Database Purpose:

Design Document

The purpose of the database is to provide a patient-centered healthcare system to the hospitals that facilitate monitoring and improvement of their services. Through this database, we

● Provide accurate, up-to-date, and complete information about patients

● Enable quick access to patient records for more coordinated, efficient care

● Help healthcare providers more effectively diagnose patients, reduce medical errors, and provide safer care

● Enable healthcare providers to improve efficiency and meet their business goals.

● Reduce costs through decreased paperwork, improved safety, reduced duplication of testing, and improved health

Business Problems Addressed:

Through this database system we plan to address the following business problems,

●Provide information to enhance or improve patient treatment (e.g., consideration of symptoms, diagnosis when treating the patient).

● Supply insights to healthcare providers to improve patient outcomes (e.g., to cater to specific market segments such as geographic regions, age- or gender-based populations, or other demographic-based campaigns).

● Permit hospital care provider staff to analyze and refine patient treatment pathways.

● Streamline assignment of diagnoses and prescriptions to patients thereby reducing potential medical errors and providing safer care

● Help hospital administration with Insurance Claims by accurately calculating patient order totals and by keeping track of the claim sanction amount to provide timely notifications to staff about payment status

● Provide comprehensive reporting on patients which further enables the hospital staff to understand large volumes of patients' data and gain insights

Business Rules:

● Each patient may have one or more patient encounters.

● Each patient may have zero or more vaccination records.

● Each patient encounter has one or more insurance providers.

● Each patient encounter has one or more diagnoses.

● Each patient encounter has one or more vital signs records.

● Each patient encounter has one or more symptoms.

● Each patient encounter has zero or more lab results.

● Each healthcare provider attends zero or more patient encounters.

● Each healthcare provider gives zero or more prescriptions.

● Each patient encounter has a billing record.

● Each patient encounter gets a prescription.

● Only Admitting physicians can Admit a Patient

● Only Diagnosis physicians can Diagnose a Patient.

Design Rules:

● Use Crow's Foot Notation.

● Specify the primary key fields wherever required, by specifying PK beside the fields.

● Draw a line between the fields of each table to show the relationships between each table. This line should be pointed directly to the fields in each table that are used to form the relationship.

● Specify which table is on the one side of the relationship by placing a one next to the field where the line starts.

● Specify which table is on the many side of the relationship by placing a crow's feet symbol next to the field where the line ends.

Design Decisions:

Entity Name	Why Entity Included	Relationship to others
Patient	One of the primary purposes of the database is to collect information about factors related to patients. The important patient data to collect include name, address, contact, and SSN. This Patient ID helps us to maintain a record of the patients, vaccination details, demographic details, and Emergency point of contact details.	This entity has an identifying relationship with patient demographics and Emergency POC. And non-identifying with vaccination and insurance provider.
Patient Demographics	This entity holds the demographic details of patients such as age gender, age, ethnicity, etc..., which help us to better understand the patient background.	This entity has an identifying one-to-one relationship with the Patient entity.
Patient Encounter	This is the core entity in the database. It holds the data of all patient encounters in the hospital and is used to track the diagnosis assigned, medications prescribed, lab tests done on the patient. This entity helps us track the patient through their stay at the hospital and understand their well-being.	As the core entity in the database, it holds the identifying relationship to diagnosis, symptoms, Lab Results, and Vital signs. It also holds a non-identifying relationship with the patient, prescription, healthcare provider & billing entity.
Prescription	This entity holds the medicine/test prescriptions provided by the doctor. Prescription details give us an understanding of the medicines the patients must take and their dosage.	Prescription has a non-identifying relationship with PatientEncounter, Medication Details.
Medication Details	Medication Details entity holds the information regarding the medicines, as to which medicine id corresponds to which medicine.	This entity is only related to prescription, to give a better understanding of the medication prescribed.
Patient Vital Signs	This entity holds the vital sign details gathered by the doctor. Vital sign details give us a better understanding of the key health factors of the patients for quick diagnosis and treatment.	Vital Signs entity holds a relationship with Patient Encounters since they are recorded every time, a patient visits a hospital
Vital Sign Details	This entity is responsible for holding the information regarding the vital signs gathered for the patient. It gives us a better understanding of the vital signs since it provides the description for vital signs based on their IDs.	This entity holds a relationship only with Patient Vital Signs, to give a better understanding of the vital signs recorded.
Patient Symptoms	This entity is responsible for storing the symptoms of the patients if any, and the duration for which they have been lasting. This would help the doctor to better understand how to proceed with the diagnosis.	Patient Symptoms entity holds a relationship with Patient Encounters since they are recorded every time, a patient visits a hospital

