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PROJECT SPRINT 1

GROUP 5

THE SAVVY HEALTH SQUAD

Deepishka Pemmasani

Harika Mareddy

Meghana Darla

Priyankitha Kandi

Department of Biohealth Informatics

Luddy School of Informatics, Computing, and Engineering

IUPUI

Dr. Saptarshi Purkayastha

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Introduction:

Electronic health records (EHRs) have become widely adopted in healthcare, enabling the digital collection and exchange of patient data. However, the need for standardized clinical terminologies to represent information in EHRs in a structured format has also become evident (Evans, 2016). The use of standardized medical terminologies is crucial for recording clinical information in a structured manner, enabling seamless data exchange, interoperability between health IT systems, and clarity in clinical documentation (De Quirós et al., 2018). They reduces errors, and supports large-scale data analysis across patient populations (Evans, 2016). The management of health terminology through specialized services is essential for facilitating the sharing of data between electronic health record systems, enabling examination of disease patterns in populations, and supporting clinical decision-making. (De Quirós et al., 2018). Terminology services ensure the accuracy and consistency of clinical documentation in electronic health records (EHRs) by enabling structured and coded data entry, which reduces ambiguity and standardizes the representation of clinical information (De Quirós et al., 2018). Standardized terminologies also support meaningful use and interoperability in EHRs, contributing to improved health outcomes and quality measurement (Monsen et al., 2010).

This report examines a hypothetical patient case to identify key clinical concepts and recommend suitable standards and terminologies for each element. Effective application of standardized codes and descriptions for symptoms, diagnoses, medications, and other domains can promote seamless data exchange, reduce errors, and support large-scale data analysis across patient populations (Orchard Software, 2022).

Use Case: A patient aged 65 years consulted clinician with the chief complaints of headache and has been diagnosed with hypertension. He had no past medical or medication history. He is a chronic smoker for 10 years and non-alcoholic. Also, had a family history of diabetes mellitus and hypertension. Physical examination was found be normal. Blood pressure was found to be 190/130 mmHg. The patient was diagnosed with hypertensive urgency and admitted in the hospital. The patient was prescribed with 0.2 mg clonidine. The clinician also advised the nurse to record Blood pressure every 4 hours. All the information has been updated in electronic health records. Nurse followed the clinician notes in EHR and measured the blood pressure accordingly. All the observations should be recorded in nursing notes and update should be sent back to EHR.

Clinical Concepts:

Clinical concept	**LOINC**	**SNOMED-CT**	**ICD-10**	**RX Norm Concept code**	**NDC**
Patient family history					
Family history of diabetes mellitus	97063-2; Link:	160303001; Link:	Z83.3; Link:	____	____

Family history of hypertension	45643-4, Link:	160357008, Link:	Z82.49; Link:	____	____
Social habits					
Smoking history (Social history)	72166-2, Link:	77176002, Link:	____	____	____
Non-alcoholic	____	105542008, Link:	____	____	____
Physical examination					
Physical examination	11384-5, Link:	5880005, Link:	Z00.0, Link:	____	____
Vital signs					
Blood pressure	85354-9, Term: Blood pressure panel with all children optional, Link:	135840009, Term: Blood pressure monitoring (regime/therapy), Link:	____	____	____
Patient symptoms					
Headache	62558-4, Link:	25064002, Link:	R51, Link:	____	____
Patient diagnosis					
Hypertension	55284-4, Link:	38341003, Link:	I10, Link:	____	____
Hypertensive urgency	____	53731005, Link:	I16.0, Link:	____	____
Medication ordered					
Clonidine	____	372805007, Link:	____	310348, Link:	68788-8080-3, Link:
Hospital admission					

Admitted to hospital/hospital admission	LA24282-8, Term: Admitted to hospital as inpatient Link:	32485007, Term: Hospital admission (procedure) Link:	____	____	____

Clinical concepts descriptions:

Headache: According to Mayo Clinic (2020), headache is pain/discomfort in any region of the head, may manifest as a dull aching, a throbbing feeling or a searing pain. In our case, this symptom prompts medical evaluation to assess its connection to elevated blood pressure.

Hypertension (diagnosis): According to Mayo Clinic (2022), elevated blood pressure, commonly known as hypertension, is a prevalent condition impacting the arteries in the body. The patient in our case is diagnosed with hypertension.

Chief complaint: The term "chief complaint" in medicine refers to the primary issue or concern that prompted a patient to seek medical attention (Wagner et al., 2006).

No past medical or medication history: No documented record of previous diseases, illnesses, diagnoses or prescribed medications for this patient.

Chronic smoker: Chronic smoking, a notable risk factor in our case, refers to the patient's decade-long habit of tobacco use. This behavior contributes to the overall cardiovascular risk profile and may exacerbate hypertension.

Non-alcoholic: The patient does not consume alcohol/alcoholic beverages.

Family history of diabetes mellitus: The patient has a family history of diabetes mellitus, indicating a genetic predisposition to diabetes (Center for Disease Control and Prevention, 2023). This familial connection highlights the importance of monitoring the patient for potential metabolic issues.

Family history of hypertension: The patient's family history includes hypertension, suggesting a genetic influence on blood pressure regulation. Understanding this familial tendency is crucial in managing the patient's hypertensive urgency (Liu et al., 2015).

