Design Guidance Exploration

Decision Support

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Prepared by
Microsoft

Microsoft

PREFACE

Documents replaced by this document

Document Title	Version
None	

Documents to be read in conjunction with this document

Document Title	Version
Design Guidance – Time Display	1.0.0.0
Design Guidance – Date Display	2.0.0.0
Design Guidance Exploration – Search and Prescribe	1.0.0.0

TABLE OF CONTENTS

1 INTRODUCTION

This document presents design exploration and early design guidelines for Decision Support, covering the areas:

- Communication of decision support capability
- Display of choice lists with preferences and display
- Interaction with unprompted notifications

The objective of this document is to describe the area of focus, provide guidance and recommendations, and explain the rationale behind the guidance and recommendations.

This initial investigation is a concise piece of work, based around the three areas listed above. Further research, user testing, patient safety assessment and supplier participation are required to define the final guidance.

During this investigative work, consideration has been given to the wider research material available within this domain. Research references of such material include:

- *Kensaku Kawamoto et al, 2005, Information in practice, Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success, BMJ*[1]
- *Amit X Garg et al, 2005, Effects of Computerized Clinical Decision Support Systems on Practitioner Performance and Patient Outcomes, JAMA*[2]

1.1 Overview

This document is intended for the use by anyone whose role includes screen design, implementation, or assessment of a clinical application. This document can therefore be used as guidance for the specification of user interfaces for decision support systems.

Conceptually (as illustrated in Figure 1), knowledge and decision support can use a general messaging capability to deliver communication in a healthcare environment. The context in which the decision support operates is closely linked to the user's role, organisation, speciality and care setting. It is also linked to the electronic patient record (EPR) for which care is being recorded in. The clinical application functions, such as medication management, investigations, knowledge support and decision support, will utilise the messaging framework to communicate between components. In this context, decision support is one of the components that form the clinical application.

Figure 1 illustrates components that can be defined individually as follows:

- User Context – The current role and situation in which the user is operating
- Electronic Patient Record (EPR) – The record of the patient's medical and demographic information
- Clinical Functionality – The services offered by the application

[1] Kensaku Kawamoto et al, 2005, Information in practice, Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success, BMJ **{R1}**: http://www.bmj.com/cgi/content/abstract/330/7494/765

[2] Amit X Garg et al, 2005, Effects of Computerized Clinical Decision Support Systems on Practitioner Performance and Patient Outcomes, JAMA **{R2}**: http://jama.ama-assn.org/cgi/content/abstract/293/10/1223

- Knowledge Support – The service that provides information to the user in the relevant context
- Decision Support – The service that provides system alerts, defined by locally-configured rules
- User Information – The information that includes the user's role, responsibilities, demographics, access rights, and so on
- Alert Log – The information captured for the alert audit trail
- Clinical Alerting – Generation of alerts in response to a change in the information available
- Messaging Service – The functionality used to pass the messages, alerts and messaging of other events between different components of a clinical application

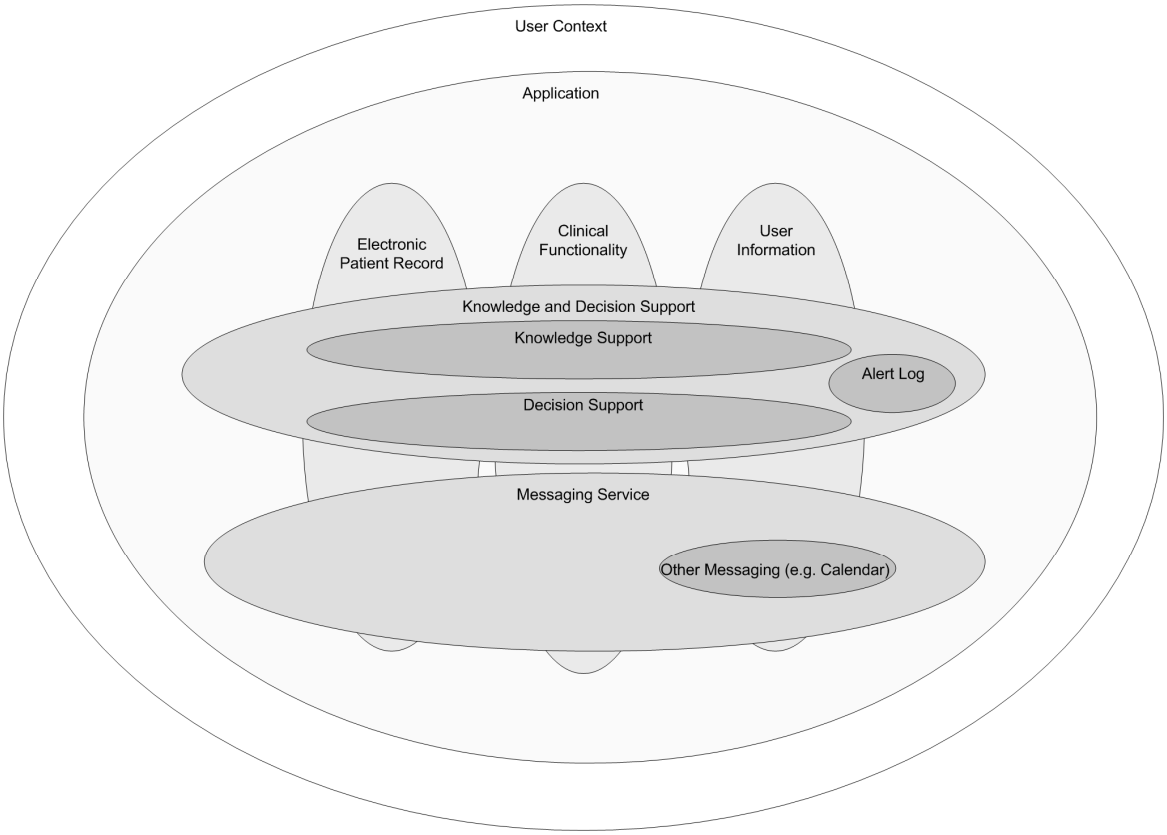


Figure 1: Context of Knowledge and Decision Support within the Application

The degree and extent of decision support within the messaging framework may be dependent on many factors, including:

- The user's role
- The user's organisation
- The user's speciality
- The user's current care setting

The user interface for Knowledge and Decision Support contains a set of fundamental elements that provide a mechanism for informing the user of important, relevant information, notifications and alerts for a specific patient within areas such as medication management and clinical testing, as illustrated in Figure 2.

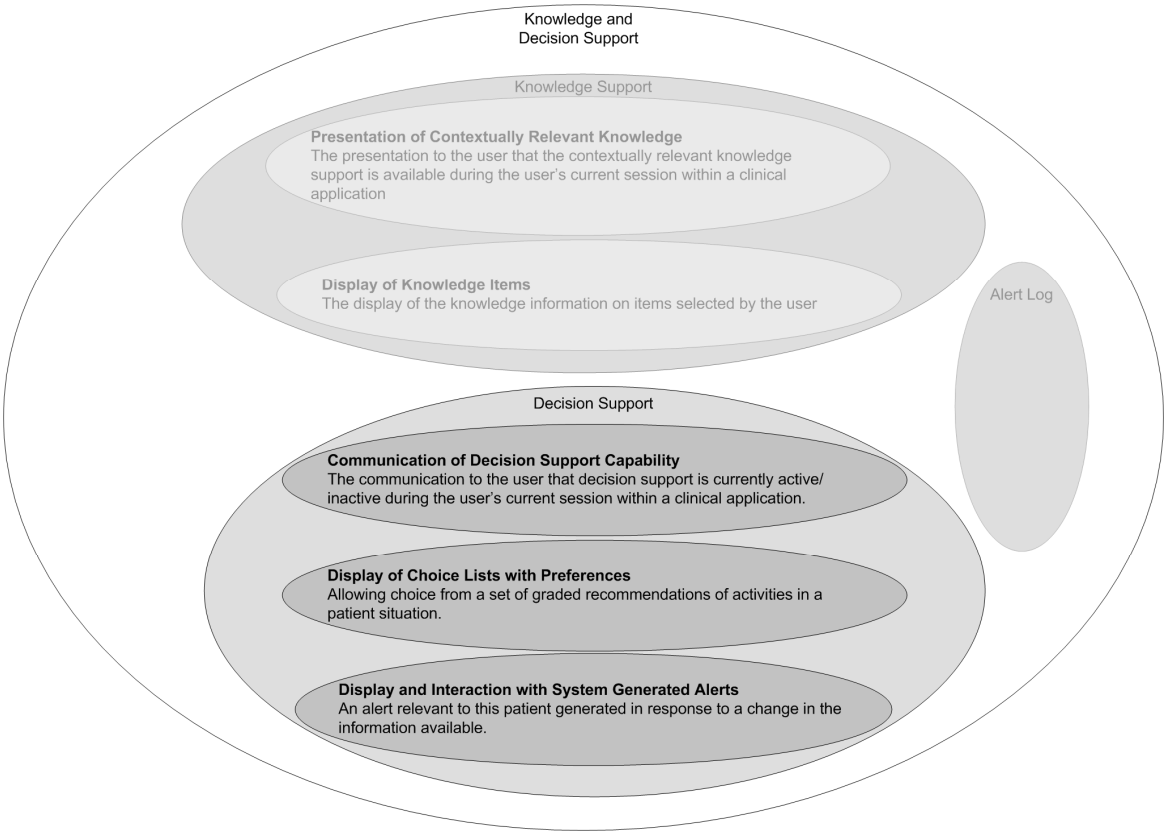


Figure 2: Decision Support Components

This document provides guidance and recommendations for the following aspects of decision support design within a clinical application:

- **Communication of decision support capability**
  The communication to the user that decision support is currently active/inactive during the user's current session within a clinical application.
- **Display of choice lists with preferences**
  Allowing choice from a set of graded recommendations of activities in a patient situation.
- **Display and interaction with system-generated alerts**
  An alert relevant to this patient generated in response to a change in the information available.

