PS4 (Project Sprint 4) - Final Project Proposal

Group 3 - Data Moguls

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INTRODUCTION

In the digital age, standardized terminologies in the healthcare sector are becoming highly significant. The use of medical data in ancillary activities including research, case study analysis and public health can be improved by standardizing medical terminology and implementing structured reporting and this can significantly impact patient healthcare as well (Awaysheh et al., 2018). It is important to work towards making the medical documentation and electronic medical records easier to understand and enhancing the quality of their content by making use of fundamental informatics technologies and tools to make sure reporting of necessary aspects in order to enhance the interoperability of the health data across various systems and to standardize health care delivery amongst the physicians so as to enhance the quality of patient care (Awaysheh et al., 2018). Adoption of standardized terminology would result in consistent nomenclature that would be shared among healthcare professionals, improving patient care. It would aid healthcare professionals and organizations in exchanging health-related information.

We have selected the Use Case B: Clinician to lab - orders from EHR to be generated as a lab worklist item. Although various terminologies may be employed for Use Case B, we have chosen three terminologies, SNOMED-CT, LOINC, and ICD-10 to compare in order to determine which

would be ideal for a better exchange of healthcare data in the current case scenario and the clinical concepts for this case include signs and symptoms, diagnosis, and laboratory findings.

"SNOMED CT is one of a suite of designated standards for use in the U.S. Federal Government systems for the electronic exchange of clinical health information and is also a required standard in interoperability specifications" (National Library of Medicine, 2019). "LOINC is a common language (set of identifiers, names, and codes) for identifying health measurements, observations, and documents" (LOINC from Regenstrief, n.d.). "The International Classification of Diseases (ICD) is a system of diagnostic codes for classifying morbidity due to diseases, external causes of injury, signs, and symptoms, and abnormal findings" (Uysal, 2019). Current Procedural Terminology (CPT) is combined with ICD-10-CM to report diagnostic tests during the computerized medical billing process (Lee, 2015).

Project Deliverables

Use case selection and details: Careful and thorough examination of the use case, cataloging of clinical concepts, recording of specific codes and term descriptions, and selection of proper and suitable terminologies supported by appropriate reasoning and sound logic.

Problem Analysis & Modelling: Building UML class diagrams and BPMN diagrams with annotations, descriptions of the different forms of interoperability indicated in the models, and lists of significant data components that aren't modeled.

CDA Entry Mockups: Selection of two appropriate events and performing two CDA entry mockups for the events.

Final Project Proposal: Improvements, corrections, and modifications of previously submitted work, along with development of new sections and construction of an organized and well-structured project proposal.

Project Terminologies Presentation: Summarizing the clinical use case and detailing the terminologies chosen and discussing the inherent downsides of terminologies and recommendations and lessons learned.

USE CASE & TERMINOLOGIES

Case Summary:

- Age: 18 years
- Gender: Female
- Patient's chief complaint:
    - Generalized weakness
    - Lethargy
    - Inability to perform daily activities
- Other signs and symptoms:
    - Excessive menstrual bleeding for six months
    - Breathlessness & Palpitations while climbing stairs
    - Lightheadedness
    - Leg cramps
    - Desire to crunch on ice
    - Reduced appetite
    - No fear/ abdominal discomfort/ drug intake
- Clinical features on examination:

    - Tachycardia
    - Pale gums & nail beds
    - Swollen tongue
- Provisional Diagnosis:
    - Anemia
- Laboratory order:
    - Blood sample

Various Terminology Codes for the Given Scenario

Signs & Symptoms

	ICD-10 CODE	**LOINC CODE**	**SNOMED-CT CODE**
Generalized weakness	Muscle Weakness (generalized) **M62.81**	Muscle atrophy or weakness **66669-3**	Muscle weakness **26544005**
Lethargy	Other Fatigue **R53. 83**	Fatigue **28100-6**	Fatigue (finding) **84229001**
Inability to do the work	Limitation of activities due to disability **Z73. 6**	-	Disability (finding) **21134002**
Excessive bleeding during menstruation	Excessive and frequent menstruation with regular cycle **N92. 0**	Menorrhagia **336572**	Menorrhagia **386692008**
Breathlessness	Shortness of breath **R06. 02**	Shortness of breath **54564-0**	Dyspnea **267036007**
Palpitations	Palpitations **R00. 2**	Heart rate Peripheral artery by palpation **8893-0**	Palpitations **80313002**
Light-headedness	Dizziness and Giddiness **R42**	Dizziness or vertigo **45699-6**	Dizziness **404640003**
Cramping in the legs	Cramp and spasm **R25. 2**	Muscle cramps in legs or feet **66093-6**	Muscle pain **68962001**
Appetite decreased	Anorexia **R63.0**	Decreased appetite [DI-PAD] **65961-5**	Loss of appetite **79890006**
Tachycardia	Tachycardia, unspecified **R00.0**	Sinus Trachycardia **9901049**	Tachycardia **3424008**
Pale gums			Gingivae finding **249410009**

