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

(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.

<table>
<thead>
<tr>
<th>staffNo</th>
<th>dentistName</th>
<th>patNo</th>
<th>patName</th>
<th>appointment date</th>
<th>surgeryNo</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1011</td>
<td>Tony Smith</td>
<td>P100</td>
<td>Gillian White</td>
<td>12-Sep-01 10.00</td>
<td>S15</td>
</tr>
<tr>
<td>S1011</td>
<td>Tony Smith</td>
<td>P105</td>
<td>Jill Bell</td>
<td>17-Sep-01 17.00</td>
<td>S15</td>
</tr>
<tr>
<td>S1024</td>
<td>Helen Pearson</td>
<td>P108</td>
<td>Ian MacKay</td>
<td>12-Sep-01 10.00</td>
<td>S10</td>
</tr>
<tr>
<td>S1024</td>
<td>Helen Pearson</td>
<td>P108</td>
<td>Ian MacKay</td>
<td>14-Sep-01 14.00</td>
<td>S10</td>
</tr>
<tr>
<td>S1032</td>
<td>Robin Plevin</td>
<td>P105</td>
<td>Jill Bell</td>
<td>14-Sep-01 16.30</td>
<td>S15</td>
</tr>
<tr>
<td>S1032</td>
<td>Robin Plevin</td>
<td>P110</td>
<td>John Walker</td>
<td>15-Sep-01 18.00</td>
<td>S13</td>
</tr>
</tbody>
</table>

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

FD1: staffNo → aDate
FD2: staffNo → aTime
FD3: staffNo → dentistName
FD4: staffNo → patNo
FD5: staffNo → patName
FD6: surgeryNo → staffNo

2NF

FD1: staffNo → aDate
FD2: staffNo → aTime
FD3: staffNo → patNo
FD4: staffNo → patName
FD5: surgeryNo → staffNo
FD6: dentistName → staffNo

3NF / BCNF

FD1: staffNo → aDate
FD2: staffNo → aTime
FD3: staffNo → patNo
FD4: staffNo → surgeryNo
FD5: staffNo → dentistName
FD6: surgeryNo → staffNo
FD7: patNo → patName

FD2 and FD4 violate 2NF

FD3' violates 3NF