedback on the options for their display (see APPENDIX B) concluded that showing both the number of ‘givable’ As Required medications and the total number of As Required medications was preferable. This conclusion was preferred as it did not hide one class of information. However, there were concerns that the display would need some initial explanation as counting ‘givable’ and ‘non-givable’ medications is not current practice.

## 3.6 Navigation

The guidance points in this section relate to the day navigation controls for the Drug Administration View. Figure 31 highlights the area in which they are located:

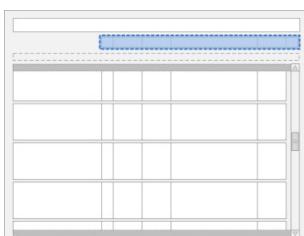


Figure 31: Day Navigation Controls

Navigation involves using the controls to move the Chart Area backwards or forwards one day or using the calendar control to move a specific date into view.

In this section, 'navigation' refers to navigating the chart by changing the time interval being displayed in the Chart Area so that administration events further in the past or future can be reviewed.

Navigation controls that step through the chart day-by-day are provided at either side of the column headings for the Chart Area and the calendar control is displayed within the column heading for the currently-selected day.

ID	Description	Conformance	Evidence Rating
MEDA-0033	Provide controls for navigating back and forward one day at a time. Place these controls to the left and right respectively of the set of date columns	Mandatory	Medium
MEDA-0034	Provide a calendar control within the column heading for the currently-selected day	Mandatory	Medium
MEDA-0035	Within the calendar control, provide a quick means of setting the currently-selected day to today. The calendar control should conform to Date and Time guidance {R5, R6, R7}	Mandatory	Medium
MEDA-0036	When a drug in the Drug Administration View has no administration event visible, mark the presence and direction of previous or Future administrations with an arrow or icon at the edge of the Chart Area for that medication line (this arrow or icon must have a tooltip to explain its purpose)	Recommended	Medium
MEDA-0037	When an arrow or icon is displayed to mark administration events for previous or Future administrations that are currently out of view in the Drug Administration View, support clicking on these icons to jump to the Next administration event in that direction for that drug	Mandatory	Medium
MEDA-0038	Maintain the order of the list when the navigation controls are used to change the time interval displayed in the Chart Area	Mandatory	High

### Usage Examples

The shaded area in Figure 32 shows where the Navigation controls are positioned:

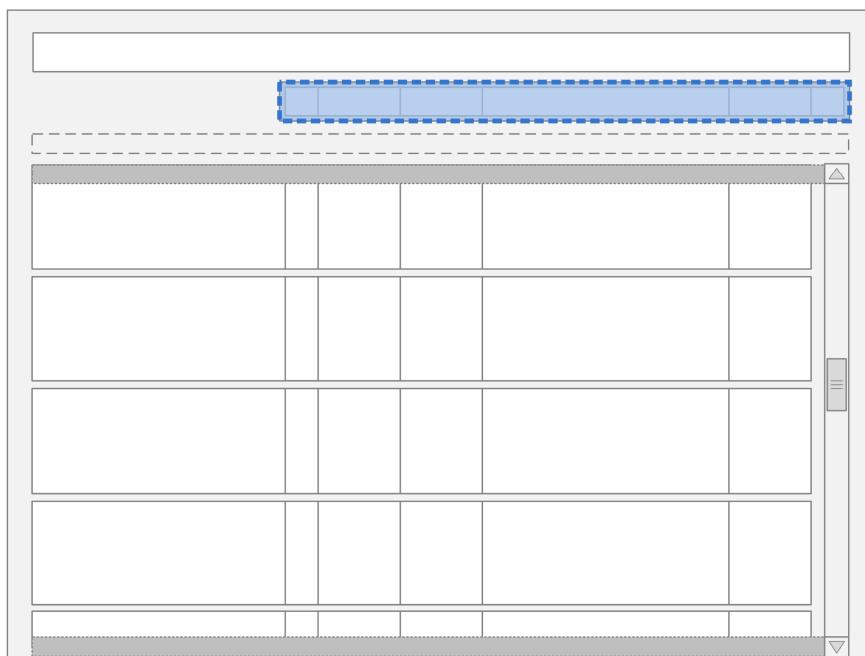


Figure 32: Drug Administration View Areas – Column Headings and Navigation Controls

Figure 33 illustrates using the navigation controls. In this figure, a placeholder is used to represent the icon that marks 'Today'. See section 3.9.4 for guidance on indicating 'Today'.

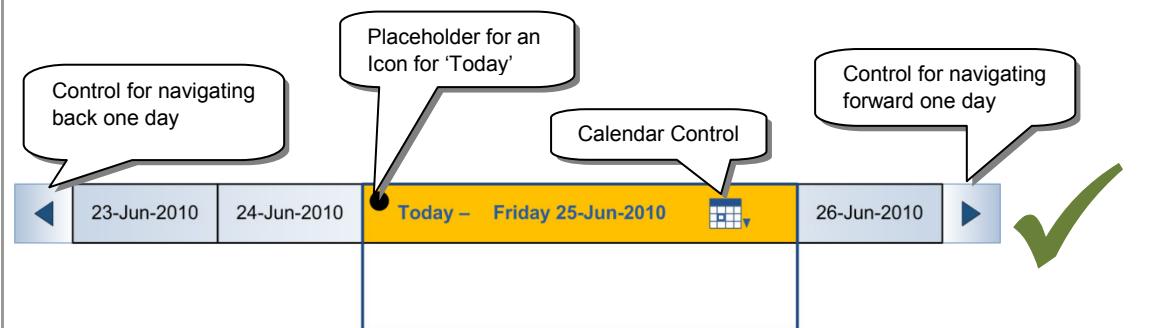


Figure 33: The Navigation Controls

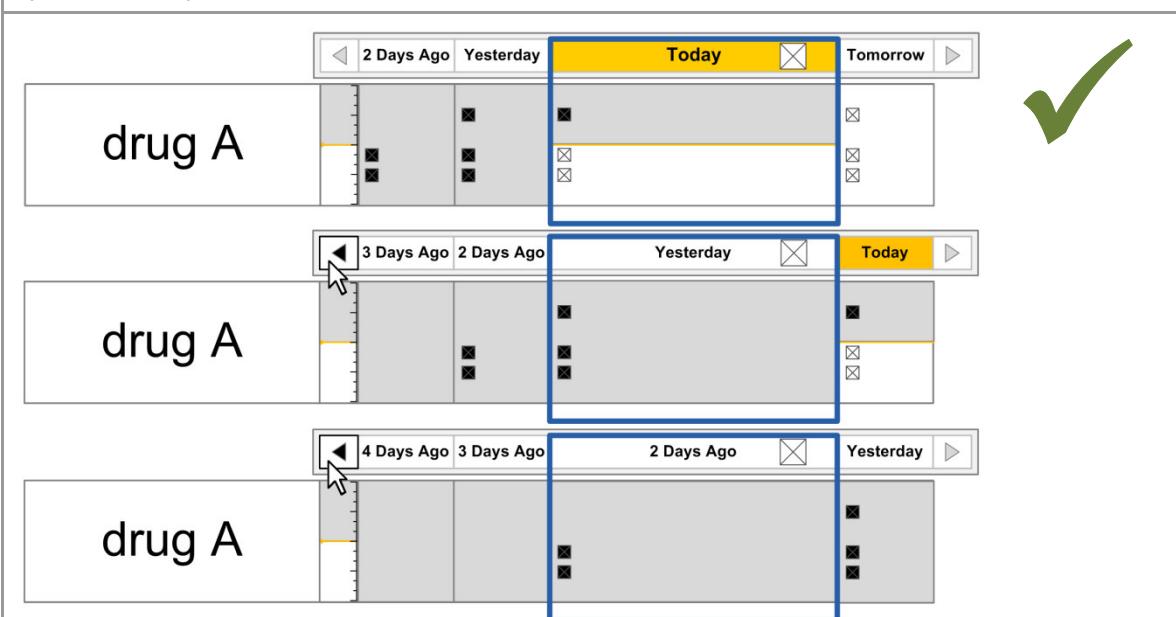


Figure 34: Example where the Currently Selected Day Starts at Today and then Steps Backwards Two Days

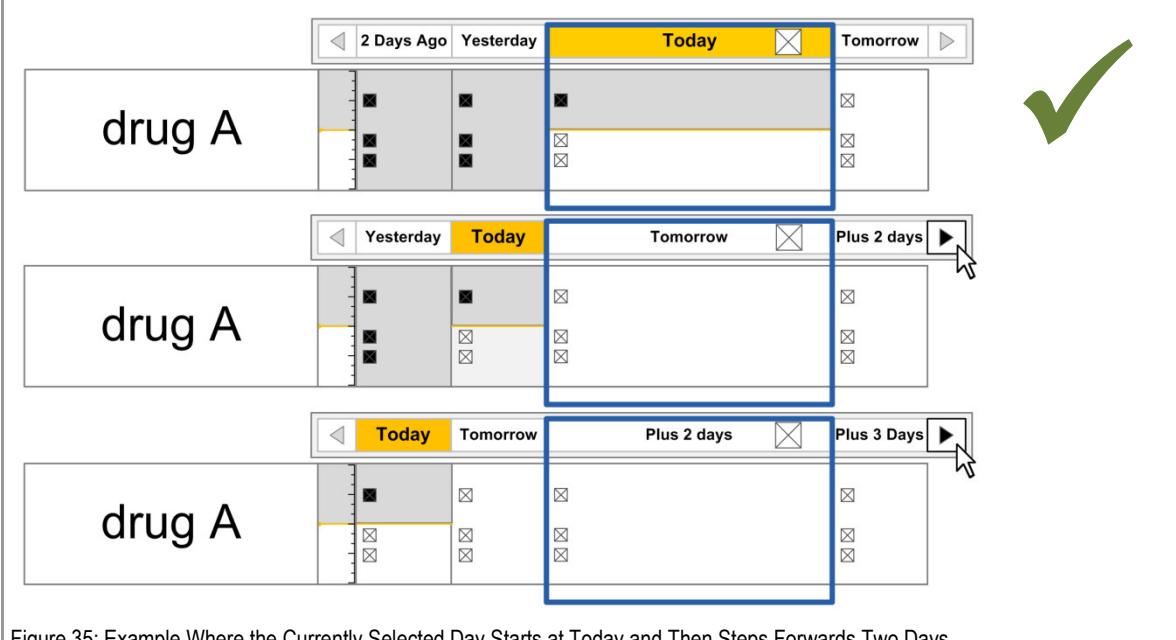


Figure 35: Example Where the Currently Selected Day Starts at Today and Then Steps Forwards Two Days

## Rationale

MEDA-0033

Navigation one day at a time allows different days to be shown in more detail. Analysis suggested that for normal inpatient drug administration, it would be more common to want to look one day or a few days into the past or future rather than weeks.

User feedback also supported the use of arrows as controls at either end of the time interval column headings to navigate forward and backward in time, so long as these arrows were clear {R14}.

For further explanations of, and rationale for, the various components displayed in Figure 34 and Figure 35, see section 3.9.

MEDA-0034, MEDA-0035

Use of a calendar control allows larger movements in time without having to scroll through days of empty or irrelevant data. For example, the clinician may want to look at the drug administration record for a patient's previous admission. Resetting to the current day allows a quick return to the immediate administration task.

MEDA-0038

As described in section 3.4, by default the Drug Administration View is sorted by medication dueness, which is likely to change throughout a day. Therefore, it is not possible to go back to a previous day's sort order when navigating back to view that day. In addition, retaining the sort order by the current time's 'dueness' means that the list order remains the same as the user navigates days into the past and future, which makes it easier to follow a particular medication row. It would be confusing if the list reordered while the user navigated time. User feedback from a small number of clinicians unanimously supported maintaining the order of the list as time is navigated {R12}.

## 3.7 The Look-Ahead Scroll Bar

The guidance points in this section relate to the Look-Ahead Scroll Bar (LASB) control for the Drug Administration View. Figure 36 highlights the area in which it is located:

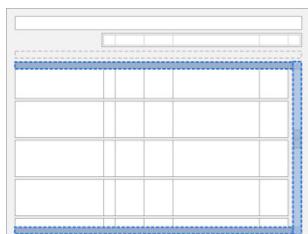


Figure 36: Look-Ahead Scroll Bar Area

The LASB is a modification from a standard scroll bar control that is designed to enhance visibility of the presence of list items that are out of view. Generic guidance for the Look-Ahead Scroll Bar is defined in the *Medications List* document {R2}. This section defines additional guidance specifically for enhancements to the Look-Ahead Scroll Bar when it is used in the Drug Administration View.

The guidance in this section relates specifically to the display of Overdue and Due drugs in the look-ahead notification areas.

ID	Description	Conformance	Evidence Rating
MEDA-0039	Use a Look-Ahead Scroll Bar in the Drug Administration View and adhere to guidance for the Look-Ahead Scroll Bar as defined in the <i>Medications List</i> document {R2}.	Mandatory	High
MEDA-0040	Apply similar formatting to Overdue and Due drugs in the look-ahead notifications as in the Chart Area and the Status Bar in the Drug Administration View	Recommended	High
MEDA-0041	Do not display drug names for 'past' drugs in the Look-Ahead Scroll Bar notification in the Drug Administration View	Mandatory	High

## Usage Examples

The shaded area in Figure 37 shows the location of the two look-ahead notifications (in addition to the standard scroll bar):

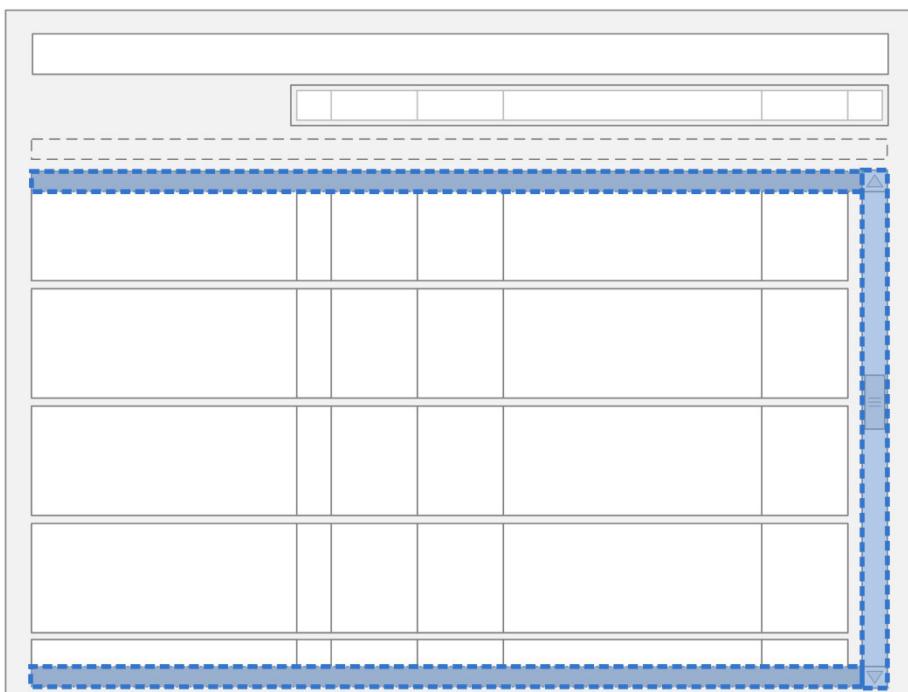


Figure 37: Drug Administration View Areas – Look-Ahead Scroll Bar

Figure 38 to Figure 40 illustrates a Look-Ahead Scroll Bar with drugs in the look-ahead notifications at the top and bottom of a short list of drugs (12 in this case):

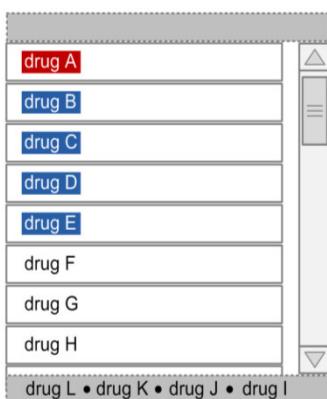


Figure 38: Example LASB with the Top of a List of Twelve Medication Lines

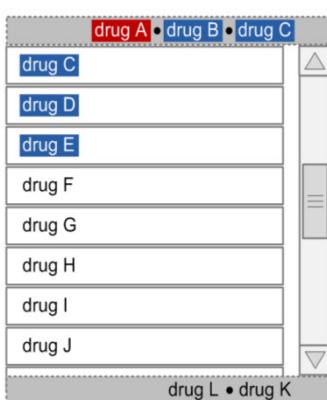


Figure 39: Example LASB with the Middle of a List of Twelve Medication Lines



Figure 40: Example LASB with the Bottom of a List of 12 Medication Lines

Figure 41 to Figure 43 illustrates a Look-Ahead Scroll Bar with drugs in the look-ahead notifications at the top and bottom of a longer list of drugs (26 in this case):

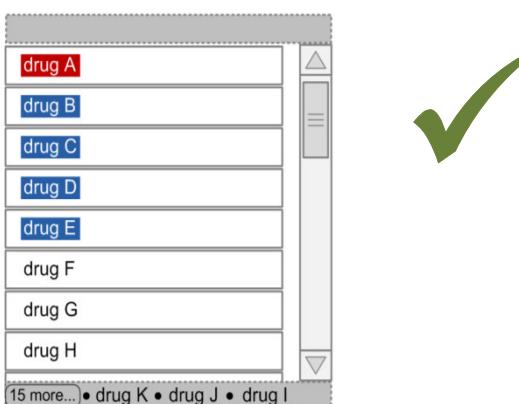


Figure 41: Example LASB with the Top of a List of 26 Medication Lines

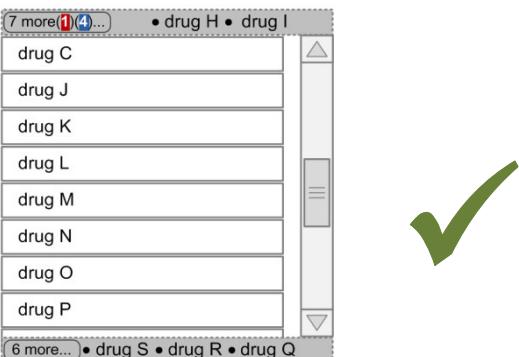


Figure 42: Example LASB with the Middle of a List of 26 Medication Lines: Indicators for Overdue (Shown as Red) and Due (Shown as Blue) Drugs are Still Present at the Top of the LASB



Figure 43: Example LASB with the Bottom of a List of 26 Medication Lines

### Rationale

MEDA-0040

Using the same formatting for Due and Overdue throughout the Drug Administration View provides ease of recognition through consistency.

Overdue and Due drugs are prioritised in the Drug Administration View via the order of the drugs in the list and the Status Bar information, as well as by applying formatting to these drugs when they appear in a look-ahead notification area. These three areas of guidance combined are a strong mitigation for the risk that important drugs in the list not currently in view may be missed.

Generic guidance for the Look-Ahead Scroll Bar (as defined in the *Medications List* document {R2}.<sup>1</sup>) supports clicking on (selecting) a drug name to navigate to that place in the list, thus bringing that drug into view. By highlighting Overdue and Due drugs in the look-ahead notification areas, all Overdue and Due drugs are either visible or accessible with a single click.

MEDA-0041

The Medications List View does not combine past and current medication and hence the LASB can have optimised behaviour for each type. However, the Drug Administration View can show both past and current medications (as described in section 3.3.2). As the LASB has limited horizontal space, it is unlikely it can hold the names of all past medications (there may be hundreds or even thousands). Also, the main aim of the Drug Administration View is to support the administration of medication. To achieve this aim, it is of primary importance to draw the clinician's attention to Due, Overdue or upcoming medications that are out of view. Therefore, past medications should not be indicated in the LASB.

## 3.8 Left-Hand Panel

The Left-Hand Panel (LHP) is a static area that contains a text description of the drug represented on that line, as well as controls which indicate the presence of further information and allow this further information to be displayed. The following sections describe the contents of the Left-Hand Panel and guidance for accessing and displaying further information.

### 3.8.1 LHP Structure and Contents

The guidance points in this section relate to the whole of the Left-Hand Panel and its associated contents for the medication lines in the Drug Administration View. Figure 44 highlights the area in which it is located:

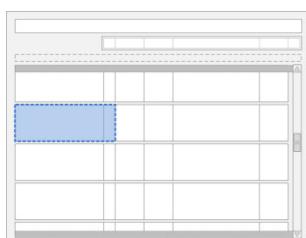


Figure 44: Left-Hand Panel

The Left-Hand Panel contains a text description of the drug; this is similar to the information in the Drug Details column of the Medications List View, as defined in the *Medications List* document {R2}. It contains a further set of attributes which are relevant to users of the Drug Administration View. Some of these attributes are displayed as text and some are represented by icons.

ID	Description	Conformance	Evidence Rating
MEDA-0265	Display drug names and details in accordance with <i>Medication Line</i> guidance {R2}	Mandatory	High
MEDA-0042	Display the details of the drug at the top of the Left-Hand Panel in the Drug Administration View	Mandatory	Medium
MEDA-0043	Display the name of the prescriber below the drug details in the Left-Hand Panel of the Drug Administration View and precede this information with a prescriber icon	Recommended	Medium
MEDA-0044	Display the start date below the prescriber information in the Left-Hand Panel of the Drug Administration View and precede it with a text label. Before the medication has been administered, the start date will be the date and time of the intended first administration. After the first dose has been administered, the start date will be the actual date and time of the first dose	Mandatory	Medium
<p><b>RISK</b></p> <p>There is a potential hazard that the indication of the start date in the Left-Hand Panel does not show whether the first dose was administered on time or, if it was delayed, to what degree it was late in starting. Under the current guidance, the clinician must view the start of the medication in the chart area in order to see whether it was late.</p>			
MEDA-0045	If an end or review date exists, then display it below the start date in the Left-Hand Panel of the Drug Administration View and precede it with a text label	Mandatory	Medium
MEDA-0046	Allow the Left-Hand Panel to be flexible in height to support long drug names and extended drug details	Mandatory	Medium
MEDA-0222	For 'past' drugs, display either a 'Completed' or 'Discontinued' label as appropriate in place of the end or review date label	Mandatory	Medium
MEDA-0223	Ensure that the 'past' drug label is visually distinct and noticeable (for example, using reverse video)	Recommended	Medium
MEDA-0224	Ensure that As Required and Once Only medication lines are visually distinct from other lines and from each other (in addition to the display of the frequency as per adherence to the <i>Medication Line</i> guidance {R2})	Mandatory	Medium
MEDA-0225	Provide a label to explain that a medication line is either As Required or Once Only, in addition to the frequency displayed in the drug details	Recommended	Medium
MEDA-0251	Allow the timescale and medication line to be flexible in height to support high frequency administrations that require more granular time scales	Mandatory	Medium

## Usage Examples

The shaded area in Figure 45 shows the location of the Left-Hand Panel:

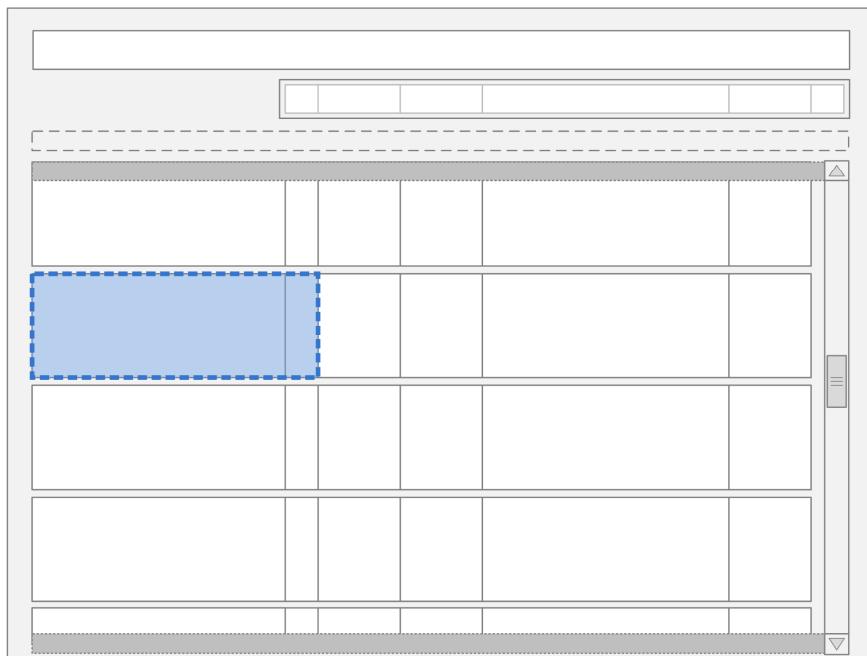


Figure 45: Drug Administration View Areas – Left-Hand Panel

Figure 46 displays examples of different styles used to highlight Once Only and As Required drugs in the LHP:

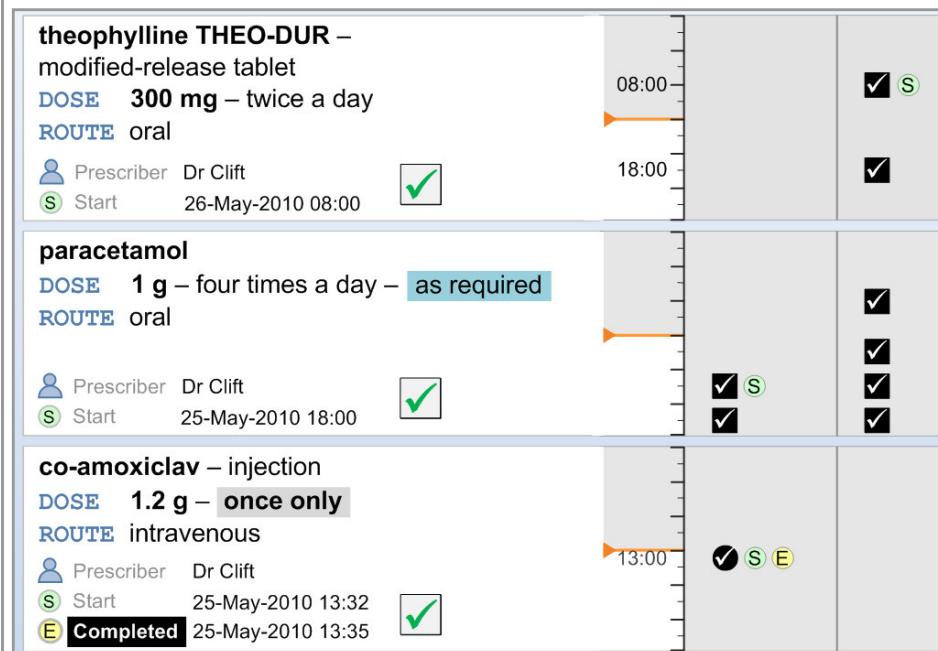


Figure 46: Example of LHP Styles for Once Only, As Required and Regular Drugs

Figure 47 shows an example of a Left-Hand Panel in which a drug with a very long drug name is displayed. This illustrates the dynamic expansion of the Left-Hand Panel relative to the rest of the line that is displayed within the Chart Area.

