

Design Guidance

Terminology – Display Standards for Coded Information

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Prepared by
Microsoft

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1 INTRODUCTION

This document provides guidance and recommendations with rationale for aspects of Terminology user interfaces related to display standards for clinical codes information.

This document should be read in conjunction with the following Design Guidance documentation:

- *Design Guidance – Terminology – Matching {R1}*
- *Design Guidance – Terminology – Elaboration {R2}*

1.1 Overview

This document is for the use of anyone whose role includes screen design, implementation or assessment of a clinical application and is involved in creating or evaluating terminology user interfaces (UIs).

Terminology user interfaces operate within a note-taking environment. These environments fall into three categories (as illustrated in Figure 1 and described below), each of which requires different guidance:

- **Forms**
 - The user makes notes by selecting check boxes and choosing options, not by entering text
 - An encoding interface is not needed. The clinical codes should be embedded within the form itself or derived from combinations of entries in the form
- **Single concept matching**
 - The user makes notes by selecting a clinical code, such as 'asthma', and elaborating it with other codes, such as 'severe' and unencoded text, such as 'worse in cold weather'
 - Encoding interfaces require components to search for and elaborate clinical terms
- **Text parser**
 - The user makes notes by writing text, then identifies and encodes words and phrases within that text
 - Encoding interfaces require components to identify and manage clinical terms within the text, as well as components to search for, and elaborate, clinical terms

Figure 1 illustrates forms (left), single concept matching (centre) and text parser matching (right):

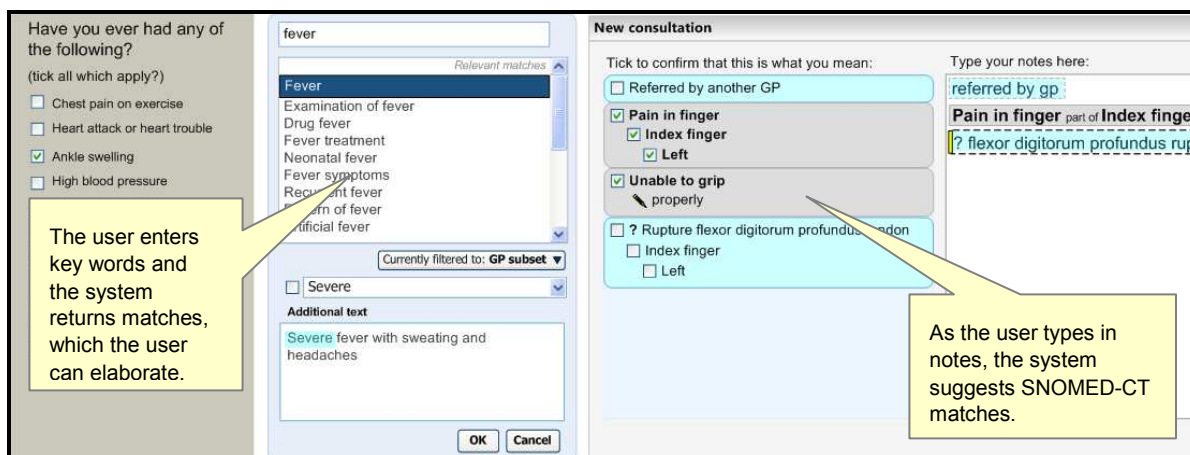


Figure 1: Styles of Encoding

A possible fourth hybrid category could be defined where forms may include areas where single concept matching or text parser is used.

Medical language is full of abbreviations and jargon, some of which have more than one meaning. By encoding clinical statements, they can be shared unambiguously. This should improve patient safety by reducing confusion, or errors, due to ambiguity in clinical notes.

Encoding also opens up important opportunities, such as:

- Filtering context specific views of medical records in order to improve searching
- Unambiguously sharing clinical statements between clinicians in different disciplines or institutions
- Using decision support mechanisms, based on codes within clinical statements, to enhance patient safety
- Auditing clinical activity by using codes to locate and report on specific types of information within patient records
- Researching clinical practice or outcomes by extracting codes from electronic patient records

SNOMED-CT®¹ {R3} is used in this Design Guidance as the terminology for encoding clinical statements.

1.2 Area of Focus

This document describes display standards for coded information. There are three main areas of consideration across the terminology domain that will be covered within this guidance, as illustrated in Figure 2 and the points below:

- Enter and select text – including display standards for communicating encodable text
- Fully qualified concepts – including display standards for encoded text
- Leave concepts unencoded – concepts not encoded but displayed in the notes

¹ SNOMED-CT: <http://www.snomed.org/>

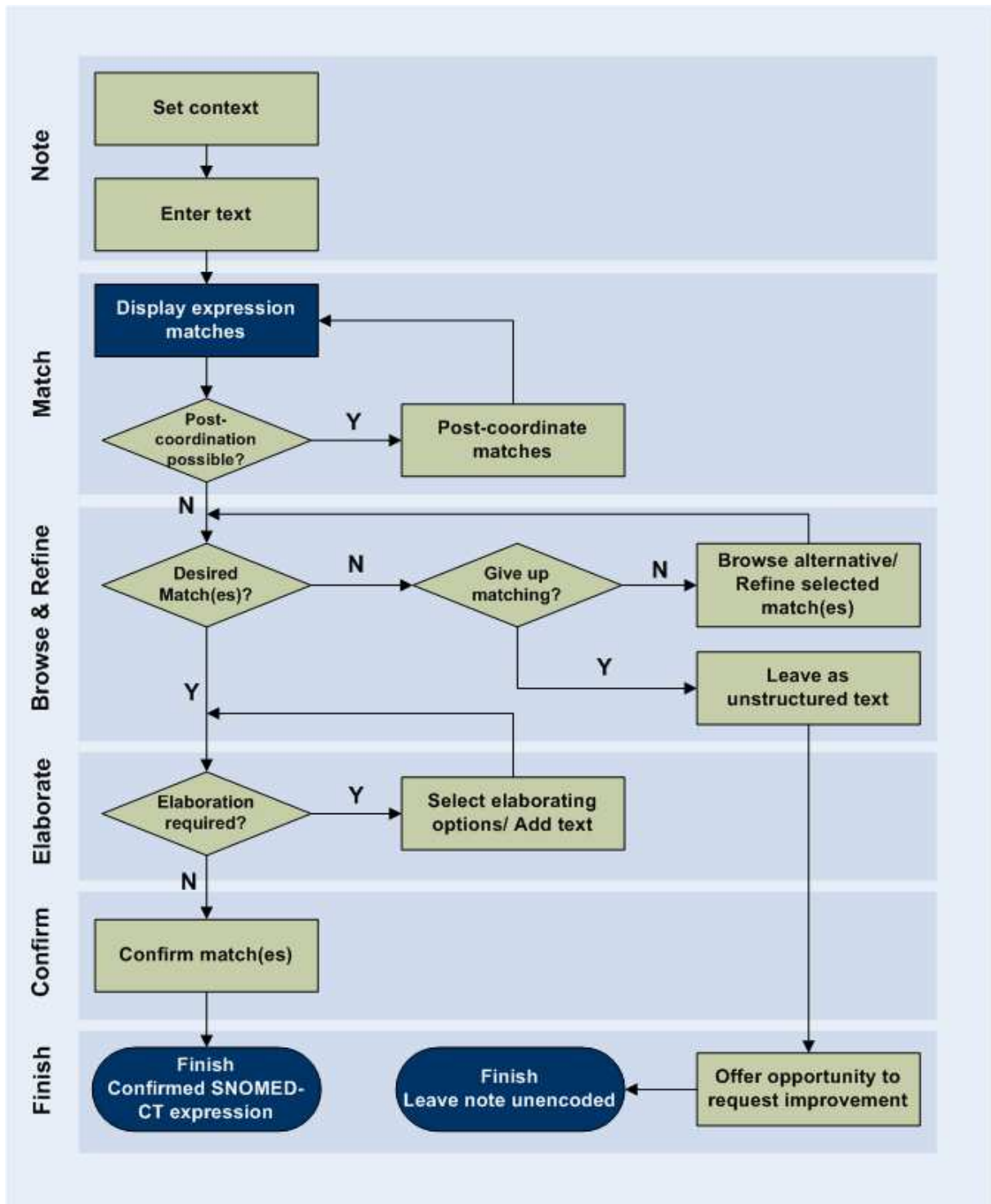


Figure 2: User Interaction Model

2 RECOMMENDATION AND GUIDANCE

2.1 Display Standards for Communicating Encodable Notes

The following sections present guidance on how text that is potentially encodable should be displayed.

This guidance applies primarily to notes in the text parser approach to matching. However, it will also apply to the **additional text** area in the single concept matching approach.

Please note that this guidance applies only to the noting input and matching process. Beyond the point at which the notes are saved to record, this guidance is no longer necessarily applicable.

