Editorial Guide on Hong Kong Clinical Terminology Table – Laboratory

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The Government of the Hong Kong Special Administrative Region

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1 INTRODUCTION

1.1 DEVELOPMENT OF THE HKCTT

1.1.1 In 2007, the Hong Kong Special Administration Region has decided to implement a territory based Electronic Health Record (eHR) Sharing System. The Hong Kong Clinical Terminology Table (HKCTT) is developed to support the interoperable eHR. The HKCTT facilitates the improvement of healthcare delivery, workflow optimization, disease surveillance, clinical decision support and health services planning.

1.1.2 The HKCTT is referenced to various international terminologies to facilitate the organization of eHR and secondary use of the eHR data. These terminologies include Systematized Nomenclature of Medicine- Clinical Terms (SNOMED CT), International Classification of Diseases 10th Revision (ICD-10), International Classification for Primary Care (ICPC) and Logical Observations Identifiers Names and Codes (LOINC). The HKCTT and the adopted reference terminologies are the recognized terminologies for the eHR. Healthcare providers can use these recognized terminologies to send diagnosis and procedure, laboratory and drug data to the eHR.

1.2 STRUCTURE OF THE HKCTT

1.2.1 The HKCTT is a term based and expandable table. Each term represents a unique concept. Concept is an embodiment of a particular meaning. Every term must carry at least one meaning ("non-vagueness") and no more than one meaning ("non-ambiguity"), and that meaning correspond to no more than one term ("non-redundancy") [(1)].

1.2.2 Each HKCTT term contains a unique term identifier (Term ID) and a description. The [Term ID] is a meaningless numeric sequence being used to identify individual HKCTT term. It is assigned by the Information Architecture Management System (IAMS) automatically. The [HKCTT description] carries a unique and coherent meaning. Alternate description(s) may be included as alias to facilitate searching of a specific term. The [eHR description] is the description to facilitate record viewing in the eHR. The HKCTT is managed by the eHR Information Standards Office (eHRISO) through the Information Architecture Management System (IAMS). For details please refer to section 1 and 2 of HKCTT Editorial Policy.

1.3 LABORATORY TERMINOLOGY IN THE HKCTT

1.3.1 Laboratory terminology in the HKCTT and reference terminologies serve the following purposes:

1. To ensure laboratory data is shared safely and reliably in eHR;
2. To provide recognized standard for laboratory data documentation;
3. To generate domain knowledge for clinical research;
4. To support disease surveillance for improving population health.

1.3.2 HKCTT laboratory terms are grouped under various natures and subset in HKCTT.

1. Nature in HKCTT
   - Laboratory test
   - Organism
   - Specimen
   - Body structure (Terminology for Anatomical Pathology)
   - Diagnosis (Terminology for Anatomical Pathology)
   - Evaluation finding (Terminology for Anatomical Pathology)
   - Substance (Terminology for Anatomical Pathology)

2. Subset in HKCTT
   - Terminology for Anatomical Pathology

1.3.3 They are mapped to the appropriate codes from the relevant reference terminology. Reference terminologies for different laboratory terms are listed in table 1:

HKCTT Laboratory Term	Reference Terminology	Organization
Laboratory Test	LOINC	Regenstrief Institute
Organism	SNOMED CT	International Health Terminology Standards Development Organization (IHTSDO)
Specimen		
Anatomical Pathology		

Table 1: Reference terminologies for laboratory domain

1.4 PURPOSE OF THIS DOCUMENT

1.4.1 This document provides an overview of laboratory terminology in the HKCTT, including terminology related to laboratory tests and laboratory resultable data. It states the principles and rules of creation and management of HKCTT laboratory terms. These principles and rules have been endorsed by the eHR Information Standards Domain Group on Laboratory Record (eHR IS DG (Lab)) — see appendix 6.1.

1.4.2 The document should be read by healthcare professionals/health informaticians and information technologists who are responsible for the development and maintenance of the laboratory information system, or other clinical systems which use laboratory data.

2 LABORATORY TEST IN THE HKCTT

2.1 IDENTIFYING A LABORATORY TEST IN THE HKCTT

2.1.1 Each laboratory test term is uniquely identified with a [Term ID] and is defined by a combination of six pieces of information with reference to the LOINC attributes, including : [component], [property], [time], [system], [scale], and [method]. The attribute information allows a level of detail in the definition of a unique test measurement. Please refer to Table 2 for details.

Part	Attribute	Definition	Example
1	Component	Name of the analyte or the substance measured	Glucose
2	Property	The characteristic or attribute of the analyte that is measured evaluated or observed.	Substance Concentration
3	Time Aspect	A measurement may be taken at a moment in time or measured over a specified time interval	point in time
4	System	Type of specimen	Urine
5	Scale	Scale of measurement used for the test result. The type of scale maybe quantitative, ordinal, nominal or narrative	Quantitative
6	Method	Method used to produce result or other observation	Test strip

Table 2: Attributes used for defining laboratory test in HKCTT

2.1.2 Each HKCTT laboratory test is mapped to an appropriate LOINC code. If no LOINC concept carries the same meaning as a HKCTT laboratory test term, an extended LOINC code (HKLOINC) will be created. Details of LOINC and HKLOINC are described in Section 5.2.

2.1.3 Each HKCTT laboratory test and its defining attributes are mapped to SNOMED CT. Details of mapping the attributes to SNOMED CT are described in Section 5.3.

2.1.4 Method is an attribute of LOINC but is not mandatory in defining a laboratory test term in the HKCTT. It is only specified in the HKCTT laboratory test name if it is significant enough for test differentiation clinically.

2.1.5 The followings are not included when defining a laboratory test in the HKCTT as they should be part of the eHR participant's laboratory record.

1. Unit: Property of the test is defined but the exact unit (e.g. mmol/L and umol/L) for reporting is not defined in the laboratory test term. Tests with same property but different units are mapped to the same LOINC code.

2. Reference range: Reference range of a particular test is not defined in the HKCTT. It is not an attribute of a test. It is associated with the object to which a test applies. Reference range is for longitudinal comparisons among patients, or for transversal comparisons in population. It changes with age, gender, and geographic location, resulting in same test with different ranges. Besides, different methods performed by different instruments can be employed for the same test with different reference intervals [(2)].

2.2 [eHR DESCRITPION] FOR LABORATORY TEST

2.2.1 To ensure data consistency and to facilitate communication amongst healthcare providers, a set of syntax and rules for naming [eHR description] has been approved by eHR IS DG (Lab). The [eHR description] is shorter than [HKCTT description] and is used as a test display name in eHR system. Laboratory test that are not named according to the convention should be approved by the eHR IS DG (Lab) before they can be used as [eHR description].