The screenshot shows a 'drug name' field containing 'drug name.....'. Below it is a 'Prescriber' field with 'Prescriber name' and a 'Start Date' field with 'Start Date'. At the bottom are 'Review' and 'Review Date' fields, each with five small square icons. A large green checkmark is in the top right corner of the chart area.

Figure 47: Displaying a Long Drug Name in the Left-Hand Panel

Figure 48 and Figure 49 illustrate:

- Visually distinct labels for 'Past' medications, replacing the review date label with one indicating whether the medication was completed or discontinued (MEDa-0222)
- The use of reverse video on these labels as an example of how they could be made more noticeable (MEDa-0223)

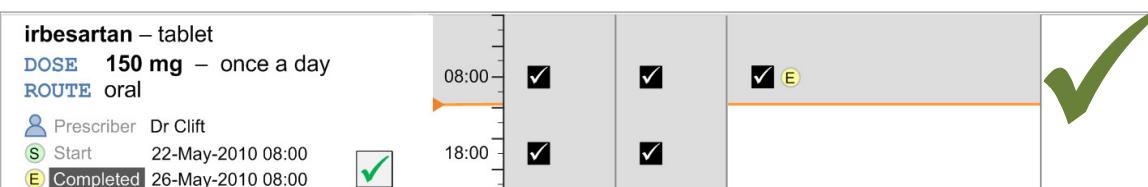


Figure 48: Completed Medication Indicated by a Date Label

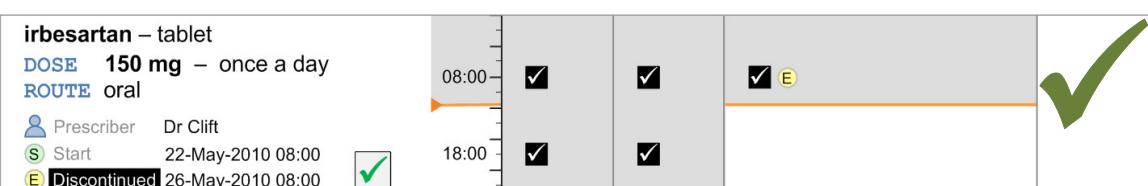


Figure 49: Discontinued Medication Indicated by a Date Label

## Rationale

MEDA-0042

Display of the drug name and details in the top left of the LHP follows the format of existing paper charts so should reduce the need for training and increase familiarity.

MEDA-0043

Display of the prescriber name with the drug details follows the format of existing paper charts. On paper, the prescriber name is used both as:

- A confirmation that the medication has been prescribed by a prescriber
- A means for other staff to identify the prescriber so that they can be contacted if necessary

NMC guidance on medications management {R11} requires that the registrant must make certain checks before administering a medicinal product:

- The prescription (or other direction to administer) is signed and dated by the authorised prescriber
- That they can contact the prescriber

It is arguable that a continually visible prescriber name is not necessary as medication cannot get onto the Drug Administration View unless it has been prescribed by an authorised prescriber. Additionally, accessing the prescriber's name could perhaps be by a link or button rather than a continually visible name. However, it was felt that there is a strong expectation to see the prescriber name due to many years of experience with the paper charts, and that continual display of the prescriber name provides a reassuring familiarity.

MEDA-0044, MEDA-0045

Display of the start, end and/or review dates allows the clinician to see the duration of the course immediately. The clinician does not have to navigate by time through the view to find the dates and then calculate the duration manually. Displaying the dates helps support the NMC requirement for the registrant to check the start and end dates before administration. Display of the start date is common to many examples of existing paper charts (some also display the stop date).

MEDA-0222, MEDA-0223

User feedback (see APPENDIX B) concluded that it was important to clearly indicate both whether a medication was past and, if so, whether it was completed or discontinued.

### 3.8.2 LHP Icons

The guidance points in this section relate to the icons presented in the Left-Hand Panel of the drug lines in the Drug Administration View. Figure 50 highlights the area in which these might be located:



Figure 50: LHP Information Icon Area

Icons are used in two different ways in the Information Panel:

1. As additions to text labels (label icons)
2. To signify the presence (or absence) of certain types of information (status icons)

The icons that are used to signify the presence of information (status icons) are also controls used to open the Information Panel in which that information is displayed.

ID	Description	Conformance	Evidence Rating
MEDA-0051	Provide status icons in the Left-Hand Panel of a drug line in the Drug Administration View to indicate the status of certain types of information for that drug. For example, whether the medication has been verified by a pharmacist or whether there are additional administration instructions	Mandatory	Medium
MEDA-0050	In the Left-Hand Panel of a drug line in the Drug Administration View, place status icons in a group in a consistent location for all medications	Mandatory	Low
MEDA-0053	Support selection of the status icons in the Left-Hand Panel of a drug line to open an Information Panel for that line	Mandatory	Medium
MEDA-0054	When a status icon in the Left-Hand Panel is selected, present the information associated with that icon in the Information Panel	Mandatory	Medium
MEDA-0059	Include icons for prescriber, start date and end or review date in the Left-Hand Panel	Recommended	Medium
MEDA-0058	Support selection of the Prescriber icon to display information relating to the prescriber in the Information Panel	Mandatory	Medium

MEDA-0227	Ensure that each of the icons represents the same information in each drug line and is located in the same position	Mandatory	Medium
MEDA-0266	In environments where pharmacist verification is used, provide a pharmacist verification icon as one of the status icons. This icon should have (at least) two clear statuses: 'verified' and 'awaiting verification'. This icon should also provide access to the verifier's details	Mandatory	Medium
MEDA-0229	Place the pharmacist verification icon in the leftmost position in the icon group to increase visibility	Recommended	Low
MEDA-0267	Use a tick in the pharmacist verification icon to mark those medications that have been verified	Recommended	Medium
MEDA-0268	If pharmacist verification is not used in a particular context, or not supported by the system, the pharmacist verification icon should not be presented, as opposed to being 'disabled'	Mandatory	Medium
MEDA-0298	The pharmacist verification icon should use green prominently	Recommended	Medium

### Usage Examples

In Figure 51, the icons are indicated by filled placeholders:

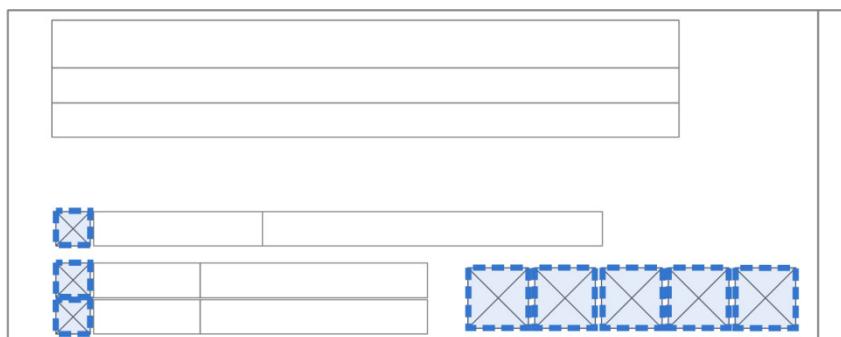


Figure 51: Example Icon Positions in the Left-Hand Panel

Figure 52 and Figure 53 show examples that use both colour and shape to highlight the status of the icon:



Figure 52: Enlarged Example of an Icon Showing the Medication has Been Verified by a Pharmacist



Figure 53: Enlarged Example of an Icon Showing the Medication Is Awaiting Verification by a Pharmacist (Where Pharmacist Verification Is Used)

### Rationale

MEDA-0051

In order to maintain an effective Drug Administration View that presents the most important attributes for each of a list of drugs, the information that can be presented for each drug must be limited. The information icons can be used to indicate the presence of additional information that may need to be reviewed before administration. By providing this information in an Information Panel, it can be displayed in full, thus mitigating the risks associated with truncating information in an attempt to fit it into the Drug Administration View.

User feedback from a small number of clinicians showed support for being able to access some of the drug information on demand as opposed to having it displayed all the time {R12}.

MEDa-0050

Consistent placement of a notification near to the main drug details helps remind the clinician this information may need to be checked.

MEDa-0059

Icons for start date, end or review dates are used in the Chart Area. Using them as additional labels in the LHP helps provide familiarity with the icons and reinforces their meaning. The prescriber icon provides access to more details about the prescriber.

MEDa-0266, MEDa-0267, MEDa-0229

Widespread current practice is for pharmacists to mark verified prescriptions on the paper drug chart, often using notation such as a green tick. User feedback from nurses reported that seeing a medication has been verified provided extra confidence that the medication was correct, even though administration of most medications is allowed before pharmacy verification (see APPENDIX A). User feedback from a wider variety of clinicians highlighted that it would be beneficial to know at a glance if the prescription has been checked (see APPENDIX A and APPENDIX B).

The guidance to mark verified medications (as opposed to marking unverified medications) follows this existing practice in order to increase the familiarity of the view. User feedback supports marking verified medications (see APPENDIX B).

MEDa-0268

A ‘disabled’ pharmacist verification icon might be incorrectly interpreted as meaning ‘not verified’. In fact, it is intended to mean ‘the system does not know if the medication has been verified’. In a worst case scenario, a ‘disabled’ verification icon might be misinterpreted as meaning that the medication has been checked. This might arise because the use of three states (verified, not verified and disabled) reduces the clarity between the verified and not verified states.

Presenting no icon also reduces clutter in the view.

MEDa-0298

From anecdotal evidence, many pharmacists use green ink when marking on paper drug charts.

### 3.8.3 LHP Information Panel

The guidance points in this section relate to the Information Panel attached to the Left-Hand Panel of the medication lines in the Drug Administration View. Figure 54 highlights the area in which it is located:

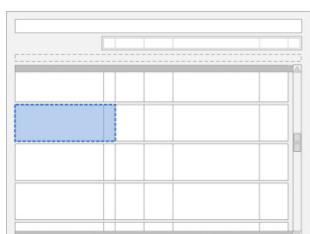


Figure 54: LHP Information Panel Area

When an information icon is selected to access more information, the information is displayed within an area referred to as the Information Panel.

ID	Description	Conformance	Evidence Rating
MEDA-0060	In the Information Panel, provide tabs for each of the information icons, and label the tabs with text and icons	Mandatory	Medium
MEDA-0061	In the Information Panel, provide a control for opening all details for that drug. This is likely to include administration and preparation instructions	Recommended	Medium
MEDA-0062	In the Information Panel, order the tabs in the same way that the corresponding information icons are grouped in the Left-Hand Panel. For example, group the icons in the same sequential order as they are placed in the LHP (translating left to right into top to bottom) followed by the Prescriber icon	Mandatory	Medium
MEDA-0063	Display the Information Panel as an extension downwards from the Left-Hand Panel	Recommended	Medium

## Usage Examples

Figure 55 is one example of how the Information Panel could be presented. In this illustration, the information icons are marked with a blue dashed border and the Information Panel with a black dotted border. The arrow indicates that, when the Information Panel is opened by selecting the Prescriber icon (icon 'A'), the panel is opened to display the Prescriber information (tab with icon 'A'). This behaviour is identical for the other icons, such as the pharmacist icon (icon 'B'). In this illustrative example, the different sections of information are presented within tabs.

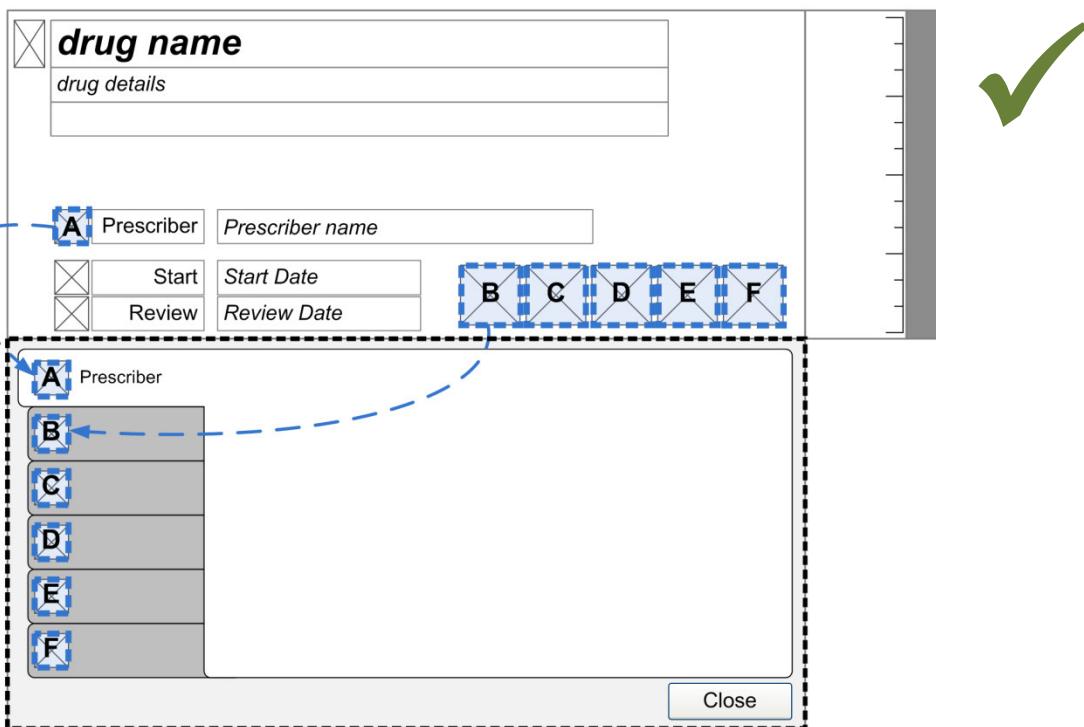


Figure 55: Illustration of an Information Panel Opened from the Left-Hand Panel

## Rationale

MEDA-0060—MEDA-0063

By providing important information in an Information Panel, it can be displayed in full thus mitigating risks associated with truncating information in an attempt to fit it into the Drug Administration View.

User feedback from a small number of clinicians showed strong support for access to detailed preparation instructions including calculations and the facility to show instructions for different products {R15}. Access to this information could be provided by the information panel.

## 3.9 Chart Area

The Chart Area is the time window for the Drug Administration View in which icons representing administration events are plotted for each drug and supplemented with descriptive text where appropriate.

This section contains guidance on the presentation of information within the Chart Area.

### 3.9.1 Chart Area Structure and Layout

The guidance points in this section relate to the Chart Area for the administration event icons and details in the Drug Administration View. Figure 56 highlights the area in which it is located:

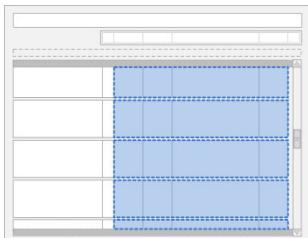


Figure 56: Chart Area

Administration events for each individual drug are plotted against both a vertical and a horizontal time scale as on the traditional TGP drug chart for recording prescriptions. The vertical time scale on the right of the Left-Hand Panel represents times of day such that time progresses from top to bottom. Columns in the horizontal time scale represent days and events that are plotted such that time progresses from left to right.

In order to interpret some of the guidance points below, it is necessary to clarify different types of 'As Required' prescription that might be supported by a system. The following three types have been identified after discussions with healthcare professionals:

1. Unscheduled As Required

The medication can be given whenever necessary as long as it does not contravene its minimum interval or maximum frequency rules

2. Unscheduled As Required with Indicative Frequency

The same as type 1 but the medication has a suggested frequency to guide those administering it as to how often it should be administered (such as 'morphine one to four times hourly As Required'). The suggested frequency is only present as an instruction and is not plotted as one or more planned events

3. Scheduled As Required

The medication is scheduled to specific times (as for Regular medications), but at each scheduled administration time those administering it should consider whether the medication should be given or not. These medications would be plotted as for other scheduled medications and so follow the appropriate guidance on list ordering and event positioning

ID	Description	Conformance	Evidence Rating
MEDA-0064	For 1024 x 768 resolution displays used in the context of inpatient drug administration, show administration events for four days at a time: one day in focus, two days back and one day forward	Mandatory	High
MEDA-0065	The default day in focus should be the current day	Mandatory	High
MEDA-0066	Plot administration events in the Chart Area using a concise set of symbols. These symbols should reflect the administration statuses mandated in MEDA-0119	Mandatory	Medium
MEDA-0067	Plot administration events against a horizontal time scale such that each column represents one day and days progress from left to right	Mandatory	High
MEDA-0068	Within a single column, plot administration events against a vertical time scale for that drug line such that time progresses from top to bottom	Mandatory	High
MEDA-0269	Plot administration events with an icon whose outline shape is symmetrical about a horizontal axis	Mandatory	High
MEDA-0232	Plot administration event icons such that the icon's centre aligns horizontally with the time associated with it	Mandatory	High
MEDA-0270	Plot scheduled administration events against their intended time of administration	Mandatory	High
MEDA-0271	For every unscheduled As Required medication, plot an administration event at the current time and update its position as the current time updates	Mandatory	Medium
<p><b>RISK</b></p> <p>There is an unmitigated risk that using the same icon for this unscheduled As Required event as is used on the Due administration events may encourage clinicians to over-administer the As Required medication. That is, clinicians mistake the unscheduled administration for a scheduled administration</p>			
MEDA-0272	After an administration event has had a status recorded against it (for example, Given or a not given status), display the event such that the intended time of administration and the recorded time of administration are both clear. Here, 'recorded time of administration' means the time recorded for when the administration occurred as opposed to the time the recording was made, which might be different	Recommended	Medium
<p><b>RISK</b></p> <p>As discussed in the rationale, there are risks with plotting recorded administration events that have not been mitigated by this guidance and are not mitigated by the positive usage examples for this guidance point.</p>			
MEDA-0273	After an unscheduled As Required medication has had a status recorded against it, plot the event against the recorded time of administration	Mandatory	Medium
MEDA-0274	Plot events so neither they nor their associated information overlap the boundary of the medication's line, are truncated by the border or fall outside of it	Mandatory	Medium
MEDA-0275	Plot events so they do not overlap each other. If an overlap might otherwise occur, extend the timescale (as per MEDA-0233)	Recommended	Medium

## Usage Examples

The shaded area in Figure 57 shows the Chart Area:

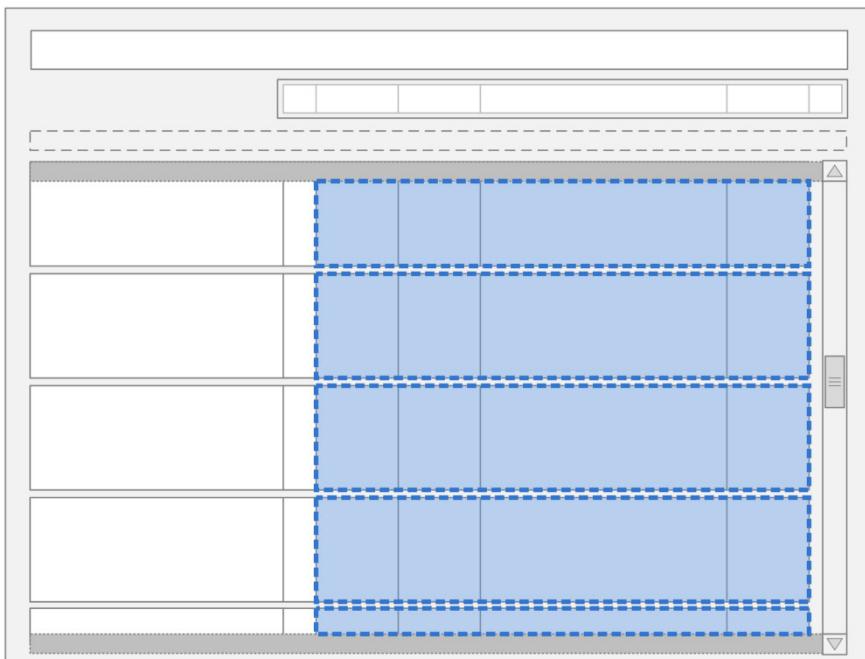


Figure 57: Drug Administration View Areas – Structure and Layout

Administration events within the Chart Area are plotted in a grid structure against a vertical and horizontal axis. The vertical axis is indicated by a time scale that appears to the right of the Left-Hand Panel and remains statically-placed on the screen.

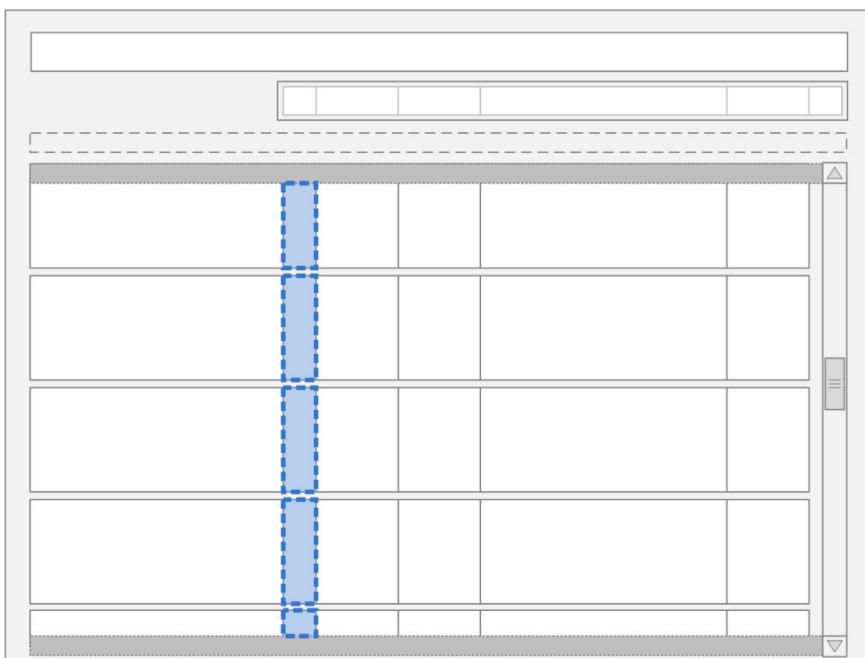


Figure 58: Drug Administration View Areas – Time Scale

Figure 59 illustrates MEDa-0064, MEDa-0065, MEDa-0068 and MEDa-0069 with four days running horizontally (with today as the default day in focus) and time running vertically down the page for each drug. The As Required does not have times in the timescale as it is unscheduled.

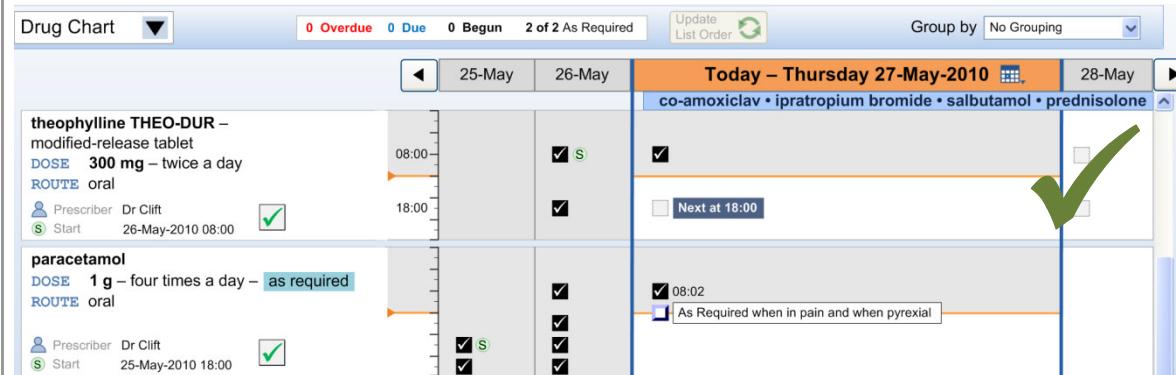


Figure 59: Time Running Vertically and Horizontally

Figure 60 shows a Regular medication administered twice a day at 08:00 and 20:00. It illustrates MEDa-0269 and MEDa-0232 by plotting icons with a symmetrical outline for each administration event and positioning them so that the centre of the icon aligns with the time they are associated with. It illustrates MEDa-0270 by plotting scheduled events (the boxes with dashed borders) against their intended time of administration (in this case 08:00 and 20:00).

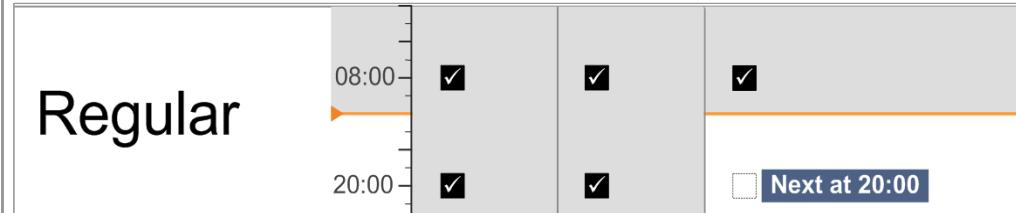


Figure 60: Icon Positions

Figure 61 shows an unscheduled As Required medication that has been administered several times over the last few days. It illustrates MEDa-0271 by plotting an event on the current time, which would allow recording of an administration. It illustrates MEDa-0273 by plotting recorded events (for an unscheduled As Required) at the time they were administered.

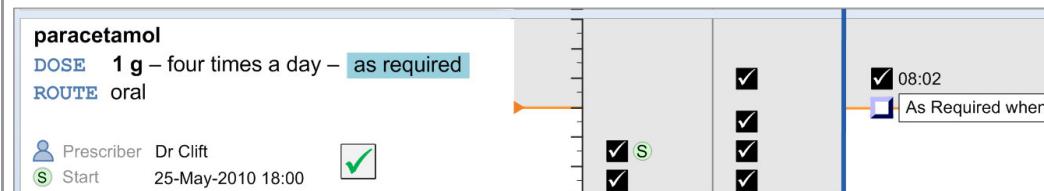


Figure 61: Plotting Events for As Required Medication

Figure 62 and Figure 63 show two different ways that MEDa-0272 might be complied with. They both display the same data in that the medication has had four administrations recorded, two of which were roughly on time while two were late. The first administration was six and a half hours after the Due time of 18:00, while the third administration was an hour after the Due time. Figure 62 shows these recorded events plotted at the recorded time of administration. Figure 63 shows events plotted at their intended time with a time to indicate the actual recorded time of administration. See also the risks with these approaches discussed in the rationale for this section.

