Medical Results in NCIS including Laboratory Results Reference Guide

Version 1

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1   Introduction

The National Cancer Information System (NCIS) is a clinical information system that supports the care of oncology and haemato-oncology patients across Ireland. The system will be used in the designated cancer centres, satellite centres and other locations where medical oncology and haemato-oncology patients are receiving SACT treatment.

Access to the patient's longitudinal cancer record will be available through the NCIS. This will ensure that all relevant healthcare providers will have access to the patients' data in an appropriate and timely manner.

NCIS has a number of key functionalities which will be used by various health care professionals including prescribing, electronic medication administration records, support for aseptic compounding, MDM, documentation and reporting.

The NCIS Programme is an eHealth programme under the leadership of the National Cancer Control Programme (NCCP). The NCIS project is sponsored by the Director of the NCCP, the HSE Chief Information Officer and the HSE Director of Acute Hospitals. Overall project oversight is provided by the NCIS Steering Group, which is chaired by the Director of the NCCP. Operational and clinical oversight, as well as project assurance, is provided by the multi-disciplinary NCIS Implementation Board. The Implementation Board ensures the interests of primary stakeholders, including end-users, are served during the configuration and implementation of NCIS.

2   What is meant by Medical Results in NCIS?

Medical results in NCIS.Med include laboratory results as well as other patient specific variables that may be used in dose calculations or decision support, e.g. height and weight.

2.1   Medical Results from the Laboratory Information System (LIS)
A set of eight laboratory results has been identified as a requirement for NCIS. An HL7 messaging output from each hospital LIS is required to provide laboratory medical results to NCIS. The message required from each LIS is an ORU, Unsolicited Transmission of an Observation Message. This structured message provides patient identifiable medical results.

It is expected that within each hospital the LIS has an existing HL7 interface with the hospital PAS which provides the patient demographic dataset and hospital specific identifiers to LIS.

Each site installation project for NCIS will include specific interfacing projects for PAS and LIS. Each interfacing project will involve identification of connections required, events and message triggers, resulting dataflows, specification of interface and agreement with the hospital project team, NCIS Office, PAS and LIS vendors for build, test and approval for implementation.

2.2   Height and Weight?
HL7 ORU messaging is also used in the transmission of Height and Weight data. Height and Weight should initially be entered in the patients Tumour Case (via the height and weight assessment form) in NCIS.Chart. HL7 ORU messaging for height and weight is **internal** between NCIS components. Transmission of Height and Weight ORU messages is triggered when the assessment form status is set to signed and the form saved. Height and Weight

data is then transmitted to NCIS.Med. Subsequent heights and weights can either be entered in a new assessment form in NCIS.Chart or directly in NCIS.Med.

3 Which Laboratory Values are available in NCIS?

The eight Medical Results available in NCIS were chosen by the NCIS Implementation Board as they are used to calculate doses and to inform decision support.

While it is useful to have Medical Results visible in NCIS it is important to remember that their primary purpose is to calculate dosing and manage Decision Support Rules (see section 8). Therefore it is important for sites to ensure they have a robust system for checking and validating all relevant Laboratory Results prior to administering SACT.

Each of the medical results has a "permissible age" which is the length of time that the result is valid for and can be used for dosing or decision support. The permissible ages have been agreed by the NCIS Implementation Board, height and weight are also included below for information.

- Neutrophils – 4 days
- White Cell Count – 4 days
- Platelets – 4 days
- ALP – 21 days
- ALT – 21 days
- AST – 21 days
- Total Bilirubin – 21 days
- Creatinine – 7 days
- Height – 999 days
- Weight – 999 days

4   Where to Find Medical Results in NCIS?

Medical results are accessed in the patient's Medical Results tab. Figure 1 below shows an example of a Medical Results screen.

Figure 1 - Medical Results Screen

- The "Current" column shows the latest medical result that is within the permissible age. Only current results can be used for dose calculation and decision support.
- Medical results with the normal range are displayed in black text.
- Medical results that are out of range are displayed in red text and the arrow indicates whether the value is higher or lower than the reference range.
- Hovering over the medical result gives the yellow box shown and will give further information about the medical result:
    - The date and time the medical result was authorised by the local LIS
    - The medical result name
    - The normal reference range of the result (as per the message sent by the local LIS)
    - "Entered by: Lab interface" identifies that the result was received via the LIS interface
    - Entered date is the time and date the result was applied to the NCIS.Med database
    - Specimen number for the result
    - "Sent by" indicates the authorising LIS. This can be used in NCIS to identify what hospital the test was completed in.
    - If the result has an associated comment, it will also appear here.

