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Prenatal Care Database

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Introduction:

Prenatal care is the medical care given to any woman during pregnancy. It usually includes routine check-ups, laboratory tests, vaccinations, and imaging to ensure and promote maternal and fetal health. The ultimate goal of prenatal care is to reduce maternal and infant morbidity and mortality (Rosa et al., 2014). According to the article by Tikkanen et al. (2020), the maternal mortality ratio in ten different countries was compared. They found that the United States had the highest maternal mortality rate ratio among the selected countries, as shown in Figure 1.

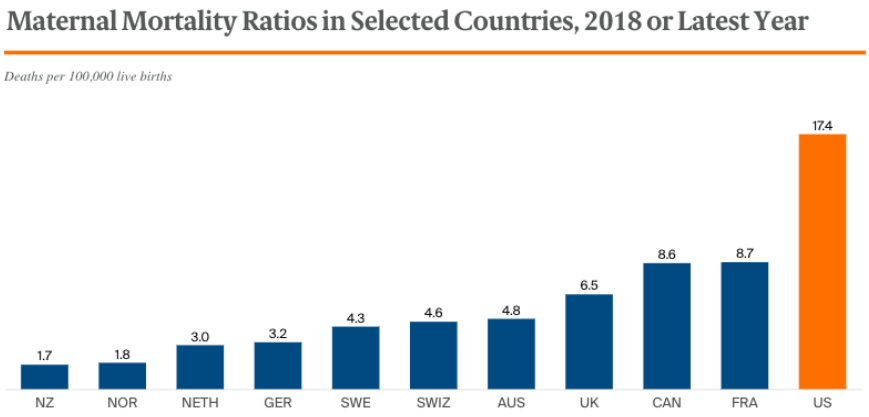

Figure 1. Comparison of maternal mortality ratios among ten selected countries.

The finding about the highest maternal mortality ratio in the United States is alarming, as it is considered a first-world country where people are expected to have a good quality of health care delivery, which includes maternal and fetal health. The maternal mortality ratio of the United States is ten-fold higher than New Zealand's, which has the lowest ratio among the ten countries. Along with this finding, Tikkanen et al. (2020) found that most of these cases were accounted for during pregnancy, as shown in Figure 2.

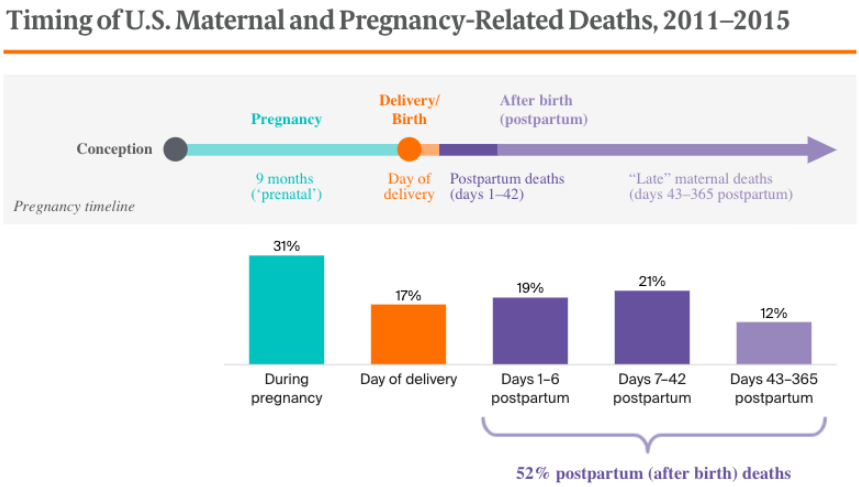

Figure 2. Timing of maternal and pregnancy-related deaths.

This project intends to build a database dedicated to women's health during pregnancy with the goal of ensuring that their health and their infants' health are monitored and supported. Implementing this project will help different healthcare professionals easily store and retrieve important protected health information and empower patients about their health.

Objective:

The project aims to create a patient database for women's health during prenatal care. This database will store the patient's demographics, medical history, past medical history, medication history, OB-GYN history, family history, social history, physical examination, and laboratory results. Different healthcare providers will be able to navigate through the vast amount of information about the patient and provide a strategic and comprehensive health plan that will help improve the health outcomes for both the patients and their newborns.

Materials and Methods:

In this section, the experimental setup utilized in the project is displayed in Figure 3. To create a database dedicated to prenatal care, sufficient data was acquired to identify which information needed to be included in the database. Conceptual and logical models were created to visualize the entities, relationships, and datatypes involved in the project. Coding and implementation of the database were done using Python and SQLite3.

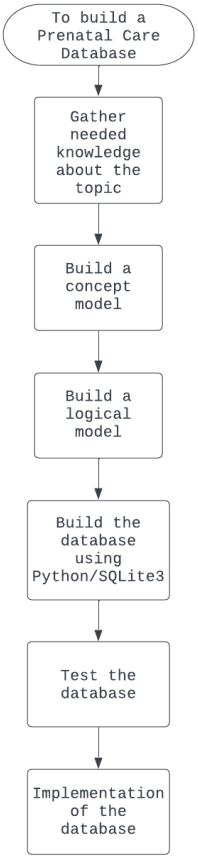

Figure 3. Experimental Setup

Kinds of knowledge:

For this project, understanding the essential elements of the database was the main priority, along with coding skills in Python and SQL to create the database, which required different packages/libraries to manipulate and perform SQL operations with Python.