2.2.2 The general principles of [eHR description] are listed as follows:

1. Should not be vague. It must correspond to at least one meaning
2. Should not be ambiguous. It should contain one meaning
3. Named according to the test, condition or disease rather than particular methodology.
4. Test display name should not be redundant. The meaning should correspond to no more than one concept.
5. Prefers UK spelling and US spelling is acceptable on some tests.

2.2.3 Syntax and Rules for [eHR Description]

2.2.3.1 The test name format and the order of the components are listed as follows:

<analyte> [,_<system>] [,_<qualifier>] [,_<method>] [_(<Modifier>)]

Note:

1. Component in square brackets is optional
2. An underscore indicates a space.
3. A comma is used in between components to separate them.
4. Capitalize first character of every component after comma.
5. System can be optional if the specimen type information is indicated in another part of the record

2.2.3.2 General Information about [eHR Description]

1. [eHR description] makes reference to the LOINC long common name. It is simpler than the long common name with sufficient details as to be unambiguous.

2. [eHR description] is readable for laboratory and clinical staff, and take into account prior common practice.

2.2.4 Analyte

2.2.4.1 General Information about Analyte:

1. Analyte is the substance being measured or detected.
   e.g. Heterophile Ab, Serum, not Monospot Test

2. Greek letters, alpha, beta, gamma, etc. are written in full.
   e.g. Alpha 1 fetoprotein, not α 1 fetoprotein.

3. The use of punctuation characters (such as commas, dashes, parentheses) is in accordance to LOINC long common name. Punctuation characters in analytes in long common names are specified by International Union of Pure and Applied Chemistry (IUPAC), the Chemical Abstract Service (CAS) convention or another international convention [(3)].
   e.g. 5-Hydroxyindoleacetate.

4. First word of every testing substance is capitalized.
   e.g. Amylase/Creatinine, not Amylase/creatinine.
   Amylase/Creatinine renal clearance, not Amylase/Creatinine Renal Clearance.

2.2.4.2 Abbreviation for Analyte:

1. Abbreviation is accepted when it is:
   i. indicated in LOINC long common name.
   ii. a standard, or more commonly used than the full name.
   iii. approved by eHR IS DG (Lab).

2. Abbreviation in round brackets is additional information to supplement the analyte.
   e.g. Prothrombin time (PT).

3. Abbreviation of genetic diseases in round brackets is for concision expression.
   e.g. Myeloid/lymphoid or mixed-lineage leukemia(MLL) gene mutations.

4. Accepted abbreviations are listed in appendix 6.3.

2.2.4.3 Analyte for Clinical Pathology:

1. Anionic names are used for naming the chemicals. The acid names are not preferable.
   e.g. Urate, not Uric acid.

2. Both vitamin and alternate chemical names are accepted. Analyte named by "vitamin" followed by the type of vitamin. Any other qualifying information to differentiate the type of vitamin will follow.
   e.g. Vitamin B12 and Cobalamins.

3. Single-word names are used for naming alcohols.
   e.g. Methanol, not Methyl alcohol.

4. The generic names of drugs are used when referring to drug concentrations. The brand names are not preferable.
   e.g. Paracetamol, not Panadol

2.2.4.4 Analyte for Microbiology:

1. Full taxonomic names of organisms are used to describe test for diagnosis. Name of diseases are not preferable.
   e.g. Herpes simplex virus Ab, not HSV Ab

2. Abbreviations used in organism name are written in full.
   e.g. serovar, not sv;

species, not sp.

3. The generic names of drugs are used when referring to drug concentrations and antimicrobial susceptibilities. The brand names are not preferable.

4. The word "Microscopy" is used for microscopic observation.
   e.g. "Microscopy, Body fluid, Gram stain", not "Microscopic observation, Body fluid, Gram stain"

5. The name of target organism is the analyte for organism specific cultural test.
   e.g. Enterovirus, Culture

2.2.4.5 Analyte for Serology:

1. The target antibody is a noun. Adjective is not preferable.
   e.g. Myocardium Ab, not Myocardial Ab

2. The target immunology substance (antigen or antibody) is specified in serology test.
   e.g. Influenza A virus Ab

2.2.5 System

2.2.5.1 General Information about System:

1. System is the type of specimen for the test

2. The system should be according to LOINC long common name.

3. First word of every testing system is capitalized.
   e.g. Serum or Plasma, not Serum or plasma.

4. All sample types are included except "Unspecified specimen"
   e.g. "Parainfluenza virus Ag", not "Parainfluenza virus Ag, Unspecified specimen"

2.2.6 Qualifier

2.2.6.1 General Information about Qualifier:

1. Qualifier provides information other than the type of specimen and method used, to specify the kind of analyte which is being measured.

2. Qualifier includes anything necessary to qualify the analyte.

3. Time aspect is the qualifier when a test expressing a value over duration.
   e.g. Sodium, urine, 24 hour.
   "Albumin, Urine", not "Albumin, Urine, Unspecified time"

4. Qualifier includes the time delay, the ordering of specimen, and the type of challenge. The type of challenge is indicated as dynamic function test and displayed as "DFT".
   e.g. "2 hour, DFT", not "2 hours post dose glucose";
   "1st specimen, DFT", not "1st specimen post XXX challenge"

5. Units used for time aspect are in singular tense.
   e.g. 24 hour, not 24 hours.

2.2.7 Method

2.2.7.1 General Information about Method:

1. Test method indicated in [eHR description] is for test differentiation and clarity.
   e.g. Glucose, Urine
   Glucose, Urine, Test strip

2. The method shown is significant for test result interpretation.

3. Test methods in table 3 are generally not indicated in [eHR description] except for microbiology tests. They are included when it is necessary to create unique [eHR description] or with the approval of eHR IS DG (Lab).

Test methods not included in [eHR description]
Manual count
Latex agglutination
Agglutination
Coagulation assay
Heat stability

Table 3: Methods routinely not indicated in [eHR description]

4. The word “Culture” is used for “Organism specific culture”.
   e.g. “Methicillin resistant Staphylococcus aureus, Culture”, not “Methicillin resistant Staphylococcus aureus, Organism specific culture”

5. The word “Microscopy” is used for light microscopy-related test and comment.
   e.g. Leukocytes, Sputum, Microscopy
   Cerebral spinal fluid comments, Microscopy

2.2.7.2 Method for Molecular Testing:

1. DNA Probe methods for molecular testing are classified into three categories as followed:
    i. Probe without amplification
    ii. Probe with nucleic acid amplification
    iii. Probe with signal amplification

2. The classification of molecular methods is referenced to LOINC.

3. Probe without amplification method is indicated as “DNA Probe” in [eHR description].
    e.g. Mycobacterium tuberculosis complex rRNA by DNA probe

4. Molecular methods that are in probe with nucleic acid amplification method are indicated as “Amplification method” in [eHR description]. Specific methods that are classified as Probe with nucleic acid amplification category are shown in table 4
    e.g. Hepatitis B virus DNA, Serum or Plasma, Amplification method