Nail beds	Nail disorder, unspecified **L60.9**	Color of Nail bed **39131-8**	Infection of nail **238408000**
Swollen tongue	Localized swelling, mass and lump, head **R22. 0**	Edema **44966-0**	Tongue swelling **421262002**

Based on the evaluation of the various ontologies presented above, it has been determined that SNOMED-CT is the best terminology for usage in case of signs and symptoms. SNOMED's use in electronic rather than paper-based, which provides interoperability. According to Gaudet-Blavignac et al. (2021), SNOMED CT is currently regarded as the world's best comprehensive, multilingual medical health care terminology, which has numerous concepts and relations. "The basic elements of SNOMED-CT are comprised of concepts, descriptions, attributes, relationships, and hierarchies or organizations of concepts" (Bowman, n.d.). Due to a large number of codes for the signs and symptoms, the SNOMED offers numerous possibilities for choosing a code for each symptom. According to Mason (n.d.), the regulated emphasis on clinical concepts and multi-axial framework of SNOMED CT makes it more effective than ICD-10 for clinical representations.

SNOMED CT is the ideal terminology to utilize as it is a regulated vocabulary that is clinically proven, semantically rich, and allows for evolutionary expansion to meet new guidelines. Further, Synonyms and modifiers in the SNOMED CT are used to improve the system's ability to accurately represent the code. For instance, for coding the chest pain they are 40 unique concepts in SNOMED-CT whereas all types of chest pain are coded in the ICD-10-CM classification (Bowman, n.d.). From the above table, we can see that each sign and symptom in SNOMED-CT has a specific code, whereas LOINC and the ICD-10 do not have specific codes for specific indicators and instead group them into general classes. For instance, the SNOMED-CT has a separate code for dizziness or lightheadedness, although the ICD-10 uses the R42 code for both

dizziness and giddiness, and the LOINC uses the 45699-6 code for dizziness or vertigo. Therefore, SNOMED-CT makes it simple for the healthcare professional to differentiate between the signs and symptoms. The hierarchical structure of SNOMED-CT allows data to be stored at varying degrees of detail to suit different requirements, enabling precise and focused access to pertinent details.

Laboratory Findings

	ICD-10 CODE	**LOINC CODE**	**SNOMED-CT CODE**	**CPT**
Blood Test	Encounter for screening for diseases of the blood **Z13. 0**.	CBC panel - Blood by Automated count **58410-2**	Blood specimen **119297000**	Blood count, complete (CBC) **85025, 85027, 85004**
Iron level		Iron panel - Serum or Plasma **75689-0**		Serum Iron **82728, 83540, 83550, 84466**
Ferritin Levels		Ferritin [Mass/volume] in Serum or Plasma **2276-4**	Ferritin measurement **489004**	Ferritin measurement **83540, 84466, 82728**

Diagnosis

In the case of laboratory tests, the LOINC is the best standard to be used. "LOINC codes provide a standard way to represent the lab test data so that the information can be shared and analyzed at a global level" (Jason, 2020). There are two components for LOINC, which help in coding the values accurately. Laboratory LOINC and Clinical LOINC are the two fundamental parts of the LOINC terminology. In contrast to clinical LOINC, which covers a variety of non-lab components, including ECG and heart echo, laboratory LOINC includes microbial testing and laboratory tests. (LOINC, 2022). LOINC only encodes the semantics of a clinical observation, which can often be expressed using a single LOINC code (Semler, 2019). In the case of CPT, codes may be applied to bills. LOINC codes are more specific than CPT codes, and one LOINC code may be linked to numerous CPT codes. "LOINC codes' ability to improve laboratory results' interoperability has been recognized broadly" (Uchegbu & Jing, 2017). LOINC provides semantic interoperability as each part of the code has a distinct identifier, making it easier to analyze the results. The LOINC codes are used to convey the same meaning, making it easier to notify information and reducing report duplication, ultimately improving the patients' healthcare (Uchegbu & Jing, 2017). Further, "LOINC is used to specify the question (e.g., 29308-4: "what is the diagnosis?"), and SNOMED CT to specify the answer (e.g., 3723001: "Arthritis")" (Bodenreider et al., 2018).