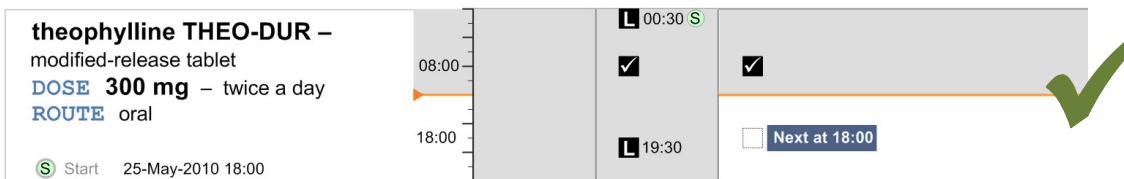


Figure 62: Events Plotted at the Recorded Time of Administration



Figure 63: Events Plotted at the Intended Time of Administration

Figure 64 does not conform to guidance MEDa-0274 as an event's information overlaps the medication line's boundary:

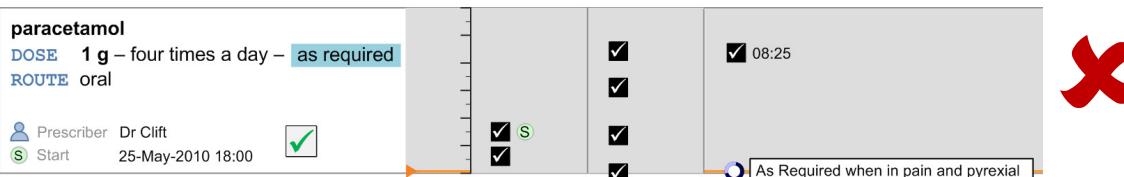


Figure 64: Events Overlapping Medication Boundary

Figure 65 does not conform to guidance MEDa-0274 as an event's information is truncated by the medication line's boundary:



Figure 65: Events Truncated by Medication Boundary

## Rationale

### MEDA-0064

User feedback concluded that displaying now, two days back and one day forward is satisfactory for short-stay inpatients. Users regarded this as satisfactory provided the start and end dates are clear and it is possible to navigate into the past and future {R12}. The number of days to display is a trade-off between the detail shown per day and the number of days simultaneously visible. User research concluded that it was preferable to see more detail for a smaller number of days and that the 14-day interval shown on most TGP drug charts is generally not necessary for administration during a shift. However, it is acknowledged that for other related tasks (such as gaining context) a larger timeframe could be beneficial. It is envisaged that these related tasks would be supported by other views (such as a Timeline View {R4}) and the use of start date and time ordering {R12, R15}.

More past days are shown than future days as the result of user research. Clinicians felt that information about administration events from the past few days was generally more useful than information about events in the future few days.

**MEDA-0067, MEDA-0068**

Four rounds of user feedback with small numbers of clinicians showed strong support for the TGP drug chart style of displaying administration events on two time axes (hours and days). This was due to its familiarity for acute care clinicians {R12, R13, R14, R15}. Laying the chart out in a similar way to current paper charts is likely to reduce the training load on staff as drug administration moves from paper to electronic.

It is envisaged that other views (such as a Timeline View {R4}) can provide the ability to view administration events on a single horizontal timescale, which allows graphing of other data (such as patient observations) against the administration events.

**MEDA-0269, MEDA-0232**

Icons need to clearly represent the time they are plotted against. Therefore, they have to have a consistent match between the icon's outline shape and the time it is associated with. If an icon is to be plotted with its 'centre' aligning with a time, then the icon's outline shape must not mislead clinicians as to which time it relates to. For this reason, the icon should be symmetrical about a horizontal axis.

**MEDA-0270**

Plotting scheduled events against their intended time follows current practice and gives an accurate visual representation of when events are Due and how far apart they are.

**MEDA-0271**

Unscheduled As Required drugs do not have an intended time of administration and so cannot be plotted at specific times. Plotting an event tied to the current time allows an unscheduled As Required drug to be administered whenever it is appropriate. Plotting the event in this way also helps to remind those administering it that the drug can be given. See section 3.11 for more guidance on As Required administrations.

**MEDA-0272**

Administration events that have a 'recorded' status have three times associated with them:

- The intended time of administration
- The recorded time of administration
- The time of recording

The clinician is most likely to be interested in the intended time and the recorded administration time, and potentially the size of the difference between these. It is especially important to highlight a significant difference between the intended time and recorded time as this may indicate delayed treatment and put administration events closer together than intended by the prescriber. Figure 62 and Figure 63 showed that positioning the events at either time still allows the other time to be communicated (or at least inferred) but with reduced emphasis. There are risks with either approach:

- The risk with plotting the events at the recorded time (Figure 62) is that if the event has been administered late or early, the intended time is less clear, and once again how late or how early is not immediately apparent
- The risk with plotting the events at the intended time (Figure 63) is that if the event has been administered late or early, how late or how early is not made apparent by the position

Another option would be to display both times as two linked events, but this raises the potential for confusion and creates a more cluttered view.

Anecdotal reports suggest that the current practice on paper charts is to 're-plot' significantly late events in a time closer to the recorded rather than the intended time of administration. However the decision to 're-plot' is at the documenter's discretion.

Implementers of this guidance should consider these risks with the different approaches to plotting administration events and their possible mitigations.

**MEDA-0273**

As unscheduled As Required medications do not have an intended time of administration, plotting them at their recorded time of administration gives the most accurate record of the administrations. This follows current practice of documenting the time of administration for As Required medication.

### 3.9.2 Time Scale

The guidance points in this section relate to the time scale area of the drug lines in the Drug Administration View. Figure 66 highlights the area in which it is located:

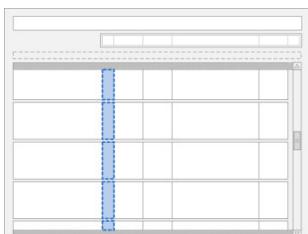


Figure 66: Time Scale Area

ID	Description	Conformance	Evidence Rating
MEDA-0069	For each drug in the Drug Administration View, display a vertical time scale at the left-side of the Chart Area, such that it clearly associates with the line's Left-Hand Panel	Mandatory	Medium
MEDA-0070	The vertical time scale should be presented with ruler-style demarcations	Mandatory	Medium
MEDA-0071	Mark the current time clearly in the time scale with a horizontal line	Mandatory	Medium
MEDA-0072	Mark the current time within the selected day in the same way as the horizontal line in MEDA-0071 (orange lines in these examples)	Recommended	Medium
MEDA-0073	Shade the past in the time scale the same way as in the Chart Area (section 3.9.3)	Recommended	Medium
MEDA-0231	Plot the movement of time throughout the day in an even and predictable manner  For example, the full height of the drug line represents 24 hours and half the height represents 12 hours	Mandatory	High
MEDA-0233	Keep the vertical time scale the same for different drug items.  An exception is where a drug line needs to grow past the default height to accommodate the administration events	Mandatory	Medium
MEDA-0234	The height of each drug item should be no less than can accommodate six administration events, where four of those events are positioned at the 'standard' drug round times for that clinical context	Recommended	Medium
MEDA-0235	Display the scheduled administration times for each drug in the Left-Hand Panel's vertical time scale	Mandatory	High
MEDA-0276	Do not display times other than the scheduled times for that drug in the vertical time scale	Mandatory	High
MEDA-0236	Do not display any times in the vertical time scale for unscheduled As Required drugs	Recommended	Medium
<b>RISK</b> There is an unmitigated risk that by not showing times in the timescale for unscheduled As Required medications, a viewer of the chart will be unclear as to the scale of the timescale and so misinterpret the times that the events are plotted. Some of the illustrations in this document show the recorded time of administration next to events in the currently selected day for unscheduled medications, which may mitigate this risk. However, showing the times in this way is not guidance.			

MEDA-0237	The very bottom of the ruler should represent 24:00 hours (that is, 00:00:00) and the very top should represent the first moment after 00:00 hours (for example, 00:00:01). However they should both be labelled '00:00'. If additional space is required to accommodate administration events in these locations, increase the line height accordingly	Mandatory	Medium
MEDA-0255	The current time indicator from MEDA-0071 and MEDA-0072 should move down the drug line during the passage of a day	Mandatory	Medium
MEDA-0259	The current time indicator line should not interfere with the legibility of any text in the Chart Area (for example, the text could have a solid background)	Mandatory	Medium

### Usage Examples

Figure 67 to Figure 69 illustrate how a time scale could be displayed:

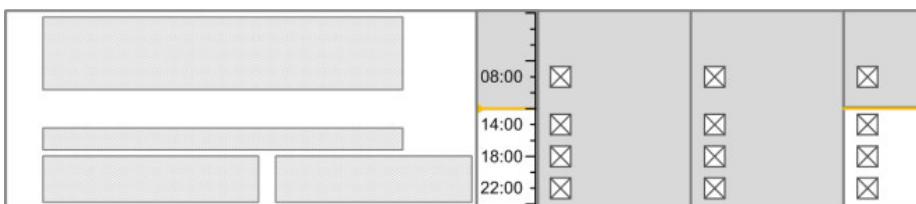


Figure 67: Illustration of Typical Time Scales with Four Daily events

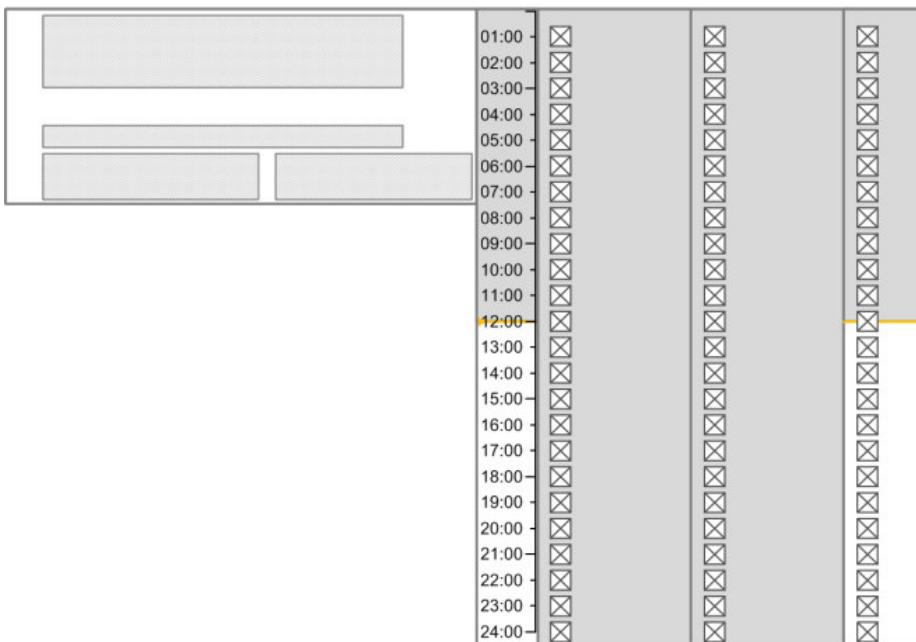


Figure 68: Illustration of a Drug with an Administration Schedule that Requires the Chart Area to Grow (Hourly Schedule)



Figure 69: Illustration of a Drug with Enough Details to Require the LHP to Expand Deeper than the Chart Area

Figure 70 to Figure 73 illustrate how a timescale should not be displayed:

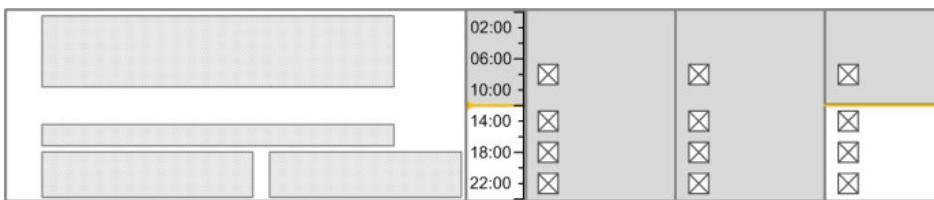


Figure 70: Incorrect Illustration of Timescales (Times in the Timescale Do Not Match the Scheduled Times Indicated by the Box Icons)

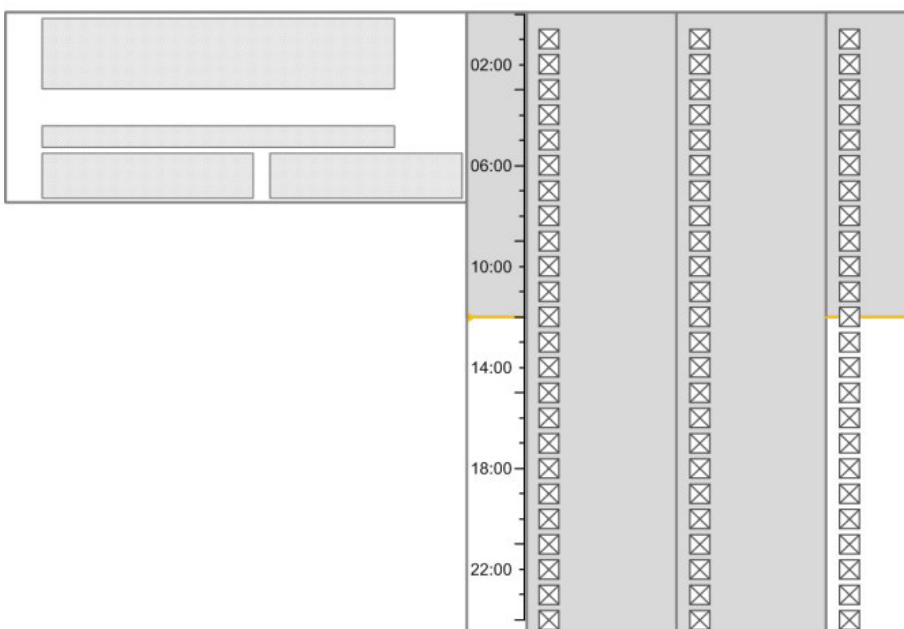


Figure 71: Incorrect Illustration of Timescales (Not All Drug Schedule Times Are Displayed)

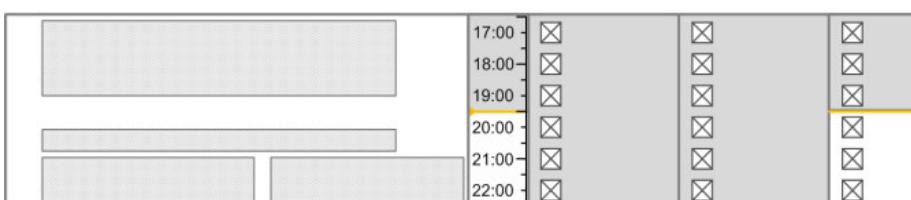


Figure 72: Incorrect Illustration of Timescales (Times Are Not for all 24 Hours)

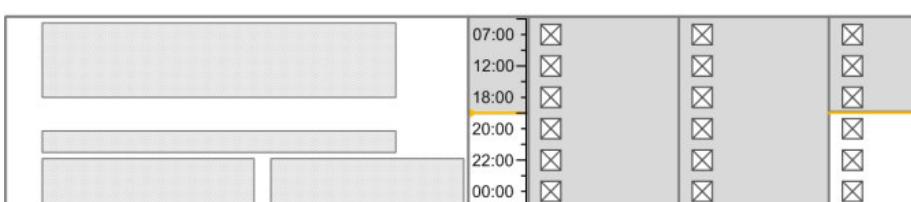


Figure 73: Incorrect Illustration of Timescales (Times Are Not Spaced at Intervals Proportional to the Time Difference)

## Rationale

MEDA-0069, MEDA-0235

Indication of the scheduled times of administration in a column to the right of the drug details is a feature common to all 20 of the TGP drug charts analysed during the guidance development. In most TGP drug chart examples, those times are the only indication of administration frequency and so would be seen as a necessary component of the drug details. Though the drug chart design indicated by this guidance already includes the frequency (in the LHP drug details), retaining the vertical column of times in this position was seen as important for familiarity of the view. It also provides quick reference to the actual scheduled times and a row header for the administration events on the chart.

TGP charts vary in their features. Some display a list of standard times that are then circled to indicate the scheduled times for the medication. Some provide only for the clinician to write in the scheduled times for the medication. Risk analysis concluded that it was safer to display only the scheduled times as it was less likely to result in standard times being misinterpreted as scheduled times.

User feedback supported the presentation of scheduled times in such a timescale (see APPENDIX A and APPENDIX B).

MEDA-0071, MEDA-0072, MEDA-0255

In user feedback, an indication of the current time was felt to be a helpful tool when conducting a medication administration task. However, clinicians felt that they would already have that information from elsewhere (for example, personal watch, workflow in the day, and so on) and that they would only use the current time in the system to confirm their knowledge and add accuracy (see APPENDIX A).

MEDA-0231

Using a real-time scale for time within a day means that the position of events on the vertical timescale conveys the time it relates to more accurately. For example, if the events were plotted so that they were always the same distance apart, irrespective of the time between them, then the plotted position may lead to a misinterpretation about the time of, or time difference between, events.

Positioning the events in real time may remind clinicians that the usual 'standard' drug round times are not evenly spaced throughout a 24-hour period.

MEDA-0233

Keeping the vertical time axis as similar as possible for different drug items maintains consistency of display. It also avoids possible misinterpretation due to items appearing in the same position relative to the scale but which represent different specific times.

MEDA-0234

Analysis of the patient prescription charts from around 15 acute medical organizations showed that allowing space for six time slots per drug was the standard and that these generally represented the medical organization's average ward four drug-round times plus space for two other times. Therefore, the drug line should be of a height that can accommodate the display of six time slots per drug, and accommodate the events when four of them are plotted at the 'standard' drug round times. This guidance aims to give each medication line a roughly standard height to provide a degree of consistency across the chart. This standard height is worked out based on what is likely to be a common high frequency of four times a day at local drug-round times plus two more administrations.

MEDA-0235, MEDA-0276

Analysis of the patient prescription charts from around 15 acute medical organizations showed two conventions for marking administration times for Regular medications:

- Displaying a set of 'normal' drug round times, which were then ringed as appropriate by the prescriber
- Displaying an empty set of time boxes, which were then filled in by the prescriber with the appropriate times

The guidance chooses to follow the convention of displaying only the time scheduled by the prescriber because:

- The electronic administration view does not need to guide the prescriber to the normal drug round times as this is achieved during prescribing
- Displaying times additional to the scheduled times may lead to confusion as to what the actual times of administration are for that medication
- Displaying times additional to the scheduled times contributes to a more cluttered view

MEDA-0236

Times should not be plotted in the timescale for unscheduled As Required medication because they do not have scheduled times. Also, actual times of administration are likely to vary per day so it would be misleading to display them in a timescale common to all days.

### Note

The 24-hour clock is mandated by the *Time Display* document {R5}, for reasons of safety, legibility and ubiquity.

### 3.9.3 Indicating Past and Future

The guidance points in this section relate to the indication of past and future time in the Chart Area of the Drug Administration View. Figure 74 highlights the default example areas in which they are located:

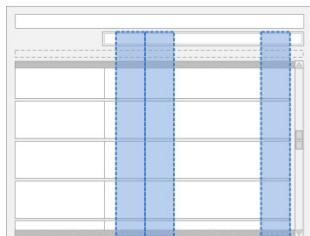


Figure 74: Example Areas for Indicating Past and Future

ID	Description	Conformance	Evidence Rating
MEDA-0277	Use shading of the Chart Area to differentiate past and future time. Try to ensure the shading used is consistent with other displays of past and future, such as in a Timeline View {R4}.	Mandatory	Medium
MEDA-0078	Differentiate between scheduled events that have had an administration status recorded and those that have not by the form of the symbols used	Mandatory	Medium
<b>Usage Examples</b>			
Figure 75 illustrates how the past and future could be indicated using shading (MEDA-0277):			
Figure 75: Different Shading Used to Represent Past and Future Time			
Figure 76 and Figure 77 illustrate how different times can be displayed in the Chart Area:			
Figure 76: How Different Times Can Be Displayed In a Medication Line (Navigating Back Two Days)			

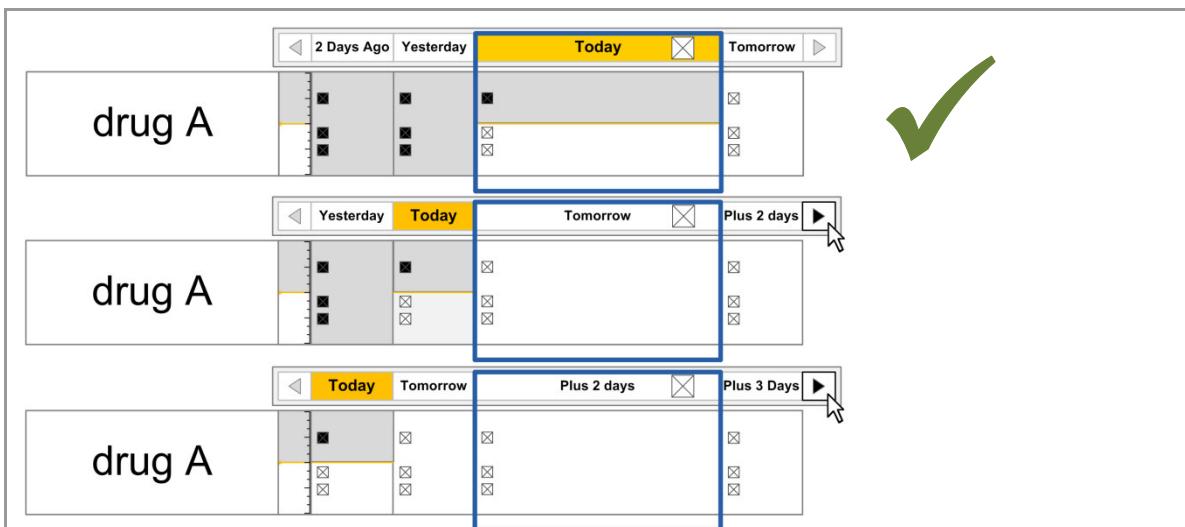


Figure 77: How Different Times Can Be Displayed in a Medication Line (Navigating Forward Two Days)

#### Rationale

MEDA-0277

Clinicians considered including a visual cue of what was past, present and future would be a useful addition to the chart (see APPENDIX A and APPENDIX B). The colour of the shading should be determined by factors such as readability and consistency of design with other views in the clinical application (such as a Timeline View {R4}).

#### 3.9.4 Indicating Today

The guidance points in this section relate to the display of the current day in the Chart Area of the Drug Administration View. Figure 78 highlights the area in which it is located:

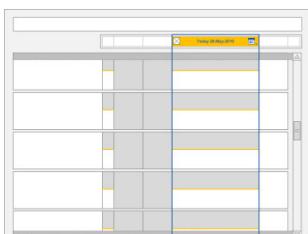


Figure 78: Current Day Area

ID	Description	Conformance	Evidence Rating
MEDA-0079	Mark 'today' in the column heading with an icon and precede the date with the word 'Today'	Mandatory	High
MEDA-0080	Use formatting of the column heading to indicate which day is today in the Drug Administration View (for example, give it a different background colour)	Mandatory	Medium
MEDA-0081	Indicate the current time (now) with a clearly visible horizontal line in the column for 'today' in the same manner that 'now' is represented in the LHP time scale area (MEDA-0071)	Recommended	Medium

## Usage Examples

Figure 79 shows how the currently-selected day could be located in the Chart Area: The figure shows 'now' represented for each medication line as a horizontal orange line.

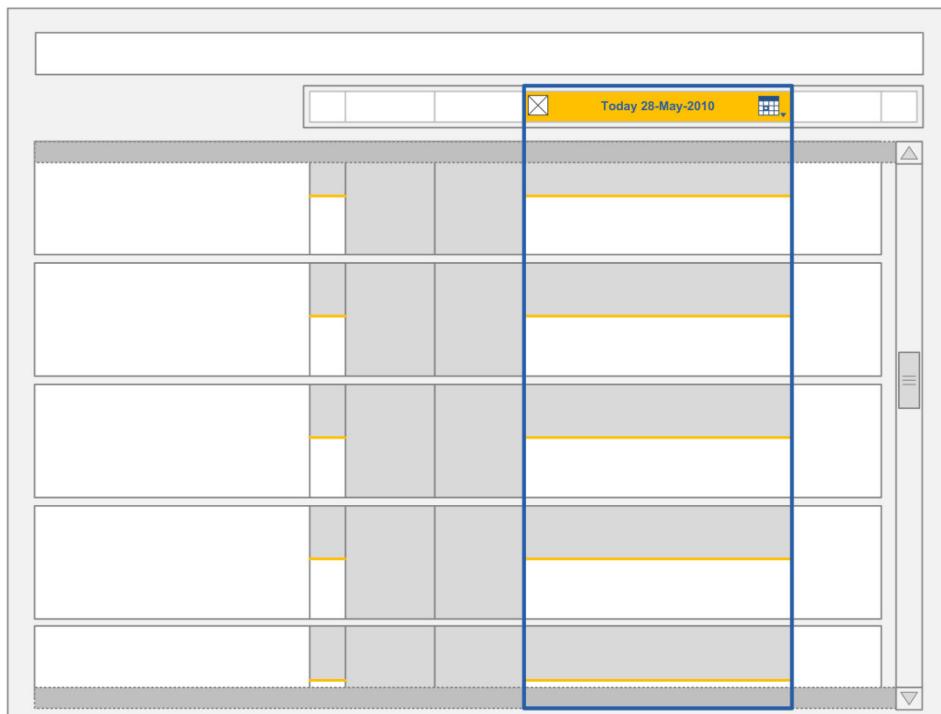


Figure 79: Example with Today as the Currently-Selected Day in the Chart Area

Figure 80 illustrates 0080 by showing how 'Today' retains an indication (in this case an orange header) even when today is not the focused day:

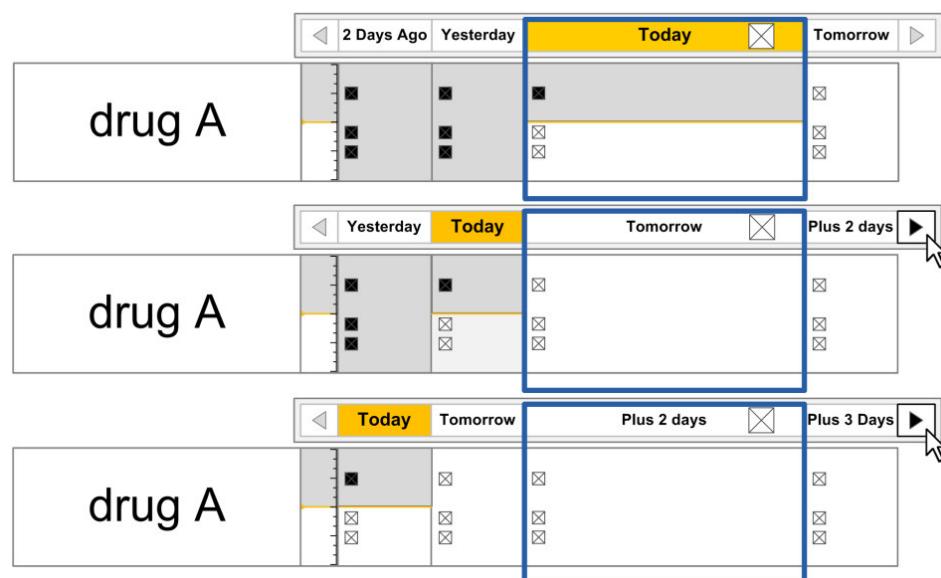


Figure 80: Representing Today When Not in Focus

## Rationale

MEDA-0079, MEDA-0080, MEDA-0081

User feedback from a small number of clinicians showed that multiple indications of the current day (for example, the icon, shading change and column formatting) were useful to ensure correct identification of the current day, as opposed to the currently-selected day {R14, R15}.