5   What are Calculated Medical Results?

NCIS includes several formulae for calculating medical results based on high, weight and the eight medical results noted above. For example Creatinine Clearance, AUC and Body Surface Area.

Calculated Medical Results can be added from the Calculated Medical Results button in NCIS.Med. They are also calculated automatically if used within a regimen or when verifying a medication.

6 Can Medical Results be managed manually in NCIS?

Physician, nurse and pharmacist users have permission to add, modify or cancel medical results directly in NCIS.Med. To modify or cancel a medical result double-click on it.
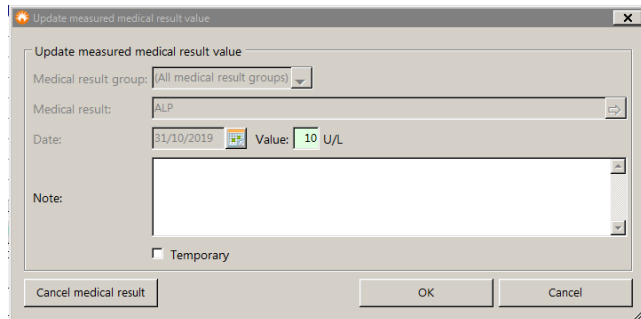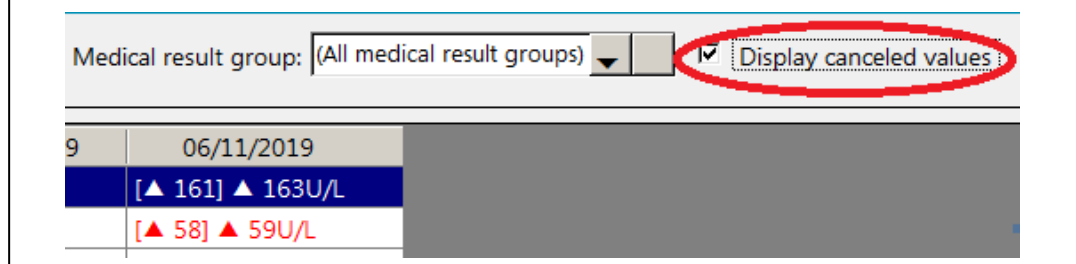

Figure 2 - Medical Result Modification Screen

> **NOTE:** if a medical result is modified or cancelled it remains in the system and can be viewed by clicking "Display cancelled values", cancelled values are displayed in square brackets and will not be used for decision support (see section 8 below).
>
>

7 How does NCIS use Medical Results for calculating doses?

For NCIS to calculate a dose it must have a "current" result that is valid at the planned time of administration for the medication. This is particularly important when prescribing medicines like carboplatin that use creatinine for dosing

8 How does NCIS use Medical Results for decision support

Regimens in NCIS have decision support rules built in. Decision support rules are either:
- Cycle postponement rules (NCIS will suggest to postpone the cycle if rule parameters are met)
- Dose modification rules (NCIS will suggest a dose modification if rule parameters are met)
- Medical result checks (NCIS will give a warning to check the regimen if rule parameters are met)

Decision support rules are triggered using current results at the time of verification rather than results at the planned date of administration. See the NCIS Decision Support Training Guide for further information.

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9 Considerations for LIS to NCIS interface.

9.1 Non-Numeric Values in Result

NCIS.Med requires numeric values in the result field. For this reason it is important to consider results that report with a symbol in your LIS, for example:

- If Neutrophils is reported as "<0.5"
- If ALP is reported as ">100"
- If the specimen is haemolysed

Non-numeric characters which may be included in the HL7 ORU output cannot be applied to the NCIS.Med database.

If there is already a result populated in NCIS.Med and on the same day a result with a non-numeric value is sent via the interface the current result will be cancelled. For example:

- Current value "Neutrophils 0.7 (1/1/2020 at 10:00am)
- New value "Neutrophils <0.5 (1/1/2020 at 18.30pm)
- Current value will be cancelled and the field in NCIS.Med will be blank

If there is a current medical result visible but it is not from today's date and a new result is sent via the interface but is rejected (e.g. non-numeric value) the current result will remain. For example:

- Current value "Neutrophils 1.2 (7/2/2021)"
- New value "Neutrophils <0.5 (9/2/2021)" rejected due to < symbol
- Current value remains "Neutrophils 1.2" as result is less than 4 days old.