	ICD-10 CODE	**LOINC CODE**	**SNOMED-CT CODE**
Anemic	Anemia, Unspecified **D64. 9**	Anemia **45676-4**	Anaemia **271737000**

In the case of units of measurement, UCUM can be used. "The Unified Code for Units of Measure (UCUM) is a code system intended to include all units of measures being contemporarily used in international science, engineering, and business" (National Library of Medicine, 2019). The objective is to promote clear electronic communication of quantities and their units, and numerous international organizations, like LOINC and HL7, have embraced UCUM (National Library of Medicine, 2019).

TERMS

S. No	Ref Term Code	Ref Term Description	Rationale/Notes
1	26544005	Muscle weakness (generalized)	• Word “Muscle weakness” in the term. Semantic tag contains finding. • Term description for the Parent ID contained the term which clearly states that this is a finding of power of skeletal muscle.
2	84229001	Fatigue (finding)	• Semantic tag contains finding. The term descriptions includes that it is an energy and stamina finding. From the term descriptions we can assess that this is a general problem and/or complaint. • SCT Interprets include Energy / stamina. SNOMED hierarchical child of 359752005 (and stamina finding).
3	21134002	Disability (finding)	• Contains text “Disability” in the term, Semantic tag is finding, SCT Interprets include General clinical state. The term

			describes Disability but not anything else (e.g., event or specialty). • The term descriptions includes that it is a Body disability and/or failure state.
4	386692008	Menorrhagia	• The term description of the Parent ID includes finding of quantity of menstrual blood loss from which we can infer that it's female related problem. • The term describes that it is an excessive and frequent menstruation, and the semantic tag is finding.
5	267036007	Dyspnea	• The term description for the Parent ID includes Difficulty breathing, which indicates that it is a finding related to breathing. • Semantic tag contains finding. Aliases include Breathlessness, Shortness of breath, Dyspnea (finding).
6	80313002	Palpitations	• SNOMED hierarchical child of 366182005 (Finding related to awareness of heartbeat). • SCT Finding site includes Heart structure. The Semantic tag includes finding. SCT Interprets include awareness of heartbeat, SCT is associated finding include history of palpitations and no palpitations.

7	249410009	Gingivae finding	• SNOMED hierarchical parent are 248402002 (General finding of soft tissue) and 116337000 (Oral cavity finding). • SCT Finding site is Gingival structure and the Semantic Tag include finding.
8	119297000	Blood specimen	• The Semantic Tag include specimen which implies this is a laboratory testing. • SNOMED hierarchical parent is 123038009 (Specimen) and Alias include Blood sample.
9	489004	Ferritin measurement	• The Semantic Tag includes procedure. SNOMED hierarchical child of 74040009 (Protein measurement). • SCT Component, SCT in interprets, SCT Method includes Ferritin, Ferritin level low and Measurement – action respectively.
10	271737000	Anemia	• Word "Disorder of cellular component of blood" in the term description. • Semantic tag contains disorder. From the term descriptions we can assess that this disorder that is related to blood.

We have compared SNOMED-CT, LOINC, and ICD-10 terminology for the provided case situation. The specific codes ultimately determine that SNOMED-CT is the best standard terminology for the signs and symptoms. It facilitates precise and focused access to pertinent information, lowering errors. Additionally, SNOMED CT gives clinical terms the many levels of

specificity that healthcare professionals need. SNOMED-CT can also be utilized for diagnosis, and it offers a definitive diagnosis or the solution to the observed findings. LOINC is the optimal terminology for referring to laboratory findings since it allows for aggregated laboratory result data to be compared and analyzed. It supports all frequently performed lab tests as well as most tests carried out in specialty fields. Finally, SNOMED-CT is appropriate for the case's signs, symptoms, and diagnosis, whereas LOINC with the UCUM is ideal for the case's laboratory data.

BPMN STEPS/UML RELATIONS

UML relations and Interoperability:

The patient consults the provider. The provider would analyze the patient and order laboratory tests. After the test results are out. The diagnosis would be made by checking the results and discussing them with the healthcare team by the provider.