### 3.9.5 Indicating the Currently-Selected Day

The guidance points in this section relate to the display of the currently selected day in the Chart Area of the Drug Administration View. Figure 81 highlights the area in which it is located:

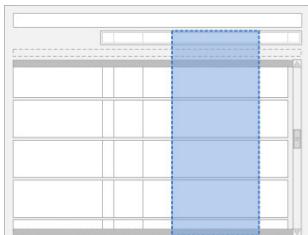


Figure 81: Currently-Selected Day Area

ID	Description	Conformance	Evidence Rating
MEDA-0082	Use a border to indicate the currently-selected day in the Drug Administration View	Mandatory	Medium
MEDA-0083	Extend the border round the currently-selected day across all drug items	Recommended	Low
MEDA-0084	Ensure that the currently-selected day in the Drug Administration View remains placed consistently on the screen (that is, that the third column is always the expanded details column rather than moving when the days are navigated)	Mandatory	Medium
<b>Usage Examples</b>			
Figure 82 displays the use of a border to highlight the selected day:			
Figure 82: Use of a Border to Indicate the Selected Day (Three Days Displayed)			
<b>Rationale</b>			
MEDA-0082, MEDA-0083			
The border of the day currently selected helps visually align the date with the administration events in the list.			

### 3.9.6 Information Display

The guidance points in this section relate to the display of administration event information in the Chart Area of the Drug Administration View. Figure 83 highlights an example area in which it is located:

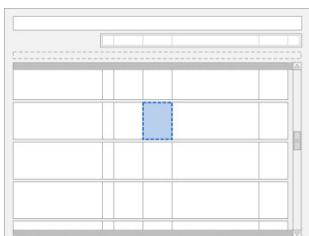


Figure 83: Example Information Display Area

The guidance models administration events so that they are represented by different types of icons:

- Scheduled events that are not yet Due are represented by a simple generic icon. Although not explicitly represented as such, these icons are clickable to enable early administration where necessary
- Administration events that are Overdue or Due are represented by 'clickable' icons since an administration is expected to be recorded for them
- Administration events for which an event has been recorded are represented by an icon that indicates the status (such as Given or Patient Refused). The status is recorded using the administration recording form

ID	Description	Conformance	Evidence Rating
MEDA-0085	Display administration event icons for every administration event	Mandatory	Medium
MEDA-0086	Make administration events that are 'active' (Due or Overdue) and look clickable	Mandatory	Medium
MEDA-0087	Display administration event icons in a single column per day. Ensure the icons are not placed alongside each other within a day	Mandatory	Medium
MEDA-0278	Additional icons can be placed to the right of the administration event icons in cases such as: <ul style="list-style-type: none"> <li>■ Start of a new drug (the first administration)</li> <li>■ When a drug has had multiple entries (rather than the single entry displayed by the single visible icon)</li> <li>■ When a review is scheduled at the same time as an scheduled administration</li> <li>■ A lockout has been placed upon the drug line</li> </ul>	Recommended	Medium
MEDA-0089	In the Chart Area, use text formatting, explicit labelling and colour to distinguish clearly between items with different administration statuses	Mandatory	High
MEDA-0090	For UK systems, use white text on a red background to highlight Overdue administrations	Recommended	Medium
MEDA-0091	Use reverse video (inverting the foreground and background colours) to highlight the text label of Overdue and Due drugs	Recommended	Medium
MEDA-0094	In the Chart Area, mark start and end/review times with the same icons as those used in the Left-Hand Panel	Recommended	Medium
MEDA-0095	When the status of an administration event has been edited after an initial recording, display the icon for the latest status. For example, if an administration was initially Given but the patient vomited the medication shortly afterwards, then display the icon appropriate for this change of status	Mandatory	High

MEDA-0096	When the status of an administration event has been edited after an initial recording, display an additional icon to indicate that it has been edited	Mandatory	Low
MEDA-0238	Ensure that notes can be recorded for any event, including Future events	Mandatory	Medium
MEDA-0250	Ensure that the administration event labels (Overdue, Due, Next) also contain the time that they were Due	Mandatory	Medium
MEDA-0258	If the functionality is available, ensure that there is a clear indicator icon in the Chart Area if a test result is available that relates to the administration event	Recommended	Medium

### Usage Examples

Figure 84 shows how supplementary icons can be used for information display. In this figure, the purple icons represent placeholder supplementary icons. In this figure, the cursor is placed over an administration event for which more than one status ('Patient Refused', 'Given') has been recorded.

Figure 85 illustrates the display of information on hover (or keyboard selection) of the administration event icon. Guidance for the display of information by hovering (placing the mouse cursor) over administration event icons is defined in section 3.9.8.

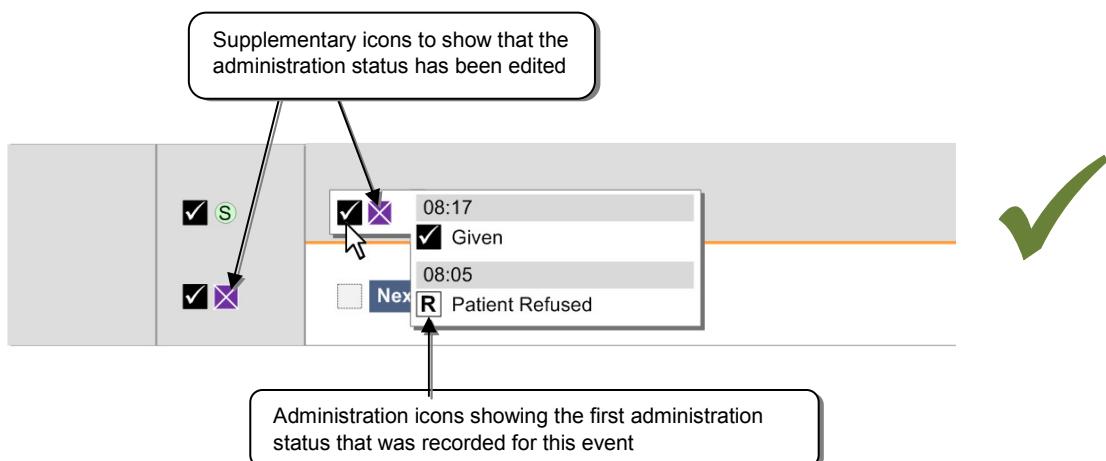


Figure 84: Supplementary Icons in Addition to the Administration Event Icon

Figure 85 shows the three different types of icons for administration events: scheduled with no recordings as yet, 'active', and those which have had an event recorded against them. It also illustrates how the use of text formatting, explicit labelling and colour can be used to clearly distinguish between items with different administration statuses (MEDa-0089). The design of these icons is notional.

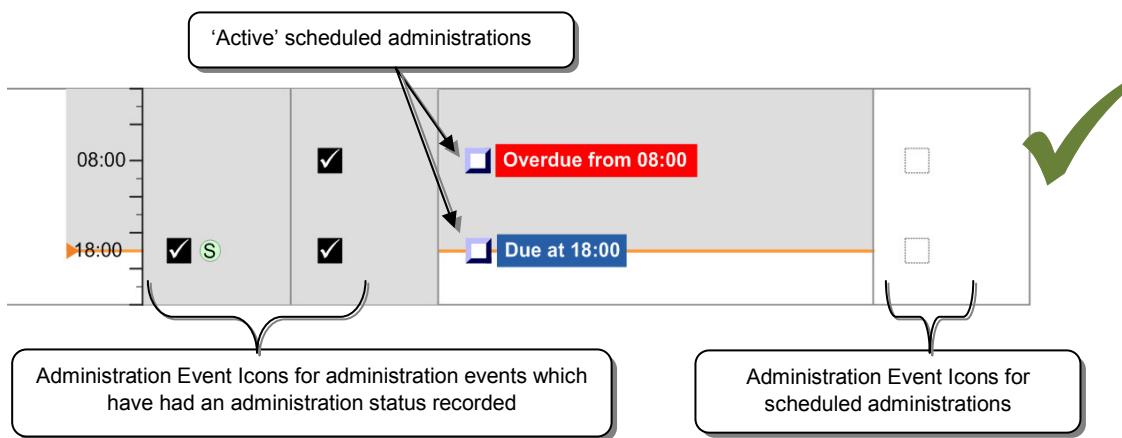


Figure 85: Types of Administration Event Icons

Figure 86 shows the display of a supplementary icon in addition to the administration event status icon:

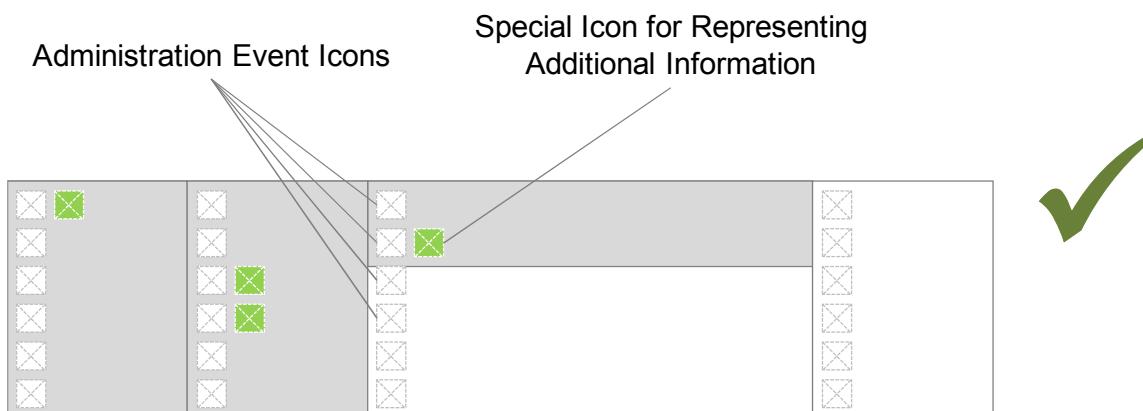


Figure 86: Display of Icons Supplementary to the Administration Event Icons

### Rationale

MEDA-0087, MEDA-0278

Guidance aims to support recognition 'at a glance' of the frequency and schedule of administrations through the placement of the administration event icons. It promotes the presentation of information so deviations and exceptions are noticeable and easy to recognise.

Administration status icons are placed in columns for a clearer and less cluttered layout that supports accurate reading along rows and down columns in order to clearly associate the icons with the relevant time period.

MEDA-0090

The recommendation to use white text on a red background to add emphasis to Overdue drugs follows conventions for the use of the colour red as a warning in the UK (see *Human Factors In Engineering and Design* {R16}). It is recognised that these conventions are subject to cultural factors that may heavily influence the final choice of colour.

MEDA-0095, MEDA-0096

Since it is possible to edit an administration status and only the final status is displayed, it is important to mark that the original entry was changed. Previous designs in which this indication of an edit was displayed only when actively accessed by the user (rather than being surfaced constantly) raised patient safety concerns. Those concerns related to the need to be aware of changes to administration statuses and the patterns that may emerge from these changes (for example, the patient always refuses at first but then asks for the drug 30 minutes later).

### 3.9.7 Information Display for the Currently-Selected Day

The guidance points in this section relate to the display of administration event information in the currently selected day in the Chart Area of the Drug Administration View. Figure 87 highlights the area in which it is located:

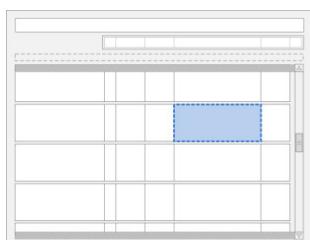


Figure 87: Area Displaying Information for the Currently-Selected Day

ID	Description	Conformance	Evidence Rating
MEDA-0097	In the Chart Area, display a wider column for the currently-selected day	Mandatory	High
MEDA-0098	In the Chart Area, provide more information for the currently-selected day and only significant information (such as when an administration has not gone to plan) for other days	Mandatory	Medium
MEDA-0099	Provide important information in days other than the currently-selected day only when the information is additional to what would ordinarily be expected	Recommended	Medium
MEDA-0100	Within the currently-selected day, display information (for example, Mandatory Notes) to support the Next administration event for that drug within that day	Mandatory	Medium
MEDA-0101	When truncating text in the currently-selected day of the Chart Area, use an ellipsis to indicate the presence of more information	Mandatory	High
MEDA-0102	In the Chart Area, allow information for the Next administration within the currently-selected day to obscure other information if necessary	Mandatory	Medium
MEDA-0103	In the Chart Area, when displaying information for the currently-selected day, display as much information as possible before truncating	Mandatory	High
MEDA-0104	Do not display a time within the Chart Area of the Drug Administration View for administrations that occurred within time constraints and for which no more precise time was given or required	Mandatory	Medium
MEDA-0105	When an approximate time (optional or mandatory) has been recorded for an administration, precede the display of the time of administration with the word 'Approx' in the Chart Area of the Drug Administration View when that administration is shown in the currently-selected day	Mandatory	Low
MEDA-0106	When an exact time has been recorded for an administration, display the time within the currently-selected day of the Drug Administration View	Mandatory	Low
MEDA-0256	Where there is space in the currently selected day, display information that has been entered as notes during the administration recording	Recommended	Medium
MEDA-0299	Guide the administering clinician to view all the relevant information for an administration event before administering the medication, even when this event is not in the currently selected day	Recommended	Low
<p><b>RISK</b></p> <p>There is an unmitigated risk that relevant information for an administration event may not display appropriately in a day not currently selected and therefore make administration on days not currently selected unsafe. One potential mitigation that has not been fully explored is restricting recording of administration to events in a currently selected day.</p>			

## Usage Examples

Figure 88 illustrates MEDA-0098 by showing more information for administrations in the currently focused day:

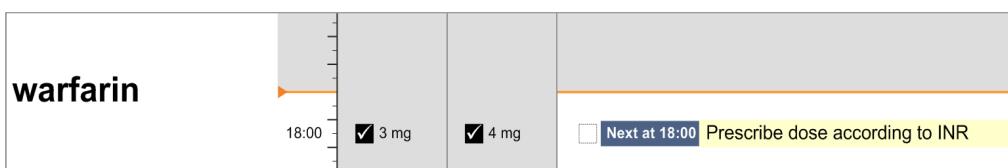


Figure 88: More Information in the Focused Day

Figure 89 illustrates MEDa-0098, MEDa-0100, MEDa-0101, MEDa-0102 and MEDa-0103 by showing how additional information for a scheduled administration can be displayed for the currently-selected day:

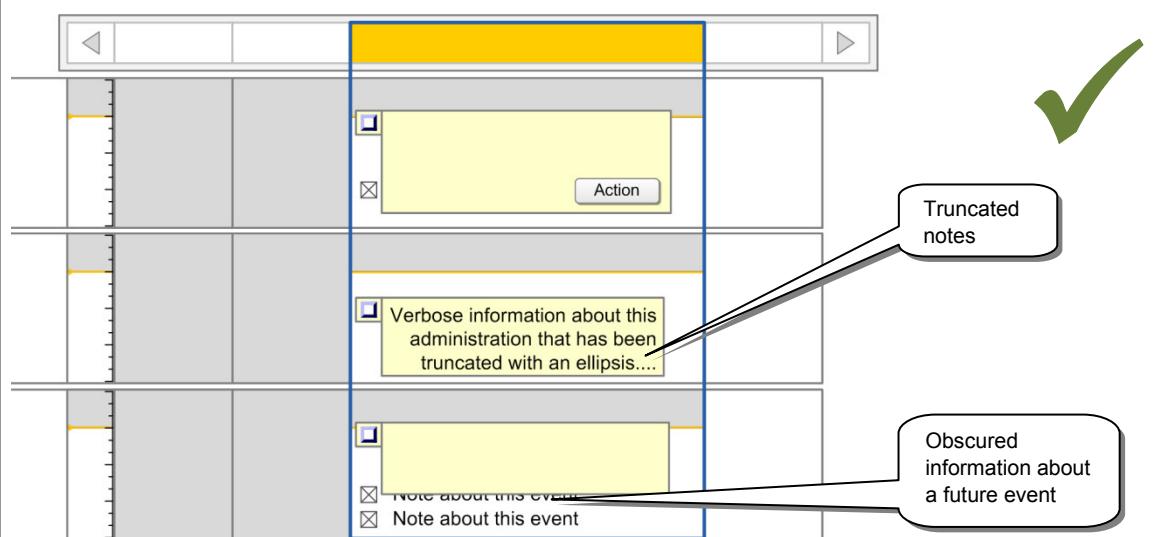


Figure 89: Display of Additional Information for a Specific Scheduled Administration in the Currently-Selected Day

Figure 90 shows examples of the display of:

- 'Approx' for drugs that were recorded with an approximate time
- A time for drugs that were recorded with an exact time

A screenshot of a software interface showing a list of times for scheduled administrations. The first two items are checked: 'Approx 02:00' and '04:16'. Subsequent items are unchecked.

Figure 90: Examples of Information Display for the Currently Selected Day

## Rationale

### MEDA-0097—MEDA-0100

The advantage of displaying fewer days in the view is that more information can be shown per day, especially information that will support upcoming administration and notify clinicians of important issues with previous administrations. Locating this detail at the point of administration means that the clinician is:

- More likely to be reminded of it
- Less likely to have to navigate the record looking for the information

### MEDA-0104

A medication recorded as administered as Given within time tolerance is assumed to be administered correctly and sufficiently on time. As such, the clinician does not need to be alerted to extra information about the event. Not displaying the times of these events results in a less cluttered view that allows other information to stand out more.

### MEDA-0299

As this guidance does not currently preclude recording administration from events not in the currently selected day, clinicians should be aware of the information relevant for that administration event before they administer the medication, even when the event is not in the currently selected day.

As the associated risk describes, the smaller space allocated to days not currently selected may mean that this information (such as criteria for administration) does not display as effectively as when in the currently selected day. Potential mitigations of this risk might be to restrict recording administration to events in the currently selected day or to make the day 'currently selected' when an event within it is selected.

### 3.9.8 Chart Area Access to More Details

The guidance points in this section relate to the display of further details of administration events in the Chart Area of the Drug Administration View. Figure 91 highlights an example of an area in which this is located:

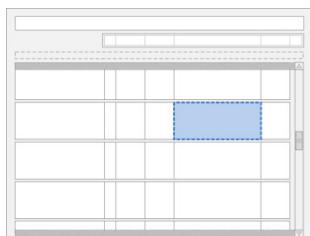


Figure 91: Example Area for Display of Further Details

This section relates specifically to the mechanism of obtaining additional information about administration events that have had administrations recorded. Details on the mechanism for recording an administration are provided in section 3.16.

Additional information for an already recorded administration could be details about that administration or it could be that the user wishes to undertake an additional action for the administration (for example, add notes to the recorded administration).

ID	Description	Conformance	Evidence Rating
MEDA-0108	In the Chart Area, for administration events that have administrations recorded, provide access to more details and the actions available for that event on hover, click or keyboard selection of the administration event icon	Mandatory	Medium
MEDA-0109	In the Chart Area, if using a hover to display details and actions for the events, use a time delay for the display (and closing) of details and actions	Mandatory	Medium
MEDA-0111	When displaying details and actions for administration events that have administrations recorded in the Chart Area, display the details for the event above the actions	Mandatory	Low
MEDA-0112	Support closing the details and actions menu for an administration event in the Chart Area by clicking elsewhere in the display or by pressing ESC on the keyboard	Mandatory	Medium
MEDA-0113	When using hover or click to display further details about an administration, ensure that the details are associated spatially and visually with the administration icon	Mandatory	Medium

#### Usage Examples

Figure 92 illustrates how more information for administration events and actions might be accessed. The event being hovered over here has been edited from a 'Patient Refused' status to a 'Given' status. The purple and blue icons are notional.

Figure 92: Examples of Information for Administration Events Reached Through Hovering Over an Event

Figure 93 illustrates MEDa-0111 by showing how actions for the event are shown below the details of the event. The green icons are notional.

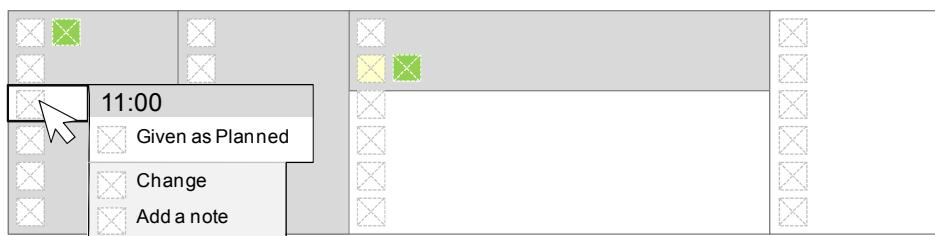


Figure 93: Accessing Actions From an Event

### Rationale

MEDA-0108

There is likely to be more information about the administration event and the clinician should have easy access to it.

MEDA-0109

A slight time delay should be used on hover-over in order to prevent the extra details appearing unintentionally (for example, when the clinician's mouse pointer runs over the events on the chart on the way to another part of the screen).

MEDA-0113

Spatial and visual association of the extra details with the event reduces the likelihood that the details will be mistakenly associated with another event.

### 3.9.9 Symbols and Icons

The guidance points in this section relate to the display of symbols and icons in the administration events in the Chart Area of the Drug Administration View. Figure 94 highlights an example of where these may be located:



Figure 94: Example Locations for Symbols and Icons

#### Note

MEDA-0066 should also be considered when reading the guidance points below.

ID	Description	Conformance	Evidence Rating
MEDA-0115	Always display an administration status icon for each administration event	Mandatory	High
MEDA-0116	Special icons for representing additional information about administration events in the Chart Area are supplementary to the administration status icon	Mandatory	Medium
MEDA-0117	In the Chart Area of the Drug Administration View, use filled-in icons to indicate successful administrations and unfilled icons to indicate those that have not been successfully administered. Unfilled icons must have a solid border	Mandatory	Medium
MEDA-0118	Use a simple icon with a dotted border to represent scheduled administrations that are not yet Due	Recommended	Low

MEDA-0119	Support administration statuses that are described by ePrescribing {R9} as a minimum	Mandatory	Medium																																										
<b>RISKS</b>																																													
	<ul style="list-style-type: none"> <li>■ There is an unmitigated risk that presenting a large number of possible administration statuses in a single list recording form may confuse clinicians or increase the chance of mis-selection</li> <li>■ There is an unmitigated risk that the administration statuses mentioned by the ePrescribing functional specification {R9} are not fully defined in publicly available documentation</li> </ul>																																												
MEDA-0120	Ensure that colour is not the only attribute used to distinguish similar symbols	Mandatory	High																																										
MEDA-0121	Ensure that symbols that can be activated or hovered over are of sufficient size to be easily pointed to by pointing devices (as a minimum, use a 16 pixel × 16 pixel icon)	Mandatory	Medium																																										
<b>Usage Examples</b>																																													
Figure 95 displays example icons that could be used for administration event statuses that can be:																																													
<ul style="list-style-type: none"> <li>■ Selected when recording an administration event (where the icons label a function)</li> <li>■ Displayed in the main chart display (where the icons indicate a status)</li> </ul>																																													
This set includes the option to clear the event details (MEDA-0260) and extends the statuses defined by ePrescribing {R9} to include:																																													
<ul style="list-style-type: none"> <li>■ Given Late – Not guidance, but implied by the notional model described in section 3.4</li> <li>■ Given Early – Not guidance, but implied by the notional model described in section 3.4</li> <li>■ Unknown (MEDA-0283)</li> </ul>																																													
<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center; width: 15px;"><input checked="" type="checkbox"/></td><td>Given</td><td style="text-align: right; vertical-align: middle; width: 150px;"></td></tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td><td>Given Once Only drug</td><td></td></tr> <tr> <td style="text-align: center;"><b>L</b></td><td>Given Late</td><td></td></tr> <tr> <td style="text-align: center;"><b>E</b></td><td>Given Early</td><td></td></tr> <tr> <td style="text-align: center;"><b>S</b></td><td>Recording of a self-administration</td><td></td></tr> <tr> <td style="text-align: center;"><b>R</b></td><td>Patient refused</td><td></td></tr> <tr> <td style="text-align: center;"><b>A</b></td><td>Patient absent</td><td></td></tr> <tr> <td style="text-align: center;"><b>O</b></td><td>Other clinical reason</td><td></td></tr> <tr> <td style="text-align: center;"><b>U</b></td><td>Drug unavailable</td><td></td></tr> <tr> <td style="text-align: center;"><b>N</b></td><td>Nil by Mouth</td><td></td></tr> <tr> <td style="text-align: center;"><b>F</b></td><td>Drug-free interval</td><td></td></tr> <tr> <td style="text-align: center;"><b>D</b></td><td>Deferred administration</td><td></td></tr> <tr> <td style="text-align: center;"><b>?</b></td><td>Unknown</td><td></td></tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td><td>Clear the administrative event (for example, if it has been recorded in error)</td><td></td></tr> </tbody> </table>				<input checked="" type="checkbox"/>	Given		<input checked="" type="checkbox"/>	Given Once Only drug		<b>L</b>	Given Late		<b>E</b>	Given Early		<b>S</b>	Recording of a self-administration		<b>R</b>	Patient refused		<b>A</b>	Patient absent		<b>O</b>	Other clinical reason		<b>U</b>	Drug unavailable		<b>N</b>	Nil by Mouth		<b>F</b>	Drug-free interval		<b>D</b>	Deferred administration		<b>?</b>	Unknown		<input type="checkbox"/>	Clear the administrative event (for example, if it has been recorded in error)	
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<b>?</b>	Unknown																																												
<input type="checkbox"/>	Clear the administrative event (for example, if it has been recorded in error)																																												
Figure 95: Example of a Possible Set of Administration Event Status Icons																																													

Figure 96 provides examples of icons that could be used to represent administrations for which an administration status has yet to be recorded (for example, administration events that are Not Yet Due, Due or Overdue):

- An administrative event scheduled in the future with no status recorded against it
- An event that has become Due but has not yet had a status recorded against it
- Administration that requires a witness
- Due Once Only administration that has not had a status recorded against it



Figure 96: Examples of Icons Representing Administrative Events for Which No Status Has Been Recorded Yet

### Rationale

MEDA-0117

Unambiguous differentiation of successful and unsuccessful administration events is of high importance. Both of these states are likely to have subcategories and so any icon will need to represent these concepts as well (for example, 'successful' might consist of 'all ok', 'late', 'early' and so on and 'unsuccessful' might consist of 'refused', 'absent' and so on). Use of filled and unfilled icons allows a background that can be supplemented by more detail (the subcategories), follow the familiar conventions for filled and unfilled checkboxes and are accessible.