5. For Probe with signal amplification category, the method in use is directly indicated in [eHR description]. Specific methods that are classified as Probe with nucleic acid amplification category are shown in table 4
    e.g. Hepatitis B virus DNA (viral load), Serum, Branched chain DNA

Category	Molecular Method
Probe with Nucleic Acid Amplification	Polymerase Chain Reaction (PCR)
	Transcription Mediated Amplification (TMA)
	Nucleic Acid Sequence Based Analysis (NASBA)
	Strand Displacement Amplification (SDA)
	Ligation-Activated Transcription (LAT)
	3 Self-Sustaining Sequence Replication (3SR SR)
	Ligase Chain Reaction (LCR)
	Q-Beta Replicase or probe amplification category method (QBR)
Probe with Signal Amplification	Hybridization Protection Assay (HPA)
	Branched Chain DNA
	Hybrid Capture

Table 4: Molecular Methods under Probe with Nucleic Acid Amplification Category

2.2.8 Modifier

2.2.8.1 General Information about Modifier

1. Modifier of laboratory test includes the information of scale of measurement and property observed, which are generally omitted in [eHR Description].

2. Modifier in round brackets is included when it is necessary to create a unique [eHR Description].
   e.g. Creatine kinase.MB, Serum or Plasma (Mass/volume)

3. Concentration, rate and titer refer to the property observed. Test Property is indicated for duplicated in [eHR description] with different property.
   e.g. Gentamicin, Serum or Plasma, peak (Mass/volume)

4. Qualitative/ Quantitative refer to the scale of measurement.
   e.g. Nuclear Ab, Serum (Qualitative)

3 ORGANISM TERMS IN THE HKCTT

3.1 IDENTIFYING AN ORGANISM IN THE HKCTT

3.1.1 Organisms are the laboratory observation of the culture results in clinical reports. This includes bacteria, viruses, fungi, and various stages of parasites.

3.1.2 Each HKCTT organism term is assigned with a unique [Term ID] and [HKCTT description]. Every HKCTT organism term shall be mapped to a SNOMED CT concept from "Organism" hierarchy in the international release. There are situations where rapid technological advancements and localized healthcare needs cannot be adequately catered by the SNOMED CT international release. The HKCTT organism term is then mapped to SNOMED CT Hong Kong Extension (HKSCT) which is created for local variations and customizations of terms relevant to the Hong Kong healthcare community. The details of SNOMED CT and HKSCT are described in this document in section 5.3.

3.1.3 The HKCTT descriptions of organism terms are referenced to the preferred names of organism concepts in SNOMED CT. The eHR IS DG (Lab) has also developed a set of syntax and rules for [eHR description] of organism to meet the requirement of the local healthcare community. Organisms that are named with exceptions should be approved by the eHR IS DG (Lab) before they can be used as [eHR description].

3.2 [eHR DESCRIPTION] FOR ORGANISM

3.2.1 Different conventions have been developed in HKCTT for naming individual types of organism due to the differences in nature among these organisms, (bacteria, fungi, viruses and parasites).

3.2.1.1 Bacteria and Fungi

The syntax for naming bacteria and fungi [eHR Description] are the same. The syntax for naming bacteria and fungi at family, genus and species level is listed as follows:

1. ***Naming bacteria and fungi at family level:***
   The family name of the bacteria or fungi is directly applied as [eHR Description]

<family>

Format	**Example**
<family>	Porphyromonadaceae

2. Naming bacteria and fungi at genus or species level:

The genus and species name of the organism are the core components for [eHR Description]. The genus name is supplemented with the word "species" for organism named at genus level. The subspecies or variant name is included when it is available. Additional information to further define the organism is classified as <descriptor>. The syntax for bacteria and fungi [eHR Description] is listed below:

<genus>_<species> [_<subspecies>] [_<variant>] [,_<descriptor>]

Format	Example
<genus>_<species>	Vibrio species
<genus>_<species>	Vibrio cholerae
<genus>_<species> [_<subspecies>]	Klebsiella pneumoniae subspecies ozaenae
<genus>_<species> [_<variant>]	Corynebacterium diphtheriae variant belfanti
<genus>_<species> [,_<descriptor>]	Vibrio cholerae, serogroup O1

Note:

1. Components in square brackets is optional.
2. An underscore indicates a space.
3. A comma is place before descriptor.

3.2.1.2 Viruses

The syntax for naming viruses at family, genus and species level is listed as follows:

1. ***Naming virus at family or genus level:***
   The family or genus name of virus is directly applied as [eHR Description]

<family/genus>

Format	Example
<family>	Herpesviridae
<genus>	Enterovirus

2. ***Naming virus at species level:***
   The virus species name is the core components for [eHR Description]. Additional information to further define the virus is classified as <descriptor>.The syntax for virus [eHR Description] is listed below:

<species> [,_<descriptor>]

Format	Example
<species>	Human adenovirus
<species> [,_<descriptor>]	Human adenovirus, type 1

Note:

1. Components in square brackets is optional.
2. An underscore indicates a space.
3. A comma is place before descriptor.
4. A slash indicates a choice is present.

3.2.1.3 Parasites:

Parasites are commonly reported with life cycle status. The life cycle status is included in the [eHR Description] when it is available. The genus and species name of parasite are the core components for [eHR Description]. The genus name is supplemented with the word "species" for parasite named at genus level. Additional information to further define the parasite is classified as <descriptor>. The syntax for parasite [eHR Description] is listed below:

<genus>_<species> [_<life cycle>] [,_<descriptor>]

Format	**Example**
<genus>_<species>	Giardia species
<genus>_<species>	Blastocystis hominis
<genus>_<species> [_<life cycle>]	Blastocystis hominis cyst

Note:

1. Components in square brackets is optional.
2. An underscore indicates a space.
3. A comma is place before descriptor.
4. A slash indicates a choice is present.

3.2.2 [eHR Description] for HKCTT Organism

1. All components are written in lower-case except genus and single character word
   e.g. Salmonella london, not Salmonella London;
   Salmonella species, group N, not Salmonella species, group n.

2. All components are written in singular tense except gram stain organism subset
   e.g. Enterococcus species;
   Gram-positive cocci, not Gram-positive coccus.

3. A hyphen is allowed to use as connector between words with the approval of eHR IS DG (Lab)
   e.g. Gram-positive cocci, not Gram positive cocci.

4. Avoid abbreviation
   e.g. Escherichia coli, not E. coli.

5. Abbreviation is used with the approval of eHR IS DG (Lab)
   e.g. Corynebacterium, CDC group F-1, not Corynebacterium, center of disease control group F-1.

6. Greek letters are always written in full
   e.g. Alpha, not α.

7. Use Arabic numerals for numbering instead of Roman numerals
   e.g. Human adenovirus 3.

8. Describe one organism in each [eHR description] except for bacterial complex
   e.g. Neisseria sicca, not Neisseria sicca/subflava.