Syntactic Interoperability

Syntactic interoperability enables data transmission and communication between two or more systems, but the interface and programming languages must be compatible. Any interoperability solution's design needs to take this into account and account for it in order to be effective. the level of detail in the data being conveyed. Depending on the circumstance and necessity, the message's content may be distinct and permitted to differ. The ability to transfer different and original kinds of information is its most crucial feature. As information is sent from the physician to the lab, back from the lab to the clinician, and further added to the electronic health record, encouraging syntactic interoperability, communication between the clinician and laboratory technician is crucial in our model. As the transfer of data is very important in this case which may be very helpful for the physician to make the clinical decisions, syntactic interoperability has been

achieved, and standards have been fulfilled. In syntactic interoperability, the content of the message can be unique and is allowed to be different based on the Case and necessity. The most important point is that it provides the flexibility to transfer varied and unique types of information. In our model, the communication between the physician and the laboratory technician is important, as the information is transferred from the physician to the lab, and again the information is returned from the lab to the clinician, which then further is added to the Electronic Health Record, promoting syntactic interoperability.

Organizational Interoperability:

Organizational interoperability refers to how many organizations work together to accomplish their shared e-government objectives. For the delivery of integrated government services, concerned organizations require a detailed agreement on collaboration and synchronization of their business operations. It is focused on the cross-border cooperation of organizations like public administrations. Aligning corporate processes and establishing clearly defined organizational links are examples of this. Interoperability within and between businesses makes it easier to share and use data in a timely, secure, and efficient manner. Organizational interoperability includes capturing, synchronizing, and coordinating corporate operations as well as communicating essential information. Organizational interoperability is necessary for this situation at all stages, including the one during which patient data is gathered and synchronized in electronic health records. This would help understand the patient in detail, such as knowing the patient's prior medical history if it were included earlier in the EHR. It is also crucial when giving the lab instructions and giving the practitioner the results. The clinician and laboratory technician should maintain timely and effective communication in order to optimize treatment for better patient outcomes. Organizational interoperability facilitates timely, secure, and effective data sharing and

usage both within and between organizations. Capturing, synchronizing, and coordinating business operations and exchanging pertinent information are all aspects of organizational interoperability. In this case, organizational interoperability is required at every stage, including the stage at which patient information is captured and synchronized in electronic health records. If this was put earlier in the EHR, it would help comprehend the patient in detail, such as knowing the patient's previous medical history. It is also essential when submitting orders to the lab and returning results to the practitioner. Since to improve patient outcomes, the clinician and laboratory technician should maintain timely and efficient communication.

BPMN relation and Interoperability:

Business Process Model and Notation is referred to as BPMN. Using predetermined symbols and components is a useful approach to depict how a process moves from beginning to conclusion. The process flow and the purpose and objects involved are all expressed in broad terms. Recently, BPMN has emerged as the de facto standard for communicating business processes to stakeholders and providing a clear understanding of the technical aspects of the processes. The highest level of interoperability, known as semantic interoperability, requires that information be understood and used in order to achieve objectives like improved patient safety, better patient safety, and the ability of doctors to make decisions based on the available evidence. Semantic interoperability is demonstrated by health information exchanges and public health data collection methods. Public medical technologies employ risk scores, which are forecasts of many clinical sample points to determine, for instance, how likely it is that a patient will be permitted to return to a hospital in the near future.

Initial clinical data collection was watched, and subsequent testing was suspected based on symptoms and reports. Patient-centered, real-time records now contain data on the patient's

medical history, diagnosis, prescriptions, immunization history, allergies, radiological pictures, and lab and test results.

Our group also identified the following crucial aspects of the case study that were not represented in the diagram:

Through an ultrasound scan, we must look for thyroid enlargement and should be able to determine if it is hypo- or hyperthyroidism. Heart failure signs brought on by blood loss. To ensure that the heart is operating properly, a 2D ECHO scan should be performed. The patient's laboratory results are correctly and accurately entered in the EHR. A follow-up should be done on physician consultation after patient information was recorded in EHRs. There was no mention of the patient counseling process. Using sterile needles to draw blood and more advanced testing equipment. If anemia is severe, a medical procedure may be chosen, including blood transfusions and bone marrow stem cell transplants. In order to assess other characteristics (symptoms) related to hypo- and hyperthyroidism, we must ask for them. The treatment plan should be created that is appropriate.