MEDA-0118

An icon with a dotted border allows a clear differentiation from both Due and Overdue events and those that have had a status recorded against them.

## 3.10 Overdue Drugs

This section refers to administration events that have become Overdue and what should happen after a medication has been Overdue for some time with no administration status recorded against it.

### 3.10.1 Overdue Drugs

The guidance points in this section relate to the display of Overdue administration events in the Chart Area of the Drug Administration View. Figure 97 highlights an example of where these could be located:



Figure 97: Example Overdue Drug Display Areas

ID	Description	Conformance	Evidence Rating
MEDA-0122	In the Chart Area of the Drug Administration View, use text formatting, explicit labelling and colour to draw attention to Overdue items	Mandatory	High
MEDA-0123	In the Chart Area of the Drug Administration View, display administration events that are Overdue according to system rules governing time tolerance	Mandatory	Medium
MEDA-0279	The Overdue indication should be clear even when an Overdue event is displayed in a day that is not currently in focus (in that it has a narrower column)	Mandatory	Medium

## Usage Examples

Figure 98 shows an example of how an Overdue drug administration event could be displayed in the drug line:

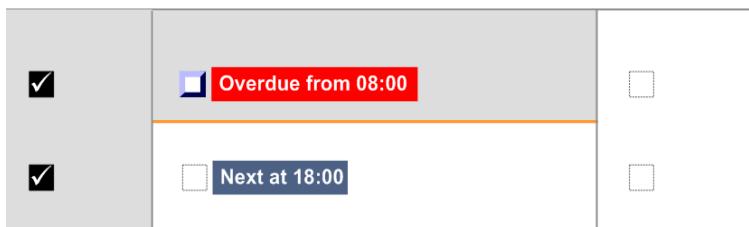


Figure 98: Illustration of an Overdue Drug

## Rationale

MEDA-0122

As discussed earlier, a major aim of this guidance is to bring the clinician's attention to drugs with administration events that require action. As Overdue events are likely to require action, text formatting, labelling and colour are used in addition to list ordering to attract the clinician's attention.

MEDA-0279

Drawing a clinician's attention to Overdue events cannot rely on the clinician viewing the event in the currently selected day.

### 3.10.2 Past Overdue

The guidance points in this section relate to the behaviour of administration events after they have been Overdue for some time. Figure 99 highlights an example of where these could be located:



Figure 99: Example Past Overdue Areas

There are conditions which determine when an event's status changes from 'Next' to Due and from Due to 'Overdue'. The conditions are most likely to be time tolerances (as described in section 3.4). For example, an event might become Due 15 minutes before its scheduled time and become 'Overdue' 1 hour after its scheduled time. Similarly, a system developer might consider including an additional condition which causes an 'Overdue' event to automatically change at some point. This does not mean that such a condition is supported by this guidance.

ID	Description	Conformance	Evidence Rating
MEDA-0280	Retain a drug's position in the list if it has past events that have not had an administration status recorded (for example, Given or one of the Not Given statuses). Determine the position according to the oldest event that has not had a status recorded. For example, a drug with Overdue events should not re-sort even if the event is four hours Overdue or if another event for that drug or another drug becomes Due.	Mandatory	Medium

MEDA-0281	Do not automatically change events with an 'Overdue' status to another status. For example, they should not change to a status of 'Unknown' three hours after their scheduled time.	Recommended	Medium
<b>RISK</b>			
	There is a risk unmitigated by this guidance that the presence of multiple Overdue events for the same medication might cause a clinician to mistakenly administer the medication for all these events one after the other to 'clear the backlog'		
MEDA-0282	If a system automatically changes status (contravening recommended guidance MEDA-0281) then this new status must imply that the status is unknown. The status must not imply that the administration has not occurred. Specifically prohibited are labels of 'Missed' or 'Not Recorded', and use of a cross icon	Mandatory	Medium
MEDA-0283	When recording any administration event, the clinician should have the opportunity to mark the event with a status of 'Unknown'	Recommended	Medium
MEDA-0284	Display a message if a clinician tries to record an administration status for any event where the drug has multiple past events with no administration status recorded. For example, a drug may have two Overdue events or an Overdue and a Due event. The message should alert the clinician to the presence of the Due or Overdue events and describe the process for dealing with them.	Recommended	Medium

### Usage Examples

Figure 100 illustrates MEDA-0281 by showing that an Overdue event has not automatically changed status even when four hours Overdue:

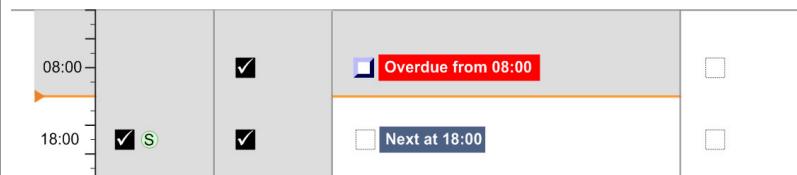


Figure 100: Overdue Event Has Not Changed Status

Figure 101 illustrates MEDA-0281 by showing that an Overdue event has not automatically changed status even though another event for the same drug has become Overdue as well:

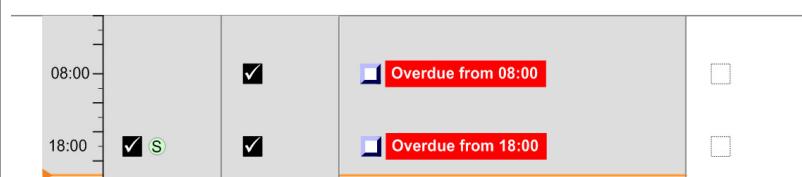


Figure 101: Two Overdue Events for the Same Medication Line

Figure 102 does not conform to MEDA-0281 because the 08:00 event has automatically changed status and does not conform to MEDA-0282 because it has used the label 'Not Recorded' plus a cross icon:



Figure 102: Event Has Automatically Changed Status

## Rationale

MEDA-0280

In current paper practice, pharmacists reported that 'blank' events on paper administration charts were a common and 'insidious' problem (see APPENDIX B). Blanks represent an absence of documentation and it may be that the administration has occurred but just not been documented. This absence of documentation not only leaves clinicians without important information but also may expose the patient to further risk if the medication is administered again if the 'blank' is assumed to mean 'not administered'. Pharmacists and nurses felt that blanks were an error that should be avoided (see APPENDIX B).

In the same way, an event which has become Due and Overdue cannot automatically be assumed to be 'missed' just because it has no administration status against it. Neither does the error disappear as time passes.

When presented with alternatives for the behaviour of Overdue items, clinicians overwhelmingly chose a model that did not re-sort these items after the event had been Overdue for several hours. They gave rationale such as that re-sorting gave the impression that the event no longer mattered and that "people need to sort out blanks" as opposed to ignoring them. Clinicians did not like the idea that the system would automatically 'demote' an event without a clinician having attended to it.

MEDA-0281, MEDA-0282

In a similar way to re-sorting, an Overdue event changing status after some condition (for example, having been Overdue for three hours) might imply that the event no longer matters as much as other Due and Overdue events. Other points of view would be that it would be useful to differentiate between 'recently' and 'long' Overdues or that it is illogical to have two Overdue events for the same drug. The majority of feedback on whether the status should change after some condition supported retaining an Overdue status until actioned by a clinician. Those clinicians that supported a change in status felt this would only be appropriate once the event had been Overdue for a long time and that two hours Overdue was too short a time (see APPENDIX A).

In addition, research has not concluded on a possible 'after Overdue' status that is unambiguous. In user feedback, a number of clinicians mistakenly interpreted the status 'Not Recorded' to mean 'Not Administered'. 'Missed' has an obvious incorrect connotation, as does a cross icon (see APPENDIX A).

Therefore, based on research, the least ambiguous status is to retain Overdue until actioned by a clinician.

MEDA-0283

In the rare event that, after investigation, clinicians are not able to determine the actual administration status, the option to record as 'unknown' allows the documentation to move on and deprioritises the 'unknown' event from the view. It is anticipated that recording of such statuses would be audited.

MEDA-0284

If two or more events for the same medication are Due or Overdue a clinician may be confused about which one to record administration against or mistakenly 'leapfrog' over a previous event without realising. A message should help clarify the policy for dealing with multiple Due or Overdue events. This policy may change depending on the drug and the clinical context.

## 3.11 Displaying As Required Administration Events

The guidance points in this section relate to the display of As Required administration events in the Chart Area of the Drug Administration View. Figure 103 highlights an example of where these could be located:

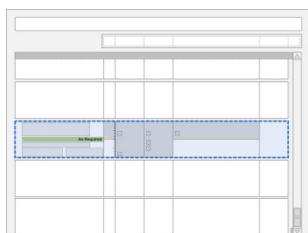


Figure 103: Example As Required Display Area

The three types of As Required medication are defined in section 3.9.1.

ID	Description	Conformance	Evidence Rating
MEDA-0133	For As Required drugs, display icons for past administration events in the Chart Area of the Drug Administration View only when an administration status has been recorded using the administration recording form	Mandatory	High
MEDA-0134	For As Required drugs, show explicitly the criteria required to be met for administration	Mandatory	Medium
	<p><b>RISK</b></p> <p>Space in the chart area is restricted for days other than the currently selected day. There is an unmitigated risk that the information required to be displayed for events such as As Requireds will not fully display when they appear in days other than the currently selected day. Implementers of this guidance must consider how to display all required information when the event is not in the currently selected day as the clinician is still able to administer from such an event</p>		
MEDA-0135	Where relevant to the criteria, provide a control to enter, calculate or check the criteria for an As Required administration event that is displayed in the currently-selected day in the Drug Administration View	Mandatory	Medium
MEDA-0136	For As Required drugs, strongly indicate in the Chart Area where there are time restrictions (such as maximum frequency or minimum interval) in operation even if other criteria are met	Mandatory	Medium
MEDA-0137	For As Required drugs, clearly indicate in the Chart Area of the Drug Administration View when any time restrictions come to an end	Mandatory	Medium

### Usage Examples

Figure 104 shows two examples of As Required criteria displayed in the currently focused day (MEDA-0134):

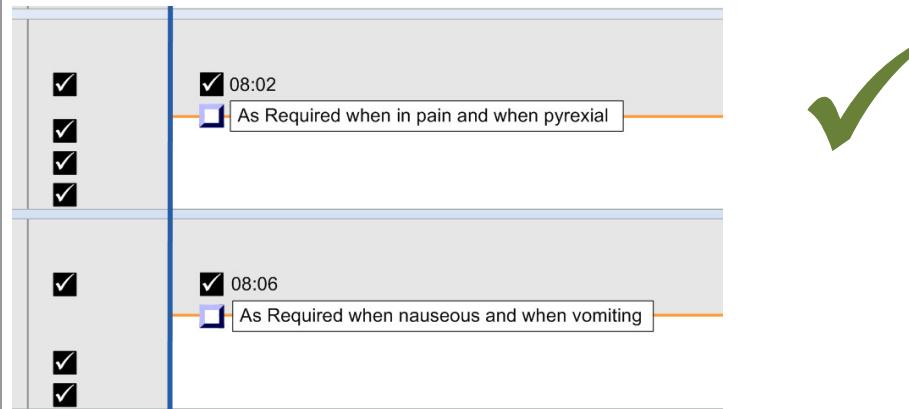


Figure 104: As Required Criteria

Figure 105 shows an example of how a related control could be displayed for an As Required administration. This control might support entry, calculation or checking of the administration criteria to be met.

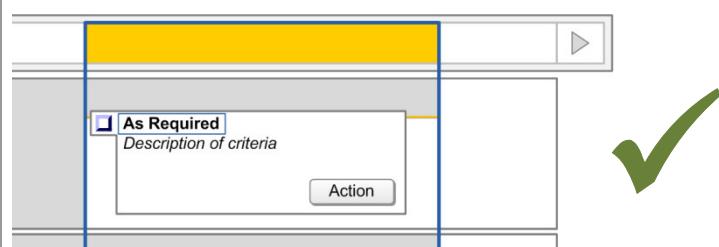


Figure 105: As Required Drugs in the Currently-Selected Day

## Rationale

MEDA-0134, MEDA-0135

Example criteria for administration of As Required medication might be:

- Specific and measurable (such as 'If beats per minute goes below 60')
- More subjective (such as 'for pain')
- Indicative of the issue which they attempt to help with (such as 'constipation')

Some trusts require that these criteria are recorded for any As Required medication and it is likely that electronic prescribing will allow rules like this to be enforced. Displaying these criteria at the point of administration encourages the clinician to consider whether the medication is required or not.

MEDA-0136, MEDA-0137

Given that there may be extenuating clinical circumstances, the ability to administer (or at least record the administration of) As Required medication should not be completely blocked because of time lockouts. For example, if a patient is in significant pain it might be inappropriate to delay analgesic administration if it is three hours and fifty-five minutes since its last administration if the analgesic has a minimum interval of four hours. However, observation of these restrictions is still important and therefore should be strongly indicated for As Required medications. In addition, the medication might be administered in error and the clinician must have the opportunity to accurately document this.

User feedback from a small number of clinicians found that As Required drugs and administration events need to be clearly indicated on the Drug Administration View and distinguished from other drugs {R12}.

## 3.12 Displaying Once Only Administration Events

The guidance points in this section relate to the display of Once Only administration events in the Chart Area of the Drug Administration View. Figure 106 highlights an example where this could be located:

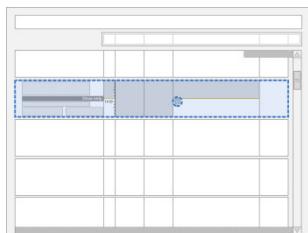


Figure 106: Example Once Only Display Area

ID	Description	Conformance	Evidence Rating
MEDA-0132	Use a different shape icon for Once Only administration events in the Chart Area of the Drug Administration View than for Regular events	Mandatory	Medium
MEDA-0241	Identify Once Only drugs by a distinct style in the Left-Hand Panel	Recommended	Medium

### Usage Examples

Figure 107 shows an example of how shape can be used to differentiate administration events of different types:

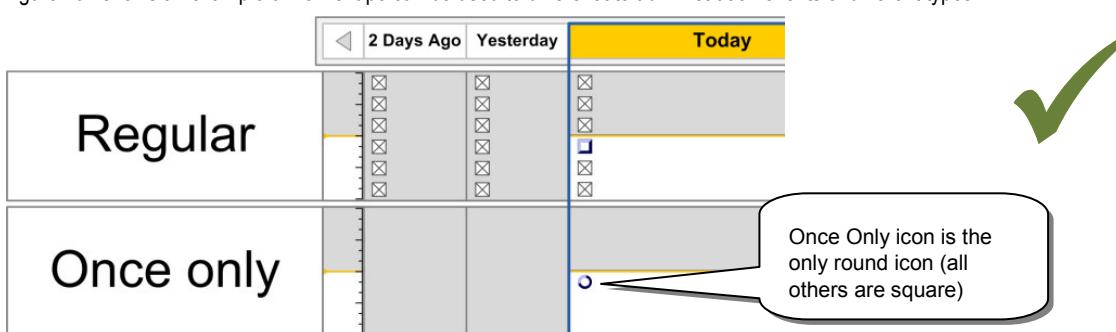


Figure 107: Using Shape to Differentiate Regular and Once Only Drugs

Figure 108 shows an example of using colour in the LHP in order to identify Once Only medication lines:



Figure 108: Example of a LHP Styled for Once Only Drug Identification

#### Rationale

MEDA-0132

Once Only medications are given distinct icons in order to further distinguish them from repeated administration medications (Regular). This reduces the chance of a Once Only mistakenly being given more than once.

## 3.13 Administrations of Significant Duration

### 3.13.1 Displaying Significant Duration Drugs

The guidance points in this section relate to the display of Significant Duration drugs in the Chart Area of the Drug Administration View. Figure 109 highlights an example of where the display would appear in the Chart Area:

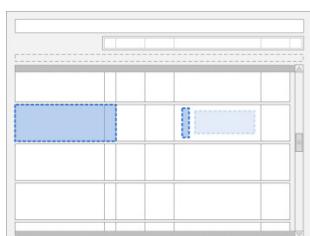


Figure 109: Example Significant Duration Drugs Display Area

The design for 'Significant Duration' drugs is intended to be used for those drugs where it is useful to record and subsequently view duration and other attributes such as rate. Gases and Infusions are examples of Significant Duration drugs. The guidance does not imply that all drugs that have an 'important' administration duration (such as aminophylline injections over 5 minutes) must be displayed according to the Significant Duration design. The decision about which medications to display using the Significant Duration guidelines will vary according to clinical context.

The guidance relates to inpatient environments other than HDU, ITU and similar areas. The display of Significant Duration drugs in these more intensive areas is out of scope. Consideration of displays that are linked to machines such as Infusion pumps is also out of scope.

There are acknowledged risks associated with infusion bag changes that are not addressed by this guidance.

ID	Description	Conformance	Evidence Rating
MEDA-0142	In the Chart Area of the Drug Administration View, show administrations of Significant Duration in a different format to drugs with discrete administration events	Mandatory	High
MEDA-0143	In the Chart Area of the Drug Administration View, display administrations of Significant Duration by a simple graphic with start and stop or estimated stop times for the drug	Mandatory	Medium
MEDA-0144	When displaying administrations of Significant Duration in the Chart Area of the Drug Administration View, use the layout and height of a graphic to visually imply scheduled start time and expected duration	Mandatory	Medium
MEDA-0285	Update the estimated stop times based on the recorded start time and any time taken by recorded interruptions	Mandatory	Medium
MEDA-0146	For administrations of Significant Duration in the Chart Area of the Drug Administration View, very clearly indicate that estimated stop times are estimates	Mandatory	High
MEDA-0286	In the Significant Duration graphic, use similar formatting to the discrete administration events to indicate scheduled administration	Recommended	Medium
MEDA-0287	Update the Significant Duration graphic to indicate that the medication has been recorded to have started	Recommended	Medium
MEDA-0145	For administrations of Significant Duration in the Chart Area of the Drug Administration View, do not update the display of the simple graphic dynamically to reflect the time that the drug has been running. (Consideration of displays that are linked to machines such as Infusion pumps is out of scope)	Mandatory	High
MEDA-0147	When displaying administrations of Significant Duration in the Chart Area of the Drug Administration View, where an interruption to the administration has been recorded, mark this on the graphic. Interruptions might include temporary suspensions when a patient goes for a Magnetic Resonance Imaging (MRI) scan, long gaps between bag changes and so on	Mandatory	Medium
<b>Usage Examples</b>			
<p><b>RISK</b></p> <p>The usage examples for this guidance (Figure 110, Figure 111 and Figure 112) show only one way that this guidance might be complied with and contain elements that are not guidance and have not been risk assessed. In particular, there is an unmitigated risk that this guidance and its usage examples do not address how the state or success of the administration is clearly conveyed when the Significant Duration administration is not shown in the currently selected day. Other design solutions might explore showing Significant Durations as linked start and end events.</p>			

Figure 110 shows examples of two Infusions, one completed during the previous day and one begun and running today. Figure 110 illustrates that administrations of Significant Duration (Infusions in this case) are displayed in a different manner to those with discrete administration events (MEDa-0142):



Figure 110: Illustration of Two Infusions

Figure 111 shows an Infusion status changing over time:

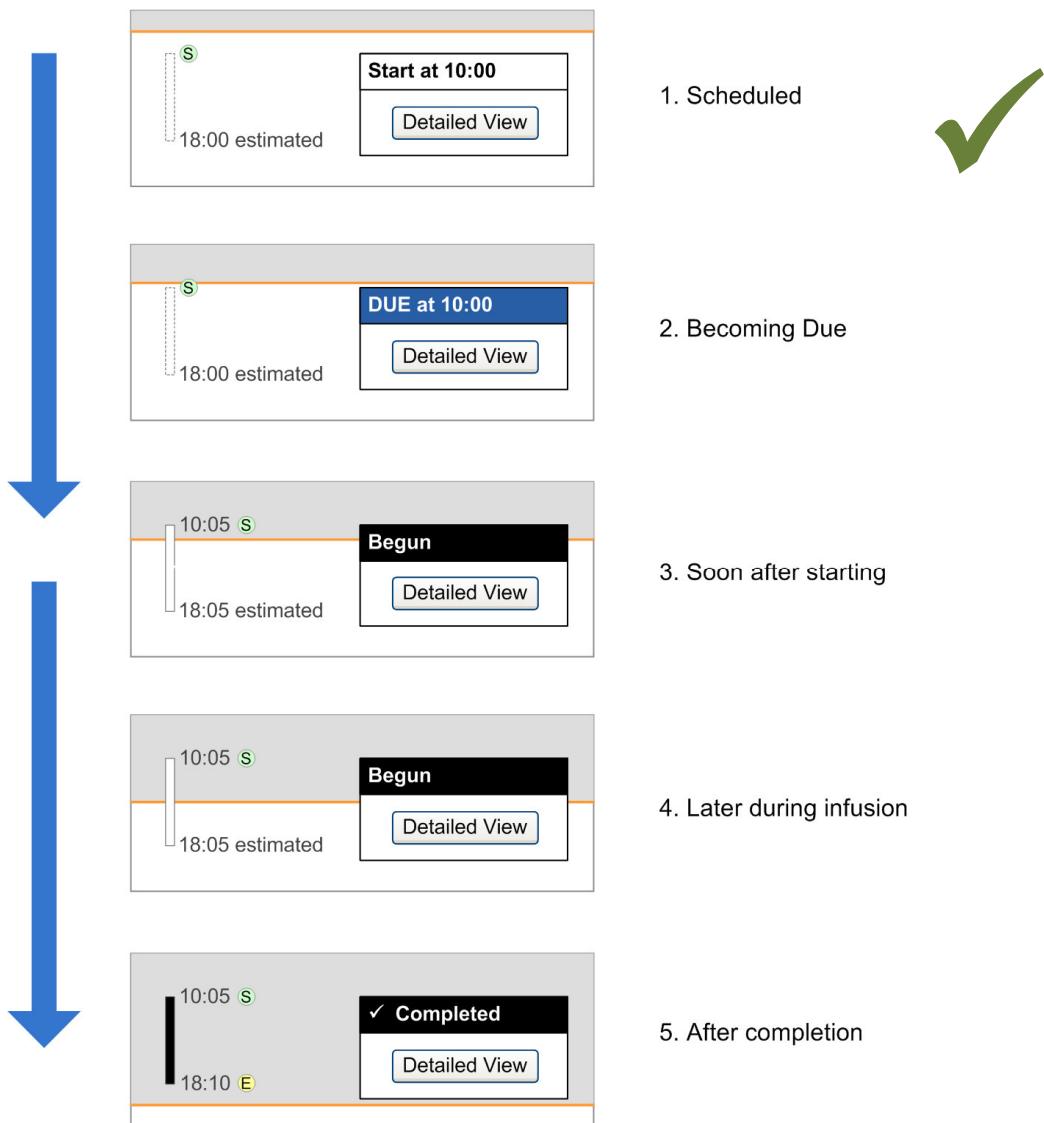


Figure 111: An Infusion Status Changing Over Time

Figure 111 illustrates a number of guidance points:

Step 1:

- A simple graphic conveying start and estimated stop times (MEDa-0143, MEDa-0144)
- Clear marking if stop times are estimates (MEDa-0146)
- Formatting the graphic in a way similar to the discrete events in order to communicate that the event is scheduled (in this case using a dashed border) (MEDa-0286)

Step 3 and 4:

- Update the graphic to indicate the medication has been recorded to have started (in this case changing from a dashed to a solid border) (MEDa-0287)
- Updating the estimated stop time based on the recorded start time (MEDa-0285)
- Not updating the graphic dynamically to show the passage of time. In this series of examples the graphic only changes when the start and stop are recorded (MEDa-0145)

The administration success icon used in step 5 is similar to the examples for Regular drugs that are displayed in Figure 95.

Figure 112 illustrates how an Infusion might look if it completed with an interruption (MEDa-0147). Note that the stop time has been updated based on the time recorded for the interruption (MEDa-0285).



Figure 112: Example of an Infusion Completed with an Interruption

## Rationale

### MEDA-0142

The display of administrations of Significant Duration needs to communicate:

- Whether they have begun and not been stopped or discontinued
- Their start and stop times
- Their ultimate administration success status
- Any interruptions (if these are recorded)

These needs cannot be accommodated with the design for discrete administration events.

It is an important principle of the Drug Administration View that all a patient's medications are presented in the same view. The medications are not presented in separate views for different kinds of medication. User feedback with a small number of clinicians showed support for displaying Significant Duration medications in the same view as other drugs {R12}.

### MEDA-0143, MEDa-0144, MEDa-0285, MEDa-0146

See section 3.13 for the rationale for presenting Significant Duration items as both simple summaries and as more detailed representations.

Two rounds of user feedback supported the clear distinction of actual from estimated or intended dates and Infusion progress {R12, R13}.

### MEDA-0145

The display of Significant Duration drugs is as simple as possible to reduce the likelihood that the graphic is perceived to be an accurate and real-time representation of the administration status of that drug. Instead, the simplicity reinforces that it is an approximate representation based on the schedule and estimated duration. Marking the graphic to show the passing of time may misleadingly imply that that drug is being successfully administered as planned over this time, when it may not be.