2.1.1 Displaying Potentially Encodable Text

This guidance shows how to distinguish words and phrases that have been identified as being potentially encodable as SNOMED-CT concepts. Potentially encodable text refers to text against which the system can match SNOMED-CT expressions (which comprise single concept or multiple coordinated concepts). Whether the text can be matched may be affected by:

- Filtering by contextual subsets
- Rules regarding what constitutes an expression, namely that a matched expression must contain a base concept (that is, a clinical finding, procedure, observable entity, situation with explicit context or, in certain circumstances, pharmaceutical/biological product) and any other concepts that post-coordinate with the base concept

Changing the subset filtering may alter what is deemed encodable, and the formatting outlined below would be updated accordingly. Additionally, users may be allowed to force an encoding by selecting (in other words, highlighting) a text string, clicking on the right mouse button and choosing the appropriate match from the shortcut menu. In this case, the formatting would not be needed.

Figure 3 illustrates how potentially encodable text typed in by the clinician as notes will be displayed in a clinical application. This text is displayed in an input text area in the right pane and the suggested SNOMED-CT matches are displayed in the left pane.

Figure 3: Formatting in the Text Input (Right Pane) and Suggested Matches (Left Pane) Areas

This guidance will also apply to the additional text field in the single concept matching design approach as illustrated in Figure 4.

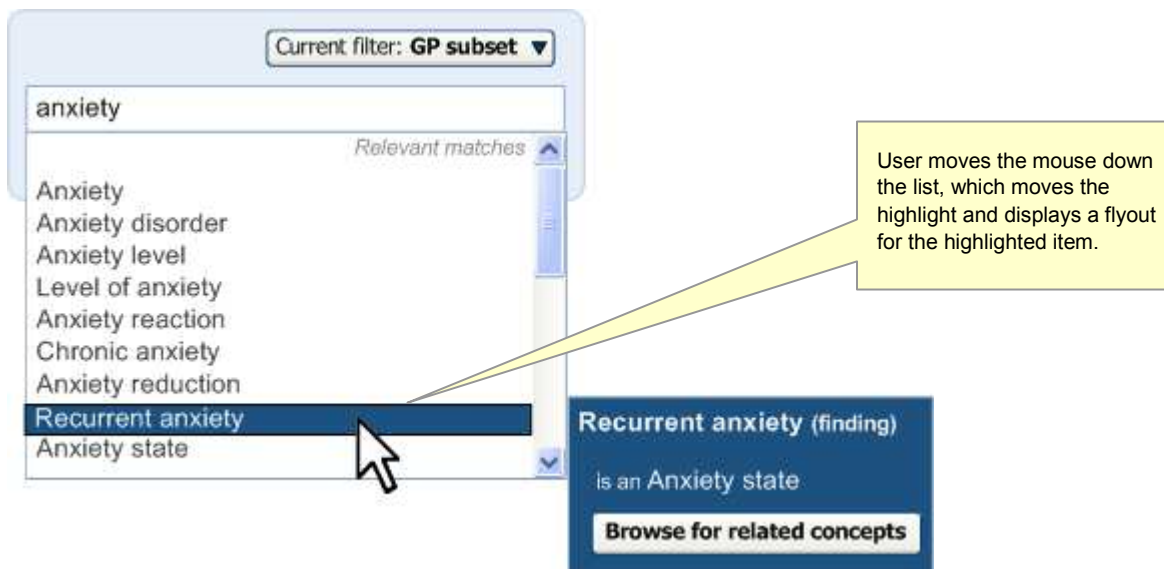


Figure 4: Formatting in the Additional Text Field

In both cases, potentially encodable text will be displayed in a pale highlight that, whilst being visible, will not affect the legibility of the text.

2.1.1.1 Guidance

The system:

- Must visibly display, from the text typed by the user, which words or phrases have been recognised by the system to be potentially encodable as SNOMED-CT concepts
- Should ensure that the visible elements for communicating encodable words or phrases must be **strongly visually associated** with the text typed by the user
- Should ensure that any communication where text can be encoded **does not hinder the legibility** of the text itself
- Should communicate that a word or phrase is encodable by **highlighting** it
- Should ensure that the colour of the highlight is sufficiently visible under conditions which do not require accessibility enhancements, but that it does not deteriorate the legibility of the text
- Should emphasise the boundaries between encodable concepts, for example, by showing **clear gaps** in the highlight between separate encodable concepts
- Should communicate that a word or phrase is encodable **as it is being typed** (and as soon as the system is able to recognise it as a potential SNOMED-CT concept)
- Should ensure that while typing, all text is clearly visible
- Should block additional formatting by the user, including highlights, text colour changes and underlines
- Should allow the user to enter punctuation and carriage returns

2.1.1.2 How to Use the Design Guidance

Usage	Format	Example	Comments
✓	Feature a light, but distinct highlight	Light blue highlight	This should be sufficiently prominent, but also allow the user to read the text underneath
✓	Feature unencoded text in black, normal weight text	Black, normal text	Black normal weight text is easy to read. It is important only to bold text where necessary
✓	The background for the text field should be white (or off-white)	Black on white	This should provide a good contrast to make the text easy to read
✓	Align (justify) text to the left	Left justified	This will make the text easy to read
✓	The space between one line of type and the next should be 1.5 to 2 times the space between words	Line spacing of 1.5 times	This is a standard format and will make the text easy to read

Table 1: How to Use the Design Guidance

2.1.1.3 How Not to Use the Design Guidance

Usage	Format	Example	Comments
✗	Do not feature dark saturated colours as the highlight	Dark highlight	The dark highlight makes black text hard to read
✗	Do not use highlight colours that could possibly have other connotations such as green or red	Not sleeping last night	Colours such as green or red can have other connotations, for example, red can be used for an alert or green for OK Also, green and red are difficult to distinguish for some colour-blind users
✗	Ensure that the highlight colour is not too light or subtle. This may not show on high contrast/high brightness screens	This colour is too light/subtle	The colours will not show on some screens, so information may be missed by the user

Table 2: How Not to Use the Design Guidance

2.1.1.4 Benefits and Rationale

Users must be able to clearly see which text is encodable so that they can choose what to encode. Displaying encodable text also acts as a reminder to the user that text should be encoded in the same way that underlining spelling mistakes in a word processor reminds a user that words should be spelled correctly. This will work in conjunction with the suggested matches in the left pane (see the next section for details).

Highlights are preferred to underlines or boxes (that enclose text), since these disrupt the legibility of the text. Additionally, underlines are used in many software packages, as well as in the current design, to indicate spelling mistakes.

Additional formatting, such as text colour changes, could interfere with the visibility of the encoding highlighting and, as a result, is strongly discouraged in this guidance. Punctuation and carriage returns form part of the text meaning and, hence, are not included in this guidance.

The light blue colour used in Table 1 is a serene yet prominent colour and one that does not affect legibility.

Potentially encodable text should be strongly visually linked with the text typed by the user, because the original text provides context and cues as to how the text should be encoded. Highlighting the text directly provides a strong visual association.

Encodable words and phrases must be clearly and visibly distinct from one another. This is so a phrase that is encodable as a single concept is distinguishable from a phrase that contains several distinct encodable concepts. For example, from the following text, 'Protein deficiency, disease of kidney, finding it hard to urinate', the system may identify the following terms: 'Protein deficiency disease' 'kidney finding' and 'urinate', which has a different meaning to the one intended by the user. It is therefore important that the user can clearly see where the boundaries of the encodable concepts lie, and, if necessary, take action. In the case of highlighted words, there needs to be a definite gap between them in order for them to be distinguished from one another.

Examples of this display were shown to clinicians during wireframe testing sessions. All of the participants recognised that the highlighting functionality communicated key words for encoding.

By highlighting potentially encodable words automatically, the effort on the part of users is reduced when encoding text.

2.1.1.5 *Confidence Level*

High confidence

- Must visibly display, from the text typed by the user, which words or phrases have been recognised by the system to be potentially encodable as SNOMED-CT concepts
- Should ensure that the visible elements for communicating encodable words or phrases must be **strongly visually associated** with the text typed by the user
- Should ensure that any communication where text can be encoded **does not hinder the legibility** of the text itself
- Should ensure that the colour of the highlight is sufficiently visible under conditions which do not require accessibility enhancements, but that it does not deteriorate the legibility of the text
- Should ensure that while typing, all text is clearly visible

Medium confidence

- Should communicate that a word or phrase is encodable by **highlighting** it
- Should emphasise the boundaries between encodable concepts, for example, by showing **clear gaps** in the highlight between separate encodable concepts

Low confidence

- Should communicate that a word or phrase is encodable **as it is being typed** (and as soon as the system is able to recognise it as a potential SNOMED-CT concept)
- Should block additional formatting by the user, including highlights, text colour changes and underlines

2.1.2 Displaying Suggested SNOMED-CT Matches

In addition to highlighting where text is potentially encodable, the system will also display the potential SNOMED-CT matches in an area adjacent to the text input area, in the text parser approach. In the single concept matching approach, the matches will appear above the additional text input field.