Semantic Interoperability:

Semantic interoperability is the ability of computer systems to exchange data with clear, common interpretations. Semantic interoperability establishes a consistent meaning for various people regardless of the system the healthcare professional is working in. Semantic interoperability is the highest level of interoperability which helps increase patient outcomes through the ability of clinicians to make decisions on that data. “Semantic interoperability (SI) aims to share data among organizations or systems and ensure they understand and interpret data regardless of who is involved, using domain concepts, context knowledge, and formal data representation” (De Mello

et al., 2022, p. 255). In this case, the clinician would send the orders to the laboratory to perform specific tests, which means that the provider would send the codes and terminologies for the test that must be performed. After the laboratory tests are performed, the tests are then entered into the electronic health records (EHR) by the laboratory technician. Since the semantic level enables one to deal with terminologies, vocabularies, and standardized values openly and creates a complete understanding, semantic interoperability would be used in these two places.

Process Interoperability:

Process interoperability refers to having "seamless communication between different healthcare systems by developing a shared understanding of their process artifacts" (Khan et al., 2013, p. 838). With the process interoperability, communication of the patient's information is possible between the sender and the receiver, where in our case, the information is transmitted from the clinician to the laboratory, which is further referred to as the "application role". Another event is "interactions" in process interoperability, referring to "trigger events," which describe the transfer and the flow process between the physician and the lab person (Khan et al., 2013, p.838).

The data elements and the situations that are significant but not modeled in this case include

- All laboratory tests and values evaluated for this specific case.
- Following the physician consultation, if the patient's complete information had been recorded in the electronic health record (EHR).
- Delivering a patient's test findings on a timely basis to the appropriate clinician
- The reference range that is needed to make predictions about the diagnosis
- Results that are above or below the reference range might be highlighted for simple assessment when delivering the test information to the provider.

- Information on the orders from the provider has been received by the appropriate laboratory technician.
- Data elements such as adding a patient and choosing the appropriate physician for a patient were not considered in the case.
- The patient's laboratory results are correctly and accurately entered in the EHR.
- The tests were properly carried out, including using sterile syringes to collect blood and the proper equipment to analyze the findings.

CONCLUSION

To summarize, our paper explained in detail the effective various terminologies/ontologies in healthcare, along with providing knowledge on which is the better terminology for exchanging healthcare information. After analyzing the three different modes of terminology, we felt that the SNOMED CT was more useful in better diagnosis, communication of clinical errors, and minimizing the errors within the diagnosis when compared to ICD10 and LOINC. Model diagrams such as UML and BPMN were used to represent the pathway of how the information would be transferred from the patient to the laboratory technician for appropriate diagnosis and then based on the lab results, how the information is retransmitted to the physician to make any further diagnostic modifications. The kind of interoperability used for the transport of health-related information through the UML was the syntactic and organizational interoperability, while the kind of interoperability used within the BPML model was the process and semantic kind of interoperability. Later in this paper, we discussed the HL7's Clinical Document Architecture, featuring and using an extensible Markup Language mentioning the way in which a clinical case can be presented using this language format, by promoting and assisting to encourage sematic interoperability.