Decision support is driven by a module which manages the logic of alerts, notifications, recommendations and relevant actions.

Alerts inform the user of a situation that requires attention. There are two alert levels:

- Priority
- High Priority

1.2 Area of Focus Description

1.2.1 Scope

This document considers decision support within the context of an individual patient record.

The area of focus for this guidance, within the context of an individual patient record, is:

- Communication of decision support capability
- Display of choice lists with preferences and display
- Interaction with unprompted notifications

1.2.2 Out of Scope

The following areas are out of scope for this guidance:

- Forwarding, referring and escalating an alert
- Design for a clinician's Home page
- Handling alerts when a clinician is outside a patient's EPR
- Handling notification messages, such as 'Test results are back'
- The user's ability to turn elements of decision support on/off
- Inserting any actions required as a result of an alert
- A state transition model to define alert transition
- Additional 'monitoring conditions' to be put in place, to ensure the safety of any particular decision
- A library of icons for alerts and notifications
- An audit trail of an alert
- Logging of an alert
- Rating of an alert
- Overriding an alert
- The messaging framework
- Viewing when an alert has been raised
- Viewing the priority of an alert (which can change over a period of time)
- Local configuration of clinical rules
- Triggers for alerts (locally configurable)
- Knowledge authoring of priority levels and context for an alert
- Configuration of alerts (managed through the configuration of the clinical application)

1.3 Key Principles

Underlying the guidance provided in section 2 are a set of key principles for decision support within a clinical application, some of which are listed below:

- There are two types of communication in decision support: informing and recommending
- When an informed or recommended act occurs, it is recorded in the EPR
- For alerts, the aim is to combine multiple axes of importance, such as criticality and urgency, into one axis of priority
- For choice lists, the aim is to combine multiple axes into a single scale for preference
- There needs to be a defined number of priority levels for an alert
- The significance of the priority levels must be easily understood by the user
- Recommendations for appropriate actions following an alert will be displayed if they are available from a decision support system
- Alerts need to be compatible with, and exist within, the messaging framework
- Explanations will be available for any alert or preference
- Where explanations refer to an item in a patient record, it must be possible to view that item in its original context
- Consistency of structure in the display of information
- The full set of local decision support functionality will be provided when the user logs on

2 Recommendation and Guidance

2.1 Communication of Decision Support Capability

The primary requirement of communicating decision support capability is to inform the users about the different decision support services that are currently available in their clinical application.

Decision support capability should be displayed at two levels:

- **Overview**
  Indicates if the decision support services are running as expected (or not as expected).
- **Detailed**
  Indicates the status of every individual decision support service within the clinical application.

2.1.1 How to Display the Overview of Decision Support Capability

Figure 3 provides an overview of the decision support capability.

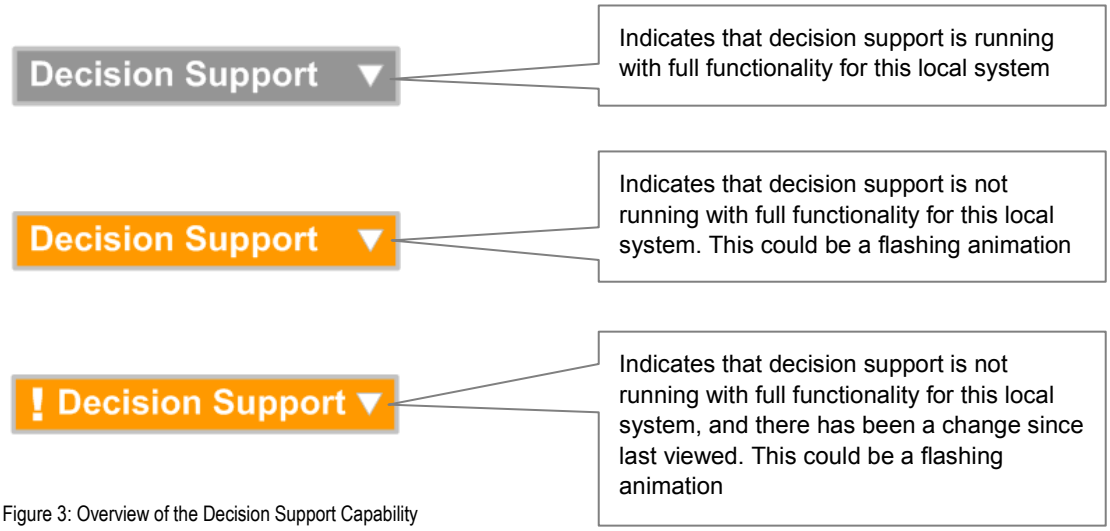


Figure 3: Overview of the Decision Support Capability

2.1.1.1 Guidance

- The title of the decision support capability tool should be short so that it occupies the minimum space on the screen (for example, 'Decision Support'). An icon could be used to suggest decision support capability; however, this still needs to be explored
- An arrow or chevron should be displayed next to the title to visually suggest that detailed information is available on a click
- If decision support is running with full functionality for this local system:
  - The title should be displayed against a neutral colour (for example, grey)
- If decision support is not running with full functionality for this local system:
  - The title should be displayed against a colour that captures attention (for example, orange)
  - The title could be used as a flashing animation to attract immediate attention
  - The title should also be supported by an icon to indicate that there has been a change since last viewed

- For every change in availability of a decision support service, a pop-up should be displayed showing a message which summarises the change, as illustrated in Figure 4
  - The pop-up should appear in close proximity to the title to visually suggest a connection between the message and the decision support functionality
  - The pop-up should display the date and time of the change, according to the documents *Design Guidance – Time Display* **{R3}** and *Design Guidance – Date Display* **{R4}**
  - The pop-up should display a textual description of the change (for example, "Dose Calculations and Formulary Management are not running")
  - The pop-up should visually fade out over a period of time (approximately 5-10 seconds), as it should not obstruct the view of the clinical application

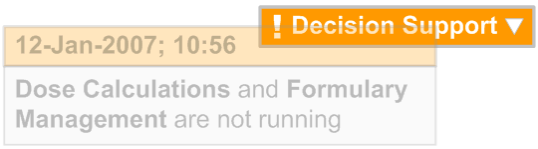


Figure 4: Example of a Pop-up

2.1.1.2 Example of Correct Usage

Table 1 shows an example of correct display of the Decision Support capability within clinical applications.

Usage	Format	Example	Comments
✓	Arrow or Chevron next to the title within the same box	Decision Support ▼	An arrow or chevron should be displayed next to the title to suggest detailed information is available on a click

Table 1: Correct Decision Support Capability Formatting Example

2.1.1.3 Example of Incorrect Usage

Table 2 shows an example of incorrect display of Decision Support capability within clinical applications.

Usage	Format	Example	Comments
✗	Arrow or Chevron next to the title outside the title box	Decision Support ▽	Incorrect format for arrow or chevron display

Table 2: Incorrect Decision Support Capability Formatting Example

2.1.1.4 Benefits and Rationale

- Informs the user as to whether the decision support services are running with full functionality for this local system
- Better informs the user by flagging a change in the decision support capability via the overview status

2.1.1.5 Confidence Level

This guidance is currently classified as 'Initial Guidance' with 'Low' confidence level. Further usability testing and patient safety assessment is expected, and the guidance will be updated following this usability testing.

2.1.2 How to Display the Detailed Level of Decision Support Capability

This section defines the guidance for displaying the detailed level of decision support capability to the user. Figure 5 illustrates an example of this.

