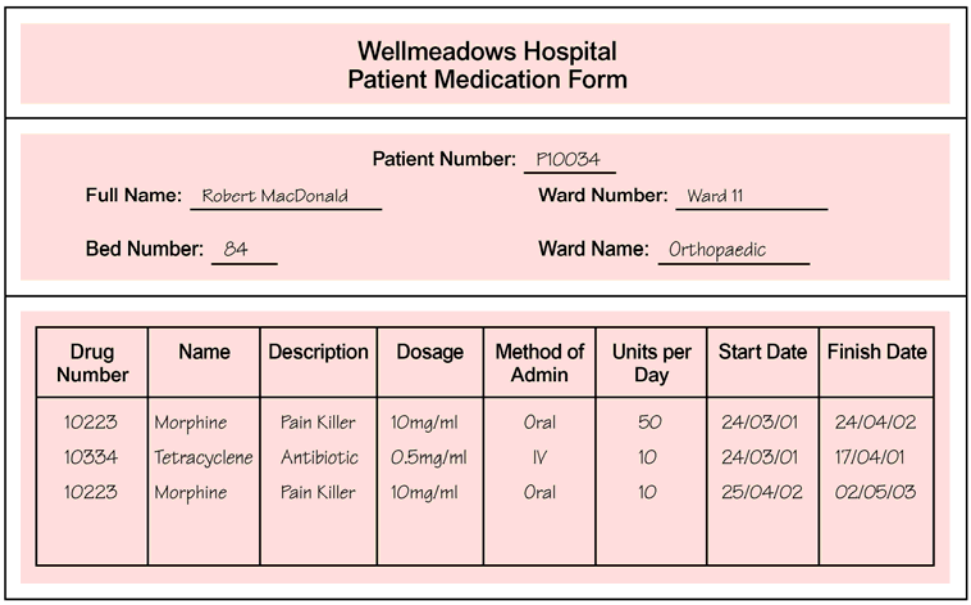
DATABASE DESIGN: NORMALIZATION Q & A

Examine the Patient Medication Form for the Wellmeadows Hospital case study shown in Figure



Wellmeadows Hospital
Patient Medication Form

Patient Number: P10034
Full Name: Robert MacDonald
Ward Number: Ward 11
Bed Number: 84
Ward Name: Orthopaedic

Drug Number	Name	Description	Dosage	Method of Admin	Units per Day	Start Date	Finish Date
10223	Morphine	Pain Killer	10mg/ml	Oral	50	24/03/01	24/04/02
10334	Tetracyclene	Antibiotic	0.5mg/ml	IV	10	24/03/01	17/04/01
10223	Morphine	Pain Killer	10mg/ml	Oral	10	25/04/02	02/05/03

(a) Identify the **functional dependencies** represented by the data shown in the form in Figure

Patient No → Full Name
Ward No → Ward Name
Drug No → Name, Description, Dosage, Method of Admin
Patient No, Drug No, Start Date → Units per Day, Finish date

The functional dependencies for Bed No are unclear. If Bed No was a unique number for the entire hospital, then could say that Bed No→Ward No. However, from further examination of the requirements specification, we can observe that Bed No is to do with the allocation of patients on the waiting list to beds.

(b) Describe and illustrate the process of normalizing the data shown in Figure to first (1NF), second (2NF), third (3NF), and BCNF.

First Normal Form
Patient No, Drug No, Start Date, Full Name, Ward No, Ward Name, Bed No, Name, Description, Dosage, Method of Admin, Units per Day, Finish Date

Second Normal Form
Patient No, Drug No, Start Date, Ward No, Ward Name, Bed No, Units per Day, Finish Date

Drug No, Name, Description, Dosage, Method of Admin

Patient No, Full Name

Third Normal Form/BCNF
Patient No, Drug No, Start Date, Ward No, Bed No, Units per Day, Finish Date

Drug No, Name, Description, Dosage, Method of Admin

Patient No, Full Name

Ward No, Ward Name

(c) Identify the primary, alternate, and foreign keys in your BCNF relations.

Patient No(FK), Drug No(FK), Start Date, Ward No(FK), Bed No, Units per Day, Finish Date

Drug No, Name, Description, Dosage, Method of Admin

Patient No, Full Name

Ward No, Ward Name

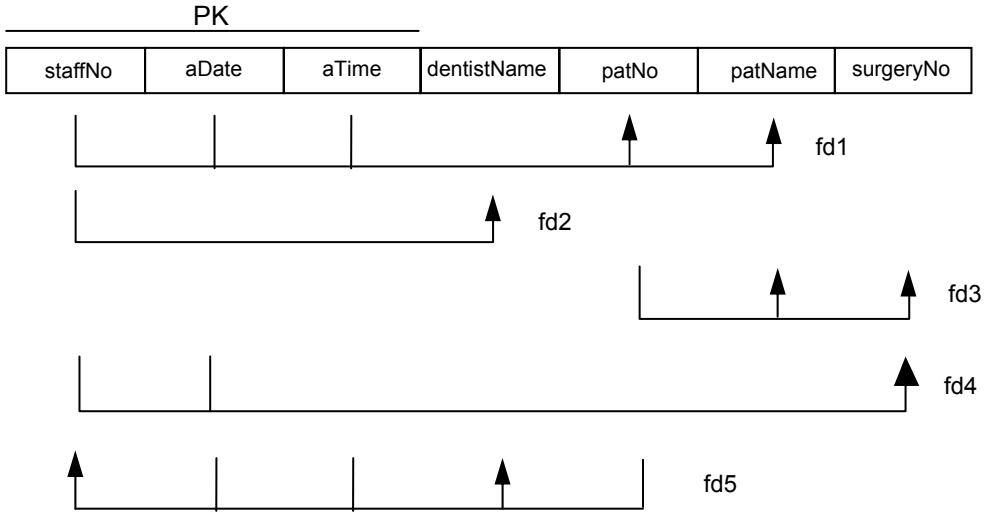
Primary keys underlined.

The table shown in Figure lists dentist/patient appointment data. A patient is given an appointment at a specific time and date with a dentist located at a particular surgery. On each day of patient appointments, a dentist is allocated to a specific surgery for that day.

staffNo	dentistName	patNo	patName	appointment date	time	surgeryNo
S1011	Tony Simth	P100	Gillian White	12-Sep-01	10.00	S15
S1011	Tony Smith	P105	Jill Bell	12-Sep-01	12.00	S15
S1024	Helen Pearson	P108	Ian MacKay	12-Sep-01	10.00	S10
S1024	Helen Pearson	P108	Ian MacKay	14-Sep-01	14.00	S10
S1032	Robin Plevin	P105	Jill Bell	14-Sep-01	16.30	S15
S1032	Robin Plevin	P110	John Walker	15-Sep-01	18.00	S13

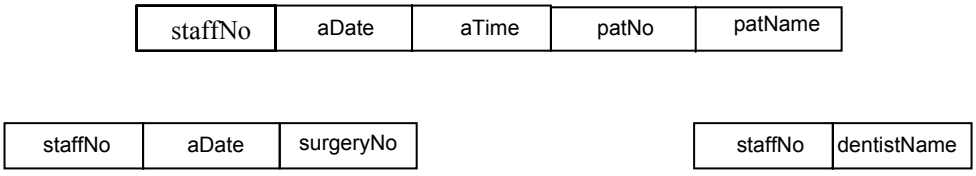
Describe and illustrate the process of normalizing the table shown in Figure to BCNF. State any assumptions you make about the data shown in this table.

1NF



fd2 and fd4 violates 2NF

2NF



Fd3' violates 3NF

3NF / BCNF