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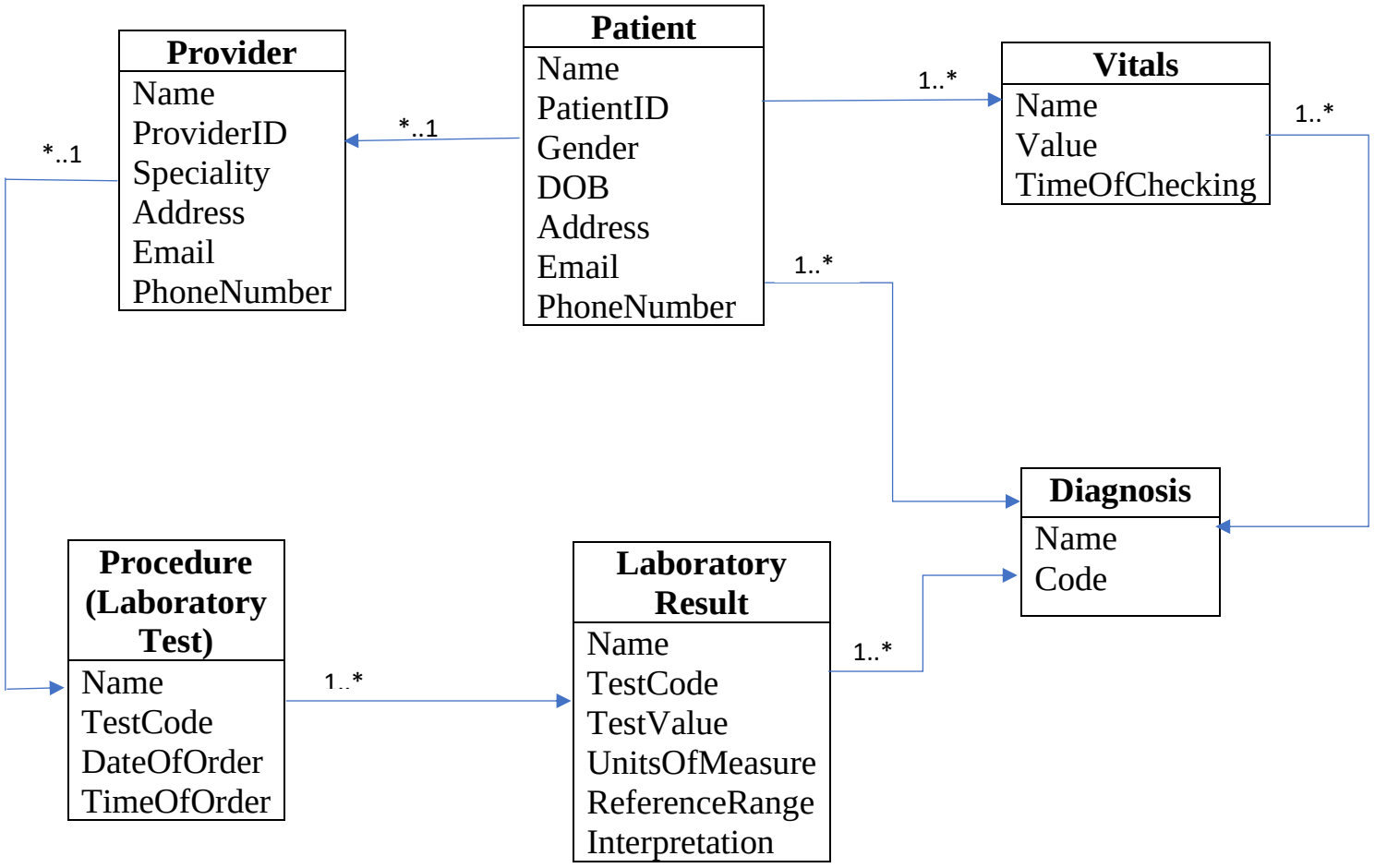
Appendix 1: BPMN and UML Diagrams

a. Use Case B: UML diagram of Clinician to Laboratory



Definitions:

TestCode: TestCode refers to specific code for the laboratory test.

Code: Code provides the diagnosis's relevant terminology code.