9. Non-specific description in [eHR description] is not included
   e.g. Salmonella species, group A, not Salmonella group A (not paratyphi A).

10. Drug resistant pattern is not included except MRSA
    e.g. Escherichia coli, not Escherichia coli (ESBL producing).

11. Always provide full description of an organism
    e.g. Salmonella enterica subspecies arizonae, not Arizona group.

3.2.3 Naming Organism at Genus Level

1. Capitalize the first character of the genus
   e.g. Streptococcus, not streptococcus.

2. Spell the genus in full
   e.g. Candida, not C.

3. The genus name is supplemented with the word "species" for organism named at genus level.
   e.g. Clonorchis species, Enterococcus species

4. Genera in a multiple-species term are spelled in full with first character capitalized.
   e.g. Acinetobacter calcoaceticus-Acinetobacter baumanni complex

5. Adopt SNOMED CT preferred term for virus.
   e.g. Enterovirus

3.2.4 Naming Organism at Family Level

1. Capitalize the first character of the family
   e.g. Porphyromonadaceae

2. Adopt SNOMED CT preferred term for bacteria, fungus and virus
   e.g. Porphyromonadaceae
   Poxviridae

3.2.5 Naming Organism at Species Level

1. Use "species" instead of "sp." for a particular species or "spp." for several species
   e.g. Enterococcus species, not Enterococcus sp. or Enterococcus spp.

2. Use "subspecies" instead of "subsp." and "ss."
   e.g. Streptococcus dysgalactiae subspecies Dysgalactiae, not Streptococcus dysgalactiae subsp. dysgalactiae
   Klebsiella pneumoniae subspecies Pneumonia, not Klebsiella pneumoniae ss. Pneumonia

3. Use "variant" instead of "var."
   e.g. Trichophyton mentagrophytes variant erinacei, not Trichophyton mentagrophytes var. erinacei

3.2.6 Descriptor for organism

1. Descriptor is additional information describe an organism.

2. Descriptor includes serogroup, biotype, serovar and serotype description for bacteria
   e.g. Escherichia coli, serotypes O157:H7.

3. Descriptor includes group, type and subtype description for virus
   e.g. Human adenovirus, type 1

4. Descriptor includes attribute description
   e.g. Staphylococcus, coagulase negative, not coagulase-negative Staphylococcus

3.2.7 Naming parasite at life cycle level

1. Indication of life cycle is applied to parasite cases
   e.g. Entamoeba histolytica cyst.

4 SPECIMEN TERMS IN HKCTT

4.1 IDENTIFYING A SPECIMEN IN HKCTT

4.1.1 Patient specimens are materials collected directly from human, including, but not limited to, excreta, secreta, blood and its components, tissue and tissue fluid swabs, and body parts being transported for purposes such as diagnosis, investigational activities and disease treatment [(4).]

4.1.2 Each HKCTT specimen term is assigned with a unique [Term ID] and [HKCTT description]. Every HKCTT specimen term shall be mapped to a SNOMED CT concept from "specimen" hierarchy in the international release. There are situations where localized healthcare needs cannot be adequately catered by the SNOMED CT international release. The HKCTT organism term is then mapped to SNOMED CT Hong Kong Extension (HKSCT) which is created for local variations and customizations of terms relevant to the Hong Kong healthcare community. The details of SNOMED CT and HKSCT are described in this document in section 5.3.

4.1.3 The HKCTT descriptions of specimen terms are referenced to the preferred names of specimen concepts in SNOMED CT. The eHR IS DG (Lab) has developed a set of syntax and rules for [eHR description] of specimen to meet the requirement of the local healthcare community.

4.2 [eHR DESCRIPTION] FOR SPECIMEN

4.2.1 The specimen substance is the core component for the specimen [eHR Description]. Additional information to describe the specimen is supplemented as <modifier> or <descriptor>. The following naming convention for HKCTT specimen is applied to specimen obtained from one or multiple body site(s)

[<modifier>_] <specimen substance> [,_<descriptor>]

Example:

[<modifier>_] <specimen substance> [,_<descriptor>]	
From one body site	Dialysate fluid, pre-dialysis
From multiple sites	Axilla + Nasal swab

Note:

1. Component in square brackets is optional
2. An underscore indicates a space.
3. A comma is place before descriptor
4. A plus sign is used as connector between specimens obtained from multiple sites.

4.2.2 [eHR Description] for HKCTT Specimen:

1. First word of every component is capitalized after comma.
   e.g. Dipslide, With catheterized urine, Indwelling

2. First word of modifier is capitalized when modifier is present
   e.g. Nasal swab, Left.

3. First word of every body site is capitalized when modifier involves more than one body site
   e.g. Low vaginal + Rectal swab.

4. First word of specimen substance is capitalized when modifier is not present
   e.g. Tissue, From autopsy

5. Words are in lower-case except the first word of every component and abbreviations
   e.g. Catheter, Internal jugular, Left
   Peritoneal dialysis fluid, CAPD

6. Abbreviation is used with the approval of eHR IS DG (Lab). Approved abbreviations are listed in appendix 7.6
   e.g. CVP, not central venous pressure

7. Hyphen is used as a connector between words with the approval of eHR IS DG (Lab)
   e.g. Post-nasal swab

8. The word “sample” is preferred instead of “specimen”
   e.g Genital sample, not Genital specimen.

9. Coordination of modifier and substance provides sufficient information to define the concept of specimen
   e.g. Donor corneal rim, Left.

10. All components are in singular tense. Exceptional cases are approved by eHR IS DG (Lab)
    e.g. Contact lens

11. Coordination of specimens with same substances obtained from multiple sites is allowed for surveillance projects only.
    e.g. Axilla + Groin swab

12. Coordination of specimens with different specimen substances is not allowed.
    e.g. Nasopharyngeal aspirate + Clotted blood

4.2.3 Modifier for specimen:

1. Specimen modifier provides sufficient information to supplement the specimen substance.

2. Specimen modifier includes body structure, morphologic abnormality and sampling procedure. Terms are modified and used as noun or adjective
   e.g. High vaginal
   Cyst
   Fine needle

3. Modifier contains one or more than one word
   e.g. Nasal
   Deep wound

4. A plus sign is used as a connector for multiple body sites
   e.g. Axilla + Nasal swab

4.2.4 Specimen Substance:

1. Specimen Substance describes the physical nature of the specimen itself
   e.g. swab
   fluid
   bile

2. The use of simple and unambiguous words is approved of eHR IS DG (Lab)

4.2.5 Descriptor for specimen

1. Specimen describer provides information to further specify the specimen to refine the concept.

2. Describer includes laterality, time aspect and procedure
   e.g. Nasal swab, Left;
   Peritoneal dialysis fluid, post-dialysis,
   Peritoneal dialysis fluid, CAPD

3. The word “pre-“and “post-“are used to indicate the time aspect. The words “before” and “after” are not preferable.
   e.g. Expressed breast milk, post-cleansing, not Expressed breast milk, after cleansing.

