Optimization of Medical coding Analysis

Dr. S. Manju[1], R. Jayaseelan[2]
[1]Associate Professor, Department of Computer Application
[2] Student, Department of Computer Application
[1, 2] PSG College of Arts & Science, Coimbatore, Tamil Nadu, India.

Abstract- *Medical coding systems are collections of codes pertaining to particular illnesses and therapies. They are used to accurately track information about illnesses and other health problems in patient records as well as to aid in the medical billing process. Hospitals and care facilities aren't the only places that employ medical coding classification systems. They are also used by private insurers and government health programmes for a range of functions, such as tracking outbreaks, using decision support systems, and statistical analysis of diseases and treatments. The paper discuss the optimisation of medical coding using deep learning concept.*

Keywords- Diagnostic Codes, Procedural Codes, American Medical Association, International Classification of Disease, Current Procedural Terminology, Healthcare Common Procedure Coding System.

I. INTRODUCTION

There are various categories used for particular objectives within the greater umbrella of medical coding categorization systems. For instance, healthcare professionals use diagnostic codes to categorize illnesses and systems, whereas procedural codes are used to denote specific surgical or medical operations. Medical coding is the process of converting diagnoses, treatments, services, and equipment used in healthcare into standard medical alphanumeric codes. The diagnoses and procedure codes are derived from the documentation in the medical records, such as the transcription of the doctor's notes, the results of the laboratory and radiologic tests, etc. [1] The category of a medical coding system may assist you better understand how it works and how it vary from the classification of codes in this medical coding analysis.

II. TYPES OF CODES

2.1 ICD-11: The most recent update, the International Classification of Diseases ICD-11, is intended to succeed the ICD-10 as the next international standard for diagnostic codes. ICD-11 was introduced in January 2022 and is used to precisely categorise everything, including illnesses and different symptoms. Additionally, it updates several diseases' classification categories, broadens the criteria of sexual health, and adds new diagnoses including immune system and sleep-wake disorders.

2.2 ICD-10: ICD-10 stands for the tenth edition of the International Classification of Diseases. In the United States, the system was implemented in 2015. As an improvement over ICD-9, ICD-10 provided more codes and classifications for modernised illnesses and diagnoses. Governments all across the world have started using ICD-10 codes, which belong to the World Health Organization. There are two different ICD-10 systems used in the United States: Both ICD-10-PCS (Procedure Coding System) and ICD-10-CM (Clinical Modification), which are utilised for diagnosis, are employed in inpatient hospitals. Determine the most accurate coding for this diagnosis and procedure using the ICD-10-CM and CPT manuals. In this case, the coder would use the ICD-10-CM code J02.0 for Streptococcal sore throat, a CPT code of 87880 for the fast strep test, and a CPT code of 00781-6041 for the prescription of orally given amoxicillin. [2] In ICD-10-CM, congestive heart failure and hypertension are now automatically associated. ICD-9-CM only assumed a cause-and-effect connection between hypertension and chronic renal disease. [5] Ambiguities and contradictions can be found in the ICD. Different conclusions about current diagnoses influence the coding of abstracts and medical reports. [10] Although it took some time for ICD-10 to gain acceptance, the system is now widely used and includes the great majority of diagnoses and procedures.

2.3 ICD-9: The World Health Organisation (WHO) created the ICD-9, which was originally released in 1975. It was used to record medical treatments performed on inpatients as well as ailments and disorders. ICD-9 codes were three to five digits and were numerical in nature. These designations were applied to indicate particular illnesses, ailments, and surgical processes. The first digit frequently denoted a significant category, while the following digits offered more detailed information. In the US, ICD-9 was widely utilised for epidemiological and statistical analysis of health data, as well as for billing and reimbursement purposes. For many years, it was essential to the healthcare sector. In the majority of countries, ICD-10 has taken the place of ICD-9. A large increase in the number of codes and increased specificity in the documentation of medical conditions and procedures were

involved in the switch from ICD-9 to ICD-10. For instance, the United States switched to ICD-10 on October 1, 2015. Despite the fact that ICD-9 is no longer the main coding system used in healthcare, it may still be utilised as a reference in older medical records and research projects. ICD-9 to ICD-10 conversion required familiarising oneself with new codes and documentation standards. ICD-10 has well than 68,000 codes, compared to ICD-9's about 14,000 codes. This makes it possible to describe medical illnesses and procedures in greater detail.