9.2 Values not entered in Laboratory System

In some cases a Laboratory value may not be entered in the Laboratory system and only a message is included. For example if White Cell Count is very low there may be no differential Neutrophil value entered.

Where no value is entered on the LIS , the HL7 ORU output will not include a result for that specific value, this means there will be no value in NCIS.Med on the day those bloods were taken and any current values will not be cancelled.

9.3 Specimen Comments

Comments attached by laboratory personnel to specific result values are displayed in NCIS.Med when provided via HL7 interface. These will display in the yellow hover box in Medical Results.

Comments attached by laboratory personnel to specimens (e.g. grossly haemolysed) **cannot** be displayed in NCIS.Med when provided via HL7 interface.

It may be possible to duplicate comments attached to specimens to each specific medical result comment within the HL7 interface. This will enable comments attached to specimens to be viewed on hover over each specific medical result value. The reverse is not possible; comments attached to specific result values cannot be duplicated to specimen level within NCIS.Med.

9.4   Observation Results Status Codes

NCIS.Med will display current and cancelled medical results. The Current column displays the medical results provided via LIS interface which have been authorised within the Laboratory. Authorised results are indicated as final results within the HL7 ORU.

Should a laboratory revise authorisation status for results previously issued via HL7 ORU , the change in status should be issued through observation result status code. The latter has a dependency on the laboratory processes, the LIS in use, the HL7 output and implications for other downstream systems within the hospital.

10   What are the workflow and technical considerations for Medical Results in NCIS?

10.1 Workflow Considerations
- Review the 8 Medical Results that are included in NCIS to determine whether they ever include a non-numeric value in the result (e.g. <0.5)
- Rationale for non-inclusion of results on LIS
- Standard Operating Processes within the laboratory , and on LIS, for
    o   Entering/Authorising a result
    o   Correcting a result
    o   Cancelling a result
    o   Deleting a result
    o   Amending a result
    o   Entering a comment
    o   Correcting a comment
    o   Cancelling a comment
    o   Deleting a comment
    o   Amending a comment
- How will you use NCIS in addition to your current practice of signing off and reviewing patient bloods.
- How will the use of decision support impact on workflows? (see the NCIS Decision Support Guide for further information)
- How will non-numeric values be managed? For example is there a phone call from the laboratory that will necessitate manual entry in NCIS.Med.

10.2 Technical Considerations
- LIS HL7 specification
- Connection requirements for LIS
- Verification of HL7 message issue, acknowledgment, process and application to NCIS.Med database for processes identified in workflow
    o   Entering/Authorising a result
    o   Correcting a result
    o   Cancelling a result
    o   Deleting a result
    o   Amending a result
    o   Entering a comment
    o   Correcting a comment
    o   Cancelling a comment
    o   Deleting a comment

      o Amending a comment
- Ascertain observation result status codes in use within each LIS and associated laboratory processes which determine the status code to be employed.
- Identify observation result status codes where there is a semantic conflict with those in use for displaying current or cancelled results in NCIS.Med

The NCIS National Project Team will work with sites to help answer the above questions and identify any laboratory values that will not be accepted by the interface. Appendix 1 includes the details of the eight interface values and should be completed to indicate how your system reports them.

Appendix 1 – NCIS Laboratory Values – Local Assessment

	NCIS Medical result	Lab Result Description (Long Name)	Lab Result abbreviation (short Name)	Laboratory Result UID	Lab Result reporting unit
			from HL7 ORU inbound message		
Haematology					
	Neutrophils				
	White Cell Count				
	Platelets				
Biochemistry					
	ALP				
	ALT				
	AST				
	Total Bilirubin				
	Creatinine				

Non Numeric Medical result values – Local Assessment

	NCIS Medical result	Is the value ever not reported (yes/no)	Does the LIS message ever include a non-numeric value	Non-numeric value entered in the value field
Haematology				
	Neutrophils			
	White Cell Count			
	Platelets			
Biochemistry				
	ALP			
	ALT			
	AST			
	Total Bilirubin			
	Creatinine			