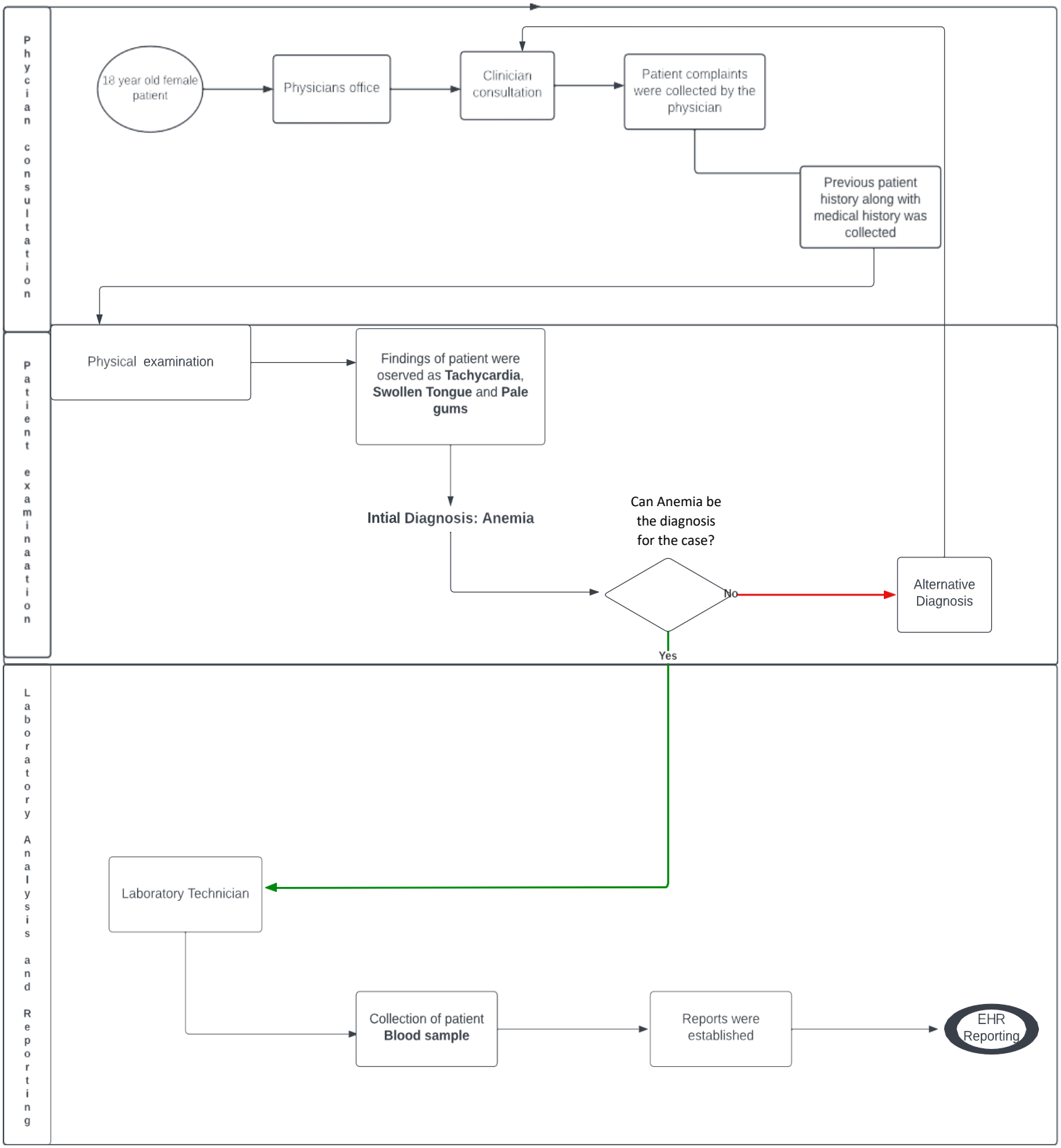
ProviderID: ProviderID includes the unique ID number given to the healthcare professionals.

PatientID: PatientID contains the special number assigned to each patient.

Notes:

The patient visits the provider. The provider would then analyze the patients and order laboratory tests. Once the test results were obtained, the diagnosis would be made.

b. Use Case B: BPMN diagram of Clinician to Laboratory



Notes: The patient visits the physician's office and gets a consultation; based on the patient's chief complaints and history, a physical examination is performed for all the signs and symptoms. If the relevant disease symptoms are present, the clinician will diagnose the case as Anemic and will proceed further with the laboratory tests and results. If that is not possible alternative diagnosis is made. After the lab findings were determined, the results would be entered into the EHR.

Appendix 2: CDA mockups

a. Patient complained about the <u>Breathlessness</u> while climbing stairs for her house

```
<!--   Patient complained about the Breathlessness while climbing stairs for her house   -->
▼<entry>
 ▼<act classCode="ACT" moodCode="EVN">
    <templateId root="2.16.840.1.113883.10.20.22.4.3"/>
    <templateId root="2.16.840.1.113883.10.20.22.4.3" extension="2015-08-01"/>
    <id root="102ca2e9-884c-4523-a2b4-1b6c3469c397"/>
    <code code="CONC" codeSystem="2.16.840.1.113883.5.6"/>
    <!--   Since this is an active problem, the concern status is active.   -->
    <!--   While clinicians can track resolved problems, generally active problems will have active concern status and resolved concerns will be completed   -->
    <statusCode code="active"/>
   ▼<effectiveTime>
      <!--   This equates to the time the concern was authored in the patient's chart. This may frequently be an EHR timestamp   -->
      <!--   EffectiveTime modified   -->
      <low value="20220711124536-0500"/>
    </effectiveTime>
   ▼<entryRelationship typeCode="SUBJ">
     ▼<observation classCode="OBS" moodCode="EVN">
        <templateId root="2.16.840.1.113883.10.20.22.4.4"/>
        <templateId root="2.16.840.1.113883.10.20.22.4.4" extension="2015-08-01"/>
        <id extension="10241104348" root="1.3.6.1.4.1.22812.4.111.0.4.1.2.1"/>
        <!--    code and diplayName altered accordingly    -->
       ▼<code code="267036007" displayName="Dyspnea" codeSystem="2.16.840.1.113883.6.96" codeSystemName="SNOMED CT">
          <translation code="54564-0" codeSystem="2.16.840.1.113883.6.1" codeSystemName="LOINC" displayName="Shortness of breath"/>
        </code>
       ▼<author>
          <templateId root="2.16.840.1.113883.10.20.22.4.119"/>
          <!--   Time value altered   -->
          <time value="20221107124536"/>
         ▼<assignedAuthor>
            <id extension="66666" root="2.16.840.1.113883.4.6"/>
            <code code="207RC0000X" codeSystem="2.16.840.1.113883.6.101" codeSystemName="NUCC" displayName="Cardiovascular Disease"/>
```