The formatting of the suggested matches will be consistent with the formatting of the encodable text, namely a pale blue colour. The exception is the in-focus (selected) match, which will be displayed in yellow and will be slightly embossed (that is, standing out in relief), to convey that it is a clickable button. This colouring will also change on mouse-over. In other words, when the user moves the mouse over the suggested matches, the colour will change. The yellow handles and bold marquee in the text input area in the right pane will also move to the appropriate text when the user clicks on a suggested match in the left pane as illustrated in Figure 5.

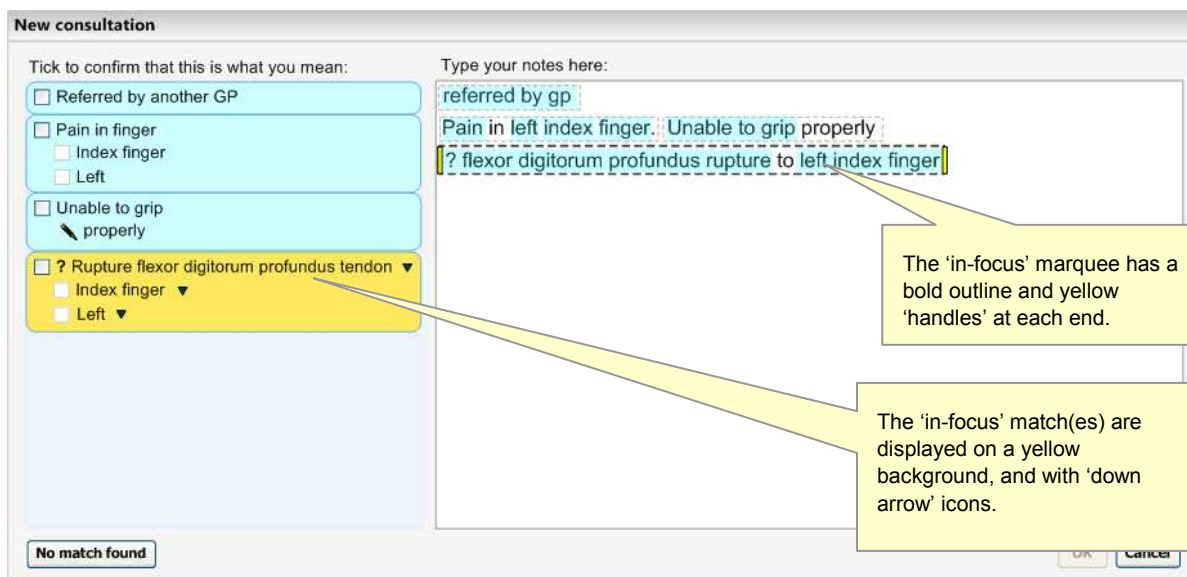


Figure 5: Suggested SNOMED-CT Matches Are Shown in the Left Pane

Additionally, when the user moves the mouse over a match, its colour will change to yellow. At this point, if there are similar matches to the top match, or there are more specific matches to be viewed, the system will communicate a message to encourage users to click further, as illustrated in Figure 6.

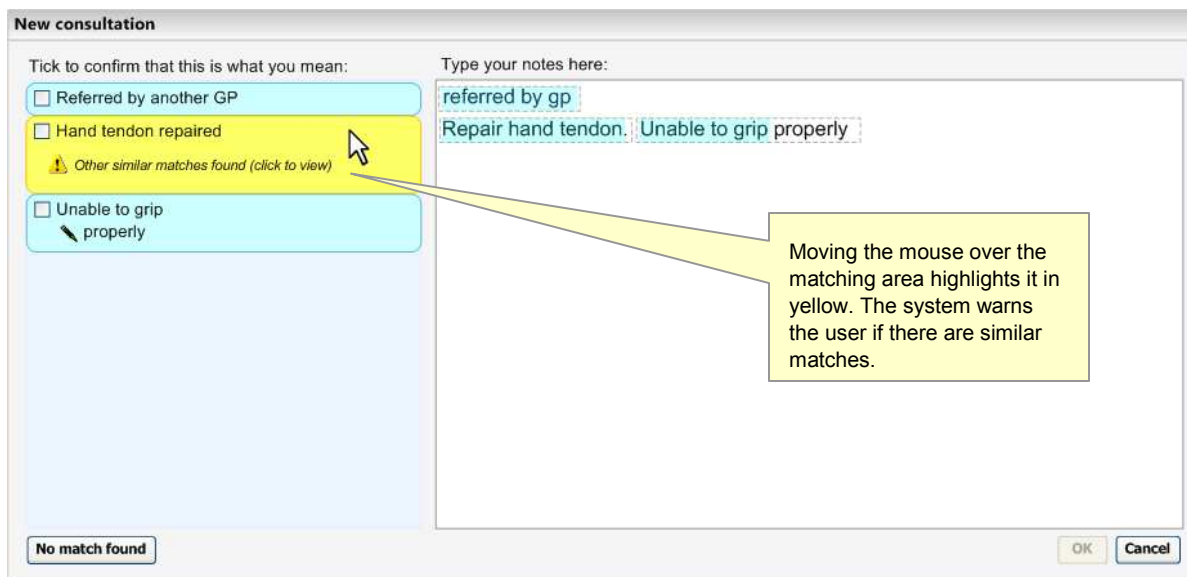


Figure 6: System Warns of Similar Matches

As the user moves the mouse onto the label itself, the surrounding area will become orange and slightly embossed (that is, standing out in relief) to communicate that it is a clickable button. This is illustrated in Figure 7.

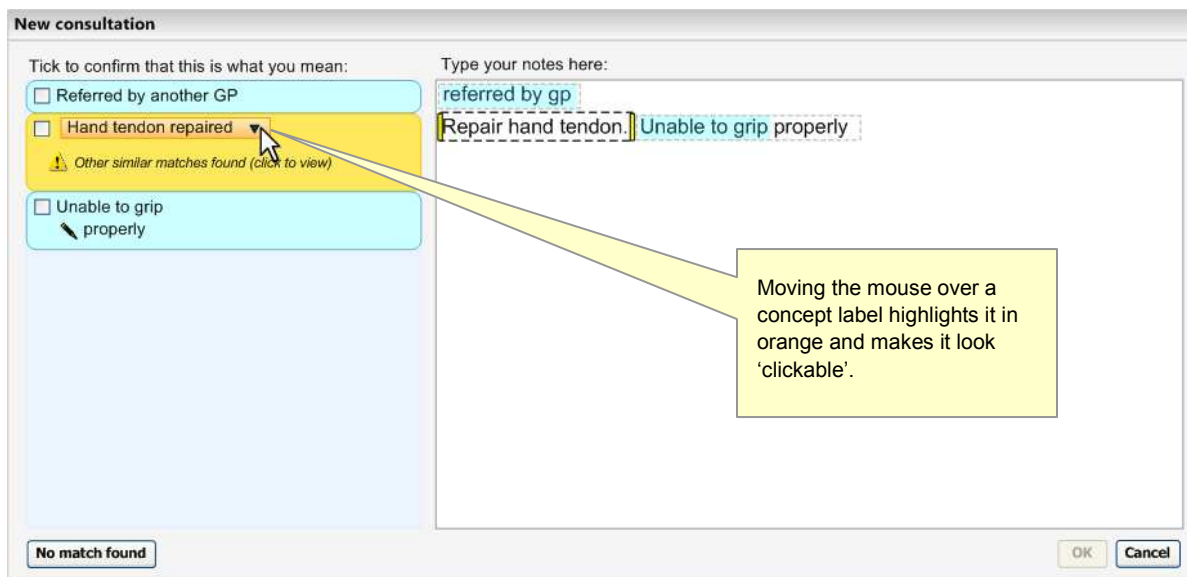


Figure 7: Match Label becomes a Clickable Button

Furthermore, if there are matches that have the same spelling as the top match, the system will communicate a message that tells the user to click the button to view the alternative matches before they can confirm the top match, as shown in Figure 8.