2.4 CPT: The abbreviation CPT stands for Current Procedural Terminology, and it is used to inform the appropriate parties about diagnostic, surgical, and medical procedures. CPT is a procedural medical coding classification system, which means it describes the treatments that physicians and other healthcare professionals gave to patients. Its main objective is to standardise how these operations are communicated for administrative and analytical purposes. CPT codes give information about the process and service. [9] ICD codes are intended to explain why (also referred to as medical necessity) while CPT codes are used to record what physicians did (the service). For visits made in a hospital, outpatient office, skilled nursing facility, or other care setting, different CPT codes apply. These codes are particular to the place of treatment. [3] More than 400 revisions were made to the CPT codes for 2022, which were developed and updated by the American Medical Association (AMA), although the AMA does not make the CPT codes publicly available. [8] Modifiers are two-digit codes added to a service that tell the payer of special circumstances. The AMA develops CPT modifiers, which are numeric. [6] The American Medical Association (AMA) offers a number of tools to assist you in effectively billing operations and services using the CPT code set. [7] The codes are divided into three groups and updated yearly.

- 2.4.1 Category 1: Five-digit codes with accompanying explanations for services or procedures.
- 2.4.2 Category 2 - Tracking codes in alphabetic form are used to measure execution.
- 2.4.3 Category 3 - Temporary codes for emerging and novel processes and services.

2.5 HCPCS LEVEL II: Based on CPT, the Healthcare Common Procedure Coding System Level II, or HCPCS, is used to categorise non-physician services including ambulances, medications, and prosthetics that fall outside the purview of CPT. The health care items and equipment are coded using HCPCS level II. Few patients seek treatment for several conditions, although some may need unrelated therapies. A service that is solely covered for a certain indication may be provided to other patients. A patient visits a doctor for hypertension treatment, but also has a wart removed. The wart elimination code must be connected to the diagnosis code for warts, and the office visit code must be connected to hypertension. [4] Modifiers are two-digit codes added to a service that tell the payer of special circumstances. CMS develops HCPCS modifiers, which are alphanumeric or alphabetic. [6] The AMA has several resources to help you accurately bill procedures and services with the Healthcare Common Procedure Coding System (HCPCS) codes. [7].

III. FUTURE RESEARCH

Future studies may focus on the variation in medical coders' coding productivity and computer assisted coding. Automated technology integration helps to eliminate manual coding errors. The amount of time required for manual coding varies depending on the healthcare organization's division, such as the inpatient department, radiology, anaesthetic, outpatient, and surgery. From programmer to programmer, productivity varies. Understanding the causes of productivity variation among automated coders aids in effective resource management and increases income.

Another research field can be automated coding and the variation in productivity caused by factors connected to medical coders, or it might be automated coding and the productivity of medical coders in particular departments.

According to the above types of medical coding Compared between characteristic of medical coding types through the table given below

IV. COMPARISON BETWEEN A CATEGORY OF MEDICAL CODING

CHARACTERISTIC	ICD-09-CM	ICD-10 CM	CPT	HCPCS Level II
Field length	3-5 characters	3-7 characters	5 characters	5 characters
Available codes	The equivalent of 14,000 codes	The equivalent of 69,000 codes	The equivalent of 8000 codes	The equivalent of 7000 codes

Code composition (numeric or alpha)	Digit 1 = alpha or numeric Digit 2-5 = numeric	Digit 1 = alpha Digit 2 = numeric Digit 3-7 = alpha or numeric	Digit 1-5 = numeric or Any 4 Digits = numeric & single Digit = alpha	Digit 1 = alpha Digit 2-5 = numeric
Established by	World Health Organization – 1940		American Medical Association – 1979	Centres for Medicare and Medicaid Services (CMS) of the United States government - 1978
Description	Clinical Modification, used for diagnosing illnesses and other medical problems, and ICD consists of two parts: Procedure Coding System, which is used for inpatient hospital treatments.		Doctors and other healthcare professionals who provide medical services and treatments are identified using the CPT code. It is made up of identification codes and descriptive sentences.	With HCPCS codes, similar durable medical equipment, prosthetics, and orthotics can be categorised consistently.
Example code	81315, Open fracture of head of radius	First encounter with displaced fracture of the left radial head, type IIIA, IIIB, or IIIC.	Osteotomy Techniques for the Spine"	"Intermittent urinary catheter; straight tip; with or without coating" is what A4351 stands for.

V.CONCLUSION

This paper explains how the classification codes for ICD, CPT, and HCPCS vary based on the many types of diagnoses and medical procedures. Additionally, it discusses the traits of several medical coding methods. In this paper conclude the analysis to get a proper optimized code of ICD-11 is used to precisely categorise everything, including illnesses and different symptoms in medical coding analysis.

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