5 ANATOMICAL PATHOLOGY TERMS IN HKCTT

5.1 IDENTIFYING AN ANATOMICAL PATHOLOGY TERM IN HKCTT

5.1.1 Anatomical pathology terms are the pathological diagnosis of the anatomical pathology results in histopathology and cytology reports. Each pathological diagnosis is composed of a body site (topography) and its diagnosis finding. For example, “Lung” is a body site and “Carcinoma” is a diagnosis finding of pathological diagnosis “Lung Carcinoma”.

5.1.2 Each HKCTT anatomical pathology term is assigned with a unique [Term ID] and [HKCTT description]. The terms are grouped under subset “Terminology for Anatomical Pathology” with 2 subset nodes:

1. Diagnosis Topography
   It contains HKCTT terms from natures “Body Structure” and “Substance” for body sites.

Subset	Subset Node	Term ID	HKCTT Description
Terminology for Anatomical Pathology	Diagnosis Topography	8003044	Lung structure

1. D

2. Diagnosis Finding
   It contains HKCTT terms from natures “Body Structure”, “Evaluation finding”, “Organism” and “Diagnosis”

Subset	Subset Node	Term ID	HKCTT Description
Terminology for Anatomical Pathology	Diagnosis Finding	8002572	Carcinoma

5.1.3 Subset "Terminology for Anatomical Pathology" is under the governance of Anatomical Pathology Working Group from Hospital Authority and eHR IS DG (Lab). Addition of new terms or inactivation of existing terms should be reviewed and authorised by group members.

5.1.4 HKCTT anatomical pathology terms shall be mapped to SNOMED CT concepts in the international release. There are situations where localized healthcare needs cannot be adequately catered by the SNOMED CT international release. The HKCTT anatomical pathology term is then mapped to SNOMED CT Hong Kong Extension (HKSCT) which is created for local variations and customizations of terms relevant to the Hong Kong healthcare community. The details of SNOMED CT and HKSCT are described in this document in section 5.3

5.1.5 The HKCTT descriptions and eHR descriptions of anatomical pathology terms are referenced to the preferred name of SNOMED CT concepts.

5.2.1 The [eHR description] for Anatomical Pathology is reference to the Preferred name of SNOMED CT. For example, "Lung" is an acceptable term for pathology reporting whereas its Full description of HKCTT of "Lung" is "Lung structure".

6 REFERENCE TERMINOLOGY

6.1 INTRODUCTION

6.1.2 SNOMED CT and LOINC are adopted as reference terminologies for laboratory terms in HKCTT. As discussed in section 1 these reference terminologies assist to define a HKCTT term and facilitate the reporting of clinical data in the eHR.

6.1.3 For laboratory data sharing in eHealth, it is important to understand the difference between tests (LOINC) and test results (SNOMED CT). LOINC provides a standard code for laboratory test that can be considered as the "question", whereas SNOMED CT provide codes that may represent "answers" for the test result. For compliance level 3 laboratory data sharing, the sharable laboratory test is mapped to a LOINC code. For example, a Urine Culture test may be a LOINC code of 630-4, which represents Bacteria identified in Urine by Culture. And the test result of the Urine Culture can be an identified bacterium: E. coli with SNOMED CT 112283007, or Term Id 5001026 of HKCTT

6.1.4 SNOMED CT provides formal definitions for its concepts in the form of a rich set of relations to other concepts. SNOMED CT is an international terminology for clinical information. It provides broad coverage of terminologies being used in clinical medicine, such as body structure, diagnosis, laboratory procedures, organisms and specimens (5).

6.1.5 The formal definitions provided by LOINC all conform to six attributes. LOINC is a specialized terminology for laboratory tests. It gives a standardized set of names and codes for identifying test results (6).

6.1.6 The HKCTT laboratory test terms are referenced to both LOINC and SNOMED CT. The integration of LOINC and SNOMED CT will be discussed in section 5.4. The HKCTT organism and specimen terms are mapped to SNOMED CT. For localized concepts that cannot be mapped to official reference terminologies, concepts are created as local extension of the corresponding terminology with identical structure. Details of LOINC and SNOMED CT local extension will be discussed in the section 5.2.5 and 5.3.3.

6.2 LOINC

6.2.1 Introduction

6.2.1.1 The terminology for Logical Observation Identifier Names and Codes, LOINC, is initiated in 1994 by Regenstrief Institute, a non-profit medical research organization associated with Indiana University. (3)

6.2.1.2 LOINC provides, creates, identifies and stores universal, unambiguous, names and ID codes for laboratory and clinical test results for data exchange.

6.2.1.3 LOINC identifies observations in electronic messages, so that when health organizations and hospitals received such messages from multiple sources, they can automatically file the results in suitable medical records, research and systems. This facilitates the interoperability of the shared data for clinical care, outcomes management and research and public health purpose.

6.2.2 Anatomy of LOINC term

6.2.2.1 A formal LOINC observation name is the fully specified name that contains six main attributes including: the name of the component or analyte measured, the property observed, the timing of the measurement, the type of sample, the scale of measurement and the method of the measurement. The definitions of the attributes are listed in table 4.

Attribute	Definition
Component/ Analyte	The substance or entity that is measured, evaluated or observed
Property	The characteristic or attribute of the analyte that is measured, evaluated or observed
Timing	The interval of time over which the observation or measurement was made
System	The specimen type upon which the observation was made
Scale	Type of scale in measurement
Method	Method of completing measurement (optional. Need if test interpretation affected)

Table 5: Definition of LOINC attributes

6.2.2.2 The syntax of the fully specified name is shown below:

<Analyte/component>:<kind of property of observation or measurement>:<time aspect>:<system (sample)>:<scale>:<method>

6.2.3 Short and Long Common Names

6.2.3.1 Short convenient names and Long Common Names are also included in LOINC observation name.

6.2.3.2 The purpose of short convenient names is to produce names of no longer than 30 characters to fit within the space allocated by most laboratory reporting system.

6.2.3.3 The goal of Long Common Name is to create user friendly names that can be used and understood in user interfaces.