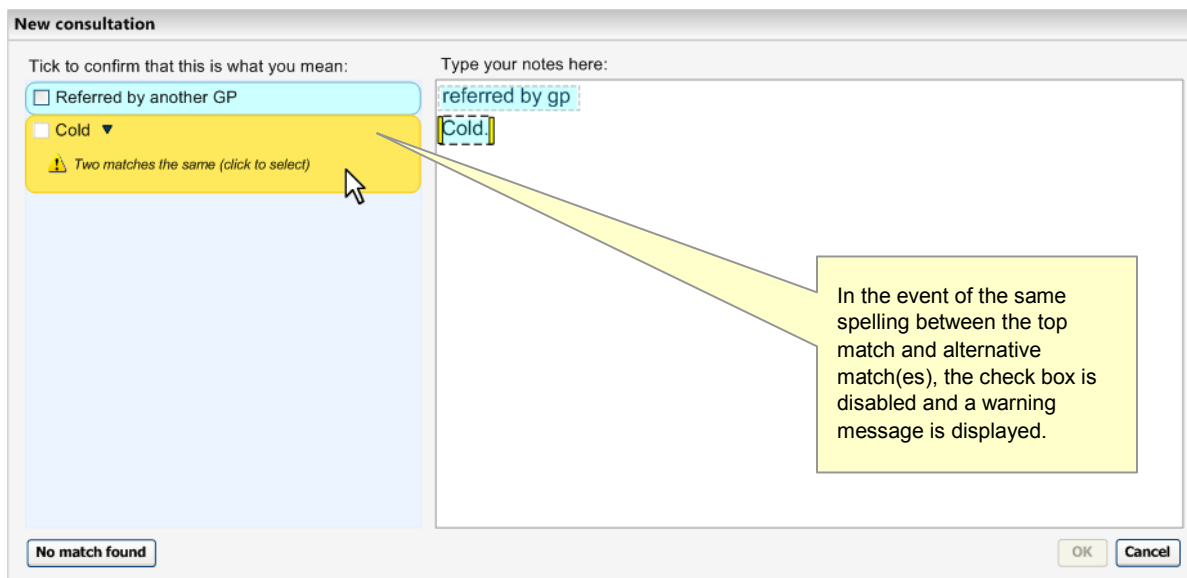


Figure 8: Confirmation Check Box is Disabled if there are Two Matches the Same

2.1.2.1 Guidance

The system:

- Must ensure that the suggested matched expressions are distinct from each other
 - Should ensure that each suggested matched expression is contained in a rectangular boundary
 - Could round the corners of the rectangular boundaries to make the areas stand out further from the field in which they are displayed
 - Could ensure that the suggested match areas have sufficient colour contrast with the background of the field in which they are displayed
- Should feature the suggested SNOMED-CT matches in the same colour as the encoded highlight
 - Could feature a yellow or orange colour for the suggested SNOMED-CT match above which the mouse is hovering
 - Could change the surface of the suggested match area so that it becomes embossed and clickable on mouse-over
- Must display a message to communicate to the user when (i) there are close alternative matches or (ii) when there are more specific alternative matches (that is, children of the top match)
 - Could expand the suggested match area downwards on mouse-over, if there are messages to communicate for that match. This would push down the matches below it in order to fit the expanded area

- Should display the text on the suggested matches in normal (regular), rather than in bold text style
- Must display the preferred term or the synonym term label for each suggested match
- Must display a confirm check box control at the far left of the suggested match area
 - Should display the suggested match label immediately to the right of the confirm check box
- Should display the suggested matches stacked vertically
 - Should display the suggested matches in the same order in which the related text appears in the input field
- Must display the suggested matches in an area that can be viewed at the same time as the area in which user types the notes
- Should **not** display the SNOMED-CT concept ID number in the default view of the encoded notes

2.1.2.2 *How to Use the Design Guidance*

Usage	Format	Example	Comments
✓	Feature the suggested matches in a prominent colour	See above	

Table 3: How to Use the Design Guidance

2.1.2.3 *How Not to Use the Design Guidance*

Usage	Format	Example	Comments
✗	Feature the suggested matches in a colour that obscures the text	Hand tendon repaired	

Table 4: How Not to Use the Design Guidance

2.1.2.4 *Benefits and Rationale*

The benefits of providing feedback in a location that is immediately visible to the user include:

- Giving users confidence that they have (successfully) encoded the notes and providing a measure of progress that may encourage the user to continue encoding. Failing to provide this feedback could lead to users being uncertain that they are encoding their notes correctly and, hence, make them dissatisfied (most of the time, people like to see the immediate results of their actions).
- Allowing users to check their encoded notes before saving them to the system. This confirmation partially mitigates the patient safety risk that the user encodes the wrong concept or fails to record an important qualification to the concept. Given the time-pressured and attention-demanding environment in which the notes may be entered, ensuring that the notes are structured in a way that the user can quickly and easily pick out the most important notes first, should also help to mitigate this risk.
- Giving the user an insight into how the notes are going to be saved in the system. This could help the user to create better-structured notes in future and could help the user understand how to best retrieve these notes when needed.

We recommend arranging the notes vertically. This is a standard way of presenting lists for users to check, and one with which users will be familiar. It also helps to ensure that the multiple notes do not appear to merge together, as in most cases there is a single term, note or value per line.

Displaying the system's suggested matches immediately next to the text input area:

- Gives the user the opportunity to check that the structured encoded notes are accurate
- Gives the user a greater understanding of how the notes will be recorded in the system

Displaying matches to the left of the text input area means that these suggested matches will always be close to the text input, given the left-hand justification of the text input.

2.1.2.5 *Confidence Level*

High confidence

- Must ensure that the suggested matched expressions are distinct from each other
- Must display the preferred term or the synonym term label for each suggested match
- Must display a confirm check box control at the far left of the suggested match area
 - Should display the suggested match label immediately to the right of the confirm check box
- Should display the suggested matches stacked vertically
 - Should display the suggested matches in the same order in which the related text appears in the input field
- Should **not** display the SNOMED-CT concept ID number in the default view of the encoded notes

Medium confidence

- Should ensure that each suggested matched expression is contained in a rectangular boundary
 - Could round the corners of the rectangular boundaries in order to make the areas stand out further from the field in which they are displayed
- Should ensure that the suggested match areas have sufficient colour contrast with the background of the field in which they are displayed
- Should feature the suggested SNOMED-CT matches in the same colour as the encoded highlight
 - Could feature a yellow or orange colour for the suggested SNOMED-CT match above which the mouse is hovering
 - Could change the surface of the suggested match area so that it becomes embossed and clickable on mouse-over
- Should display the text on the suggested matches in normal, rather than bold, style

Low

- Must display a message to communicate to the user when (i) there are close alternative matches or (ii) when there are more specific alternative matches (that is, children of the top match)
 - Could expand the suggested match area downwards on mouse-over, if there are messages to communicate for that match. This would push down the matches below it in order to fit the expanded area

- Must display the suggested matches in an area that can be viewed at the same time as the area in which user types the notes

2.1.3 Displaying Potential Post-Coordinated Attribute Matches

The system must also be able to display potential post-coordinated attribute matches that it has identified from the user's typed text.

The system needs to both communicate the post-coordinated expression as a unitary whole, while at the same time displaying its component parts.

The system will display the post-coordinated solution (that is, the base concept and its attribute concepts) within the same boundary as illustrated in Figure 9.

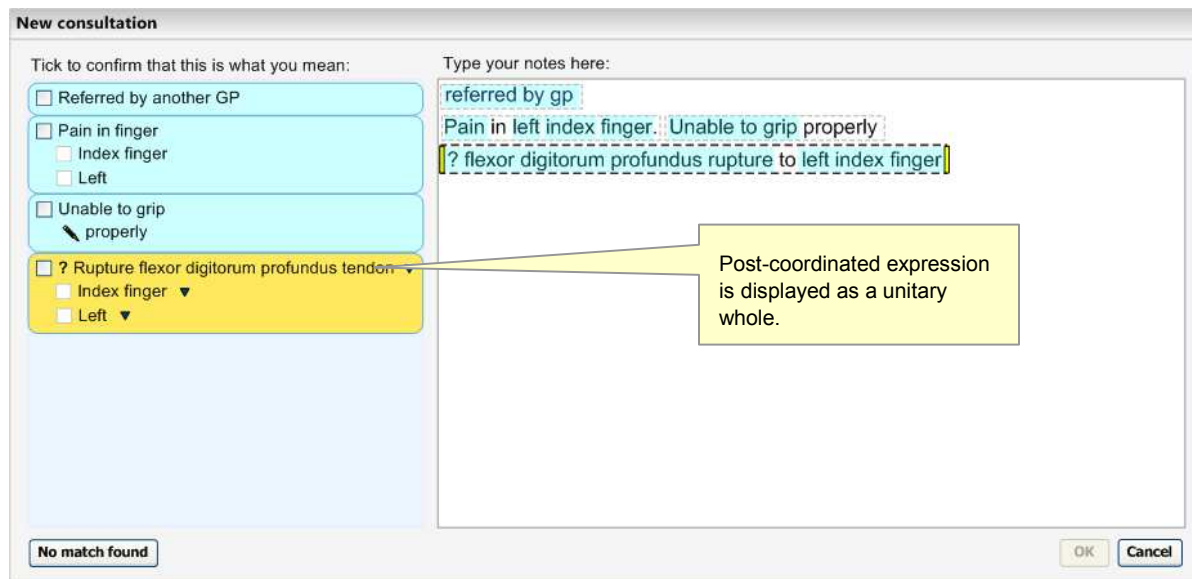


Figure 9: Post-Coordinated Expression Match Displayed As a Unitary Whole

2.1.3.1 Guidance

The system:

- Must display the attribute concepts that it has identified as part of the top matched SNOMED-CT expression solution, within a single boundary
 - Must display a confirm check box for each of the attributes
- Must communicate that the attribute concepts are further descriptions that belong to the base concept
 - Should indent each attribute concept in relation to its base concept
 - Should indent each attribute concept approximately a width of a check box
 - Should be able to communicate if an attribute concept is also a base concept for a further attribute concept, by further indentation
- Should only display the attribute value label (such as 'Mild'), and not the attribute name (such as 'Severity')

2.1.3.2 *How to Use the Design Guidance*

Usage	Format	Example	Comments
✓	Display the post-coordinated expression in a single suggested match area	See Figure 9	

Table 5: How to Use the Design Guidance

2.1.3.3 *How Not to Use the Design Guidance*

Usage	Format	Example	Comments
✗	Feature more than one indent		

Table 6: How Not to Use the Design Guidance

2.1.3.4 *Benefits and Rationale*

We need to distinguish the base concept from its attribute concepts, and indents are a standard way of showing that items belong together or are a further description of the main item. User testing has shown that clinicians understand this presentation of post-coordinated expressions.