Data Science Tools:

The project utilized Python and SQLite3 libraries to create the database.

Clients:

The users of this database are the patients, different healthcare providers, medical technologists, pharmacists, and the hospital administration. The patients benefit from this database by empowering them to become part of the strategic health planning, improving their health outcomes. Healthcare providers, medical technologists, pharmacists, and the hospital administration will have a more effective way of storing, communicating, and interacting with one another to build efficient and holistic healthcare.

Conceptual Model:

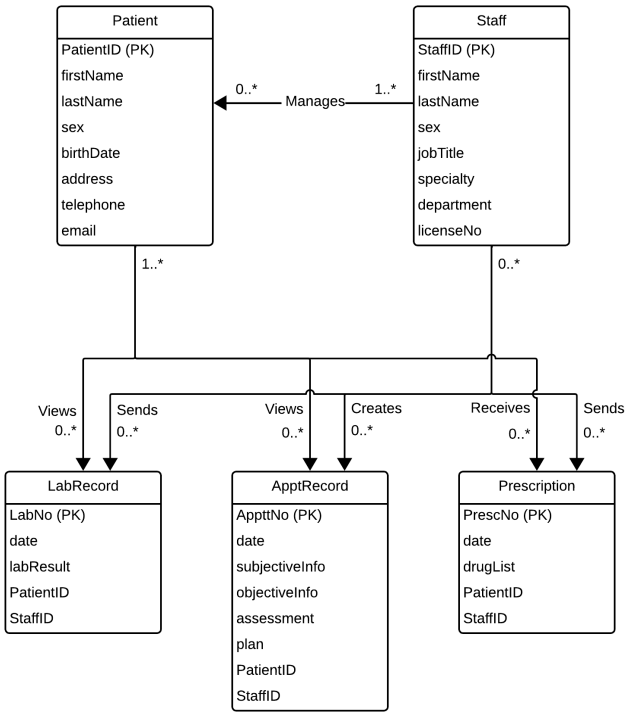

Figure 4. Conceptual Model.

Initially, a conceptual model was created to identify the tables and their relationships, as seen in Figure 4. This provided an overall structure of the planned database to support the needed requirements of any data storage structure. From this database, the project intended to create five tables: Patient, Staff, LabRecord, ApptRecord, and Prescription. In each table, the respective attributes were labeled.

Logical Model:

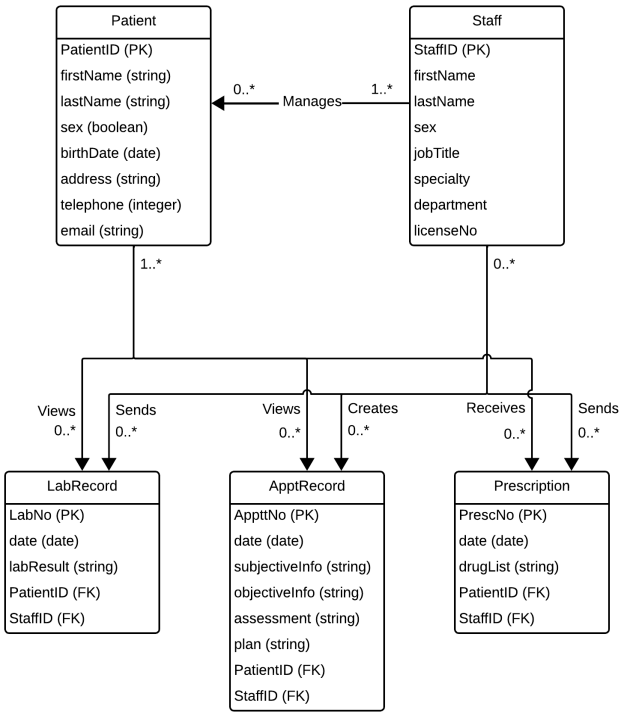

Figure 5. Logical Model.

A logical model was created to describe the elements in the database further. Primary keys, Foreign keys, data types, and relationships among tables and attributes were identified to ensure and reflect the business environment.

All of the tables were built and fortified using SQL constraints and integrity enhancements, such as the NOT NULL constraint, ensuring that the system will reject any null values entered into the database. Moreover, the CHECK constraint was also added in specific attributes, allowing only certain conditions or values to be entered into the database. Ten simple queries were successfully run to ensure the database was working correctly. The coding and implementation of the database can be explored using the .ipynb file attached to this paper.

Results and Discussion:

The prenatal care database successfully held, stored, and retrieved data information in each table. Different users can utilize the database for various purposes. Physicians can access the medical history, laboratory test results, and prescriptions of specific patients. This database allows maternal and fetal health to be improved and monitored effectively. This database will help healthcare professionals work on providing comprehensive and practical assessment and treatment management to patients through easy access to patient information. Patients also

have access to their information, empowering and involving them to become part of their strategic health planning.

Conclusion:

Databases are essential for storing and retrieving important data information. They are beneficial in different sectors, especially in healthcare. Implementation of this project will provide a database that can be utilized to find better ways to improve maternal and infant health outcomes, limiting the cases of preventable maternal and infant mortalities.

Recommendations:

To improve this project, it is highly encouraged to add more details to each table to be able to gather more essential information that can be utilized for the assessment and treatment management of patients.

References:

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