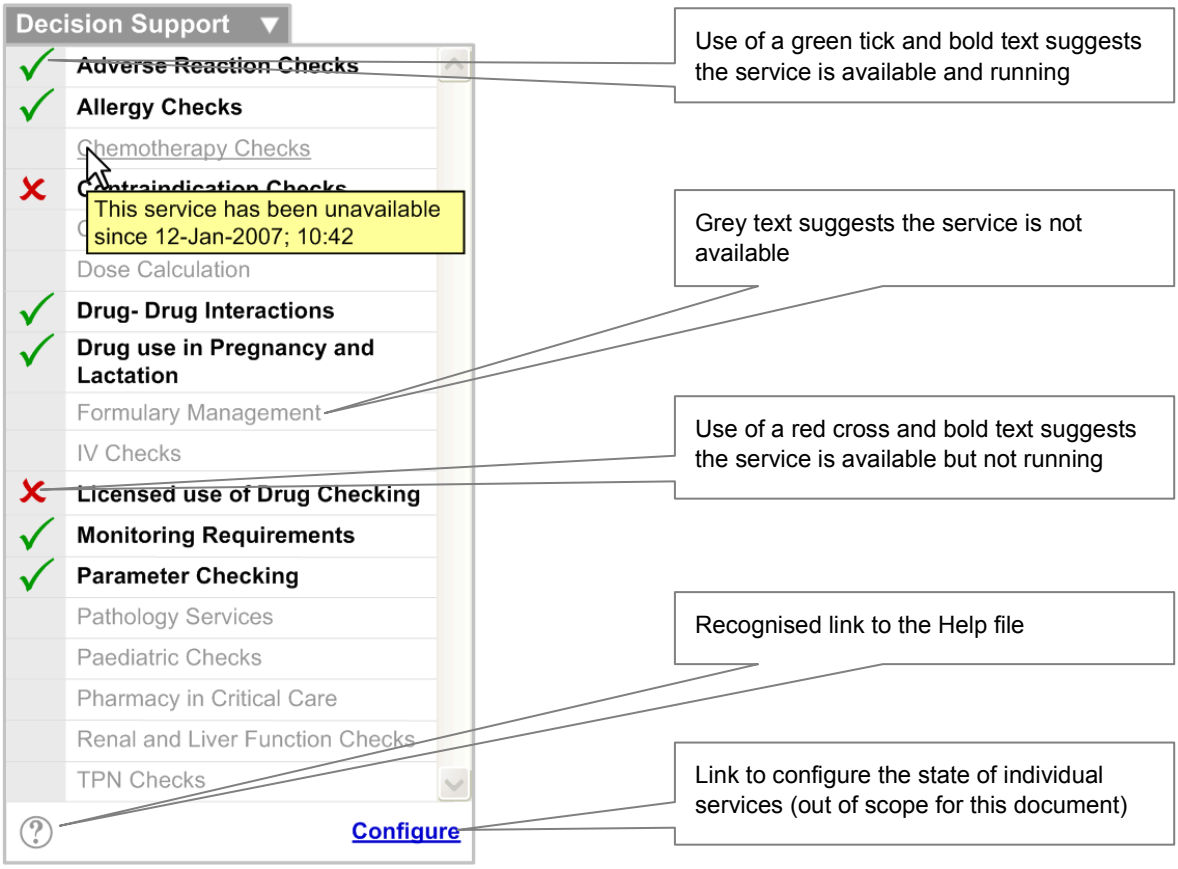


Figure 5: Example of How to Display Detailed Level Decision Support Capability

2.1.2.1 Guidance

When the arrow or chevron is clicked, the detailed level of decision support capability is displayed. This should capture the following:

- A list of decision support services (for example, 'Licensed use of Drug Checking') should be displayed. This list should:
  - Be displayed in alphabetical order
  - Be visually treated to help distinguish between services that are available and not available. This means that the two states should be obvious to the user when the user scans through the list
  - Display available services in black, bold font. The status of the service should be reinforced with an icon (for example, a green tick)
  - Display services that are available, but not running, in black, bold font. The status of the service should be reinforced with an icon (for example, a red cross)
  - Display unavailable services in light grey, regular font
  - Display the status of any service in a tooltip (with date and time) according to the documents *Design Guidance – Time Display* **{R3}** and *Design Guidance – Date Display* **{R4}** (for example, 'This service has been unavailable since 12-Jan-2007; 10:42')

- Display the Help file when any service is clicked. The Help file should automatically scroll to the location of the selected service

- A vertical scroll bar should be introduced if the list grows beyond the designated screen space
- A link to configure the states of individual services should be provided. This is currently outside the scope of this document
- A recognised link to the Help file should be provided, which could be an icon (see Figure 6):
  - The Help file should display information in alphabetical order, in the same way as the list of services
  - A brief description of each service should be displayed
  - The Help file should be accessible through the Help link, as well as by clicking on an individual service
  - Where possible, the Help system should be integrated with the generic Help

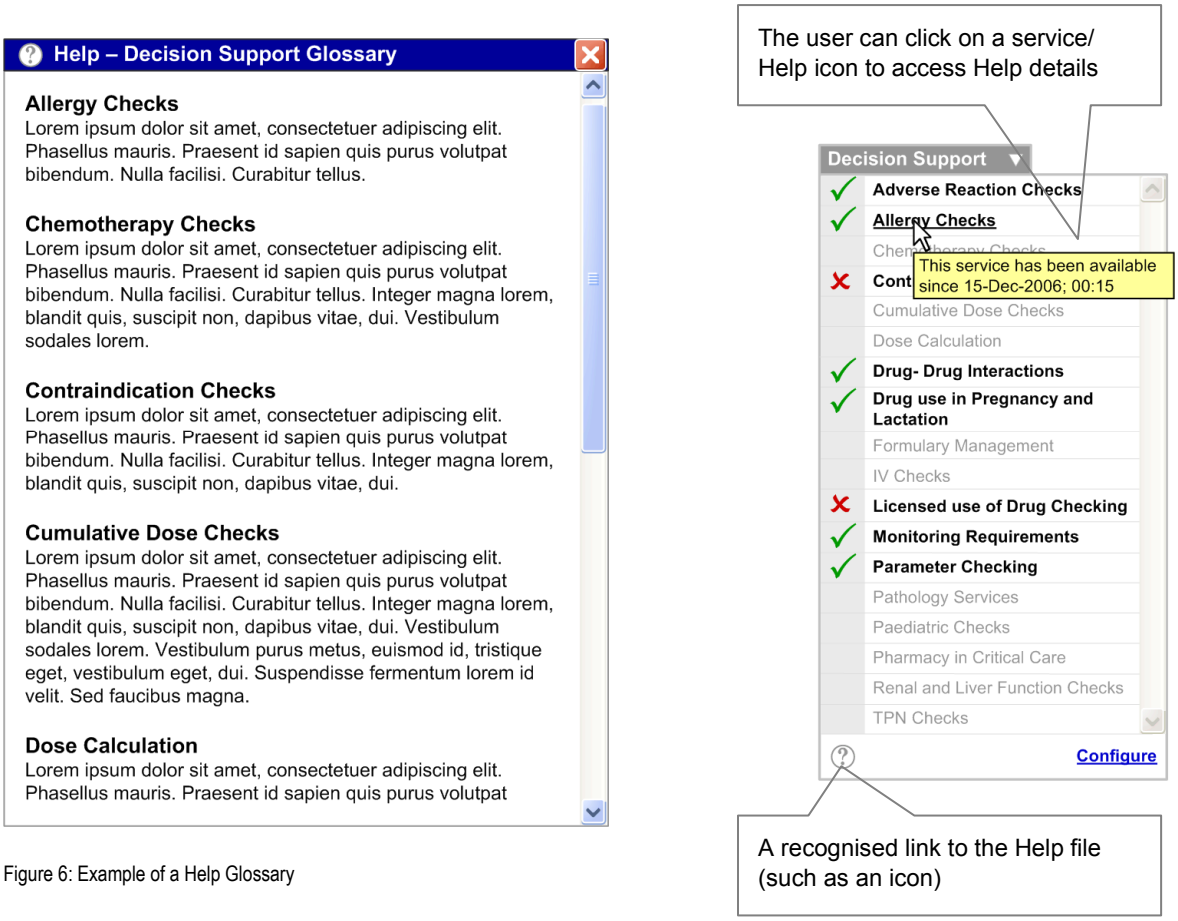


Figure 6: Example of a Help Glossary

2.1.2.2 Example of Correct Usage

Table 3 shows an example of correct display of the detailed level of the Decision Support capability within clinical applications.

Usage	Format	Example	Comments
✓	Displaying available services	✓ **Drug- Drug Interactions**	Available services should be displayed in black, bold font. The status of the service should be reinforced with an icon (for example, a tick)
✓	Displaying unavailable services	Formulary Management	Unavailable services should be displayed in light grey, regular font

Table 3: Correct Detailed Decision Support Capability Formatting Examples

2.1.2.3 Example of Incorrect Usage

Table 4 shows an example of incorrect display of the detailed level of Decision Support capability within clinical applications.

Usage	Format	Example	Comments
✗	Displaying available services	☑ Allergies	Incorrect format for displaying available services using a selected check box
✗	Displaying unavailable services	☐ Contraindications	Incorrect format for displaying unavailable services using an unselected check box

Table 4: Incorrect Detailed Decision Support Capability Formatting Examples

2.1.2.4 Benefits and Rationale

- Allows access to context sensitive Help for the decision support framework
- Provides information to the user about the local systems' current availability to support the user's decision making

2.1.2.5 Confidence Level

This guidance is currently classified as 'Initial Guidance' with 'Low' confidence level. Further usability testing and patient safety assessment is expected, and the guidance will be updated following this usability testing.

2.2 Information Window Anatomy

This section describes the anatomy of the decision support information window.

2.2.1 Guidance

All information windows should contain the following areas or elements (as illustrated in Figure 7), and this should be consistent across choice lists with preferences and unprompted notifications:

- Header area
- Summary area
- Details area
- Resizing control

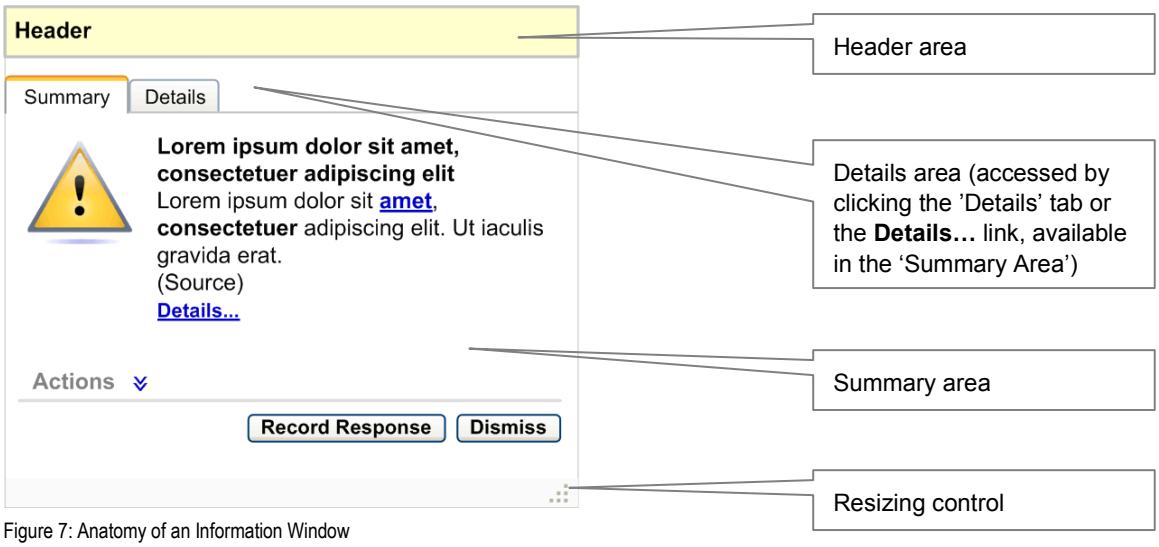


Figure 7: Anatomy of an Information Window

2.2.1.1 Header Area

The information window header is placed at the top of the information window.