6.2.3.4 Examples of LOINC Term, Short and Long Common Name:
Example 1:

LOINC Code	2951-2	
LOINC Term	Sodium:SCnc:Pt:Ser/Plas:Qn	
LONIC attributes		
1. Component / analyte	Sodium	
2. Property	SCnc	[Substance Concentration]
3. Timing	Pt	[Point in time (spot)]
4. System	Ser/Plas	[Serum or Plasma]
5. Scale	Qn	[Quantitative]
6. Method	---	
LOINC Short Name	Sodium SerPl-sCnc	
LOINC Long Common Name	Sodium [Moles/volume] in Serum or Plasma	

Example 2:

LOINC Code	29946-1	
LOINC Term	Albumin: ACnc:24H:Urine:Ord:Electrophoresis	
LONIC attributes		
a. Component / analyte	Albumin	
b. Property	ACnc	[Arbitrary Concentration]
c. Timing	24H	[24 hours]
d. System	Urine	---
e. Scale	Ord	[Ordinal]
f. Method	Electrophoresis	
LOINC Short Name	Albumin 24h Ur QlElph	
LOINC Long Common Name	Albumin [Presence] in 24 hour Urine by Electrophoresis	

Example 3:

LOINC Code	3665-7	
LOINC Term	Gentamicin^trough:Mcnc:Pt:Ser/Plas:Qn	
LONIC attributes		
a. Component / analyte	Gentamicin	
-Challenge	Trough	[TDM Trough]
b. Property	MCnc	[Mass Concentration]
c. Timing	Pt	[Point in time (spot)]
d. System	Ser/Plas	[Serum or Plasma]
e. Scale	Qn	[Quantitative]
f. Method	---	
LOINC Short Name	Gentamicin Trough SerPl-mCnc	
LOINC Long Common Name	Gentamicin [Mass/volume] in Serum or Plasma -- trough	

Example 4:

LOINC Code	634-6	
LOINC Term	Bacteria identified:Prid:XXX:Nom:Aerobic culture	
LONIC attributes		
1. Component/ analyte	Bacteria identified	
2. Property	Prid	[Presence or Identity]
3. Timing	Pt	[Point in time (spot)]
4. System	XXX	[To be specified in another part of message]
5. Scale	Nom	[Nominal]
6. Method	Aerobic culture	
LOINC Short Name	Bacteria XXX Aerobe Cult	
LOINC Long Common Name	Bacteria identified in Unspecified specimen by Aerobe culture	

6.2.4 LOINC Hong Kong Extension (HKLOINC)

6.2.4.1 The LOINC Hong Kong Extension (HKLOINC) is the local extension of LOINC, which does not exist in official LOINC database. It is created when a HKCTT laboratory test concept cannot be found in the official LOINC table.

6.2.4.2 HKLOINC concepts are maintained by the eHR Information Standards Office (eHRISO). It is designed structurally identical to the official LOINC. Each extension concept is prefixed by the letter "X" to be differentiated from official LOINC terms.

6.2.4.3 Each HKCTT laboratory concept is referenced to a concept from either official LOINC or HKLOINC.

6.2.4.4 HKLOINC concepts may be submitted to Regenstrief Institute for addition to official LOINC.

6.3 SNOMED CT

6.3.1 Introduction

6.3.1.1 SNOMED CT[5] [6] (Systematized Nomenclature of Medicine — Clinical Terms) is a controlled healthcare terminology to support patient data capture, transfer, retrieval, querying and storage in a computer readable format. SNOMED CT covers laboratory result contents, non-laboratory interventions and procedures, anatomy, diagnosis and problems, and nursing.

6.3.2 Structure of SNOMED CT

6.3.2.1 SNOMED CT is comprised of concepts, descriptions and relationships. Each concept has a concept ID with one or more human-readable descriptions, and is defined by a set of inter-relationships to other concepts. The inter-relationships link concepts with different levels of granularity to one other. The hierarchical relationships define and provide related information to specific concepts.

6.3.2.2 SNOMED CT concepts are organized into 19 hierarchies with multiple levels of granularity. Each hierarchy represents an abstract clinical classification. These hierarchies are sub-classified into second-level hierarchies (sub-hierarchies). Sub-hierarchies are again sub-classified into child concepts, and this structure continues further down the concept hierarchy until very specific concepts are reached.

6.3.3 SNOMED CT Hong Kong Extension (HKSCT)

6.3.3.1 The SNOMED CT Hong Kong Extension (HKSCT) is the local extension of SNOMED CT. It is structurally identical to official SNOMED CT. It is created when an organism or specimen concept in HKCTT cannot be found in the SNOMED CT table.

6.3.3.2 HKSCT concept is created by combining two or more existing official SNOMED CT concepts. HKSCT concepts may be submitted to the International Health Terminology Standards Development Organization for additional to SNOMED CT.

6.3.3.3 For details please refer to section 3.7 of HKCTT Editorial Policy Specific Paper — Diagnosis and Procedure.

6.3.4 Organism Hierarchy in SNOMED CT for HKCTT Organism Terms

6.3.4.1 Organisms of significance in human and animal medicine are included in the SNOMED CT organism hierarchy. The organism hierarchy in SNOMED CT is structured by establishing and defining systematic groups of organisms in a hierarchical manner that reflects the evolutionary past and present relationships among groups. SNOMED CT subdivides organism hierarchy into seven branches:

1. Microorganism (organism)
2. Life-cycle form (organism)
3. Renotrophic organism (organism)
4. Trophic life form (organism)
5. Kingdom Animalia (organism)
6. Kingdom Plantae (organism)
7. Kingdom Chromista (organism)

6.3.4.2 Concepts of bacteria, virus, fungus and parasite in HKCTT are mapped to SNOMED CT concepts in Microorganism (organism) sub-hierarchy.

6.3.4.3 Bacteria, Virus and Fungus in SNOMED CT Organism Hierarchy

Examples of bacteria, virus and fungus concepts in Microorganism (organism) sub-hierarchy are shown below:

1. Bacteria: Staphylococcus aureus

Concept ID		3092008
Description Type		
Fully Specified Name		Staphylococcus aureus (organism)
Preferred Name		Staphylococcus aureus
Synonym	**1.**	Staphylococcus pyogenesaureus
	2.	Staphylococcus pyogenescitreus
	3.	Micrococcus pyogenes var. aureus

Hierarchy

Staphylococcus, coagulase positive

- Staphylococcus aureus
  - Staphylococcus aureus ss. anaerobius
  - Staphylococcus aureus ss. aureus
  - methicillin resistant Staphylococcus aureus
    - Community associated methicillin resistant Staphylococcus aureus
    - Hospital associated methicillin resistant Staphylococcus aureus
  - glycopeptide resistant Staphylococcus aureus
    - vancomycin resistant Staphylococcus aureus
  - glycopeptide intermediate Staphylococcus aureus
    - vancomycin intermediate Staphylococcus aureus
  - glycopeptide intermediate/resistant Staphylococcus aureus
    - vancomycin intermediate/resistant Staphylococcus aureus
  - methicillin susceptible Staphylococcus aureus
- Staphylococcus intermedius
  - methicillin resistant Staphylococcus intermedius
- Staphylococcus delphini
- Staphylococcus lutrae

2. Virus: Rubella virus

Concept ID	5210005
Description Type	
Fully Specified Name	Rubella virus (organism)
Preferred Name	Rubella virus
Synonym	German measles virus