Physical examination: It is the process of interpreting verifiable anatomical findings through palpation, auscultation, percussion, and observation (Campbell, 1990). Patient's physical examination in our case revealed no abnormalities, suggesting that at the time of assessment, there were no obvious acute problems.

Blood pressure: Blood pressure is the assessment of the blood's internal pressure or force within the arteries (Cleveland Clinic, 2022). In the context of hypertensive urgency, this elevated blood pressure level necessitates immediate medical intervention to prevent adverse effects on target organs.

Hypertensive urgency (diagnosis): Hypertensive urgency refers to a situation in which blood pressure is heightened, specifically with a diastolic reading exceeding 120 mmHg, and there is

no immediate presence of acute target organ disease (Abdelwahab et al., 1995). In our case, with a blood pressure reading of 190/130 mmHg, the patient is at risk of complications, and urgent medical attention is required to manage and lower blood pressure.

Hospital admission: The act or procedure of granting admission to a hospital as a patient, typically due to the necessity for medical care (Cambridge Dictionary., n.d.). Hospital admission is deemed necessary in our case due to the severity of hypertensive urgency. The patient requires close monitoring, timely interventions, and further assessments to mitigate potential complications associated with critically elevated blood pressure.

Clonidine: Clonidine is a medication used to treat hypertension, which works by reducing blood pressure and heart rate through arterial relaxation and improved blood flow to the heart. Clonidine was prescribed at a dose of 0.2 mg, employed to address hypertensive urgency. It acts by relaxing blood vessels and reducing heart rate, ultimately aiding in the control and normalization of blood pressure (Yasaei & Saadabadi, 2023).

Blood pressure monitoring (nursing instructions): Nursing instructions entail the regular measurement and documentation of the patient's blood pressure every 4 hours. This routine monitoring is crucial for tracking the effectiveness of interventions and ensuring the patient's stability during hospitalization (The Royal Children's Hospital Melbourne, 2017).

Electronic Health Records: In the United States, electronic health record (EHR) systems are extensively employed for the documentation of care provision and the tracking of outcomes (Valvi et al., 2023). They are digital versions of patients' paper charts. In our case, the EHR is capturing the patient's medical history, diagnosis of hypertensive urgency, prescribed medications like clonidine, and ongoing vital sign observations.

Clinical concept	Preferred standard
Family history of diabetes mellitus	SNOMED CT codes can represent family history using pre-coordination (Rector et al., 2003, p. 58)
Family history of hypertension	SNOMED CT allows detailed clinical documentation through its compositional grammar. By combining concepts like "family history" and "hypertension", it can create specific codes to represent family medical history. This enables structured data capture of important health-related information about a patient's relatives (Liu et al., 2015).
Smoking history (Social history)	"SNOMED CT contains codes to represent social history details like smoking status as structured data in EHR systems" (Nelson et al., 2018, p. 5).
Non-alcoholic	SNOMED CT is an appropriate terminology for representing the concept of non-alcoholic due to its ability to capture detailed clinical information and qualifications. Specifically, SNOMED CT defines the concept of non-alcoholic as "does not consume alcohol" (SNOMED CT code 161000000) (De Quirós et al., 2018, pp. 228-231).

Headache	"SNOMED CT provides more detailed clinical concepts to represent symptoms in EHR systems" (De Quirós et al., 2018, pp. 228-231).
Physical examination	The study by Goeg et al. (2014) found that using SNOMED CT helps create a basic set of elements for physical examinations. By looking at both exact matches and similar terms, this set becomes an initial stage for establishing standardization and semantic interoperability (Goeg et al., 2014).
Blood pressure	"LOINC is the standard terminology for representing many vital signs and clinical measurement results like blood pressure in EHRs" (Orchard Software, 2022).
Hypertension	"ICD-10 is the standard diagnostic terminology for classification of diseases like hypertension" (Bodenreider et al., 2018).
Hypertensive urgency	"ICD-10 allows classification of hypertensive urgency for morbidity statistics and reimbursement" (Bodenreider et al., 2018).
Clonidine	"RxNorm provides standardized names and codes for clinical drugs like clonidine to enable structured representation in EHRs" (Nelson et al., 2018, p. 4).
Admitted to hospital/hospital admission	SNOMED CT is an appropriate terminology for representing the concept of hospital admission due to its ability to capture clinical meanings and contexts. Specifically, SNOMED CT defines the concept of hospital admission as "admission to a hospital for inpatient care" (SNOMED CT code 183452005) (Liu et al., 2015).

Conclusion:

Analysis of the patient case demonstrates the wide range of clinical concepts that must be accurately documented in EHR systems, including patient demographics, vital signs, symptoms, diagnoses, medications, procedures, and more. Standardized terminologies such as LOINC, SNOMED CT, RxNorm, and ICD-10 allow effective representation of these concepts in a structured, interoperable way. The level of detail provided by these terminologies improves the specificity and consistency of clinical documentation (McDonald et al., 2003). While challenges and limitations remain in implementing standards, their adoption is vital for enabling widespread health data exchange and realizing the potential of EHRs for delivering quality care (Rector et al., 2003). As healthcare progresses in digitization, controlled medical vocabularies will continue to be indispensable resources for improving semantic and technical interoperability.

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