User feedback determined that summary indications of 'idealised' Infusion (as opposed to actual progress) were potentially dangerous {R13}. Further feedback indicated similar danger with running totals, unless the system was connected to an administration machine such as an Infusion pump {R14}. Even then, the machine may not be able to accurately determine that the Infusion is being successfully administered into the patient's body.

### MEDA-0147

User feedback indicated that significant time gaps in Significant Duration drug administration (such as interruptions or suspensions) should be indicated at the summary level {R15}.

### 3.13.2 Status Box

The guidance points in this section relate to the display of the status box for Significant Duration drugs in the Chart Area of the Drug Administration View. Figure 113 highlights an example of where this could be located:

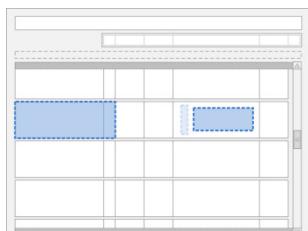


Figure 113: Example Status Box Display Area

ID	Description	Conformance	Evidence Rating
MEDA-0148	For Significant Duration drugs in the Chart Area of the Drug Administration View, display a status box which is placed consistently within the currently-selected day	Mandatory	Medium
	<b>RISK</b> There is an unmitigated risk that this guidance does not specify how the information contained in the status box is conveyed when a Significant Duration administration is not in the currently selected day.		
MEDA-0149	Within the status box displayed in the currently-selected day for a Significant Duration drug in the Drug Administration View, provide a clear indication of how a more detailed view of the drug can be accessed. If this detail can be accessed by the system, provide control for accessing this view	Recommended	High
MEDA-0150	Within the status box displayed in the currently-selected day for a Significant Duration drug in the Drug Administration View, display the status of the administration event. For example; 'Start at 10:00', 'Due at 10:00', 'Begin', 'Completed' or 'Discontinued'	Mandatory	Medium
MEDA-0151	Where a Significant Duration administration has had an event status recorded (such as 'Completed', 'Discontinued' and so on), indicate this status with an icon. Where possible, use the same icons as for discrete administration event status (section 3.9.9)	Recommended	High
<b>Usage Examples</b>			
Figure 114 shows an example of how the status box for a Significant Duration drug could be displayed: <ul style="list-style-type: none"> <li>■ Placing the box consistently in the currently selected day (MEDA-0148)</li> <li>■ Providing access to a more detailed view (MEDA-0149)</li> <li>■ Providing a clear status (in this case 'Begin') (MEDA-0150)</li> </ul>			

Figure 114: Status Box for a Significant Duration Drug

Figure 115 indicates successful administration with the same icon as for discrete events (MEDa-0151):



Figure 115: Successful Administration Icon for Status Box

### Rationale

MEDA-0148

The status box allows important information to be displayed about the item that the graphic is unlikely to be able to convey. The status box also provides a consistent placement for access to a more detailed view.

MEDA-0149

User feedback from a small number of clinicians showed strong support for having separate summary and detailed representations of Significant Duration drugs. Other rounds of user feedback also found that clinicians were interested in displaying Significant Duration drugs at different levels of detail {R13, R14, R15}. It was felt that it was difficult and unnecessary to display more detailed information (for example, bag changes, rate and volume) on a Drug Administration View. Clinicians were familiar with having specialised, more detailed charts for Significant Duration drugs such as Infusions {R13, R14}.

MEDA-0150

The display needs to clearly differentiate administrations that have started from those that are yet to start. Given that the display summarising the Significant Duration administrations does not dynamically update as time passes, a status box provides a clear way of indicating status change without updating the display. Updating the display could be misleading.

MEDA-0151

The design encourages consistency between discrete and Significant Duration administration representations.

### 3.13.3 Detailed View

The guidance points in this section relate to the display of further details for Significant Duration drugs. Figure 116 highlights an example of where this could be accessed from:

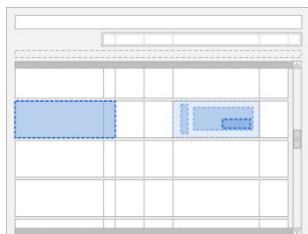


Figure 116: Example Further Details Display Area

ID	Description	Conformance	Evidence Rating
MEDA-0152	In the detailed view for a Significant Duration drug, display information such as bag changes, rates, pump settings, changes, administration issues and notes	Recommended	Medium
MEDA-0153	In the detailed view of a Significant Duration drug, display a graphic on which timings of notes, observations and issues are marked and made distinct from each other	Recommended	Medium
MEDA-0157	In the detailed view of a Significant Duration drug, where applicable display where checks have been made and show the recorded volumes or rates	Recommended	Medium
MEDA-0159	In the detailed view of a Significant Duration drug, where applicable indicate outstanding issues and provide appropriate instructions and action buttons	Recommended	Medium

### Usage Examples

No usage examples for this guidance

### Rationale

MEDA-0152, MEDA-0153, MEDA-0157, MEDA-0159

Multiple rounds of user feedback indicated further suggestions for extra details that should be present in a detailed view of Significant Duration drugs {R12, R13, R14, R15}.

Two rounds of user feedback supported the guidance that actual and estimated/intended dates and Infusion progress should be clearly distinguished {R12, R13}. It was also indicated that summary indications of 'idealised' Infusion progress (as opposed to actual progress) were potentially dangerous {R12}.

### 3.13.4 Recording Significant Duration Drug Administrations

The guidance points in this section relate to the recording of administration events for Significant Duration drugs in the Chart Area of the Drug Administration View. Figure 117 highlights an example of where this could be located:

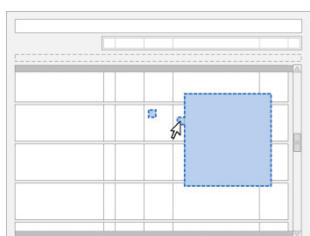


Figure 117: Example Significant Duration Drugs Recording Area

This guidance does not cover cases where an administration is incomplete (for example, where a drip has 'tissued' part of the way through the administration of an Infusion so that fluid has leaked into the tissue surrounding the cannula). Cases where an administration is incomplete are out of scope for this document.

ID	Description	Conformance	Evidence Rating
MEDA-0160	For Significant Duration drugs in the Drug Administration View, provide access to controls for recording the administration within the detailed view. Do not allow recording of administration in the main view	Recommended	Medium
MEDA-0161	When volumes are recorded, indicate whether they are approximate	Recommended	Medium
MEDA-0162	Require the recording of administration issues, notes and changes for Significant Duration drugs to be classified by selecting an option from a limited list	Recommended	Medium

Usage Examples
No usage examples for this guidance

Rationale
<p>MEDA-0160</p> <p>Recording Significant Duration administration events in the main view is not recommended as it is likely to require visibility of information only present in the detailed view.</p> <p>MEDA-0162</p> <p>Compared to using unstructured free text, using structured options will speed up input of these exceptions and provide more consistent data for display and subsequent audit.</p>

## 3.14 When a Patient is Nil by Mouth

### 3.14.1 Displaying Nil by Mouth Status

The guidance points in this section relate to the display of the Nil by Mouth status in the Drug Administration View. Figure 118 highlights an example of where this could be located:



Figure 118: Example Nil by Mouth Display Area

ID	Description	Conformance	Evidence Rating
MEDA-0163	When a patient is Nil by Mouth, display a notification across the top of the Drug Administration View positioned below the column headings and above the medication lines and scroll bar	Mandatory	Medium
MEDA-0164	Do not disable controls for recording administration events for oral drugs automatically as a result of a patient's Nil by Mouth status	Mandatory	High

#### Usage Examples

The shaded area in Figure 119 shows where the Nil by Mouth status should be displayed:

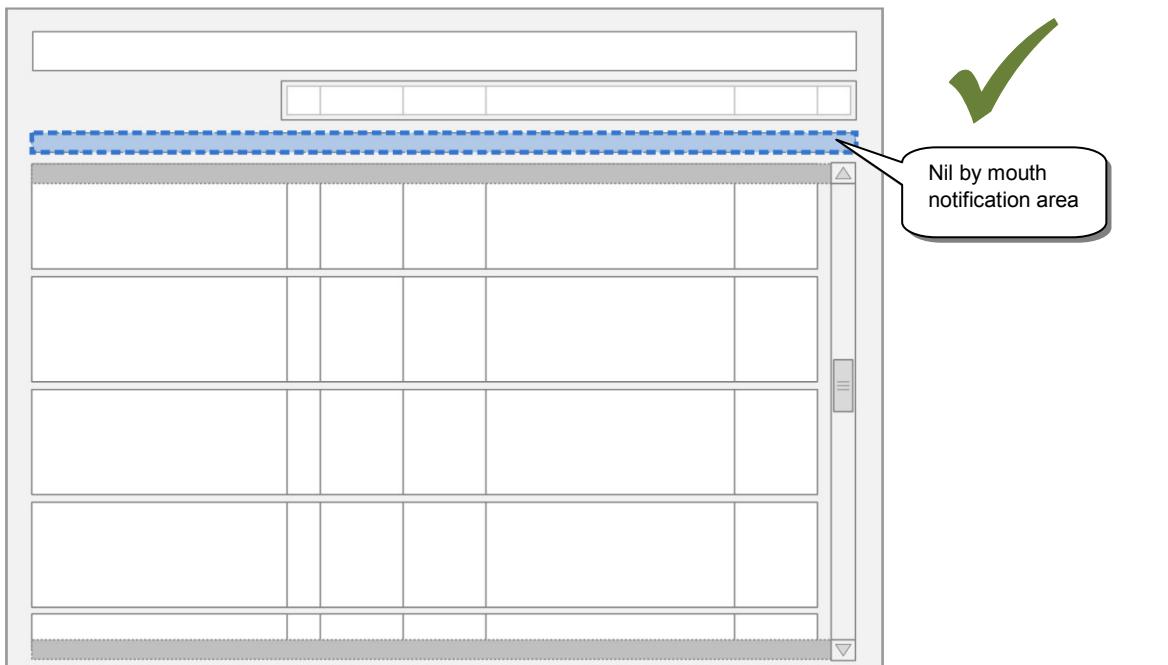


Figure 119: Drug Administration View Areas – Nil by Mouth Notification

Figure 120 shows an example of how a Nil by Mouth notification could be displayed in a patient's Drug Administration View:



Figure 120: Drug Administration View – Nil by Mouth Notification Display

Figure 121 shows the same drugs as Figure 120 for a patient who is not Nil by Mouth. This shows that the space that was reserved for the Nil by Mouth notification is now available for the display of medication lines.



Figure 121: Drug Administration View – No Nil By Mouth Notification

### Rationale

MEDA-0163

Reducing misadministration of oral substances to Nil by Mouth patients is an important feature of an administration system.

MEDA-0164

Clinicians should not be completely prevented from administering (or recording the administration of) oral medications to Nil by Mouth patients as there may be extenuating clinical circumstances. Additionally, if the medication is administered in error the record will need to accurately reflect this.

### 3.14.2 Supporting Administrations While a Patient is Nil by Mouth

The guidance points in this section relate to recording administration events when the patient is Nil by Mouth. Figure 122 highlights an example of where this could be located:

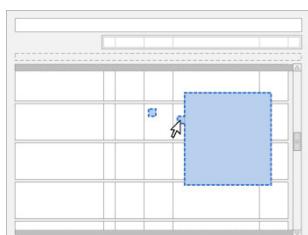
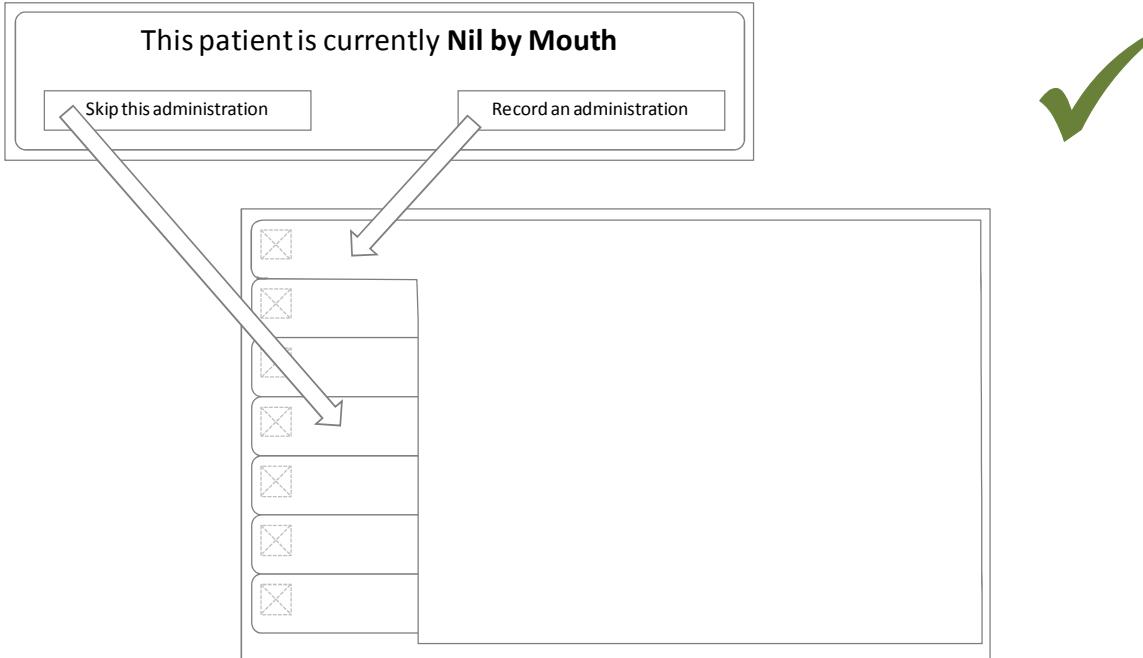


Figure 122: Example Nil by Mouth Administration Recording Area

ID	Description	Conformance	Evidence Rating
MEDA-0165	When an administration recording form is opened for an oral drug while the patient is Nil by Mouth, remind the user of that status and present the options to record the oral medication as having been Given (overriding the Nil by Mouth) or as 'not given due to Nil by Mouth'	Mandatory	Medium
MEDA-0166	When recording the administration of an oral drug whilst a patient is Nil by Mouth and the user chooses the option to not give the medication, open the administration recording form and present the fields relevant for recording a 'not given due to Nil by Mouth' administration status	Mandatory	Low
MEDA-0167	When recording the administration of an oral drug whilst a patient is Nil by Mouth, and the user chooses the option to give the medication, open the administration recording form and present the default view for recording a successful administration	Mandatory	Low
<b>Usage Examples</b>			
Figure 123 shows an example where a patient's Nil by Mouth status must be explicitly acknowledged before a drug can be administered. The labels for the two options are not part of guidance, but indicate that the administration can be recorded as Given ('Record an administration') or as 'not given due to Nil by Mouth' ('Skip this administration') (MEDA-0165):			
			
Figure 123: Requiring Explicit Acknowledgment of Nil by Mouth Before Administration			
<b>Rationale</b>			
MEDA-0165  It is still possible to administer (and record the administration of) oral medications to Nil by Mouth patients. Therefore, the clinician needs to be provided with the options to do so. Also, the clinician will need to be able to record an administration 'Not Given due to the patient being Nil by Mouth'. The clinician cannot leave the administration unrecorded as it would then be wrongly flagged as Overdue. If the event automatically recorded itself as 'Not given due to Nil by Mouth' this might also end up being incorrect as the clinician might decide that he or she did want to give the medication.			

MEDa-0166

Taken with guidance point MEDa-0165, this means that when a patient is Nil by Mouth the clinician has to take three steps for every administration event for oral medication:

1. Open the administration recording form for that event
2. Select the option to not give the medication due to Nil by Mouth
3. Confirm the administration (for example, through a 'Record Administration' button)

This may seem like a lot of steps to 'accept' a Nil by Mouth; however it is the same number of steps that would be made for recording any administration as Not Given. The system cannot accept the administration after the second selection as the clinician may want to add other information in options present on the administration form.

## 3.15 Complex Drugs

### 3.15.1 Variable Dose Drugs

The guidance points in this section relate to the display of administration events for drugs where the prescriber has specified that the dose will vary. Figure 124 highlights an example of where this could be located:

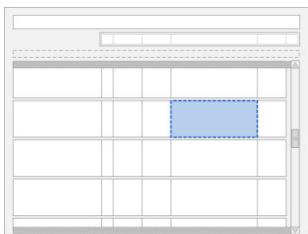


Figure 124: Example Variable Dose Drugs Display Area

There are a number of ways that a dose may vary. Table 7 describes the ways a dose may vary and indicates whether each type is addressed in this guidance:

Type of Dose	Description	Examples	Addressed in Guidance?
Conditional Dose	Dosage likely to vary per administration or per day based on criteria such as drug levels	warfarin, insulin, gentamicin	Yes
Dose Range	Dosage range specified by the prescriber within which those administering it can choose a dose depending on patient need	As Required analgesia	Yes
Constant Dose–Pattern	Dosage variations repeating either within or between days based on a schedule defined by the prescriber	furosemide morning and evening	Yes
Varying Dose–Pattern	Dosage schedule defined by the prescriber that does not fall into a repeating pattern	prednisolone tapering dose	Yes
Loading Dose	An initial higher dosage at the start of a course that reduces to a regular, consistent dose	amiodarone	No
Adjusted Dose	Dosage changed by a prescriber after the initial prescription where this change was not specified by the original prescriber. (This is not counted as a variable dose by this guidance).	enalapril 2.5 mg changed to enalapril 5 mg	No

Table 7: Ways a Dose May Vary

The guidance in this section covers drugs whose dose has been prescribed to vary. The guidance does not apply to adjusted doses as these are cases where the dose varies after the initial prescription.

In current practice, some of the variable drug types in Table 7 are commonly prescribed on 'one line'. For example, it is common to find special lines on paper charts that allow for differing oral anticoagulant doses every day. On some paper charts, variable drug types such as constant dose

patterns (for example morning and evening furosemide doses) may be written as two separate prescriptions (on two lines). Other paper charts allow for varying doses within a day so can be written up as one prescription on one line.

The guidance does not require that variable dose drugs are displayed as a single prescription on a single line but does offer direction on how this display should work if the application does display medication in this way. For example, the two representations of furosemide in Figure 125 and Figure 126 both have guidance compliant Chart Areas: Figure 125 displays the furosemide as one prescription on one line, whereas Figure 126 displays the two doses as separate prescriptions on separate lines:



Figure 125: Two Dose Prescription Displayed as a Single Medication Line

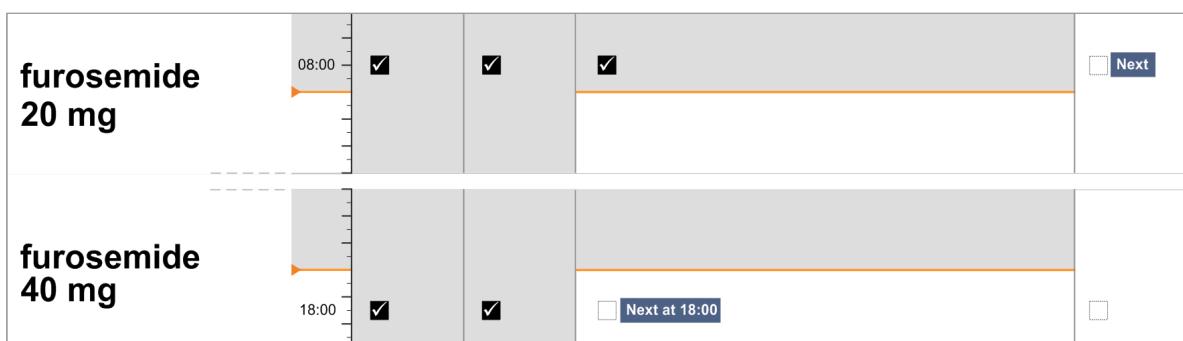


Figure 126: Two Dose Prescription Displayed as Two Medication Lines

If the application does display variable doses over multiple lines (as in Figure 126) then it is likely there will need to be some indication of linkage between these lines. This guidance document does not address the design of this linkage.

This guidance does not address loading doses as it has not been determined whether they should ever be displayed on single lines (that aggregate the loading and subsequent doses) or whether the guidance for variable doses would be appropriate for loading doses also.

ID	Description	Conformance	Evidence Rating
MEDA-0288	For Conditional Dose drugs, display the criteria for determining the dose next to the administration event icon (and label) for the Next upcoming event in the currently-selected day (which may be Scheduled, Next, Due or Overdue)	Mandatory	Medium
MEDA-0289	For Conditional Dose drugs, display the actual dose administered next to the administration event icon for all events that have a status of Given or those that have been partially administered. Display the dose for all applicable days, not just those currently selected	Mandatory	Medium
MEDA-0290	For Dose Range drugs, display the dose range and, if present, the criteria for determining the dose next to the administration event icon (and label) for the Next upcoming event in the currently-selected day (which may be Scheduled, Next, Due or Overdue)	Mandatory	Medium
MEDA-0291	For Dose Range drugs, display the actual dose administered next to the administration event icon for all events that have a status of Given or those that have been partially administered. Display the dose for all applicable days, not just the currently selected day	Mandatory	Medium

MEDA-0292	For drugs with a constant or varying dose-pattern, display the actual dose administered next to the administration event icon for all events that have a status of Given or those that have been partially administered. In that the dose should be displayed for all applicable days, not just the currently selected day	Mandatory	Medium
MEDA-0293	For drugs with a constant or varying dose pattern, display the intended dose against all scheduled administration events, whether in the currently selected day or not	Mandatory	Medium

### Usage Examples

Figure 127 shows an example of a Conditional Dose drug. It shows the dose criteria for the Next administration (MEDA-0288) and the doses administered for the previous successful administrations (MEDA-0289):

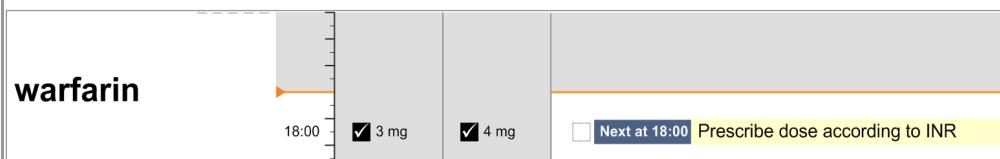


Figure 127: Conditional Dose Drug

Figure 128 shows an example of a drug with a Dose Range. It shows the dose range and criteria for the dose in the Next administration event in the selected day (MEDA-0290) and the doses administered for previous successful administrations (MEDA-0291):

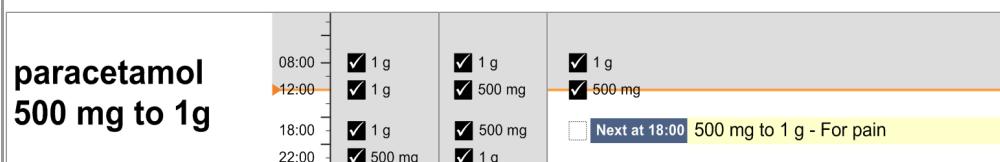


Figure 128: Drug With Dose Range

Figure 129 shows an example of a varying dose-pattern and Figure 130 shows an example of a drug with a constant dose-pattern. Both figures show the dose administered for all events with a successful administration recorded (MEDA-0292) and intended dose for all scheduled events (MEDA-0293):

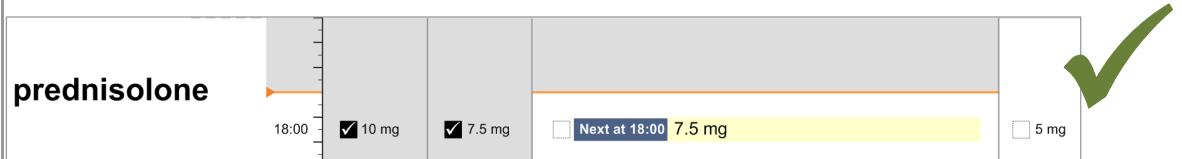


Figure 129: Drug With Varying Dose Pattern



Figure 130: Constant Dose Pattern

### Rationale

MEDA-0288—MEDA-0293

Across the guidance in this section, the principle has been applied that for some variable dose types it is useful to see a dosage trend and for some it is less useful. For example, it is useful to know at what stage a patient is in a tapering dose regimen by being able to reference the Next dose with those around it.

MEDA-0288

Displaying more detail per event is one advantage of having more space for the currently selected day. Display of the criteria for variable dose reminds the clinician that the dose may have to be recalculated for the Next administration and provides quick access to this information.

MEDA-0289

Conditional Dose drugs are an instance where it is useful for the clinician to immediately see the trend of past doses. It is acknowledged that it would also be very useful to see the other measurements upon which the dose is varying mapped to the dosage (for example, International Normalized Ratio (INR) against warfarin dose). This guidance does not cover how this would be achieved, though the guidance in this section might be combined with that in *Timeline View {R4}* to produce a view that allows medication dosage to be plotted against a graph of other values over time.

MEDA-0290

Display of the dose range and criteria for dose reminds the clinician that the dose may have to be recalculated for the Next administration and provides quick access to this information.

MEDA-0291

Dose range drugs are an instance where it is useful for the clinician to immediately see the trend of past doses.

MEDA-0292, MEDA-0293

Dose-patterns are an instance where it is useful for the clinician to immediately see the trend of past doses and planned future doses. This informs the clinician as to where the patient is in the schedule, the doses they have had recently and those that are coming.

### 3.15.2 Preconditions

The guidance points in this section relate to the display of preconditions in the Chart Area of the Drug Administration View. Figure 131 highlights an example of where this could be located:

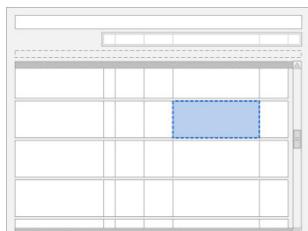


Figure 131: Example Preconditions Display Area

The display and interaction with administration preconditions is a complex area, which this guidance addresses only at a high level. Preconditions such as level checking are out of scope.