2.2.1.2 Summary Area

By default, the 'Summary' tab of the information window should be selected. This tab should be to the left of the 'Details' tab. It should contain the following elements:

- **Icon**
  The icon should be placed to the left of the summary information. There could be several types of icon, where each icon suggests a different type of information. This library of icons does not exist and needs to be explored.
- **Information Summary**
  The summary should be brief and should summarise the details found on the 'Details' tab (for example, "There are potential additive hypotensive effects with Lisinopril and Furosemide, a current medication for this patient").
- **Information Source**
  The source of the information should be displayed in brackets, below the summary.
- **Information Details**
  A textual link to the information details should be displayed below the source. This link should display the same information that is available under the 'Details' tab.
- **Actions**
  - By default, the 'Actions' label should be displayed with a chevron next to it. This area should be displayed in a collapsed state by default. The chevron should act as an interactive element, expanding the Actions when clicked
  - On expansion, this area should display a list of recommended actions (see Figure 8)
  - The actions should be displayed in order of preference, with the most preferred first
  - The preference rating for actions should be visually supported by icons, which should be placed on the left side of every action. On mouse-over of this icon, a tooltip explaining the preference should be displayed (for example, 'High Preference Option')
  - An action can be selected by clicking its option button

- An action could have multiple sub options, which should be selectable by check boxes or option buttons. For example, 'Option 3' is an action, and the associated options are 'Sub Option 1, Sub Option 2 and Sub Option 3'
- If decision support is not recommending any actions, elements including the label and the chevron should not be displayed (see Figure 9)

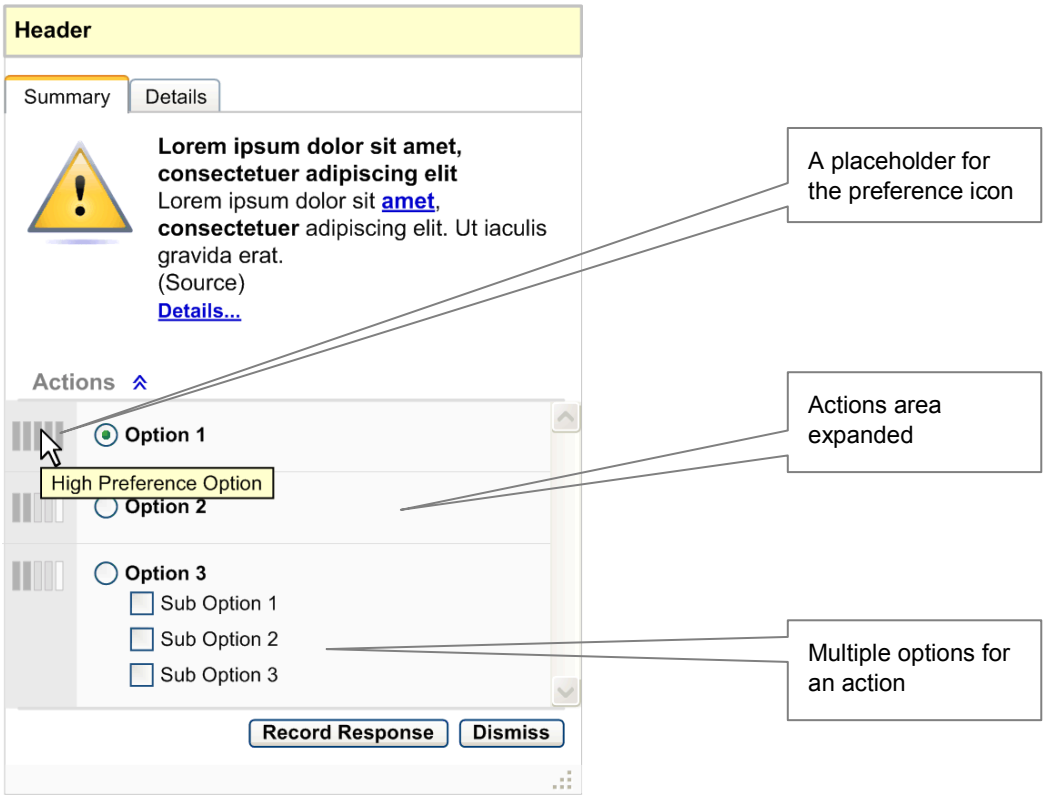


Figure 8: Anatomy of an Information Window – When Decision Support Recommends Actions

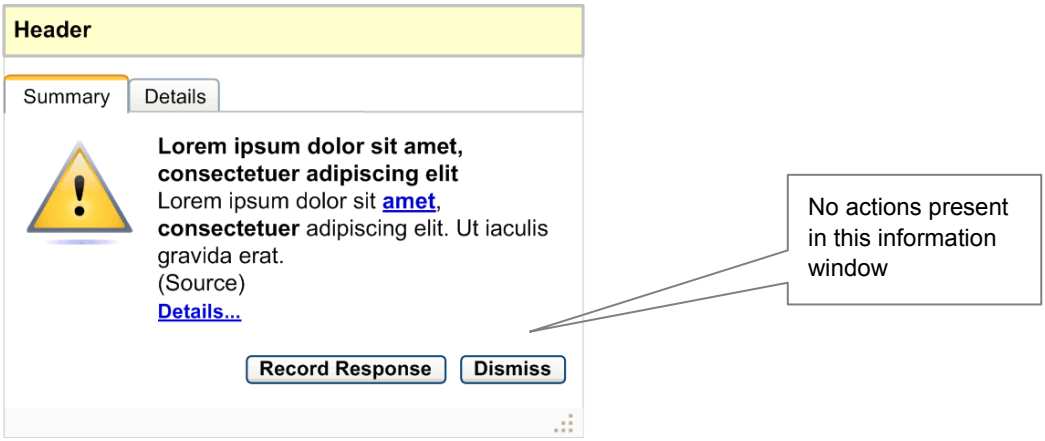


Figure 9: Anatomy of an Information Window – When Decision Support Does Not Recommend Actions

- **Record Response**
  The **Record Response** button should be enabled at all times. When this button is clicked, the user should be taken to the relevant area of the clinical application to allow them to record a response. This button should be placed before, and to the left of the **Dismiss** button.

- **Dismiss**
  The **Dismiss** button should be enabled at all times. When this button is clicked, the information window should be dismissed. This button should be placed after, and to the right of, the **Record Response** button.

2.2.1.3 Details Area

The details area should be available when the 'Details' tab is selected. This tab should be placed after the 'Summary' tab. This area should also be available by clicking the **Details…** link from the 'Summary' tab.

This area displays the explanation or reasoning behind the information window. It should capture the following information (see Figure 10):

- A summary of the information
- Patient-specific information
- Rationale
- References

Subject to business rules in the decision support system, and elements in the screen that have been derived from the patient record, there should be hyperlinks to go back to the relevant part of the patient record.

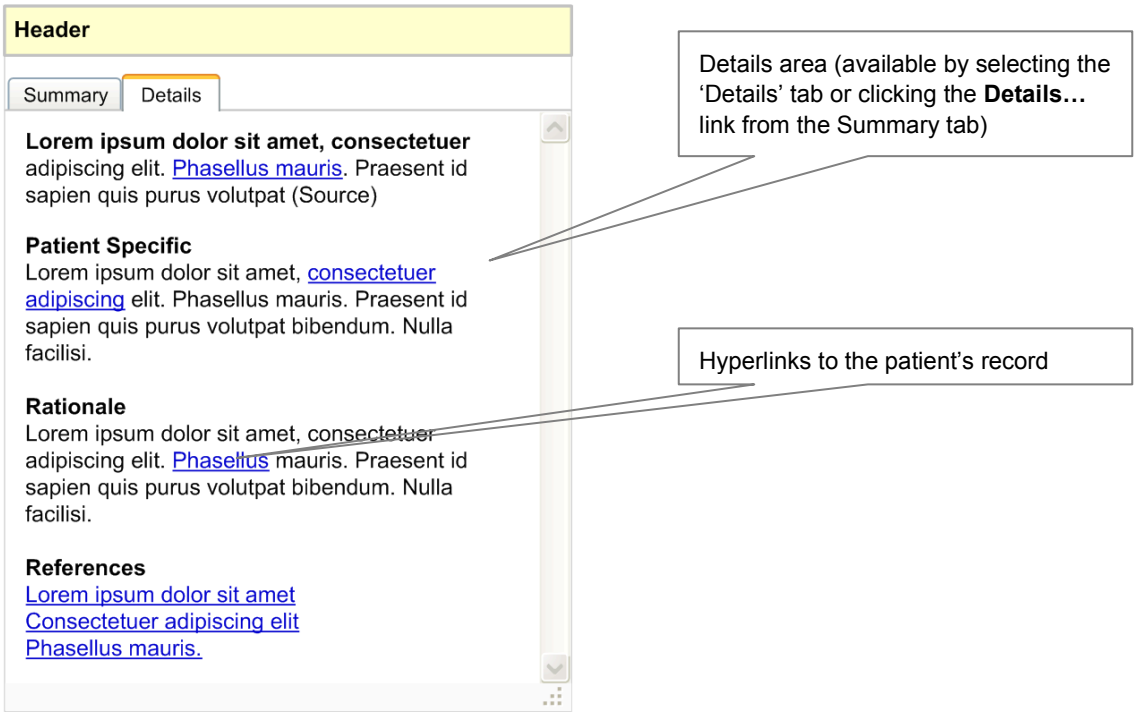


Figure 10: Anatomy of an Information Window – Details Area

2.2.1.4 Resizing Control

The resizing control should be placed at the bottom right or left corner of the alert box. The user should be able to drag this control to resize the alert box (see Figure 7).

