

Database Design Requirements

Newark Medical Associates (MMA) is a clinic located in Newark, New Jersey, owned by a group of medical corporations and individual physicians. Clinic personnel include physicians, surgeons, nurses, and support staff. All clinic personnel except the surgeons are on an annual salary. Surgeons do not receive a salary but work for Newark Medical Associates on a contract basis. It is possible for a physician to have an ownership position in the clinic.

Since surgeons perform surgery on patients as needed, it is required that a surgery schedule keep track of the operation theatre where a surgeon performs a certain surgery type on a particular patient and when that surgery type is performed. Some patients need surgeries and others don't. Surgeons perform surgeries in the clinic; some do a lot, and others just a few. Some surgery types are so rare that they may not yet have been performed in the clinic; but there are others that are performed numerous times. In addition, there is the need to keep track of nurses who can be assigned to a specific surgeon type since all nurses cannot be assigned to assist in all types of surgeries. A nurse cannot be assigned to more than one surgery type. It is the policy of the clinic that all types of surgery have at least two nurses. The clinic maintains a list of surgery skills. A surgery type requires at least one but often many surgery skills are utilized in numerous surgery types. However, all surgery skills are not utilized in the clinic while some surgery skills some surgery skills rate utilized in numerous surgery skills for which no nurse in the clinic qualifies; at the same there are certain surgery skills for which no nurse in the clinic qualifies; at the same time there are other surgery skills that have several qualified nurses. In order to assign a nurse to a surgery type, a nurse should possess one or more of the skills required for the surgery type.

Depending on the illness, some patients may stay in the clinic for a few days; but most require no hospitalization. In-patients are assigned a room and a bed. A nurse attends to several in-patients, but must have at least five. No more than one nurse attends to an inpatient; but some in-patients may not have any nurse attending to them. If a nurse leaves the clinic, temporarily remove the association of all in-patients previously attended to by that nurse in order to allow these patients to be transferred to another nurse at a later time. Every physician serves as a primary care physician for a least seven patients, however, no more than 20 patients are allotted to a physician... If a physician leaves the clinic, temporarily assign the physician's patients to the clinic's chief of staff. Clinic personnel can also become ill and be treated in the clinic. A patient is assigned one physician for primary care.

A patient may have several illnesses and several patients may have the same illness. In order to qualify as a patient, a patient must have a least one illness. Also, a patient may have several allergies that are also recorded. In order for a patient to be diagnosed with a disease or an

allergy, the patient requests an appointment to see a doctor. The term used for these appointments is consultation. A patient sees most of the time his/her primary doctor but can also be consulted by other doctors.

Physicians prescribe medications to patients; thus it is necessary to capture which physician(s) prescribes what medication(s) to which patient(s) along with dosage and frequency. In addition, no two physicians can prescribe the same medication to the same patient. If a physician leaves the clinic, all prescriptions prescribed by that physician should also be removed because this information is also retained in the archives. A person affiliated with the clinic as a surgeon cannot be deleted as long as a record of all surgeries performed by the surgeon is retained.

A patient may be taking several medications, and a particular medication may be taken by several patients. However, in order for a patient to take a medicine the medicine must be prescribed to that patient. As a medicine may interact with several other medicines, the severity of such interaction must be recorded in the system. Possible interactions include S = Severe interaction, M = Moderate interaction, L = Little interaction, and N = No interaction.

All clinic personnel have an employment number, name, gender (male or female), address and telephone number; with the exception of surgeons, all clinic personnel also have a salary (which can range from \$25,000 to \$300,000), but salaries of some can be missing. Each person who works in the clinic can be identified by an employment number. For each physician, his or her specialty is captured whereas for each surgeon data pertaining to his or her specialty and contract are captured. Contract data for surgeons include the type of contract and the length of the contract (in years). Grade and years of experience represent the specific data requirement for nurses.

A surgery code is used to identify each specific type of surgery. In addition the name category, anatomical location, and special needs are also captured for each surgery type. There are two surgery categories: those that require hospitalization (category= H) and those than can be performed on an outpatient basis (category = 0). A surgery skill is identified by its description and a unique skill code. Data for patients consists of personal data and medical data. Personal data includes patient number (the unique identifier of a patient), name, gender (male or female), date of birth, address, and telephone number. Medical data include the patient's blood type, cholesterol (consisting of HDL, LDL, and triglyceride), blood sugar, and the code and name of all the patient's allergies.

For both clinic personnel and patients, a Social Security number is collected. For each illness, a code and description are recorded. Additional data for each in-patient consists of a required data of admission along with the patient's location (nursing unit, room number, and bed number). Nursing units a renumbered 1 through 7, rooms are located in either the Blue or

Green wing , and the bed numbers in a room are labeled A or B. Medications are identified by their unique medication code and also include name, quantity on hand quantify on order, unit cost, and year to date usage. For medical corporations with ownership interest in the clinic the corporation name and headquarters are obtained. Corporation name uniquely identifies a medical corporation. The percentage ownership of each clinic is also recorded.

The physicians who work in the clinic have recently embarked on a program to monitor the cholesterol level of its patients because cholesterol contributes to heart disease. Risk of heart disease is classified as N (None), L (Low), M (Moderate), and H (High). The ratio of the person's total cholesterol divided by HDL is used in the field of medicine as one indicator of heart risk. Total cholesterol is calculated as the sum the HDL, LDL, and one fifth of triglycerides. A total cholesterol/HDL, ratio less than 4 suggests no risk of heart disease due to cholesterol, a ratio between 4 and 5 reflects a low risk, and a ratio greater than 5 is moderate risk. The high risk category is not coded as a function of cholesterol.