2.1.3.5 *Confidence Level*

High confidence

- Must display the attribute concepts that it has identified as part of the top matched SNOMED-CT expression solution, within a single boundary
 - Must display a confirm check box for each of the attributes
- Must communicate that the attribute concepts are further descriptions that belong to the base concept
 - Should indent each attribute concept in relation to its base concept

Low confidence

- Should only display the attribute value label (such as 'Mild'), and not the attribute name (such as 'Severity')

Although hiding the attribute name should make the communication of many attributes more efficient and easier to read, there may be some instances where this could be problematic. For example, where there are two attribute matches that fall within similar categories, and where the use of these attributes is hard to discern without the attribute name label.

2.1.4 Displaying Non-SNOMED-CT-Matched Elaboration

In addition to displaying post-coordinated attributes as part of a top-matched solution, the system will also display other (free) text and structured data matches which are not SNOMED-CT matches, as illustrated in Figure 10. These structured non-SNOMED-CT matches may be drawn from an external informational model. Examples include time chunks and shorthand matches, which we recommend are created and used in conjunction with the SNOMED-CT data.

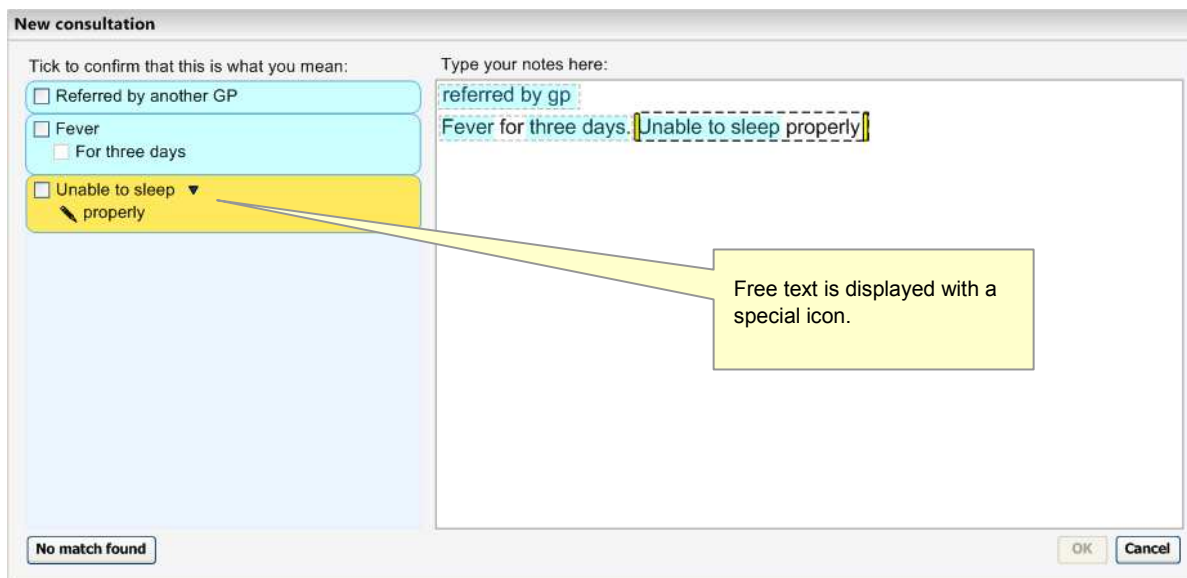


Figure 10: Chunks of Text Visibly Distinguished

Also there may be non-SNOMED-CT attribute relationships drawn from an external information model, for example, linking clinical findings with qualifiers such as expressions of time periods (such as night time).

As of yet, there is no agreed way of actually linking the non-SNOMED-CT matches with the SNOMED-CT matches. Therefore, as the relationships do not exist, they are simply displayed below all the SNOMED-CT matches within a single expression envelope.

All the text that (i) cannot be matched (either with SNOMED-CT or non-SNOMED-CT matches) or (ii) coordinated with the base concept in an expression, must remain as unstructured free text if it does not match a base concept and cannot therefore form a new expression of its own.

This text will be displayed as being associated with the SNOMED-CT matches, but without being encodable itself.

Each chunk of free text, where a chunk is text in which all the words are adjacent, will be displayed separately as shown in Figure 11. Any chunk that only features words from the exclusion list, including prepositions, will not be displayed.

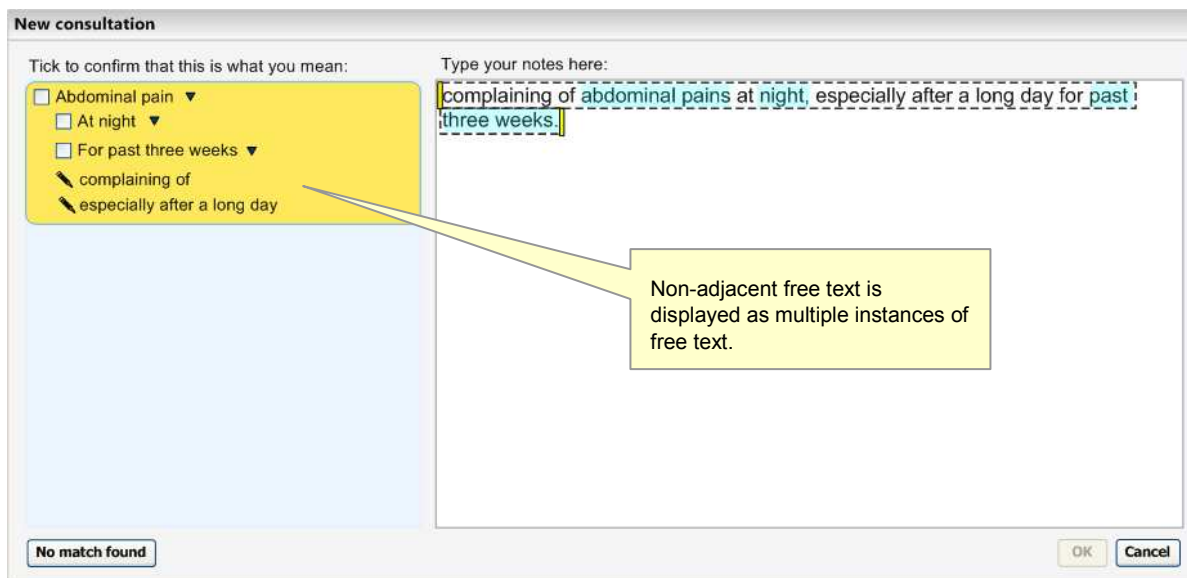


Figure 11: Example of Post-Coordination and Two Strings of Associated Free Text

2.1.4.1 Guidance

The system:

- Should display all structured data matches in the same way as for the SNOMED-CT matches, regardless of whether they are drawn from SNOMED-CT or not
- Must display a confirm check box control at the far left of the suggested match area
 - Should display the suggested match label immediately to the right of the confirm check box
- Should display each chunk of unstructured text separately
- Must display the unstructured text underneath all the structured matches (within a single expression envelope)
 - Should display the unstructured text one indent in from the base concept
 - Should display all chunks of unstructured text at the same indent level
- Must display the non-SNOMED-CT matches below the SNOMED-CT matches
- Must visually distinguish the unstructured free text from the structured SNOMED-CT and non-SNOMED-CT items
 - Should feature a special icon for the unstructured free text
 - Should feature the special icon immediately to the left of the unstructured free text
 - Must not feature a confirm check box control for the unstructured free text
- Must feature the unstructured free text in normal (regular), rather than in bold text style

2.1.4.2 *How to Use the Design Guidance*

Usage	Format	Example	Comments
✓	Display each chunk of text separately	See figure above	

Table 7: How to Use the Design Guidance

2.1.4.3 *How Not to Use the Design Guidance*

Usage	Format	Example	Comments
✗	Display words from an externally written exclusion list	Words such as 'of' or 'to' should not be displayed on their own	

Table 8: How Not to Use the Design Guidance

2.1.4.4 *Benefits and Rationale*

We need to display the associated text, but need to distinguish it from the encodable text so that the user fully understands what they are confirming. Several rounds of usability testing have shown that clinicians understand this convention.