2.2.1.5 Example of Correct Usage

Table 5 shows an example of correct display of the Decision Support information window within clinical applications.

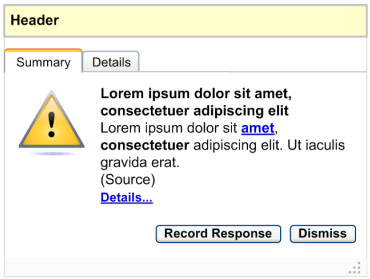
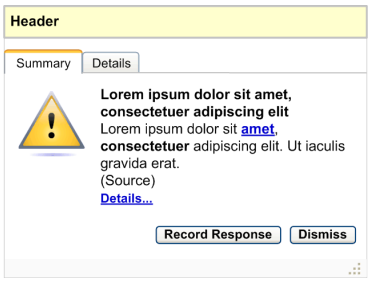
Usage	Format	Example	Comments
✓	Displaying an icon		The icon should be placed to the left of the summary information
✓	Showing no actions available		If decision support is not recommending any actions, elements, including the label and chevron, should not be displayed

Table 5: Correct Decision Support Information Window Formatting Examples

2.2.1.6 Example of Incorrect Usage

Table 6 shows an example of incorrect display of the Decision Support information window within clinical applications.

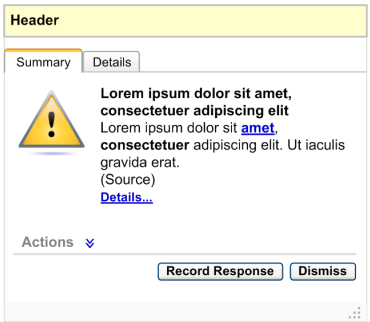
Usage	Format	Example	Comments
✗	Displaying an icon	**Lorem ipsum dolor sit amet, consectetuer adipiscing elit** Lorem ipsum dolor sit amet, **consectetuer** adipiscing elit. Ut iaculis gravida erat. (Source) Details... 	Incorrect format for displaying an icon within the information window
✗	Showing no actions available		Incorrect format for displaying no actions recommended

Table 6: Incorrect Decision Support Information Window Formatting Examples

2.2.2 Benefits and Rationale

- Provides consistent display of information and reduces the users' learning curve

2.2.3 Confidence Level

This guidance is currently classified as 'Initial Guidance' with 'Low' confidence level. Further usability testing and patient safety assessment is expected, and the guidance will be updated following this usability testing.

2.3 Choice Lists with Preferences

Choice lists with preferences provide graded recommendations of activities in a particular patient situation.

2.3.1 Guidance

- Preferences in a choice list should be represented by icons placed to the left of the appropriate option (see Figure 11)
- On mouse-over of the preference icon, a summary of the information should be displayed as a tooltip (for further details see section 2.3.1.2.)
- When the preference icon is clicked, the information window should be displayed as an overlay aligned to the top right side of the choice list, as illustrated in Figure 12
- If the user clicks on any other area of the screen outside the information window, the information window should close
- If the user clicks on the **Dismiss** button, the information window should close
- If the user clicks on the **Record Response** button, they should be taken to the relevant area of the clinical application to allow them to record a response

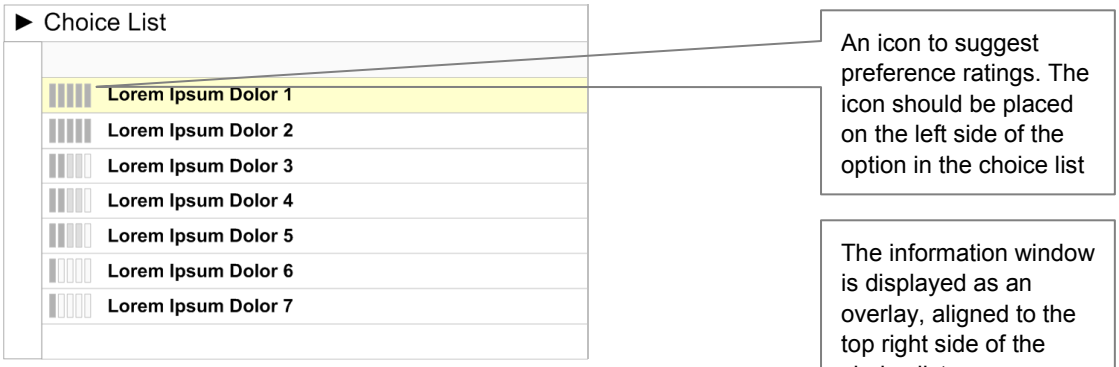


Figure 11: Example of a Choice List showing the placement of Preferences

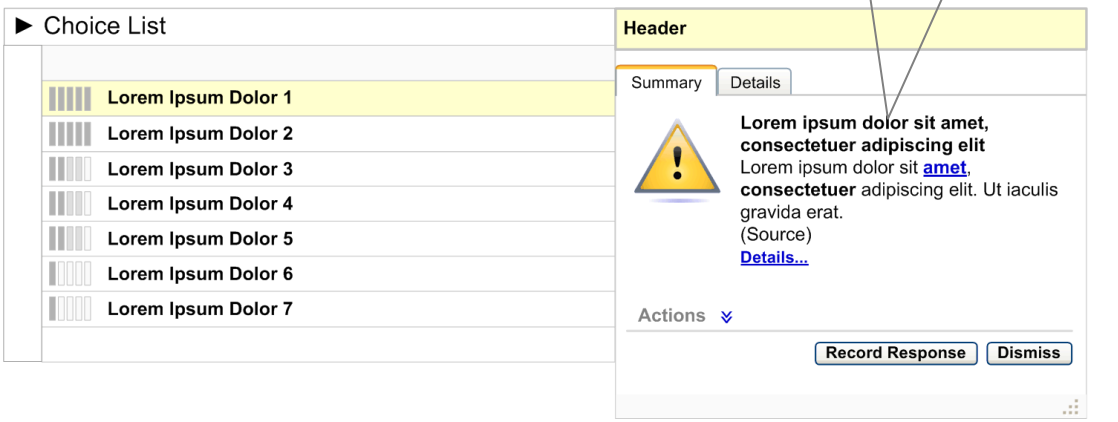


Figure 12: Example of an Information Window Displayed as an Overlay

2.3.1.1 Icon

There should be unique icons to represent the different preferential ratings. However, this library of icons does not exist and needs to be explored.

2.3.1.2 Summary Information on Mouse-Over

On mouse-over of the preference icon, a summary of the information should be displayed as a tooltip (see Figure 13). The summary information should identify the reason for the preference (for example, “Potential drug-drug interaction with Furosemide”). The summary information should be brief.

> **Note**
>
> The following medications list examples (Figure 13 and Figure 14) are used here for illustrative purposes only.

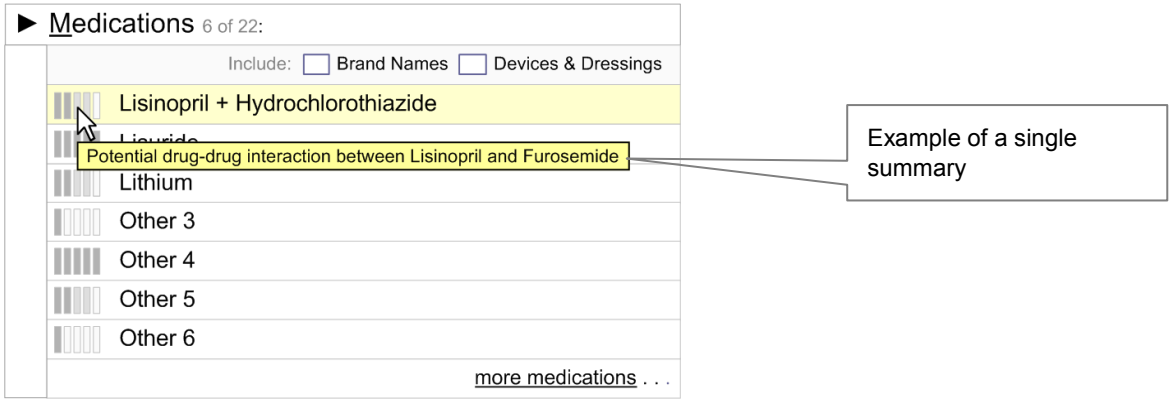


Figure 13: Example of a Single Information Summary

If there are multiple reasons for a particular preference, display all the information summaries on mouse-over.