b. Physician suspected that the patient was anemic and ordered a sample of her blood for examination <u>(Blood Test Procedure)</u>

```
<!--   Physician suspected that the patient was anemic and ordered a sample of her blood for examination.    -->
<entry xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" typeCode="DRIV">
  <!--   Observations should be used for care that result in information about the patient (e.g. a diagnostic test & result) but do not alter physical state  -->
  <observation classCode="OBS" moodCode="EVN">
    <templateId root="2.16.840.1.113883.10.20.22.4.13"/>
    <templateId root="2.16.840.1.113883.10.20.22.4.13" extension="2014-06-09"/>
    <id root="c03e5445-af1b-4911-a419-e2782f21448c"/>
    <!--   Code and displayName were altered in response to the test   -->
    <code code="396550006" codeSystem="2.16.840.1.113883.6.96" displayName="Blood test" codeSystemName="SNOMED-CT">
      <originalText>
        <reference value="#ProcedureDesc2"/>
      </originalText>
      <!--   translation code, displayName, codeSystemName changed accordingly.   -->
      <translation code="85027" codeSystem="2.16.840.1.113883.6.12" displayName="Complete Blood Count(CBC) with Differential" codeSystemName="CPT"/>
      <translation code="58410-2" codeSystem="2.16.840.1.113883.6.13" displayName="CBC panel - Blood by Automated count" codeSystemName="LOINC"/>
      <translation code="Z13.0" codeSystem="2.16.840.1.113883.6.104" displayName="Encounter for screening for diseases of the blood and blood-forming organs and certain disorders involving the immune
      mechanism" codeSystemName="ICD-10 Procedure"/>
    </code>
    <text>
      <reference value="#Procedure2"/>
    </text>
    <statusCode code="completed"/>
    <effectiveTime value="20221107091522-0500"/>
    <!--   On the assumption that the patient is anemic, which would indicate low hemoglobin levels.
                Based on that altered the code, codeSystems, and displayName   -->
    <value xsi:type="CD" code="165397008" codeSystem="2.16.840.1.113883.6.96" displayName="Hemoglobin low" codeSystemName="SNOMED-CT"/>
  </observation>
</entry>
<!--   REFERENCES   -->
<!--   Centers for Disease Control and Prevention.(2018, December 05).
       Public Health Information Network Vocabulary Access and Distribution System (PHIN VADS).
       https://phinvads.cdc.gov/vads/ViewCodeSystemConcept.action?oid=2.16.840.1.113883.6.96&code=396550006  -->
<!--   Fyfe, J.(2015, January 15). Mood Codes. OpenHIE. https://wiki.ohie.org/display/SUB/Mood+Codes   -->
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       https://www.healthlabtesting.com/Test%20Directory/Test%20Directory%20Item.
       aspx?itemGuid=5a48681d-23a4-4842-8154-af006b72ad87   -->
<!--   HL7 CDA Example Search.(n.d.). Procedures Section Observation Entry.
       http://cdasearch.hl7.org/examples/view/Procedures/Procedures%20Section%20Observation%20Entry   -->
<!--   HL7 FHIR.(n.d.). HL7 v3 Code System ActClass. https://www.hl7.org/fhir/v3/ActClass/cs.html   -->
<!--   HL7 International.(n.d.). OID Reports. https://www.hl7.org/Oid/index.cfm   -->
<!--   ICD10Data.com. (2015, October 01). 2023 ICD-10-CM Diagnosis Code Z13.0.
       https://www.icd10data.com/ICD10CM/Codes/Z00-Z99/Z00-Z13/Z13-/Z13.0  -->
<!--   LOINC.(n.d.). Panel Hierarchy. https://loinc.org/58410-2/  -->
```