It must be possible to display the unstructured notes with the structured notes so that:

- The user can easily view potentially important unstructured notes that elaborate the structured notes; the user should be encouraged to check what unstructured notes are going to be saved with the structured notes
- The user can easily view the original text that led to the creation of the structured notes; the user can check why the structured notes are written as they are

Leaving the unstructured notes in a normal, rather than bold style, visually distinguishes them from the structured notes. Once they are saved, there are potentially more uses for the structured notes than the unstructured notes and it is important to communicate the distinction. The system should communicate that these unstructured notes belong to the main encoded concept, either because the unstructured notes should be written as elaboration for the structured notes, or because they have been part of the method for achieving the structured notes. Either way, this belonging is central to the relationship between the structured and unstructured notes.

We need to exclude certain words from the free text that would not make sense on their own. For example, it would not make sense to display the word 'of' or 'to' as an individual chunk of free text.

2.1.4.5 *Confidence Level*

High confidence

- Must visually distinguish the unstructured free text from the structured SNOMED-CT and non-SNOMED-CT items
 - Should feature a special icon for the unstructured free text
 - Should feature the special icon immediately to the left of the unstructured free text
 - Must not feature a confirm check box control for the unstructured free text

Medium confidence

- Should display all structured data matches in the same way as for the SNOMED-CT matches, regardless of whether they are drawn from SNOMED-CT or not
- Must display a confirm check box control at the far left of the suggested match area
 - Should display the suggested match label immediately to the right of the confirm check box
- Must display the non-SNOMED-CT matches below the SNOMED-CT matches
- Must feature the unstructured free text in normal (regular), rather than in bold text style

Low confidence

- Should display each chunk of unstructured text separately
- Must display the unstructured text underneath all the structured matches (within a single expression envelope)
 - Should display the unstructured text one indent in from the base concept
 - Should display all chunks of unstructured text at the same indent level

2.1.5 Displaying Expression Boundaries

This guidance shows how the system displays groupings of words that encompass the encodable terms and the text that can elaborate the concept, either in a structured or unstructured way.

A grouping could comprise 'mild fever for three days', where 'Fever' is the main encodable (SNOMED-CT) concept, 'Mild' is the qualifier concept (an attribute of the concept, Fever) and 'Three days' is the non-SNOMED-CT time-chunk elaboration.

The system would parse the words into groups, as the user types them, according to its interpretation of the most likely structure that could be expressed with these words. (See *Design Guidance – Terminology – Matching {R1}* and *Design Guidance – Terminology – Elaboration {R2}* for details of the parsing process.)

The user then may decide to encode a term (and its group of elaboration words) or manipulate the boundaries of the group in order to include or exclude words (to give the correct meaning to the notes), prior to encoding the concept. Therefore, as these groups are identified by the system, they must be displayed to the user.

Figure 12 and Figure 13 illustrate how to display groupings through the use of marquees. Marquees are displayed around all chunks of encodable concepts and their elaboration. The selected (in-focus) marquee is distinguished by bold lines and yellow draggable handles, which change in appearance when the user points the mouse over them (see Figure 12). Additionally, a hover-over could be provided which communicates to the user what they could achieve by dragging the boundary. These descriptions could be specific depending upon what has been typed and what could be achieved by dragging it, for example, 'Drag the selection to separate terms' or 'Drag the selection to include or exclude text to add meaning to the concept'.

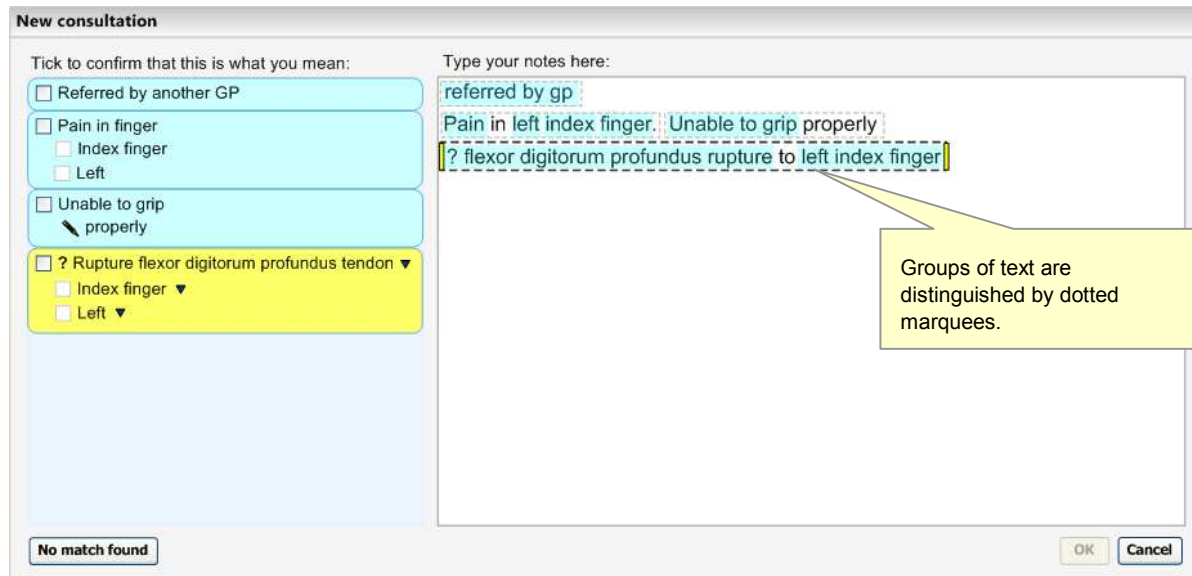


Figure 12: Grouping of Terms

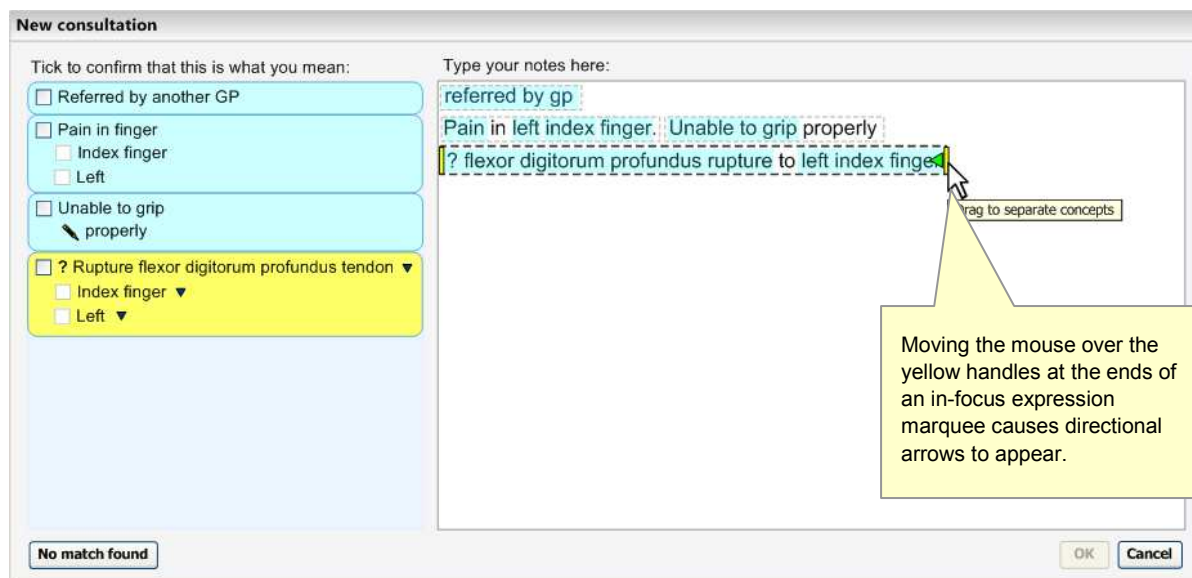


Figure 13: Draggable Handles

When the user changes the expression boundaries, this may have an effect on the suggested matches in the left pane (which would occur almost immediately).

2.1.5.1 Guidance

The system:

- Must communicate how potentially encodable text is grouped with potential elaboration text, and distinguish this from text that will not be encoded
- Must distinguish the group that is selected (that is, in-focus) from the other groups that are not selected
- Should ensure that any visual communication of grouping does not significantly reduce the legibility of the text
- Should ensure that any visual communication of grouping does not interfere with other visual communication elements associated with the text (for example, encodable text highlights)
- Could display marquees around words to visually communicate they are grouped together
- Must communicate that the boundaries of a selected group can be dragged (to include adjacent text or exclude text already included)
- Must display the new boundaries of the selected group as they are being dragged (as feedback of the dragging action)
- Should communicate the direction in which the selected group boundaries can be dragged, for instance, by changing the mouse cursor (not illustrated) or by changing the boundary marker to include arrows when the user selects the boundary marker (see Figure 13)
- Should communicate in words that the boundaries can be dragged, for instance, using hover-over messages that communicate that users can drag the boundaries and what can be achieved by dragging them

2.1.5.2 How to Use the Design Guidance

Usage	Format	Example	Comments
✓	The marquees must be fairly faint, unless they are selected	See Figure 12	The marquees must not visually interfere with the user's reading of the text
✓	Feature a hover-over over the selected marquee that communicates to the user that they can drag the selection area over other text. Where appropriate, it should also communicate the corresponding keyboard actions	The hover-over could read 'Drag the selection around related text'	This will communicate to the user what they can do with the selected marquee

Table 9: How to Use the Design Guidance

2.1.5.3 How Not to use the Design Guidance

Usage	Format	Example	Comments
✗	Do not overlap marquees	n/a	Each marquee contains distinct text
✗	Do not feature more than one selected area (that is, an area with draggable handles) at a time	n/a	The proposed system will only handle one encoding process at a time

Table 10: How Not to Use the Design Guidance

2.1.5.4 **Benefits and Rationale**

The user must have an understanding of how the system will interpret the text when an encoding action is triggered, how they can manipulate this structure, as well as the effects of any manipulation.