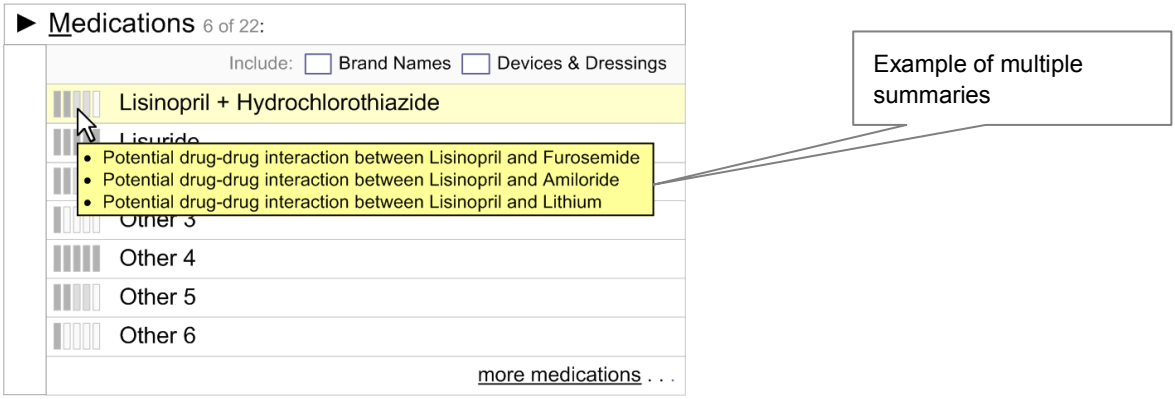


Figure 14: Example of Multiple Information Summaries

2.3.1.3 Information Window Anatomy

The information window anatomy should essentially follow the guidelines defined in section 2.2, with only the following minor differences:

- **Header Area**
  Should be labelled ‘Explanation’.

- **Summary Area – Single Summary**

  If any wording in the summary is derived from one or more patient items, it should be linked to that record item in its original context. For example, if the summary says "There are potential additive hypotensive effects with Lisinopril and Furosemide, a current medication for this patient", then 'Furosemide' should be a hyperlink (see Figure 15) which, when clicked, should display the current medications list in conjunction with the alert box. This interactive behaviour has not been detailed and needs to be explored.

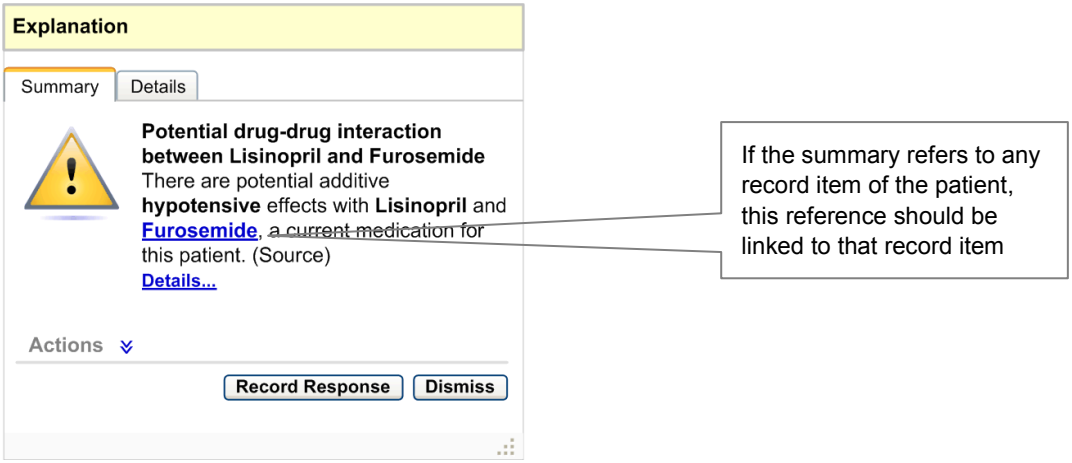


Figure 15: Example of a Summary Area

- **Summary Area – Multiple Summaries**

  If there are multiple summaries for the same option, display all the summaries within the same information window as illustrated in Figure 16. Actions for multiple summaries should be consolidated as a single list in the actions area. Explanations for multiple summaries should be consolidated in the explanation area.

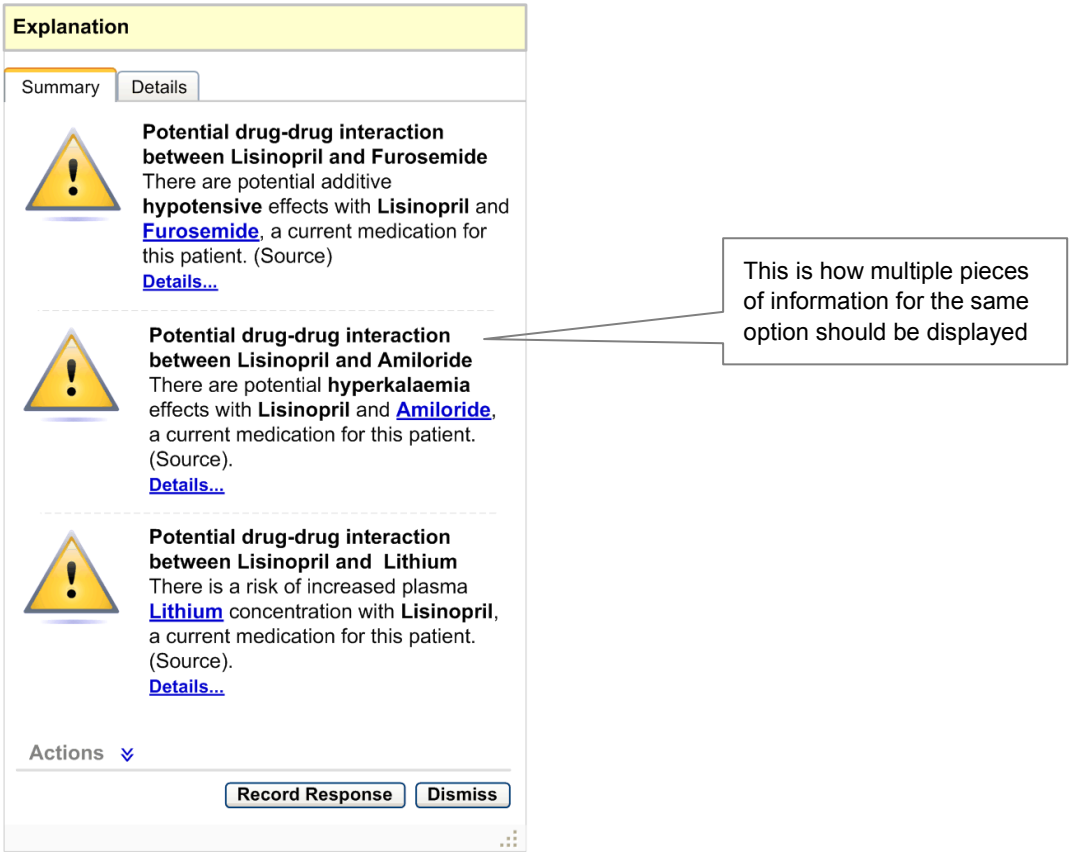


Figure 16: Example of a Summary Area – Multiple Pieces of Information

2.3.1.4 Example of Correct Usage

Table 7 shows an example of correct display of choice lists with preferences within clinical applications.

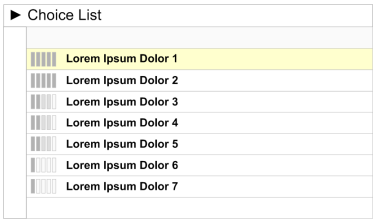
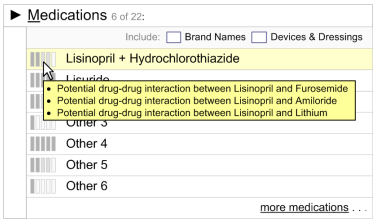
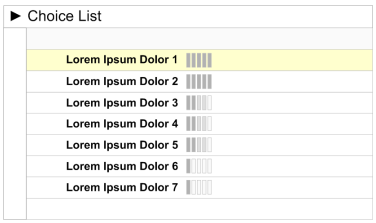
Usage	Format	Example	Comments
✓	Displaying an icon		The preference rating icon should be placed to the left side of the option in the choice list
✓	Displaying multiple information summaries		If there are multiple reasons for a low preferential rating, on mouse-over all information summaries should be listed as bullet points
✓	Displaying details of multiple information summaries		If there are multiple summaries for the same preferential rating, display all the summaries within the same information window

Table 7: Correct Formatting Examples of Choice Lists with Preferences

2.3.1.5 Example of Incorrect Usage

Table 8 shows an example of incorrect display of choice lists with preferences within clinical applications.

Usage	Format	Example	Comments
✗	Displaying an icon		Do not display the icon to the right of the choice list

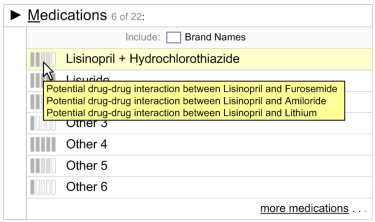
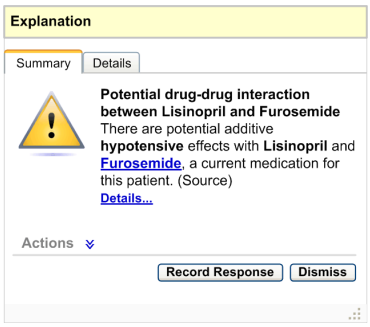
Usage	Format	Example	Comments
✘	Displaying multiple information summaries		Do not display the multiple summaries without bullet points
✘	Displaying multiple information		Do not divide the information into individual information windows

Table 8: Incorrect Formatting Example of Choice Lists with Preferences

2.3.2 Benefits and Rationale

- By providing the preferred options at an early stage in the process, disruption to the workflow is minimised

2.3.3 Confidence Level

This guidance is currently classified as 'Initial Guidance' with 'Low' confidence level. Further usability testing and patient safety assessment is expected, and the guidance will be updated following this usability testing.