Hierarchy

Rubivirus

- Rubella virus
  - Rubella virus genotype 1B
  - Rubella virus genotype 1a
  - Rubella virus genotype 2A
  - Rubella virus genotype 1E
  - Rubella virus genotype 1g
  - Rubella virus genotype 1F
  - Rubella virus genotype 2B
  - Rubella virus genotype 2c
  - Rubella virus genotype 1C
  - Rubella virus genotype 1D

3. Fungus: Epidermophyton

Concept ID	112403007
Description Type	
Fully Specified Name	Epidermophyton (organism)
Preferred Name	Epidermophyton
Synonym	---

Hierarchy
Arthrodermataceae
• Epidermophyton
  ○ Epidermophyton floccosum
  ○ Epidermophyton stockdaleae	

4. Parasite: Acanthamoeba cyst

Concept ID	444612005
Description Type	
Fully Specified Name	Acanthamoeba cyst (organism)
Preferred Name	Acanthamoeba cyst
Synonym	---
Hierarchy Acanthamoeba cyst from of protozoa ○ Acanthamoeba cyst	

6.3.5 Specimen Hierarchy in SNOMED CT for HKCTT Specimen Terms

6.3.5.1 Concepts of materials that are removed from patients, physical locations or products are defined in SNOMED CT hierarchy "Specimen".

6.3.5.2 HKCTT specimen terms are mapped to SNOMED CT concepts in specimen hierarchy.

6.3.5.3 Five defining attributes are permitted to establish relationships between each other to define concepts in specimen hierarchy. The role of each attribute in a specimen concept is listed in table 6:

Defining Attribute	Role
1. Specimen procedure	Identifies the procedure by which a specimen is obtained
2. Specimen source topography	Specifies the body site from which a specimen is obtained
3. Specimen source morphology	Names the morphologic abnormality from which a specimen is obtained
4. Specimen substance	Names the type of substance of which a specimen is comprised
5. Specimen source identity	Names the type of individual, group, or physical location from which a specimen is collected

Table 6: Role of specimen attributes

6.3.5.4 Each defining attribute has one or more than one range of attribute values. Details of defining attributes are listed in the table 7.

Defining Attribute	Range of Allowable Value
1. Specimen procedure	Procedure
2. Specimen source topography	Anatomical or acquired body structure
3. Specimen source morphology	Morphological abnormality structure
4. Specimen substance	Substance
5. Specimen source identity	• Person
	• Family
	• Community
	• Device
	• Environment

Table 7: Approved specimen attributes summary

6.3.5.5 Multiple attributes with values are grouped to define a SNOMED CT specimen concept. Values to define specimen concept are limited to those approved attributes.

6.3.5.6 Specimen Concepts in Specimen Hierarchy

Examples of specimen concepts in Specimen hierarchy are shown below:
Example 1

Concept ID	258574006
Description Type	
Fully Specified Name	mid-stream urine sample (specimen)
Preferred Name	mid-stream urine sample
Synonym	MSU - Mid-stream urine sample
Definition	

• is a
  ○ urine specimen
 	
• Group
 	
  ○ specimen source topography
  ▪ structure of urinary tract proper
 	
  ○ specimen procedure
  ▪ collection of mid-stream specimen of urine
 	
  ○ specimen substance
  ▪ urine	

Hierarchy	
• urine specimen ○ mid-stream urine sample	

Example 2

Concept ID	258453008
Description Type	
Fully Specified Name	cyst fluid sample (specimen)
Preferred Name	cyst fluid sample
Definition	

• is a
  ○ specimen from cyst
 	
• is a
  ○ body fluid sample
 	
• Group
 	
  ○ specimen source morphology
  ▪ cyst
 	
  ○ specimen substance
  ▪ body fluid	

Hierarchy	

specimen from cyst
 	
• cyst tissue
• cyst fluid sample
  ○ breast cyst fluid sample
  ○ thyroid cyst fluid sample
  ○ fluid specimen from spermatocele
  ○ fluid specimen from sebaceous cyst
  ○ fluid specimen from Bartholin gland cyst
  ○ fluid specimen from mucocele of lacrimal sac
• skin cyst sample
• ovarian cyst sample
• ganglion cyst specimen	

6.3.5.7 Post-coordination of Specimen Concept

When a HKCTT specimen term cannot be found in official SNOMED CT, a HKSCT concept will be created. The HKSCT specimen concept is created structurally identical to the specimen concept from official SNOMED CT attributes Allowable values are grouped to define a new specimen concept.
For example, a concept of "Deep wound swab" is not available in official SNOMED CT. It is created as HKSCT concept by post-coordination.

Concept ID	57001131000114109
Description Type	
Fully Specified Name	Deep wound swab (specimen)
Preferred Name	Deep wound swab
Definition	

• Is a
  ○ specimen from wound
• Is a
  ○ Swab
 	
• Group
  ○ specimen source morphology
  ▪ deep wound
 	
  ○ specimen procedure
  ▪ taking of swab	

6.3.6 Hierarchies in SNOMED CT for HKCTT Anatomical Pathology Terms

6.3.6.1 SNOMED CT concepts about pathological diagnosis including the body sites and the diagnosis finding are defined in multiple SNOMED CT hierarchies.

6.3.6.2 HKCTT Anatomical pathology terms in the nodes of subset "Terminology for Anatomical Pathology" are mapped to SNOMED CT concepts in the following SNOMED CT hierarchies:

Subset Node	SNOMED CT hierarchy
Diagnosis Topography	• All Sub-hierarchies in body structure hierarchy* EXCEPT the sub-hierarchy "Morphologically altered structure" • Substance hierarchy
Diagnosis Finding	• sub-hierarchy "Morphologically altered structure" of body structure hierarchy • Organism hierarchy • Clinical finding hierarchy

6.3.6.3 For the subset of "Terminology for Anatomical Pathology", SNOMED CT relationships provide the subsumption for the parent concepts for Body structure. The body structure domain includes anatomical structures, as well as morphologic abnormalities, as follows:

* Sub-hierarchies in Body structure hierarchy:

1. Body structure (body structure)

    1. Anatomical or acquired body structure (body structure)
    2. Anatomical organizational pattern (body structure)
    3. Anatomical site notations for tumor staging (body structure)
    4. Body structure, altered from its original anatomical structure (morphologic abnormality)
    5. Nonspecific site (body structure)
    6. Normal anatomy (body structure)
    7. Topography not assigned (body structure)
    8. Topography unknown (body structure)

6.3.6.4 SNOMED CT concepts for Diagnosis Topography

1. **Example of concept in body structure hierarchy**

Concept ID	39607008
Description Type	
Fully Specified Name	Lung structure (body structure)
Preferred Name	Lung structure
Synonym	Lung
Definition	

• Is a
  ○ Structure of thoracic viscus (body structure)
• Is a
  ○ Lower respiratory tract structure (body structure)
• Is a
  ○ Pulmonary structure including vessels and lymphoid tissue (body structure)
• Is a
  ○ Structure of pulmopleural compartment (body structure)	