Marquees are useful because they allow the user to read the text (because they do not cover the text) and they do not interfere with highlights (which could signify what terms are encodable as SNOMED-CT concepts). Their boundaries also afford manipulation, such as dragging. Dragging could be reinforced by featuring handles with directional arrows on the left-hand and/or right-hand boundaries of the selected group.

The notion that the directional arrows would only appear when the user points at the handles, would keep the interface clean. Also, a context-specific hover-over message could give users instructions on how and why to drag the boundaries.

In early wireframe testing, upon viewing a static picture of the mouse hovered over the boundary handle, over 50% of the clinicians tested realised that they could associate text with an encodable word by dragging the boundaries to encompass the text.

2.1.5.5 **Confidence Level**

High confidence

- Must communicate how potentially encodable text is grouped with potential elaboration text, and distinguish this from text that will not be encoded
- Must distinguish the group that is selected (that is, in-focus) from the other groups that are not selected
- Should ensure that any visual communication of grouping does not significantly reduce the legibility of the text
- Should ensure that any visual communication of grouping does not interfere with other visual communication elements associated with the text (for example, encodable text highlights)

Medium confidence

- Could display marquees around words to visually communicate they are grouped together
- Must communicate that the boundaries of a selected group can be dragged (to include adjacent text or exclude text already included)
- Should communicate the direction in which the selected group boundaries can be dragged, for instance, by changing the mouse cursor (not illustrated) or by changing the boundary marker to include arrows when the user selects the boundary marker (see Figure 13)
- Should communicate in words that the boundaries can be dragged, for instance, using hover-over messages that communicate that users can drag the boundaries and what can be achieved by dragging them

Low confidence

- Must display the new boundaries of the selected group as they are being dragged (as feedback of the dragging action)

2.2 Display Standards for Notes Confirmed for Encoding

This guidance shows how the system should display the notes following the user's confirmation that the match is correct for encoding. It applies to all notes to be encoded in the text parser matching approach. It also applies to additional text notes in the single concept matching approach. Both approaches are dealt with in this section.

Showing the distinction between notes that have been confirmed to be encoded (both as SNOMED-CT codes and as supporting informational model attributes) and those which are not, is important. Failure to do so sufficiently, could risk the user not knowing what will be encoded and possibly the user not encoding anything (depending, of course, upon whether the user interface forces them to encode at least one concept).

2.2.1 Displaying Confirmed Matches

2.2.1.1 Suggested Matches Area

When the user has confirmed a note (by confirming the whole of or part of an expression), a tick appears in the check box. This happens either when the user has actually selected it or when the user has double-clicked on a selection (or has actioned an equivalent keyboard stroke). Furthermore, the area surrounding the appropriate match changes to grey. Those parts of the expression that have been confirmed and are structured matches are rendered in a bold text style. Those conceptual elements that have not been confirmed remain in normal text style (not bold), as shown in Figure 14. The unstructured text always remains in normal text style.

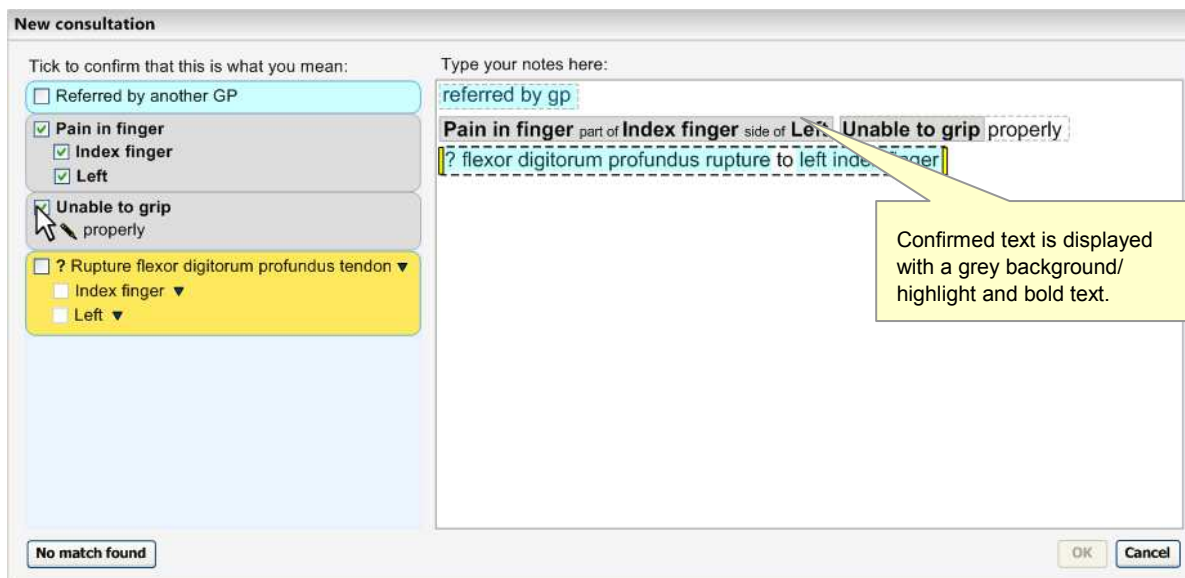


Figure 14: Confirmed Matches are Greyed Out

2.2.1.2 Text Input Area

When the user confirms a single SNOMED-CT match, the input text that spawned the match becomes replaced by the SNOMED-CT description label; either by the preferred term or synonym description label.

When the user confirms a post-coordinated expression comprising multiple SNOMED-CT concepts, the system renders the text by displaying the appropriate SNOMED-CT description labels for the base concept and for the attribute value concept(s).

Likewise, the confirmation of a non-SNOMED-CT match (such as a match against a concept from a separate informational model) also leads to the rendering of the text as that particular match label.

In between these labels, it will render a simplified translation of the attribute (relationship) label, which typically is a linkage concept. For example, in the case of the concept number 116676008, instead of displaying the preferred term label 'associated morphology', the system will display the word 'with'. The system will render this label in a smaller font and in grey in order to keep it from distracting the user's attention from the other labels.

All the confirmed structured notes in the text input area will be highlighted in grey to indicate that they are inactive, until they are unconfirmed.

2.2.1.3 Single Concept Approach

In the single concept approach to matching, matches identified in the additional text input field are displayed below the base concept list (but above the additional text input field). If the user confirms this match by selecting the check box next to this match, it will be rendered in bold. The corresponding text in the additional text input field will become highlighted in grey and will be rendered (in bold) by the appropriate SNOMED-CT description label.

In addition, if the user single-clicks on an item in the main list, and moves the mouse away from the list, the item is highlighted grey to indicate that it is selected. See the example in Figure 15:

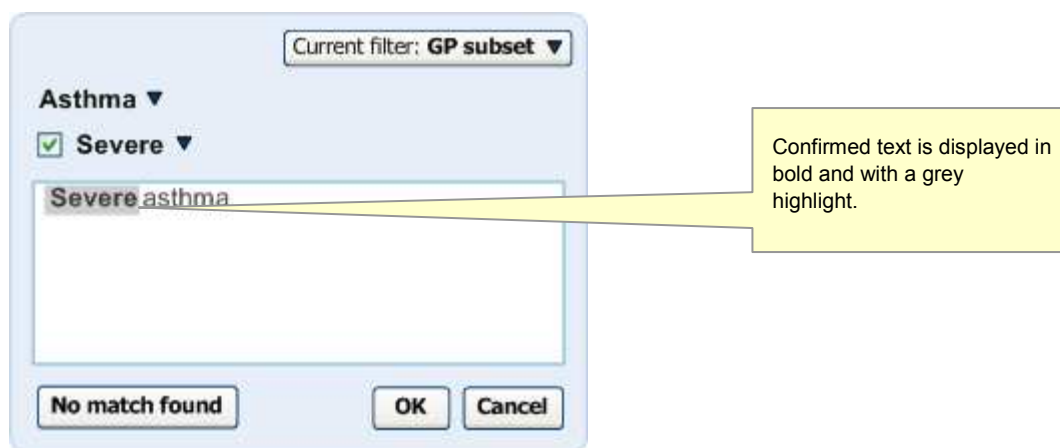


Figure 15: Confirmed Matches in the Single Concept Matching Approach

2.2.1.4 Guidance

The system:

- Should ensure through visual communication that a match has been confirmed and is consistent between the text input area and the suggested match area
- Must visually distinguish confirmed from unconfirmed or unstructured text
 - Could feature a grey background/highlight for matches that have been confirmed
 - Should feature the label text for all confirmed matches in bold text style
 - Should ensure that all unstructured text remains in a normal text style
- Must replace the typed text with the matched SNOMED-CT label once the user confirms the match
- Must display either the preferred term or the synonym description labels in the noting area (depending on what the user has chosen) once the user has confirmed the match
- Must display either the preferred term or the synonym description labels in the matching area (depending on what the user has chosen) once the user has confirmed the match
- Must render expression matches that comprise post-coordinations of multiple concepts in a user-friendly and readable form
 - Could render expressions that comprise post-coordinations of multiple concepts by displaying the preferred term/synonym descriptions in a left-to-right order, with the base concept at the far left and its attribute concept values to its right
 - Could render a simplified translation of the attribute (relationship) label
 - Could render the attribute label in a smaller font and in grey

Note

- The simplified translations of attribute relationship labels should be created and managed. However, before this approach is adopted, further testing and research is required to determine the usability of the range of possible translations (for example, testing the usability of translating 'associated morphology' into 'with')
- The simplified translation of attribute relationship labels is only a default approach. In the event of a more sophisticated rendering solution becoming available, the simplified translation approach should be replaced

2.2.1.5 How to Use the Design Guidance

Usage	Format	Example	Comments
✓	If the text drops below the height of the text box, feature a scroll bar	n/a	The user must be able to view all the encoded text

Table 11: How to Use the Design Guidance

2.2.1.6 *How Not to Use the Design Guidance*

Usage	Format	Example	Comments
✘	Do not feature any elaboration settings that the user has not selected (unless there is a special safety reason to do so)	It would be unnecessary for the system to show the axial modifiers, for example, 'patient currently has this finding', if the user has modified these settings	This would be distracting and unnecessary
✘	Do not feature too dark a highlight; the text must be readable underneath	Fever for three days	The user must be able to read the text underneath the highlight

Table 12: How Not to Use the Design Guidance

2.2.1.7 *Benefits and Rationale*

User feedback has indicated that users want to see a tidy, meaningful narrative in the text area before saving it to record. If they have typed in shorthand and have refined a concept match, they would like to see the label displayed here, rather than their original notes. Some users believed that there was the need to display the original text, but this is a point for discussion.

Displaying confirmed items in grey is a useful communication that the item is finished and is now unchangeable (until the match is unconfirmed by the user). User testing has supported this notion.

2.2.1.8 *Confidence Level*

High confidence

- Should ensure through visual communication that a match has been confirmed and is consistent between the text input area and the suggested match area
- Must visually distinguish confirmed from unconfirmed or unstructured text
 - Could feature a grey background/highlight for matches that have been confirmed
 - Should feature the label text for all confirmed matches in bold text style
 - Should ensure that all unstructured text remains in a normal text style
- Must display either the preferred term or the synonym description labels in the noting area (depending on what the user has chosen) once the user has confirmed the match
- Must display either the preferred term or the synonym description labels in the matching area (depending on what the user has chosen) once the user has confirmed the match

Medium confidence

- Must replace the typed text with the matched SNOMED-CT label once the user confirms the match
- Must render expression matches that comprise post-coordinations of multiple concepts in a user-friendly and readable form
 - Could render expressions that comprise post-coordinations of multiple concepts by displaying the preferred term/synonym descriptions in a left-to-right order, with the base concept at the far left and its attribute concept values to its right
 - Could render a simplified translation of the attribute (relationship) label
 - Could render the attribute label in a smaller font and in grey

From the wireframe testing conducted with clinicians, very positive comments were received about the encoded notes view. Responses included the fact that the notes were easy to run one's eyes over, that the encoded note view looked 'really nice', and that the association of elaboration and concepts was much clearer in the encoded notes view than it was in the original typed text view.

2.2.2 Displaying Unstructured Notes that are Associated with Confirmed Matches

The unstructured (free text) notes that are associated with matches that have been confirmed, will remain rendered in normal text style (as opposed to a bold text style), but will also feature the marquee around them which remains fixed until the note is unconfirmed. This is illustrated in Figure 16.

Maintaining the unstructured notes in normal text style is useful to distinguish it from the encoded notes.

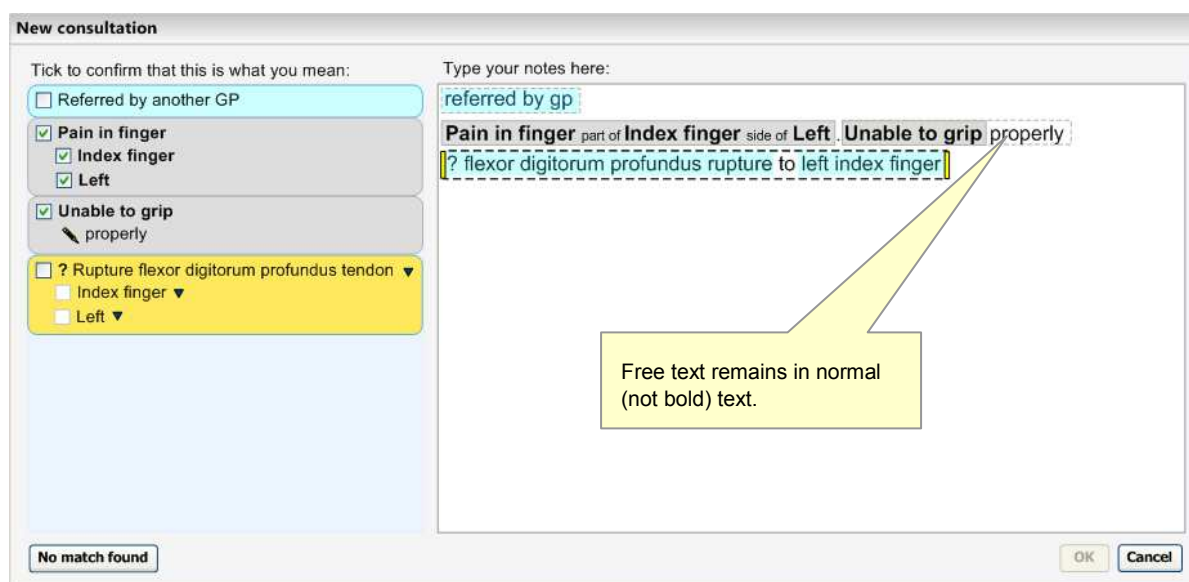


Figure 16: Unstructured Notes Appear in Normal Style Text

2.2.2.1 Guidance

The system:

- Must leave the unstructured (free text) notes that are associated with matches that have been confirmed, rendered in normal text style
- Must visually link the unstructured notes with the confirmed concept match with which they are associated
 - Should visually link the unstructured notes with the associated confirmed concept match by a marquee

2.2.2.2 *How to Use the Design Guidance*

Usage	Format	Example	Comments
✓	Leave the marquee boundary around the unstructured notes, even when the structured notes have been confirmed for encoding	See figure above	

Table 13: How to Use the Design Guidance

2.2.2.3 *How Not to Use the Design Guidance*

Usage	Format	Example	Comments
✗	Feature any associated unstructured notes in bold	properly	This would make the unstructured notes indistinguishable from the structured notes

Table 14: How Not to Use the Design Guidance

2.2.2.4 *Benefits and Rationale*

The user must be confident that they know what elaboration will be saved with each encoded note when they save the notes to record. Leaving the marquees in to indicate associations between confirmed notes and their associated text will be an important way to communicate this.

This notion has been supported by multiple rounds of usability testing.

2.2.2.5 *Confidence Level*

High confidence

- Must visually link the unstructured notes with the confirmed concept match with which they are associated
 - Should visually link the unstructured notes with the associated confirmed concept match by a marquee

Medium confidence

- Must leave the unstructured (free text) notes that are associated with matches that have been confirmed, rendered in normal text style

3 DOCUMENT INFORMATION

3.1 Terms and Abbreviations

Abbreviation	Definition
SNOMED-CT	Systematised Nomenclature of Medicine-Clinical Terms
UI	User Interface

Table 15: Terms and Abbreviations

3.2 Nomenclature

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

All content subject to completion, agreement or verification is denoted with **highlighting**.

3.2.1 Body Text

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

Table 16: Body Text Styles

3.2.2 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 hyperlinked footnote

Table 17: Cross Reference Styles

3.3 References

Reference	Document	Version
R1.	Design Guidance – Terminology – Matching	1.0.0.0
R2.	Design Guidance – Terminology – Elaboration	1.0.0.0
R3.	SNOMED-CT: http://www.snomed.org/	

Table 18: References