2.4 Unprompted Notifications (System-Generated Alerts)

An 'Alert' is a notification that is relevant to the patient, and is generated in response to a change in the information available.

2.4.1 Guidance

2.4.1.1 Alert Behaviour

This section details the interactive behaviour of system-generated alerts.

- In the context of a clinical application, there should be an indicator for system-generated alerts. This indicator could be represented by an icon
- The indicator icon should clearly indicate the state it represents, as detailed in section 2.4.1.2
- When a new alert appears, a pop-up should be displayed in close proximity to the indicator icon (see Figure 17). This pop-up should capture the status, date and time of the alert in its header, according to the documents *Design Guidance – Time Display* **{R3}** and *Design Guidance – Date Display* **{R4}**. The pop-up should also capture the alert icon and description. The pop-up should fade out over a period of time (approximately 5-10 seconds), as it should not obstruct the view of the clinical application
- If the user clicks on the pop-up, the system should display the alert container

- When the indicator icon is clicked, the system should display the alert container, which lists all the active system-generated alerts for this patient. The alerts should be grouped by status and stacked in reverse chronological order
- There should be two types of alert status: High Priority and Priority. All 'Priority' alerts should be displayed in a collapsed state by default, where only the alert header is visible. All 'High Priority' alerts should be displayed in an expanded state by default, where the alert details are visible (see Figure 18). The group of 'High Priority' alerts should be placed above the group of 'Priority' alerts
- The user should be able to collapse and expand every alert by clicking on the alert header
- If the number of alerts increases beyond the designated screen space of the alert container, a vertical scroll bar should be introduced to accommodate all the alerts. This holds true even if the expanded alerts need to take up additional vertical screen space

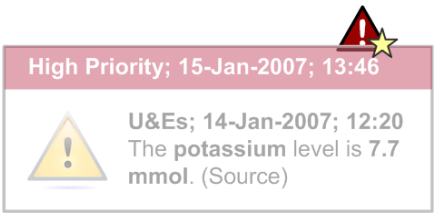


Figure 17: Example of a High Priority Alert Pop-Up

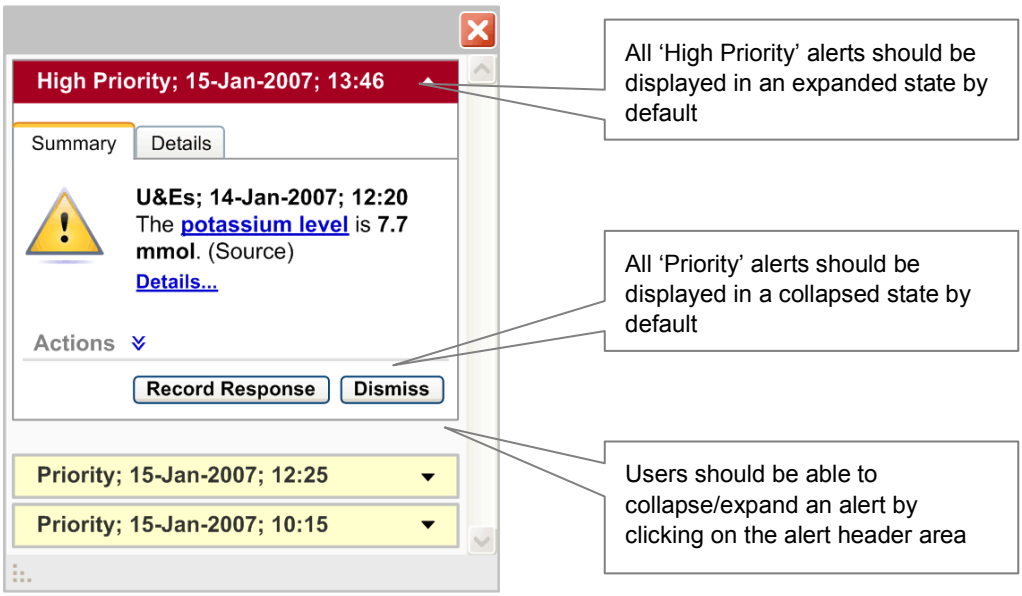


Figure 18: Example of Different Default States for High/Priority Alerts

2.4.1.2 Alert Icon

There should be unique icons to represent the different states of the indicator icon. There should also be unique icons to represent the different types of system-generated alerts. However, this library of icons does not currently exist and needs to be explored in the future.

The indicator icon should suggest the following states (as illustrated in Table 9):

- No active alerts
- One or more active Priority alert which has not been viewed
- One or more active Priority alert which has been viewed

- One or more High Priority active alert and a possible number of Priority alerts which have not been viewed
- One or more High Priority active alert and a possible number of Priority alerts which have been viewed

Exemplar Representation of Icon	Icon Description
	Icon suggests there are no active alerts
	Icon suggests there is one or more active Priority alert which has not been viewed
	Icon suggests there is one or more active Priority alert which has been viewed
	Icon suggests there is one or more High Priority active alert and a possible number of Priority alerts which have not been viewed
	Icon suggests there is one or more High Priority active alert, and a possible number of Priority alerts, which have been viewed

Table 9: States of the Indicator Icon

Icons could represent different types of system-generated alerts. The different types of system-generated alerts need to be defined.

2.4.1.3 Alert Summary

There should be two types of an alert summary for system-generated alerts. The first appears as a pop-up for a new alert (as illustrated in Figure 17). The second is displayed as the alert header when an alert is in a collapsed state in the alert container (as illustrated Figure 18).

The alert summary in the pop-up should display the alert status, date and time, according to the documents *Design Guidance – Time Display* **{R3}** and *Design Guidance – Date Display* **{R4}**. The summary should also display the alert icon and identify the reason for the alert (for example, “The potassium level is 7.7 mmol”). The alert summary should be brief.

The summary in the header should display the alert status, date and time, according to the documents *Design Guidance – Time Display* **{R3}** and *Design Guidance – Date Display* **{R4}**.

2.4.1.4 *Alert Window Anatomy*

The alert window anatomy should essentially follow the guidelines defined in section 2.2 with minor differences:

- **Header Area**
  Should capture the alert status (for example, High Priority), date and time of the alert according to the documents *Design Guidance – Time Display* **{R3}** and *Design Guidance – Date Display* **{R4}** (as illustrated in Figure 19).
- **Summary Area**
  - If the alert summary refers to any record item of the patient, this reference should be linked to that record item. For example if the alert summary says "The potassium level is 7.7 mmol". "Potassium level" should be a hyperlink which, when clicked, should display the patient's potassium level details along with the other Urea and Electrolyte (U&E) results
  - The resizing control should not be present for an individual alert box
- **Alerts Container Area**
  - This area should contain all the active system-generated alerts in context for this patient (as illustrated in Figure 20)
  - The alerts should be stacked in reverse chronological order
  - If the number of alerts increases beyond the designated screen space of the alert container, a vertical scroll bar should be introduced
  - The resizing control should be available here. On resizing the container area, all the alerts in the container should also get resized
  - The minimum dimensions of the alert container and information window should be fixed