ID	Description	Conformance	Evidence Rating
MEDA-0173	In the Drug Administration View, use an icon within the Chart Area to mark administration events that have preconditions (past and future)	Mandatory	Medium
MEDA-0174	When displaying administration events with preconditions in the currently-selected day within the chart display, use text to describe the pre-condition	Mandatory	Medium
MEDA-0175	When displaying administration events with preconditions in the currently-selected day within the chart display, provide access to resources to assist with interpretation or recording of the condition	Recommended	High
MEDA-0176	When displaying administration events with preconditions in the Drug Administration View, provide access to more information about the preconditions on hover	Mandatory	Medium
MEDA-0177	For past administration events with preconditions, display the details that were recorded to satisfy the precondition on hover over or selection of the administration event in the Drug Administration View and display these when the event appears within the currently-selected day	Recommended	Medium
MEDA-0178	For administrations with preconditions, provide the ability for authorised users to override the condition	Mandatory	High

## Usage Examples

Figure 132 shows a medication line with notional precondition icons over the scheduled administration events (MEDa-0173) and displaying the detail of the precondition next to the event in the currently focused day (MEDa-0174):



Figure 132: Medication With a Precondition

## Rationale

MEDA-0173, MEDA-0174, MEDA-0175, MEDA-0176

Analysis of user feedback from a small number of clinicians found general support for the principle of marking preconditions on the view {R14}.

Displaying more detail per event is one advantage of having more space for the currently selected day. Display of the event precondition reminds the clinician that actions may be required before the Next administration (for example, taking observations). This also provides quick access to this information and a means of recording, if necessary.

MEDA-0178

User feedback confirmed that due to varying clinical circumstances it will be necessary to allow preconditions to be overridden {R14}.

### 3.15.3 Time-Critical Administration Events

The guidance points in this section relate to the display of time-critical events in the Drug Administration View. Figure 133 highlights an example of where this could be located:

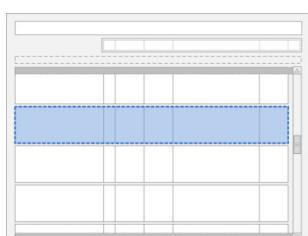


Figure 133: Example Time-Critical Event Display Area

ID	Description	Conformance	Evidence Rating
MEDA-0179	In the Chart Area of the Drug Administration View, use an icon to mark administration events that have special time tolerances  <b>RISK</b>  There is an unmitigated risk that the clinician may need to be able to access the time tolerances associated with this event. This guidance does not specify how this would be achieved.	Mandatory	Medium
MEDA-0180	When a past time-critical administration event is shown in the currently-selected day in the Drug Administration View, display the time of administration	Mandatory	Medium

### Usage Examples

Figure 134 shows notional green icons to indicate events that have special time tolerances and displays times of recorded administration events for the same drug (MEDa-0179 and MEDa-0180):



Figure 134: Medication With a Special Time Tolerance

### Rationale

MEDA-0179

Given that many administrations may be scheduled for the same time, and resources are limited, clinicians have to make judgements about which ones to administer and record closest to the scheduled time. Anecdotal reports suggest that a variety of methods (such as alarms clocks) have been tried to remind and encourage prioritisation of Parkinson's medication administration (see APPENDIX B). Icons to mark time critical events should help to remind clinicians that these events may need special consideration.

MEDA-0180

Time critical medications may require the maintenance of consistent intervals between administrations. Therefore, display of the previous times of administration will help the clinician to judge exactly when the Next administration is Due, as this time may be slightly different from the scheduled Due time.

### 3.15.4 Witnessed, Role-Specific and Self-Administrations

The guidance points in this section relate to the display of witnessed, role-specific and self-administered drugs in the Drug Administration View. Figure 135 highlights an example of where this could be located:

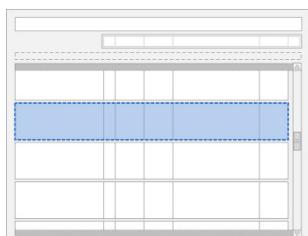


Figure 135: Example Witnessed, Role-Specific and Self-Administered Display Area

ID	Description	Conformance	Evidence Rating
MEDA-0181	Where self-administrations appear in the view, and where those administrations require recording, display the name of the person who recorded the administration in the Chart Area of the Drug Administration View	Recommended	Medium
MEDA-0182	For an administration event that must be administered by a user with a specific role, supplement administration status icons with an icon that indicates that a specific role must administer the medication. The icon does not have to indicate the actual role required	Mandatory	Medium
MEDA-0183	When an administration event that must be recorded by a user with a specific role is shown in the currently-selected day of the Drug Administration View, display the user's required role (for future events) or name (for past events)	Mandatory	Medium
MEDA-0184	When an administration event requires a witness, use a special icon for that administration event in the Chart Area of the Drug Administration View	Mandatory	Medium

MEDA-0185	When an administration event requires a witness, support the mandatory recording of witness credentials in the administration recording form	Mandatory	Medium
MEDA-0186	For displaying an administration event that was recorded as a self-administration, display a special icon in the chart display of the Drug Administration View	Recommended	Low

### Usage Examples

Figure 136 shows the name of the clinician who recorded an administration that required a specific role, notional red icons to indicate that a specific role is required and the role required to administer (MEDa-0182, MEDa-0183):



Figure 136: Administration That Requires a Specific Role to Administer

### Rationale

#### MEDA-0182

An administration that requires a specific role may require additional planning if it is to occur on time. Therefore, it is useful to surface this requirement so that the normal medication administration team can alert the other necessary staff in good time.

#### MEDA-0184

As with specific roles, a witnessed administration may require greater team co-ordination to occur on time. The 'witness required' icon reminds the team to plan for this.

#### MEDA-0185

Though witness recording is mandatory, an implementer of this guidance will have to consider how the witness can be reliably and quickly recorded while retaining the original administrator's place in the application (the drug administration chart).

#### MEDA-0186

With some levels of self administration there may be a reduced degree of certainty about the success of the administration (for instance, where the patient reports to the staff that they have taken their medication on time). Indicating that a medication was self-administered reminds readers of the chart that the administration has this lesser degree of certainty.

## 3.15.5 Displaying Partially-Logged Administrations

There may be a requirement for a clinician to be able to record an administration, but not complete the minimum data required for a complete administration (for example, when under emergency conditions). This is referred to as a partially-logged administration.

This guidance does not cover partially-logged administrations.

### Important

Implementers of systems that support such a function must carefully consider what constitutes a safe user interface for both the recording and subsequent display of partially-logged administrations.

## 3.16 Recording Administration Events

### 3.16.1 Recording Administration Events

The guidance points in this section relate to the way administration events are recorded using a form in the Drug Administration View. Figure 137 highlights an example of this area:

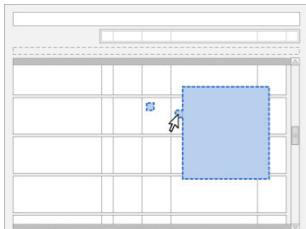


Figure 137: Example Recording Administration Events Area

ID	Description	Conformance	Evidence Rating
MEDA-0190	Launch the administration recording form with a pointing device (for example, a mouse left-click) or keyboard selection of a Due, Overdue or Future administration event icon in the Drug Administration View	Mandatory	High
MEDA-0191	Display the administration recording form such that it does not obscure the Left-Hand Panel or the administration event to which it relates	Mandatory	High
MEDA-0192	Use visual design to clearly associate the administration recording form with the administration event to which it relates	Mandatory	Medium
MEDA-0193	When presenting an administration recording form in the Drug Administration View, place it adjacent to the administration event icon from which it was launched	Mandatory	Medium
MEDA-0194	When an administration recording form is launched, de-emphasise all other information in the Drug Administration View except for two areas of the drug being administered: the Left-Hand Panel and the currently-selected day in the Chart Area. For example, de-emphasise the other information by dimming those other areas	Mandatory	Medium
MEDA-0245	Always position the recording form so that it displays in full (that is, without parts falling off the screen)	Mandatory	High

#### Usage Examples

Figure 138 shows an example of an administration recording form that is explicitly linked to the icon from which it was launched:

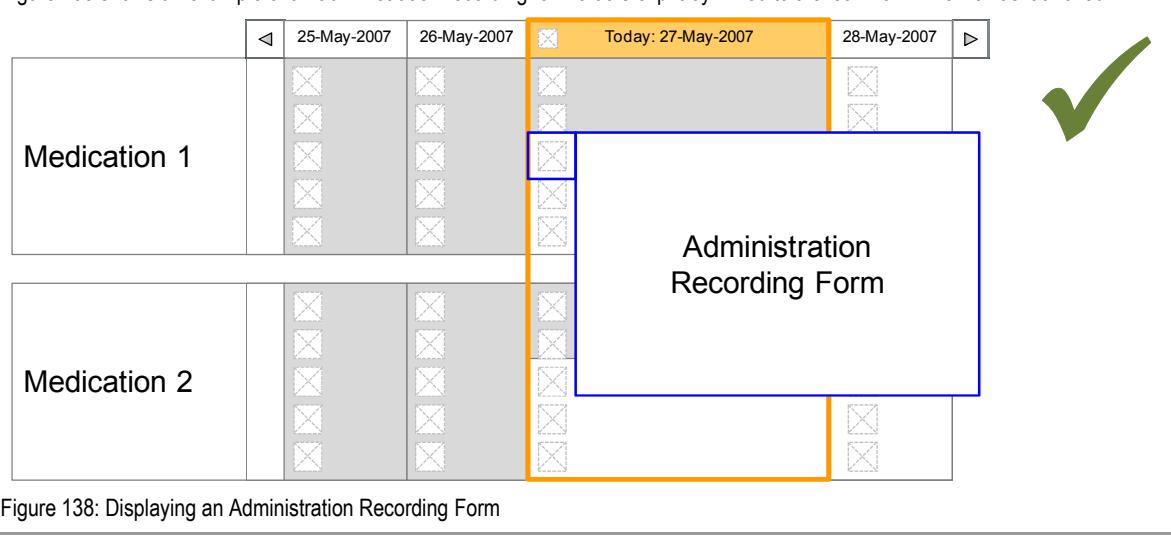


Figure 138: Displaying an Administration Recording Form

Figure 139 shows highlighting of important areas of the Drug Administration View when the administration recording form is opened by dimming all other areas of the display:

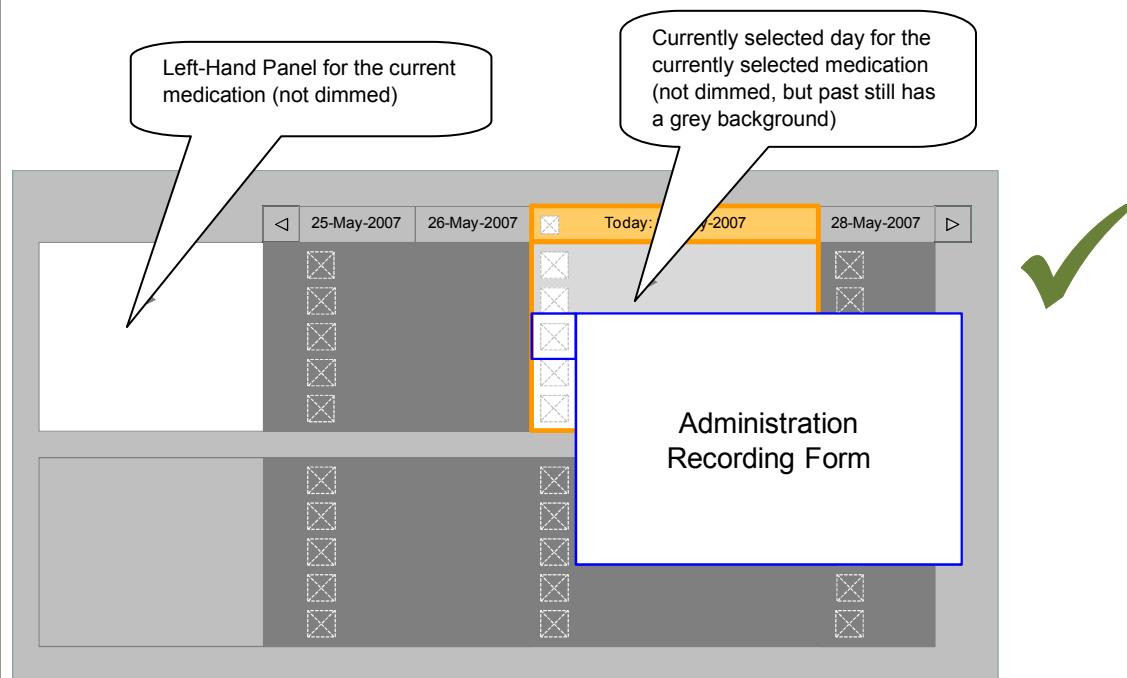


Figure 139: Dimmed and Undimmed Areas During Display of an Administration Recording Form

## Rationale

### MEDA-0190

Administration can be recorded on Due or Overdue events for obvious reasons. Being able to record against Future events not yet Due is because clinical circumstances may mean that an administration has to occur earlier than planned (for example, if the patient is going for surgery). Additionally, early administration of the medication in error needs accurate recording. This is rather than the clinician waiting until the administration becomes Due and then retrospectively recording it as Given Early. Though records can be made against Future events, administration cannot be recorded to have happened in the future (MEDA-0239): the administration has to be logged as having occurred in the past.

### MEDA-0191—MEDA-0194

To mitigate against selection error, clinicians have to be made as aware as possible of the medication and administration events that they are about to record against. For example, this also includes mitigating a scenario where:

- The clinician selects the right medication and event but is then distracted
- The clinician then reads the wrong medication line and administers this other medication
- The clinician records this administration against the original medication

In addition, the dimming of other parts of the screen during administration recording allows clinicians to quickly focus on the most relevant information and not have to re-scan the page to find what they are looking for.

Two rounds of user feedback with small numbers of clinicians strongly supported the guidance on displaying the administration recording form {R14, R15}.

### MEDA-0245

Not being able to see part of the administration form would mean that the clinician may not be able to read important information on it or may not be able to use it properly.

### 3.16.2 Structure of the Form

The guidance points in this section relate to how the recording form should be structured. Figure 140 highlights an example of where this could be located:

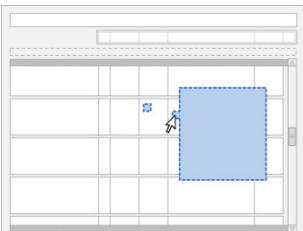


Figure 140: Example Recording Form Location

ID	Description	Conformance	Evidence Rating
MEDA-0195	Support the display of different sets of input fields depending on the type of administration status selected	Mandatory	High
MEDA-0196	For data attributes other than the basic information, clearly separate mandatory data from optional data, placing mandatory data first in the form	Mandatory	Medium
MEDA-0197	Provide a structured set of input fields that are determined from the drug item details on the system	Mandatory	High
MEDA-0199	Group optional details appropriately and provide a name for the group	Mandatory	Medium
MEDA-0200	Display appropriate optional entry fields by default depending on the type and specifics of the drug	Mandatory	Medium
MEDA-0201	Provide access to any additional optional entry fields through a simple control	Recommended	Medium
MEDA-0203	Provide an optional free-text area for notes	Recommended	Medium
MEDA-0260	Provide a mechanism for the user to return the administration event icon and details to the state they were in prior to the user input (for example, the <b>Clear the event details</b> tab in Figure 141). However, the administration event must retain the previous details on an icon as indicated by guideline MEDA-0096	Mandatory	High
<b>RISK</b> There is an unmitigated risk that a mechanism to clear event details may be misused in order to hide errors, even though edits would always be retained in an audit trail. Implementers of this guidance should consider aspects both of UI and of policy that may be required to mitigate this risk			

## Usage Examples

Figure 141 illustrates how an administration recording form could be structured:

Record the administration of drugName

Given

E Given Early

L Given Late

S Self administration

R patient Refused

A patient Absent

O Other clinical reason

U medication Unavailable

N Nil by mouth

F medication Free interval

D Deferred administration

? Unknown

X Administration Error

Clear the event details

Record Administration      Cancel

Area for mandatory information for the administration (for example, time of administration)

Area for optional information (for example, extra notes)

Figure 141: Structure of Administration Recording Form with Example Administration Statuses

## Rationale

MEDA-0195—MEDA-0197, MEDA-0199—MEDA-0200

Two rounds of user feedback with small numbers of clinicians supported the guidance on the presence of contextually-varying mandatory data input fields (for example, having to record a reason for late administration), and having a clear distinction between mandatory and optional input fields {R14, R15}.

MEDA-0260

A clinician must be able to clear the event details for a recorded event as details may have been recorded against it in error, either by themselves or others

### 3.16.3 Recording Administrations

The guidance points in this section relate to the display of the recording of drug administrations in the Drug Administration View. Figure 142 highlights an example of where this could be located:

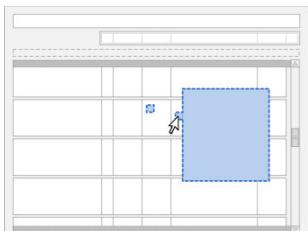


Figure 142: Example Recording Administrations Location

This guidance does not cover cases where an administration is incomplete (for example, where a patient has vomited up part of the medication or a drip has passed part of the way through the administration of an Infusion). Cases where an administration is incomplete are out of scope for this document.

ID	Description	Conformance	Evidence Rating
MEDA-0204	When launching the form for recording an administration, present the set of fields that are most appropriate for the status of that event	Mandatory	Medium
MEDA-0205	Within the administration recording form, provide a clearly-labelled control for recording the administration event (thus submitting the form) and ensure that this control is the default action associated with the Return (Enter) key	Mandatory	Medium
MEDA-0206	Provide an explicit control for cancelling the action and closing the recording administration form	Mandatory	Medium
MEDA-0207	Include pre-filled values for fields by default where relevant (for example, the time of recording could be pre-filled to be the current time). It would not be appropriate to pre-fill the dose of a drug with a dose range.	Recommended	Medium
<b>RISK</b> There is an acknowledged risk that by pre-filling values by default, the user is encouraged to select those choices even though they may not reflect the reality of the administration.			
MEDA-0208	Where necessary, provide controls to access additional forms to permit recording of complex administrations	Recommended	Medium
MEDA-0209	When providing controls to access additional forms for recording complex administrations, ensure that the result of the action is clearly communicated by the control from which the additional form was accessed	Recommended	Low
MEDA-0210	Support the recording of specific dose amounts in the administration recording form. For example, if only part of the prescribed dosage has been administered	Recommended	Medium
MEDA-0211	Support discretionary recording of incremental doses in the administration recording form	Recommended	Medium
MEDA-0212	Support site rotation and limited-list selection of sites in the administration recording form where appropriate	Recommended	Medium
MEDA-0239	Do not allow the time of an administration, when recorded, to be in the future	Mandatory	Medium

## Usage Examples

Figure 143 has a clear control for submitting the administration form ('Record Administration') (MEDa-0205) and for cancellation ('Cancel') (MEDa-0206):

Record the administration of drugName

Given  
 Given Early  
 Given Late  
 Self administration  
 patient Refused  
 patient Absent  
 Other clinical reason  
 medication Unavailable  
 Nil by mouth  
 medication Free interval  
 Deferred administration  
 Unknown  
 Administration Error  
 Clear the event details

Record Administration      Cancel

Figure 143: Primary Actions on the Administration Form

## Rationale

MEDA-0204, MEDa-0205

Administration can be completed quickly and easily by presenting the most appropriate fields by default and providing clear controls with default actions. In current paper practice, administration recording can be very quick and clinicians reported that longer processes for this highly repeated action would add time and frustration to daily work. However, guidance does require that the administration form is opened before administration is recorded. Therefore, it takes a minimum of two user actions to complete recording. The option for a one-click recording straight from the chart was rejected on the basis that it would be too likely that an administration event was selected in error and an administration recorded. Clinician feedback in patient safety assessments supported the two action minimum for administration recording.

MEDA-0206

Clinicians should have a clear mechanism for closing the recording form:

- If they have opened it in error
- To look at the recording form without needing to record anything
- To access other information before finishing the recording of that administration

MEDA-0207

Administration recording is speeded up by pre-filling values where it is safe to do so. Example values would include ones that are implicit on the paper drug charts, such as the time of administration.

MEDA-0239

As per MEDA-0190, administration can be logged against Future events but the administration must have occurred in the past and be recorded as such. For example, at 10:00 a clinician can record the 12:00 dose as Given as long as he or she records it as having been given before 10:00. That is, prospective administration recording is not supported.

### 3.17 Medication Updates

In the event that a patient's prescriptions are updated while the Drug Administration View is open, these updates must be immediately reflected in the view. Updates would include new prescriptions, discontinued prescriptions and edited prescriptions.

ID	Description	Conformance	Evidence Rating
MEDA-0294	If a new medication is prescribed, or existing medication edited or discontinued, while the Drug Administration View is open, the view should clearly indicate that a change has taken place (or will take place) and allow the clinician to easily see what this change is (or will be)	Mandatory	Medium
MEDA-0295	The view should not dynamically update if a new medication is prescribed, or existing medication edited or discontinued, while the Drug Administration View is open.	Recommended	Low
MEDA-0296	If a new medication is prescribed, or existing medication edited or discontinued, while the Drug Administration View is open, freeze the view and present a message. The message should draw attention to the update, provide its details and indicate any potential changes to the view (for example, re-sorting). After the user acknowledges the message, unfreeze the view	Recommended	Low
MEDA-0297	If an existing medication is edited or discontinued while the Drug Administration View is open, the clinician should be allowed to record an event as administered according to the values prior to the update. The message displayed on update (as per MEDA-0296) should clarify that the clinician should complete the recording according to the prior values if he or she has already administered the medication	Recommended	Low
<b>Usage Examples</b>			
No usage examples for this guidance			
<b>Rationale</b>			
MEDA-0294  In current practice, anecdotal reports suggest that prescribers often add, discontinue or edit medications on a patient's drug chart without informing the appropriate medication administration staff. This may lead to delayed administration of that medication. Even in an electronic system that orders by 'dueness', there is a need to make administration staff aware of changes at any time. Therefore, irrespective of how the view handles updates, changes should be clearly communicated as they happen to a clinician with the view open. If the clinician is not made aware of an update there is a chance he or she may mis-administer.			

**MEDA-0295, MEDA-0296**

However, if the view dynamically updates without a clear indication of the change, clinicians may not appreciate its exact nature resulting in confusion or mis-administration. For example, if a clinician is preparing to administer a medication displayed at the top of the screen, he or she may read the name of the medication, look away to get the medication out of the relevant drawer and then look back at the view to check the dosage. If the top item has meanwhile been replaced by another medication (without a clear indication that this has changed), there is a danger that the clinician may not notice the name change and reads the dosage of the new item as the dosage to give of the medication in their hands.

Freezing the view and providing a message to draw attention to the nature of the update helps mitigate the risk that the update is not noticed or understood. This guidance is rated as recommended as the method described and risks of doing this have not been fully explored. For example, it is possible that the view could dynamically update but very clearly mark what change has occurred. However, this behaviour would have to be very carefully specified in order to be safe and the required exploration was not in scope for this guidance.

**MEDA-0297**

The documentation should always reflect reality. Therefore, if a medication is changed between a clinician reading the instruction to administer and the documentation of this administration, the administration must still be recorded as it happened. It is reasonable to clarify to clinicians how they should proceed as this kind of change will be unfamiliar to users of paper drug charts, especially since the administration may be seen as an error.

## 4 DOCUMENT INFORMATION

### 4.1 Terms and Abbreviations

Abbreviation	Definition
CUI	Common User Interface
INR	International Normalized Ratio
IUD	Intrauterine Device
LASB	Look-Ahead Scroll Bar
LHP	Left-Hand Panel
HDU	High-Dependency Unit
MRI	Magnetic Resonance Imaging
NHS	National Health Service
NHS CFH	NHS Connecting for Health
NMC	Nursing and Midwifery Council
NPfIT	National Programme for Information Technology
OTC	Over the Counter
PGD	Patient Group Direction
POD	Patient's Own Drugs
PRN	Pro Re Nata ('As Required')
PSD	Patient Specific Direction
TGP	Typical Generic Paper
TPN	Total Parenteral Nutrition
TTO	To Take Out

Table 8: Terms and Abbreviations

### 4.2 Definitions

Term	Definition
As Required	A drug that has not been given a regular schedule and therefore is only given on an as needed basis based on clinical judgement and preset criteria.
Begun	A Significant Duration drug, for which a start date and time have been recorded, is scheduled to still be running and has nothing recorded to indicate that it has stopped.
Conformance	In the guidance tables, indicates the extent to which you should follow the guideline when defining your UI implementation. There are two levels: <ul style="list-style-type: none"> <li>■ <b>Mandatory</b> – An implementation should follow the guideline</li> <li>■ <b>Recommended</b> – An implementation is advised to follow the guideline</li> </ul>
Current best practice	Current best practice is used rather than best practice, as over time best practice guidance may change or be revised due to changes to products, changes in technology, or simply the additional field deployment experience that comes over time.

Term	Definition
Current medication	Current medications refer to those that have been prescribed to a patient and have not yet been discontinued or completed. A medication can also be termed current with reference to a time in the past when the medication was current for the patient
Due	Within the time constraints that allow the administration to be recorded as given successfully ('Given').
Evidence Rating	In the guidance tables, summarises the strength of the research defining the guideline and the extent to which it mitigates patient safety hazards. There are three ratings (with example factors used to determine the appropriate rating): <ul style="list-style-type: none"> <li>■ <b>Low:</b> <ul style="list-style-type: none"> <li>■ Does not mitigate specific patient safety hazards</li> <li>■ User research findings unclear and with few participants</li> <li>■ Unreferenced usability principles indicate the design is not significantly better than alternatives</li> </ul> </li> <li>■ <b>Medium:</b> <ul style="list-style-type: none"> <li>■ Mitigates specific patient safety hazards</li> <li>■ User research findings clear but with few participants</li> <li>■ References old authoritative guidance (for example, from National Patient Safety Agency (NPSA), Institute for Safe Medication Practices (ISMP) or World Health Organization (WHO)) that is potentially soon to be superseded</li> <li>■ Referenced usability principles indicate the design is significantly better than alternatives</li> </ul> </li> <li>■ <b>High:</b> <ul style="list-style-type: none"> <li>■ Mitigates specific patient safety hazards</li> <li>■ User research findings clear and with a significant number of participants</li> <li>■ References recent authoritative guidance (for example, from NPSA, ISMP or WHO)</li> <li>■ Referenced usability principles indicate the design is significantly better than alternatives</li> </ul> </li> </ul>
Overdue	Outside the time constraints for recording an administration as 'Given' but still within time constraints for recording a late administration ('Given Late').
Past drugs	Drugs that have been prescribed and subsequently have either been discontinued or completed at the time the list is being viewed
White Space	Area of user interface left clear and unused

Table 9: Definitions

## 4.3 Nomenclature

This section shows how to interpret the different styles used in this document to denote various types of information.