Symptom Details	This entity is responsible for holding the information regarding the symptoms gathered for the patient. It gives us a better understanding of the identification of symptoms since it provides the description for symptoms based on their IDs.	This entity holds a relationship only with Symptoms, to give a better understanding of symptoms identified
Diagnosis	This entity holds information regarding the diagnosis a particular patient has undergone in an encounter. It also stores information about the health care provider whom the patient consulted.	Diagnosis holds an identifying relationship with patient encounters and healthcare providers.
Diagnosis Details	This entity is responsible for holding the information regarding the diagnosis gathered for the patient. It gives us a better understanding of the identification of diagnosis since it provides the description for diagnosis based on their IDs.	This entity holds a relationship only with Diagnosis, to give a better understanding of the diagnosis identified.
Patient Lab Results	Patient Lab Results play a significant role in the understanding of how to proceed with the diagnosis. This entity holds information related to the lab test the patient undergoes, the timestamp of the test, the result, and the quantifying metrics which are involved in the test.	This entity holds an identifying relationship with patient encounters as well as with healthcare provider since healthcare provider suggests lab test.
Lab Result Details	This entity is responsible for holding the information regarding the lab results performed for the patient. It gives us a better understanding of the further steps of diagnosis since it provides the description for all lab results based on their IDs.	It has a single relationship with lab tests since it provides details regarding the results that are generated after that patient undergoes the lab test.
Healthcare rovider	This entity holds information regarding the Employees who manage the work related to test/diagnose the patients.	Healthcare provider holds an identifying relationship with diagnosis and lab results. It also holds a non-identifying relationship with prescriptions.
Insurance Provider	This entity has information regarding the insurance provider covering the medical bill of the patient for an encounter.	This entity holds a non-identifying relationship with patients.

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Vaccination	This entity holds the record of vaccination of the patient visiting the hospital including information related to vaccination status, vaccination name, and booster status.	This entity is connected to the Patient by a non-identifying many-to-one relationship.
Billing	This entity holds information about the invoice generated and the payment status	It holds a non-identifying one-to-one relationship with the patient encounter. Since every encounter has a unique billing invoice

EPOC	This entity holds the record of emergency points of contact of a patient	This entity is connected to the Patient by a non-identifying one-to-one relationship.

Entities Relationship:

From	To	Relationship
Patient	EPOC	One to One
Patient	Vaccination	One to Many
Patient	Insurance Provider	One to One
Patient	Patient Demographics	One to One
Patient	Patient Encounter	One to Many
PatientEncounter	Symptoms	One to Many
PatientEncounter	Diagnosis	One to Many
PatientEncounter	LabResults	One to Many
PatientEncounter	HealthCareProvider	Many to One
PatientEncounter	Prescription	One to One
PatientEncounter	VitalSigns	One to Many
PatientEncounter	Billing	One to One
Prescription	MedicationDetails	One to One
LabResults	LabResultsDetails	One to One
VitalSigns	VitalSignsDetails	One to One
Diagnosis	DiagnosisDetails	One to One
Symptoms	Symptom Details	One to One
HealthCareProvider	Prescription	One to Many
HealthCareProvider	LabResults	One to Many
HealthCareProvider	Diagnosis	One to Many