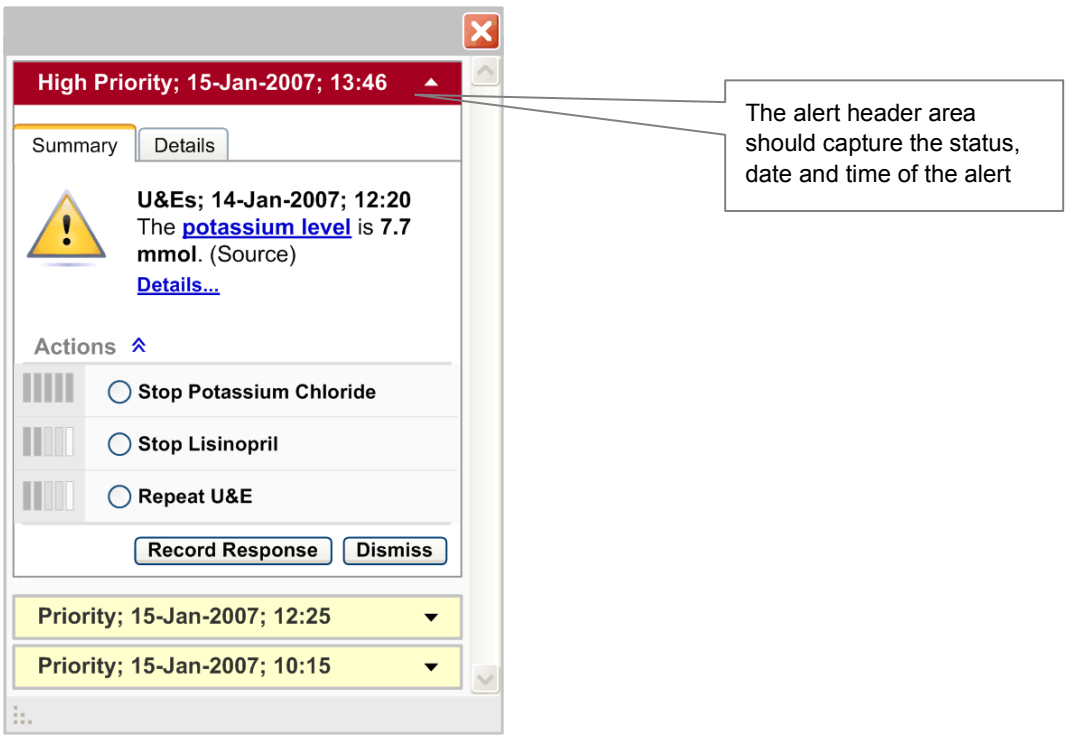


Figure 19: Anatomy of a System-Generated Alert

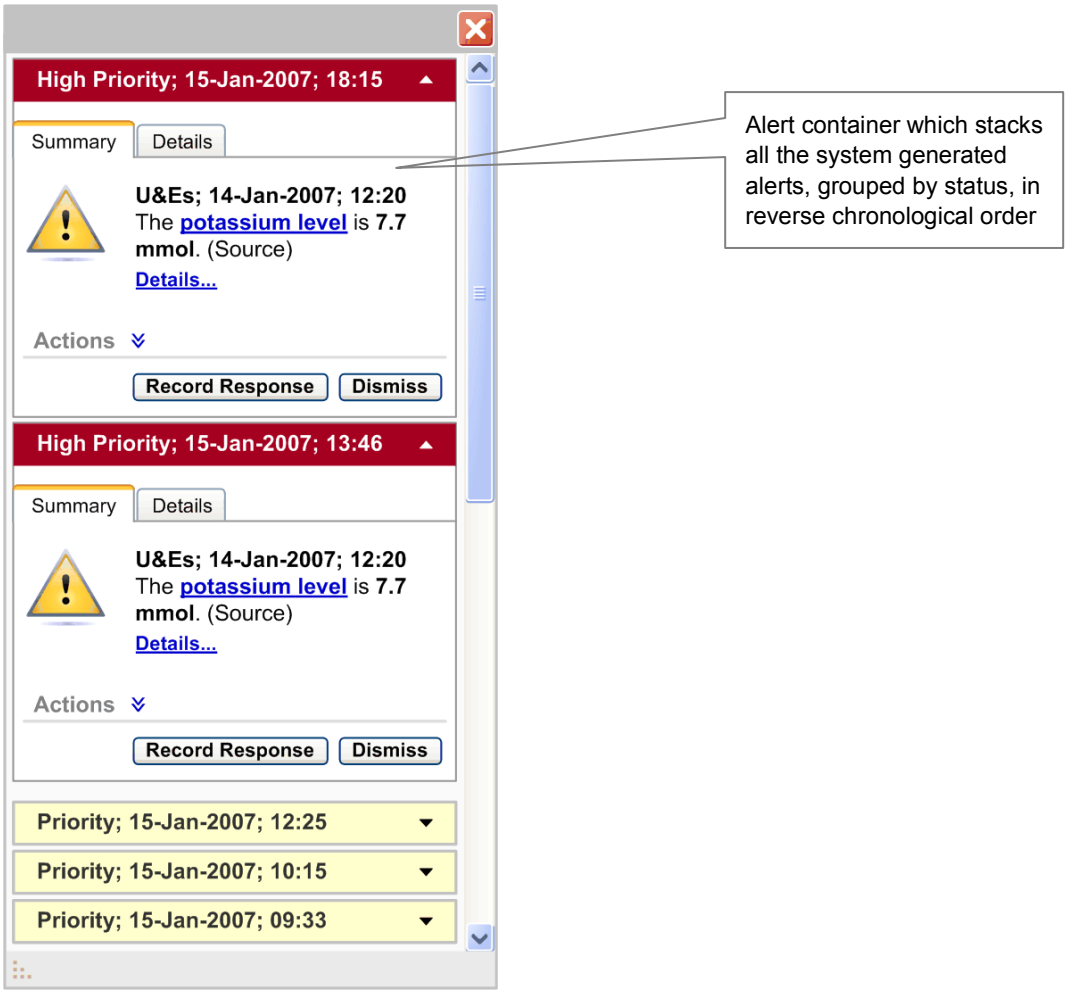
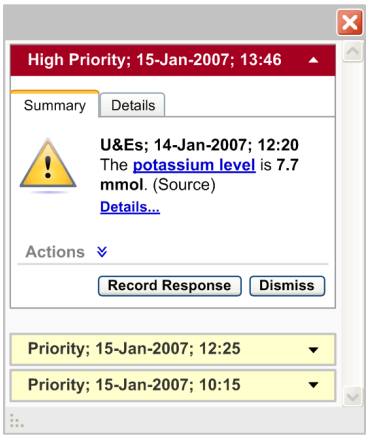


Figure 20: Example of an Alert Container

2.4.1.5 Example of Correct Usage

Table 3 shows an example of correct display of system generated alerts within clinical applications.

Usage	Format	Example	Comments
✓	Display of High Priority and Priority alerts		All 'High Priority' alerts should be displayed in an expanded state by default, where the alert details are visible. All 'Priority' alerts should be displayed in a collapsed state by default, where only the alert header details are visible

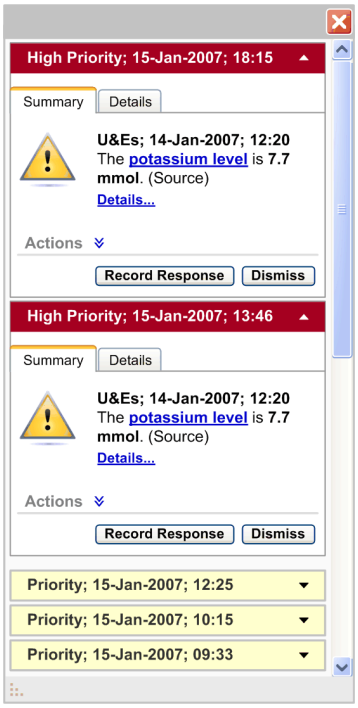
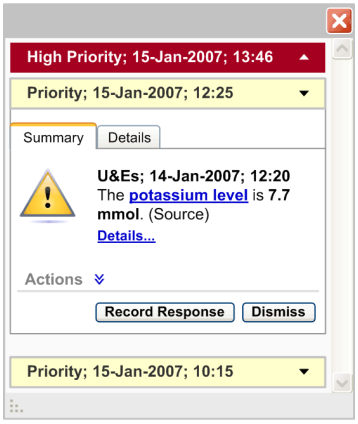
Usage	Format	Example	Comments
✓	Stacking High Priority and Priority alerts		The alerts should be grouped by status and stacked in reverse chronological order. The group of 'High Priority' alerts should be placed above the group of 'Priority' alerts

Table 10: Correct Formatting Examples of System Generated Alerts

2.4.1.6 *Example of Incorrect Usage*

Table 4 shows an example of incorrect display of system generated alerts within clinical applications.

Usage	Format	Example	Comments
✗	Display of High Priority and Priority alerts		Do not display 'High Priority' alerts in a collapsed state by default

Usage	Format	Example	Comments
✘	Stacking High Priority and Priority alerts		Do not mix the status of alerts

Table 11: Incorrect Formatting Examples of System Generated Alerts

2.4.2 Benefits and Rationale

- System-generated alerts inform the user about a situation which requires attention
- Interruption of important care processes is minimised because system-generated alerts are designed to demand attention without modal behaviour

2.4.3 Confidence Level

This guidance is currently classified as 'Initial Guidance' with 'Low' confidence level. Further usability testing and patient safety assessment is expected, and the guidance will be updated following this usability testing.

2.5 Next Steps

In order to progress this work further, the following aspects of decision support require consideration and investigation:

- Carry out further research, user testing and patient safety assessments
- Handling of multi-patient alerts when a clinician is not in a patient's record
- Design a library of icons for alerts and the display of preferences
- Ability to turn elements of the decision support capability window on/off
- Extend this guidance to have multiple patient views
- Work with the software and application providers to refine the guidance
- The header information for system-generated alerts should be explored further to accommodate summary information of the alert
- Research into how to summarise an alert to make it meaningful

- Design for the 'look-ahead scroll bar' to suggest the number of system-generated alerts that are behind the scroll bar
- Placement of the system-generated alerts container within a clinical application

3 Document Information

3.1 Terms and Abbreviations

Abbreviation	Definition
EPR	Electronic Patient Record
TPN	Total parenteral nutrition
U&E	Urea and Electrolyte

Table 12: Terms and Abbreviations

3.2 Definitions

Term	Definition
Pop-up	Within this document, a pop-up is a feature that behaves like a small window, and fades in and out of the current clinical application over a period of time.

Table 13: Definitions

3.3 Nomenclature

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

3.3.1 Body Text

Text	Style
Code	`Monospace`
Script	
Other markup languages	
Interface dialog names	**Bold**
Field names	
Controls	
Folder names	Title Case
File names	

Table 14: Body Text Styles

3.3.2 Cross References

Reference	Style
Current document – sections	Section number only
Current document – figures/tables	Caption number only
Other project documents	*Italics* and possibly a footnote
Publicly available documents	*Italics* with a footnote
External Web-based content	*Italics* and a hyperlinked footnote

Table 15: Cross Reference Styles

3.4 References

Reference	Document	Version
R1.	Kensaku Kawamoto et al, Information in practice, Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success, BMJ, 14 March 2005 http://www.bmj.com/cgi/content/abstract/330/7494/765	
R2.	Amit X Garg et al, Effects of Computerized Clinical Decision Support Systems on Practitioner Performance and Patient Outcomes, JAMA; March 9, 2005 http://jama.ama-assn.org/cgi/content/abstract/293/10/1223	
R3.	Design Guidance – Time Display	1.0.0.0
R4.	Design Guidance – Date Display	2.0.0.0

Table 16: References