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DEVELOPMENT AND IMPLEMENTATION OF STANDARDS IN LABORATORY INFORMATION SYSTEM (LIS) USING SNOMED CT AND LOINC

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Introduction

- Medical laboratory in Malaysia use various Laboratory Information Systems (LIS).
- These systems were developed by different vendors and implemented at various hospitals.
 1. Isoft
 2. Cerner
 3. Strateq
 4. ProfDoc
- Challenges ;
 - Data is not comparable and integrated due to no data standardization
- Solution ;
 - To propose and implement LOINC as a lab standard for LIS development.



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Why LOINC?

Why not other standard ?

- LOINC have wide coverage of cover majority of lab test in Malaysia
- Free usage availability thru web browser and downloadable application (RELMA®)
- Guidance by Regenstrief on LOINC utilisation
- Collaboration between Regenstrief-IHTSDO



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Stakeholder Engagement

- 2 workshops were held in Kuala Lumpur in 2014 and 2015
- LOINC and SNOMED CT were introduced and presented to the Ministry of Health (MoH) Pathology Services (stakeholder) .
- A comparison was made between LOINC and LIS on standards.
 - All the stakeholder came to a consensus to use LOINC and SNOMED CT as a laboratory standard in Malaysian healthcare.
- Approval and endorsement to be done by Health Informatics Council



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Role and Guardian of Regenstrief and NLM

- Participation of Prof Clement McDonald (NLM) and Daniel J Vreemen (Regenstrief) during the stakeholder engagement.
- They were our guidance during the workshop.
- Regenstrief assist during this development.



Methodology

- List of LIS orderables were provided by Head of Department in each pathology department, (Histopathology, Chemical Pathology, Microbiology and Haematology).

- Mapping was done using two application

1. RELMA® - downloadable application by Regenstrief

2. LOINC Web browser at : search.loinc.org

6 criterias were identified as below to ensure accuracy of mapping:

LOINC CODE	Long name	Property	Timing	System	Scale	Method	Unit
1742-6	Alanine aminotransferase	CCnc	Pt	Ser/Plas	Qn		U/L

- The output was presented to Health Informatics Council for approval.

Mapping local terminology (orderables) in HIS to LOINC

- During the second workshop, 1562 orderables from HIS list were mapped to LOINC.
- Mapping was done by SME (Pathologist and Science Officer).
- 4 major disciplines involved were:
 - Histopath, ChemPath, Microbiology, Haematology.
 - Except from genetic lab and blood bank lab.
- Some HIS and LOINC used different terminology but carried the same meaning
 - Full blood count (FBC) used in HIS but LOINC used Complete blood count (CBC).
 - Thus, harmonization in terminologies need to be done.



Table 1: Details of orderables list by sub disciplines

NO	Sub Disciplines	Number of Orderables	Total
1	Hematology	146	146
2	AnatPath-Histo	14	21
3	AnatPath-cytologi	7	
4	Chempath	1045	1045
5	Microb-Isolation	76	350
6	Microb-Serology non culture	23	
7	Microbiology-Mycology	24	
8	Microbiology-Immunology	73	
9	Microbiology-Parasitology	27	
10	Microbiology-Virology	127	
	Total		1562



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Mapping LOINC to SNOMED CT

- Previously mapped Cardio Registry to SNOMED CT and endorsed by SME (Malaysian Cardiology Refset)
- 14 orderables (investigations) available in Cardiology Refset.
- But there were 9 orderables that are not in SNOMED CT but available in LOINC
- Eg peak CK-MB, peak CK, peak troponin TnT, peak troponin Tn I, Lipid profile (fasting), HDL-C, fasting blood glucose, total cholesterol, LDL level



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Issues

Issue No 1: One to many mapping

In HIS, there is only one erythorocytes sedimentation rate(ESR) orderable available but in LOINC, they were five orderables available with different methods. Do we need to include 5 orderables in HIS or just in LIS?

Clarification by Regenstrief : HIS orderables are from clinician/ through HIS/EMR system. It is not required to provide list in the system. Only pathologist will determine type of method subject to test availability in each laboratory.



Issues

Table 2: Examples of one to many mapping

Orderable list	Sample Type	Tube Type		Instruction	No	LOINC	Long Name	Property	Timing	System	Scale	Method	Unit
Erythrocyte Sedimentation Rate	Blood	Special ESR tube	1.8 ml	Send the sample immediately	1								
						30341-2	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn		mm/h
					2	43402-7	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	15M reading	
					3	4537-7	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	Westergren	mm/h
					4	18184-2	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	Westergren. 2H reading	mm/2 H
5	45382-5	Erythrocyte sedimentation rate	Vel	Pt	Bld	Qn	Wintrobe						



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Issues

Issue No 2: Term ‘unspecified’/left blank in “Method” column.

For ESR test, LOINC provided 5 laboratory test techniques including unspecified. What does unspecified mean?(Table 2)

Clarification from Regenstrief: The unspecified can be either the test is not mentioned or it was not included in the list.



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References

- IHTSDO Browser <http://browser.ihtsdotools.org/>
(SNOMED CT International Release January 2015)
- LOINC Version 2.5 and RELMA® Version 6.0



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TERIMA KASIH
Thank you