2. **Example of concept in substance hierarchy**

Concept ID	65216001
Description Type	
Fully Specified Name	Cerebrospinal fluid (substance)
Preferred Name	Cerebrospinal fluid
Synonym	CSF - Cerebrospinal fluid Spinal fluid
Definition	
• Is a ○ Body fluid (substance)	

6.3.6.5 SNOMED CT concepts for Diagnosis Finding

1. **Example of concept in sub-hierarchy "Morphologically altered structure" of body structure hierarchy**

Concept ID	68453008
Description Type	
Fully Specified Name	Carcinoma, no subtype (morphologic abnormality)
Preferred Name	Carcinoma
Synonym	Epithelial tumor, malignant Malignant epithelial tumor
Definition	

• Is a
  ○ Malignant neoplasm, primary (morphologic abnormality)
• Is a
  ○ Malignant epithelial neoplasm - category (morphologic abnormality)	

2. **Example of concept in Organism hierarchy**

Concept ID	23496000
Description Type	
Fully Specified Name	Fungus (organism)
Preferred Name	Fungus
Synonym	Fungi Mycete
Definition	
• Is a ○ Microorganism (organism)	

3. Example of concept in Clinical finding hierarchy

Concept ID	253002004
Description Type	
Fully Specified Name	Carcinoid tumor of appendix (disorder)
Preferred Name	Carcinoid tumor of appendix
Synonym	Carcinoid of appendix
Definition	

• Is a
  ○ Carcinoid tumor of large intestine (disorder)
• Is a
  ○ Neuroendocrine neoplasm of appendix (disorder)
• Finding site
  ○ Appendix structure (body structure)
• Associated morphology
  ○ Carcinoid tumor - morphology (morphologic abnormality)	

6.4 COMBINED USE OF SNOMED CT AND LOINC

6.4.1 SNOMED CT is a comprehensive clinical terminology. It provides a large coverage of the domain of clinical medicine and often overlaps specialized terminologies. It is the reference terminology to bridge between specialized terminologies of different domains in HKCTT.

6.4.2 The LOINC laboratory test concept with every HKCTT term is mapped to pre-coordinated SNOMED CT concepts based on shared relations. It is initially based on the sample files given by the International Health Terminology Standards Development Organization (IHTSDO). The harmonization of the two reference terminologies were prepared according to the style of sample files.

6.4.3 The SNOMED CT — LOINC Integration provides a mechanism that reflects the complementary relationship between LOINC and SNOMED CT. This integration yields formally defined appropriately classified laboratory terms that can be implemented in the design of robust laboratory analysis applications [(6)].

6.4.4 The combine use of LOINC terms to the SNOMED CT hierarchy and concepts can provide an inferred hierarchy for LOINC terms, Some of these benefits were described by Adamusiak and Bodenreider [(8)], including SNOMED CT concepts for micro-organisms are widely used in laboratory area for reporting Microbiology results. Linkage to related LOINC codes (laboratory tests) provides an integrated information model for data analysis.

6.4.5 As mentioned in chapter 5.2.2, each LOINC code is defined by six main attributes including the analyte measurement, the property observed, the time aspect involved, the sample or system type, the scale of measurement, and where relevant the method of measurement.

6.4.6 SNOMED CT concepts are explicitly represented in a multi-hierarchical structure. Each of the six distinguishing attributes of a given LOINC code have their linkage concepts in SNOMED CT hierarchy. For example, the attribute [component] in LOINC is equivalent to |has measured component| in SNOMED CT. The Integration of SNOMED CT and LOINC are listed in table 8.

Defined six attributes in LOINC code	Corresponding relationship type in SNOMED CT hierarchy
Component	has measured component
Property	has property
Time aspect	has time aspect
System	has specimen
Scale type	has scale type
Method type	has Method

Table 8: The correspondence between relationships in LOINC and SNOMED

6.4.7 An example shows how LOINC code 5792-7 is defined in the integrated SNOMED CT hierarchy in table 9.

LOINC code		5792-7		
LOINC Long Common Name		Glucose [Mass/volume] in Urine by Test strip		
LOINC		**SNOMED**		
Attributes	**Value**	**Relationship Type in SNOMED CT**	**Concept ID**	**Value**
Component	Glucose	**has measured component**	67079006	glucose (substance)
Property	Mass concentration	**has property**	118539007	mass concentration (property) (qualifier value)
Time aspect	Point in time (spot)	**has time aspect**	123029007	single point in time (qualifier value)
System	Urine	**has specimen**	122575003	urine specimen (specimen)
Scale type	Quantitative	**has scale type**	30766002	quantitative (qualifier value)
Method type	Test strip	**has Method**	117021008	test strip method (procedure)
		is a	69376001	urinalysis, glucose, qualitative (procedure)

Table 9: example of SNOMED CT - LOINC integration

7. APPENDIX

7.1 eHR INFORMATION STANDARDS DOMAIN GROUP ON LABORATORY RECORD (eHR IS DG (LAB))

7.1.1 Background

eHR IS DG (Lab) was established in 2011 to provide advice on the formulation of strategies to develop information standards on laboratory record to facilitate the sharing of laboratory data to the eHR. Members are healthcare stakeholders from public and private sectors.

7.1.2 Terms of Reference:

1. To develop and refine the standard dataset for laboratory orders and results
2. To define the scope of laboratory terminology table
3. To define requirements of the standard laboratory terminology
4. To develop and refine standard laboratory terminology with reference to international terminology
5. To provide oversight for management of the laboratory terminology
6. To develop, endorse and maintain the editorial policy for laboratory terminology table
7. To identify implementation issues and propose solutions
8. To report to eHRIS Co-ordination Group (eHR IS CG)

7.1.3 Membership:

Organization	Name
Hospital Authority	Dr K C LEE (Chairman)
Health Bureau	Mr Tony LEUNG
Health Bureau	Mr Ivy NG
Department of Health	Dr Allen Chi-wai CHAN
Department of Health (CHP)	Dr Wai Kit YEUNG
Department of Health	Dr Kwok Kwan JONG
Hong Kong Medical Association	Dr Chung Ping HO
Hong Kong College of Pathologists	Dr Kui Fat CHAN
Hong Kong Association of Medical Laboratories	Ms Marianne LEUNG
Hong Kong Private Hospital Association	Mr Gary CHU
Hong Kong Institute of Medical Laboratory Sciences	Mr Chi Lim KWOK
Hong Kong Association of Medical Laboratory Hong Kong Institute of Medical Laboratory Science	Mr Alex LI
HAITS- LIS Project Team	Mr Jackie CHAN
eHR PMO	Mr Hudson CHAN
eHR PMO	Mr Eric WONG
eHR ISO	Senior Health Informatician (S&P)
eHR ISO	Mr John MOK

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