### 4.3.1 Body Text

Text	Style
Code	Monospace
Script	
Other markup languages	

Text	Style
Interface dialog names	<b>Bold</b>
Field names	
Controls	
Folder names	Title Case
File names	

Table 10: Body Text Styles

### 4.3.2 Cross References

Reference	Style
Current document – sections	Section number only
Current document – figures/tables	Caption number only
Other project documents	<i>Italics</i> and possibly a footnote
Publicly available documents	<i>Italics</i> with a footnote
External Web-based content	<i>Italics</i> and a <a href="#">hyperlinked footnote</a>

Table 11: Cross Reference Styles

## 4.4 References

Reference	Document	Version
R1.	UK Department of Health – Building a safer NHS for patients: Improving Medication Safety <a href="http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4071443">http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4071443</a>	22-Jan-2004
R2.	Design Guidance – Medications List	1.0.0.0
R3.	Design Guidance – Medication Line	2.0.0.0
R4.	Design Guidance – Timeline View	1.0.0.0
R5.	Design Guidance – Time Display	3.0.0.0
R6.	Design Guidance – Date Display	3.0.0.0
R7.	Design Guidance – Date and Time Input	3.0.0.0
R8.	NHS NPfIT – dm+d Implementation Guide (Secondary Care) <a href="http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/refdocs/index_html">http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/refdocs/index_html</a>	May 2009
R9.	NHS CFH – ePrescribing Functional Specification for NHS Trusts <a href="http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/baselinefuncts.spec.pdf">http://www.connectingforhealth.nhs.uk/systemsandservices/eprescribing/baselinefuncts.spec.pdf</a>	1.0
R10.	NHS – The Dictionary of Medicines and Devices <a href="http://www.dmd.nhs.uk/">http://www.dmd.nhs.uk/</a>	2.3
R11.	UK Nursing and Midwifery Council – Standards for medicines management <a href="http://www.nmc-uk.org/aDisplayDocument.aspx?DocumentID=6228">http://www.nmc-uk.org/aDisplayDocument.aspx?DocumentID=6228</a>	2008
R12.	Design Guide Medications Overview and Administration User Feedback 2007-08-20	Unpublished
R13.	Design Guide R4 Medications Overview and Admin User Feedback 2007-02-12	Unpublished
R14.	Design Guide R4 Medications Admin and Overview User Feedback 2007-01-18	Unpublished

Reference	Document	Version
R15.	Design Guide Medications Admin and Overview User Feedback 2006-11-13	Unpublished
R16.	Sanders, M. and McCormick, E., Human Factors In Engineering and Design	Seventh Edition

Table 12: References

## **APPENDIX A      STUDY ID 8: EXECUTIVE SUMMARY**

### **A.1 Abstract**

The UK National Health Service (NHS) Common User Interface (CUI) programme is a partnership between Microsoft® and NHS Connecting for Health (NHS CFH), which is part the NHS National Programme for Information Technology (NPfIT).

As part of CUI, the Clinical Applications and Patient Safety (CAPS) project has the goal of ensuring that software applications used by the NHS enhance patient safety. To achieve this, CAPS provides software developers with user interface design guidelines derived through a user-centric development process that includes explicit patient-safety evaluations.

This summary describes key findings from user research carried out in June 2008 by the CUI CAPS team on Drug Administration. These findings are a subset of those in a larger internal report prepared for the CUI CAPS Drug Administration team.

**Purpose:**

To gain clinical feedback on design concepts for Drug Administration in electronic systems.

**Method:**

Interviews: structured interviews with 15 Health Care Professionals (HCPs) eliciting HCP preferences and qualitative feedback on design alternatives.

Survey: six respondents answered open and closed questions on a subset of the same designs shown in the interviews.

**Key Results:**

Based on clinician preference and rationale:

- Sorting by 'dueness' seems appropriate for the task of drug administration. However, concerns were raised that this was not the most appropriate sort order for non-administration tasks
- There was mixed feedback on whether to group drugs by default or not
- The current model for pharmacist verification was supported
- The notional 'dueness' state transition model was supported (though alternatives were not considered)

### **A.2 Research Objectives**

To gather HCP preferences and qualitative feedback on, and to identify possible patient safety hazards with, CUI Drug Administration designs.

### **A.3 Research Design**

#### **A.3.1 Interviews**

Interviews were structured, lasted one hour and were carried out in person. Participants were taken through design alternatives for each area and asked for preferences based on patient safety rationale. Qualitative feedback was also elicited.

Detailed notes from the interviews were qualitatively analysed using thematic coding.

## A.3.2 Survey

Respondents completed a 30 minute online survey containing a subset of the images used in the interviews. As with the interviews, respondents were asked for preferences among the design alternatives, based on patient safety rationale, and asked for qualitative feedback.

## A.4 Results

### A.4.1 Interview Participant Description

15 participants were interviewed in 13 sessions. Each had either volunteered through the NHS CFH Event Management System (EMS) signup or had been recruited by an HCP who had volunteered. Table 3 shows a summary of the participants' profiles:

Session	Job Role	Specialty	Used eMAR?	Computer Experience
240	Pharmacy Technician	-	Yes	?
241	Pharmacist	?	Yes	?
242	Pharmacist	Specialist Medicine	No	?
243	Pharmacist	Clinical Systems	Yes	High
244	Pharmacist	Intensive care and Surgery	Yes	?
246	Pharmacist	Clinical Systems	Yes	High
	Senior sister	Care of the Elderly	Yes	Medium
247	Pharmacist	Department and Clinical System Management	Yes	High
248	Ward Manager	Care of the Elderly	No	Medium
249	Ward Manager	Cardiology	No	Medium/High
250	Pharmacist	Discharge	No	?
	Chief Pharmacist	Oncology and Management	No	?
251	Senior nurse	Critical Care and Practice Development	Yes	Medium/High
252	Pharmacist	'Interface' with PCT	No	High
253	Senior Nurse	Care of the Elderly and Practice Development	No	Medium

Table 13: Interview Participants

All participants were from acute secondary care and were from two teaching hospital trusts and one district general hospital.

8 out of 15 participants had used an electronic medication administration record (eMAR) before and 10 had used ePrescribing. The majority had 'medium' or 'high' computer experience as they had to use computers as part of their clinical work.

## A.4.2 Survey Respondent Description

Six respondents completed the survey. All had either taken part in previous CUI feedback or were forwarded the survey by a colleague. Table 2 shows a summary of the respondents:

Respondent	Job Role	Specialty	Used eMAR?	Computer Experience
1	Nurse	EPR	Yes	Medium
	Nurse	eMAR		Medium
2	Pharmacist	?	No	Medium
3	Pharmacist	?	Yes	High
4	UI Designer (NHS CFH)	Clinical Software	No	High
5	Pharmacist	?	Yes	Medium

Table 14: Survey Respondents

## A.4.3 Design Areas

Bullet text *in italics* represents researcher recommendations or comments in order to distinguish them from user feedback.

### ***Example Pharmacist Tasks with Drug Charts***

- Is there anything that I need to verify?
- Is there anything that I need to supply?
  - And how soon do I need to supply it: is an administration imminent?
- Are there any patterns of non-administration that might need to be addressed?
- How is the XXXX medication doing?
- Why is the patient's blood pressure still high? Have they had their blood pressure medication yet?
- Should any of the As Requireds be changed to Regulars (or vice versa)?
- Is the patient's discharge medication correct?
- Does the patient need a compliance aid at home?

### ***As Required***

- Four participants raised concerns about showing timescale with times for As Required medications. The presence of times on the timescale implies it was Regular medication with scheduled events
- The 'As Required for ...' text was seen as useful
- Three participants suggested that it would be helpful to see the administration times for the As Requireds of previous days by default so that they could determine if the medication needed to be converted to a Regular
- Questions were raised over whether both the minimum interval and maximum frequency should be displayed and how they should be phrased:
  - *Deferred to NHS CFH ePrescribing team*

## Sorting by Dueness

- All participants were positive about sorting by dueness (“quite a good idea”) or very positive (“a really good idea”) for the task of drug administration
- One nurse had used an eMAR with sorting by dueness before and found it “fine”
- Considering non-administration tasks, the pharmacists interviewed felt that ordering by dueness would not be the most appropriate sort order for them or for doctors:
  - And therefore they would like access to an alternative sort order or a different view to see the administration schedule and history
- Several pointed out that, as many medications were likely to be Due at the same time, secondary sort orders would be useful:
  - Such as by ‘priority’ (for example, those with a narrow time tolerance)

## Grouping by Default

- Preferences were very mixed on whether medications should be grouped by default or not
- Differences centred around the pros and cons of ‘mixing’ of As Required with the rest of the medications
- Roughly, more nurses would prefer not grouped by default and more pharmacists would prefer grouped by default:
  - *Presumably because sorting by ‘dueness’ is of less use to the pharmacist than a nurse carrying out administrations (and not grouping allows the most Due to rise to the top of the list not just the top of the group)*
- Why not grouping by default?
  - Users wanted to prioritise sorting by dueness
  - Having As Required and stat drugs in a separate section would perpetuate the problem of these being accidentally ‘missed’
  - One nurse had used a system with no grouping by default, describing that it “was fine”
  - The issue of seeing a familiar view (for example, grouped like the paper drug charts) can be satisfied by applying the grouping afterwards (if the user wants to)
- Why grouping by default?
  - Having no groups would be “TOO big a change” (253) in that familiarity and acceptance was more important overall
  - “Nurses have a learnt routine of groups which they go through” (253)
  - As Required ‘mixed in’ would lead to over administration (250)
  - An As Required ‘query’ (‘can we give them anything for pain?’) would be easier to answer if it was in a separate section

## Never-Administered As Required

- Of eight participants asked, six felt it would be important to see discontinued As Requireds on the chart even if they had never been administered

## ***Status Bar***

- Preferences for the Status Bar design were inconclusive, however several respondents felt that the whole Status Bar was unnecessary if the information was clear in the list:
  - However, one participant realised that if you could apply grouping or alternative sort orders (which is likely), then the Status Bar would alert you to Due and Overdue medication that you might be able to currently see and therefore was a useful feature

## ***Pharmacist Verification***

- Both nurses and pharmacists confirmed it was useful to see verification
- The two pharmacists asked felt that each medication was verified on its own and a global verification was not necessary
- All six participants asked felt it was not necessary to permanently display the verifier's name, as long as it could be easily accessed
- Feedback was inconclusive on the use of a flag for verified or unverified

## ***Due – The State Transition Model***

- The potential time-based model was discussed with participants. The model includes:
  - Flagging an event as Next when it is the next non-Due or Overdue event for that medication
  - Flagging an event as Due when it passes its scheduled time and becomes Overdue around an hour after that
  - Flagging whether administration was recorded early or late
- All seven participants with whom it was discussed felt the model was acceptable for the general inpatient context:
  - They also supported the idea of variable time tolerance within this model

## ***Discontinued***

- One participant was concerned that discontinued medications were currently not sufficiently distinguished

## **APPENDIX B      STUDIES ID 14 AND 40: EXECUTIVE SUMMARY**

### **B.1 Abstract**

The UK National Health Service (NHS) Common User Interface (CUI) programme is a partnership between Microsoft® and NHS Connecting for Health (NHS CFH), which is part the NHS National Programme for Information Technology (NPfIT).

As part of CUI, the Clinical Applications and Patient Safety (CAPS) project has the goal of ensuring that software applications used by the NHS enhance patient safety. To achieve this, CAPS provides software developers with user interface design guidelines derived through a user-centric development process that includes explicit patient-safety evaluations.

This summary describes key findings from user research carried out in August 2008 by the CUI CAPS team on designs for Drug Administration. These findings are a subset of those in a larger internal report prepared for the CUI CAPS Drug Administration team.

**Purpose:**

To gain clinical feedback on design concepts for Drug Administrations in electronic systems.

**Method:**

Interviews: structured interviews with 14 Health Care Professionals (HCPs) eliciting HCP preferences and qualitative feedback on design alternatives.

Survey: 45 respondents answered open and closed questions on a subset of the same design images used in the interviews.

**Key Results:**

Based on clinician preference and rationale:

- ‘Long’ Overdue administration events should not re-sort in the list until after clinician action
- ‘Long’ Overdue administration events probably should not change to another state (for example, Not Recorded) without clinician action
- A less mis-interpretable description for a Not Recorded state might be ‘Unknown’
- The Status Bar refresh control does not need to display multiple times and can simply indicate that the list order needs updating

### **B.2 Research Objectives**

To gather HCP preferences and qualitative feedback on, and to identify possible patient safety hazards with, CUI Medication Administration designs focusing on unfinished scope areas such as dealing with Not Recorded.

### **B.3 Research Design**

#### **B.3.1 Interviews (Study ID 40)**

Interviews were structured, lasted one hour and carried out in person. Participants were taken through design alternatives for each area and asked for preferences based on patient safety rationale. Qualitative feedback was also elicited.

Detailed notes from the interviews were qualitatively analysed using thematic coding.

### B.3.2 Survey (Study ID 14)

Respondents completed a 30 minute online survey containing a subset of the images used in the interviews. As with the interviews, respondents were asked for preferences among the design alternative, based on patient safety rationale, and asked for qualitative feedback.

## B.4 Results

### B.4.1 Interview Participant Description

14 participants were interviewed in 12 sessions. Each had either volunteered through the NHS CFH Event Management System (EMS) signup or had been recruited by an HCP who had volunteered. Table 3 shows a summary of the participants' profiles:

Session	Job Role	Specialty	Level	Used eMAR?	Computer Experience	CUI Feedback Before?
292	Doctor	Anaesthetist	SpR	No	Medium	No
293	Nurse	Acute pain	Sister	No	Medium	No
294	Pharmacist	?	?	HIS	Medium	No
295	Resus Officer	Resuscitation	Senior	No	High	No
296	Doctor	Obstetrics and Gynaecology	FY2	No	Medium	No
297	Doctor	Obstetrics and Gynaecology	FY2	No	Medium	No
298	Nurse	Gynaecology	Staff Nurse	No	Medium / Low	No
299	Nurse	Gynaecology	Staff Nurse	No	Medium / Low	No
300	Nurse	Gynaecology	Junior Sister	No	Medium	No
301	Pharmacist	?	Senior	ServeRx™	High	Yes
302	Nurse	Surgery	Sister	ServeRx	Medium / Low	No
	Pharmacist	Safety	?	ServeRx	Medium / High	No

Table 15: Interview Participants

All participants were from acute secondary care and were from three different teaching hospital trusts with diverse geographical locations.

Only 4 out of 12 participants had used an electronic medication administration record (eMAR) before. The majority had 'medium' computer experience as they had to use computers as part of their clinical work.

### B.4.2 Survey Respondent Description

45 respondents completed the survey. All had either taken part in previous CUI feedback or were forwarded the survey by a colleague. Table 16 shows a summary of the respondent's job roles:

Job Role	Respondents
Hospital Staff Nurse	2
Ward Manager	1
Other Nurse	5
Junior Doctor	2

Job Role	Respondents
Medical Consultant	6
Anaesthetist	2
Pharmacist	23
Healthcare Manager	1
Software Analyst	1
Change Agent	1
Healthcare IT Clinician	1
TOTAL	45

Table 16: Survey Respondents

53% of respondents had used some kind of ePrescribing and 27% had used some kind of electronic drug administration. Most respondents had medium to high computer experience.

### B.4.3 Design Areas

Bullet text *in italics* represents researcher recommendations or comments in order to distinguish them from user feedback.

Results from the interviews and survey have been combined where they covered the same design areas.

#### **Not Recorded: Indication**

- Only 45% of interview participants and 64% of survey respondents correctly interpreted what the Not Recorded indicator would mean (the label was supplemented with a cross):
  - *Implying that the label and cross symbol are not safe for use to represent this concept*
  - *'Unknown' was suggested as a more appropriate term*

#### **Not Recorded: Current Practice**

- Pharmacists described unrecorded administration as a very common problem, expecting to see several a day on their rounds:
  - “Very serious, very prevalent and universal....not catastrophic but it is the insidious nature of the problem”
- Participants felt that it was very unusual not to be able to discover what actually happened to the administration
- Participants speculated that blanks are often caused by interruptions in drugs rounds

#### **Not Recorded: Time Change**

- When shown an example of what might happen to an event that had been Overdue for two hours, the majority of participants and respondents:
  - Anticipated it would stay Overdue
  - Reasoned that it should stay Overdue
  - Or saw problems with it changing to a Not Recorded state after two hours

## **Not Recorded: Sorting and Changing**

- As well as changing state, participants were asked about whether the 'long' Overdue event should re-sort so that other Due events came to the top of the list (as the list is ordered by dueeness)
- Table 17 shows participant's and respondent's preferences for the behaviour of an Overdue event after two hours:

Which Option is Safest?	Interviews (n=11)	Survey (n=45)
Option 1 – Change to Not Recorded and re-sort	0	8%
Option 2 – Change to Not Recorded and not re-sort	36%	22%
	*If longer time till change	
Option 3 – No change and not re-sort	64%	67%
Don't know	0	2%

Table 17: Preferences for Behaviour of an Event Over Two Hours Overdue

- Preference was to not change and not re-sort, with clear rationale such as that if you change and re-sort the unrecorded events will get forgotten:
  - However, an important risk raised was that if 'unrecorded' events did remain as Overdue an administerer might administer BOTH doses in quick succession

## **Not Recorded: Recommendations**

- *Until after clinician action, administration events that have gone beyond Overdue should:*
  - *Not re-sort automatically*
  - *Remain prominent in the display (perhaps through the Status Bar, label or visual design)*
  - *Indicate the original Due time*
  - *Not use a mis-interpretable label or icon (for example, do not use Not Recorded or a cross)*
  - *Be very clear that there has NOT been any user-initiated change (perhaps by remaining Overdue)*
  - *Strongly encourage a user to deal with that administration event before any others for that medication*
- *A clinician should be able to record that the administration status of an event is unknown (as an exceptional circumstance)*
- *Consider whether an automatic change of state (that does not violate the above recommendation) after either a 'longer' period of time or 'when the Next event becomes Due' is feasible, compared to just remaining Overdue*
- *Illustrate all administration states on days not in focus on the administration view, ensuring that they are still interpretable*
- *Address the risk that multiple Overdue events are mistakenly administered in quick succession*

## **Self-Administration**

- Participants described a variety of practice around self-administration, including one trust which did not support it
- Table 18 shows survey respondent's preferences for assessing compliance with Level 3 self-administration:

What Should Level 3 Practice Be?	Survey (n=49)
Nurse makes no documentation	0%
Nurse documents stated compliance daily	29%
Nurse documents stated compliance per drug round	55%
Other practice	10%
Don't know	6%

Table 18: Preferences for Self-Administration Level 3 Compliance Documentation

- *Self-administration was placed out of scope shortly after this research as current clinical policy is unclear and it is not the CUI's responsibility to determine such policy*

## **As Required in the Status Bar**

- Both interview participants and survey respondents preferred the design option which showed a count of 'givable' and all As Required medications in the Status Bar:
  - Reasons given were that it provided more information and made you think about the As Required status
- *However, as several participants were confused by the count of 'givable' it should be considered how this can be made more explicable to clinicians without increasing clutter*

## **Status Bar Refresh Control**

- Of the three design options shown, participants felt the option indicating time of last update and time of last input was overly wordy and confusing:
  - In addition, a small time since last list order update does not mean that there are no important order updates
- The option that just indicated that an list order update was available was seen as simplest
- The option in the style of a Internet browser alert bar was seen as a little confusing, though most noticeable

## **Preconditions**

- Feedback implied that there are at least two types of non-time-based preconditions:
  - a. The clinician has to record or view a measure (for example, pain score) before administering
  - b. The clinician has to record or view a measure AND it has to be over a certain value (for example, for digoxin) before administering

*(Type b preconditions are out of scope for the CUI Drug Administration work)*
- A number of complicating factors were raised:
  - Indication that a score is not the only factor in a decision to give a PRN
  - Dealing with a choice between multiple As Requireds (for example, with analgesics)

- A value may already be recorded recently as part of observation rounds so MIGHT need to be imported or checked rather than input again
- The clinician may need to record a score AFTER administration to document the effect of treatment
- There may need to be an indication of WHICH score to use (for example there may be multiple pain scores in use)
- *Along with other issues, such as indicating trough-level requirements, this implies that the CUI preconditions guidance will have to include a caveat that it does not cover the full complexity of preconditions*

### ***Indicating 'Out-of-Round'***

- As seen in other feedback, concern was raised at circling administration times to indicate administrations 'out of normal' times as this clashed with the current paper convention to circle the times of administration

## APPENDIX C      CHANGES SINCE PREVIOUS VERSION

Table 19 describes the changes made since the previous version of this guidance (Baseline version 2.0.0.0 dated 19-Dec-2007).

There are significant updates to the Usage Examples and Rationale descriptions throughout this document. There are also instances of changed terminology, some of which affects section titles. This table does not detail those but only lists guideline-related modifications, deletions and additions.

### Notes

- ‘Modified’ indicates a change to one or more of a guideline’s description, conformance or evidence rating
- IDs are listed in the order in which they appear, not numerically

Section	Change	IDs
3.3.1	<b>Modified</b>	MEDA-0001, MEDA-0003
	<b>Added</b>	MEDA-0246
3.3.2	<b>Deleted</b>	MEDA-0005, MEDA-0006
	<b>Added</b>	MEDA-0262, MEDA-0263
3.4	<b>Deleted</b>	MEDA-0024
	<b>Modified</b>	MEDA-00023, MEDA-0025, MEDA-0026, MEDA-0027, MEDA-0028, MEDA-0029
	<b>Added</b>	MEDA-0252, MEDA-0264
3.5.1	<b>Added</b>	MEDA-0248
3.5.2	<b>Added</b>	MEDA-0218, MEDA-0219, MEDA-0249
3.5.3	<b>Modified</b>	MEDA-0016, MEDA-0021,
	<b>Added</b>	MEDA-0257
3.6	<b>Modified</b>	MEDA-0036
3.7	<b>Modified</b>	MEDA-0039
3.8.1	<b>Modified</b>	MEDA-0043, MEDA-0044
	<b>Added</b>	MEDA-0224, MEDA-0225, MEDA-0251, MEDA-0265
3.8.2	<b>Deleted</b>	MEDA-0055
	<b>Modified</b>	MEDA-0051, MEDA-0050, MEDA-0053, MEDA-0054, MEDA-0059, MEDA-0058
	<b>Added</b>	MEDA-0228, MEDA-0229, MEDA-0230, MEDA-0266, MEDA-0267, MEDA-0268, MEDA-0298
3.8.3	<b>Modified</b>	MEDA-0060, MEDA-0061, MEDA-0062
3.9.1	<b>Modified</b>	MEDA-0064, MEDA-0065, MEDA-0066, MEDA-0067,
	<b>Added</b>	MEDA-0232, MEDA-0269, MEDA-0270, MEDA-0271, MEDA-0272, MEDA-0273, MEDA-0274, MEDA-0275
3.9.2	<b>Modified</b>	MEDA-0069, MEDA-0073
	<b>Added</b>	MEDA-0234, MEDA-0235, MEDA-0236, MEDA-0237, MEDA-0276

Section	Change	IDs
3.9.3	<b>Deleted</b>	MEDA-0077
	<b>Modified</b>	MEDA-0078
	<b>Added</b>	MEDA-0277
3.9.6	<b>Deleted</b>	MEDA-0088, MEDA-0092
	<b>Modified</b>	MEDA-0085, MEDA-0086, MEDA-0087, MEDA-0089, MEDA-0095, MEDA-0096
	<b>Added</b>	MEDA-0258, MEDA-0278
3.9.7	<b>Modified</b>	MEDA-0099
	<b>Added</b>	MEDA-0256, MEDA-0299
3.9.8	<b>Modified</b>	MEDA-0108, MEDA-0109, MEDA-0111, MEDA-0112
	<b>Deleted</b>	MEDA-0110
3.9.9	<b>Modified</b>	MEDA-0117, MEDA-0119
3.10.1	<b>Added</b>	MEDA-0279
3.10.2	<b>Deleted</b>	MEDA-0124, MEDA-0125, MEDA-0126, MEDA-0127
	<b>Added</b>	MEDA-0280, MEDA-0281, MEDA-0282, MEDA-0283, MEDA-0284
3.10.3	<b>Deleted</b>	Section deleted (MEDA-0128, MEDA-0129, MEDA-0130, MEDA-0131)
3.11	<b>Modified</b>	MEDA-0134
3.13.1	<b>Modified</b>	MEDA-0142, MEDA-0143, MEDA-0145, MEDA-0146, MEDA-0147
	<b>Added</b>	MEDA-0285, MEDA-0286, MEDA-0287
3.13.2	<b>Modified</b>	MEDA-0148, MEDA-0149, MEDA-0150, MEDA-0151
3.13.3	<b>Deleted</b>	MEDA-0154, MEDA-0155, MEDA-0156
	<b>Modified</b>	MEDA-0152, MEDA-0153, MEDA-0157, MEDA-0159
3.13.4	<b>Modified</b>	MEDA-0160, MEDA-0161, MEDA-0162
3.14.1	<b>Modified</b>	MEDA-0163, MEDA-0164
3.14.2	<b>Modified</b>	MEDA-0165, MEDA-0166, MEDA-0167
3.15.1	<b>Deleted</b>	MEDA-0165, MEDA-0166, MEDA-0167, MEDA-0169
	<b>Added</b>	MEDA-0288, MEDA-0289, MEDA-0290, MEDA-0291, MEDA-0292, MEDA-0293
3.15.2	<b>Modified</b>	MEDA-0177
3.15.3	<b>Modified</b>	MEDA-0179
3.15.4	<b>Modified</b>	MEDA-0181, MEDA-0182, MEDA-0186
3.15.5	<b>Deleted</b>	Section deleted except for informational note (MEDA-0187, MEDA-0188, MEDA-0189)
3.16.1	<b>Modified</b>	MEDA-0194
3.16.2	<b>Deleted</b>	MEDA-0198, MEDA-0202
	<b>Modified</b>	MEDA-0196, MEDA-0201, MEDA-0203
3.16.3	<b>Modified</b>	MEDA-0204, MEDA-0207, MEDA-0208, MEDA-0209, MEDA-0210, MEDA-0211, MEDA-0212
	<b>Added</b>	MEDA-0239

Section	Change	IDs
3.16.4	Deleted	Section deleted (MEDa-0213, MEDa-0214, MEDa-0215, MEDa-0217)
3.17	Added	New section (MEDa-0294, MEDa-0295, MEDa-0296, MEDa-0297)

Table 19: Updates since the Last Baseline Version