Medical inventory optimization

Exploratory Data Analysis SQL by Om Prakash Sinha

Software: pgAdmin 4 (SQL) Workbench

Bounce Rate Analysis:

1. Finding the percentage of customers who bounced (returned a product with a final sale price of 0) out of the total number of customers.

```
SELECT ROUND((bounced_customers / total_customers) * 100, 2) AS bounce_rate
FROM
 (SELECT COUNT(DISTINCT Patient_ID) AS total_customers
 FROM cleaned_table
 WHERE Typeofsales IN ('Sale', 'Return')) AS t1,
 (SELECT COUNT(DISTINCT Patient_ID) AS bounced_customers
 FROM cleaned_table
 WHERE Typeofsales = 'Return' AND Final_Sales = 0) AS t2;
```

Output:

bounce_rate
22.85

Insight:

We can understand that around 22.85% of customers in the ‘cleaned_table’ faced a situation where they returned medicines with a Final_Sales value of 0. This means that a significant portion of customers did not get the medicines they needed, which could lead to dissatisfaction. To improve business success and increase revenue, it is important to reduce this bounce rate by ensuring customers receive the medicines they require.

2. Finding the number of drugs in each subcategory that have been returned without making a sale (Final_Sales = 0).

```
SELECT SubCat, COUNT(DISTINCT DrugName) AS
num_returned_drugs FROM cleaned_table
WHERE Typeofsales = 'Return' AND Final_Sales =
0 GROUP BY SubCat
ORDER BY num_returned_drugs DESC;
```

Output:

SubCat	num_returned_drugs
INJECTIONS	98
TABLETS & CAPSULES	63
IV FLUIDS, ELECTROLYTES, TPN	18
INHALERS & RESPULES	10
SYRUP & SUSPENSION	8
OINTMENTS, CREAMS & GELS	7
DROPS	6
POWDER	6
LIQUIDS & SOLUTIONS	5
PESSARIES & SUPPOSITORIES	4
NUTRITIONAL SUPPLEMENTS	3
VACCINE	2
LOTIONS	1
PATCH	1
unknown	1

Insight:

We can observe that the subcategory "INJECTIONS" has the highest count of returned drug names with 98 occurrences, followed by the subcategory "TABLETS & CAPSULES" with 63 occurrences, indicating a potential issue with customer satisfaction, product quality, or other factors that lead to returns for these two subcategories.

3. Finding the formulation with the highest return count within the "INJECTIONS" and "TABLETS & CAPSULES" subcategories.

```
SELECT SubCat, Formulation, return_count
FROM (
   SELECT SubCat, Formulation, COUNT(*) AS return_count,
      ROW_NUMBER() OVER (PARTITION BY SubCat ORDER BY COUNT(*) DESC) AS rn
   FROM cleaned_table
   WHERE Typeofsales = 'Return' AND Final_Sales = 0 AND SubCat IN ('INJECTIONS', 'TABLETS & CAPSULES')
   GROUP BY SubCat, Formulation
) AS subquery
WHERE rn = 1;
```

Output:

SubCat	Formulation	return_count
INJECTIONS	Form1	398
TABLETS & CAPSULES	Form1	77

Insight:

We can observe that within the "INJECTIONS" subcategory, the Formulation "Form1" has the highest return count with 398 occurrences. Similarly, within the "TABLETS & CAPSULES" subcategory, the Formulation "Form1" again has the highest return count with 77 occurrences.

4. Finding the count of occurrences of Formulation "Form1" for each Department (Dept) where the SubCat is either "INJECTIONS" or "TABLETS & CAPSULES".

```
SELECT Dept, COUNT(*) AS form1_count
FROM cleaned_table
WHERE Formulation = 'Form1' AND SubCat IN ('INJECTIONS', 'TABLETS &
CAPSULES') GROUP BY Dept
ORDER BY form1_count DESC;
```

Output:

Dept	form1_count
Department1	5226
Department2	782
Department3	99

Insight:

The Formulation "Form1" appears to be significantly more prevalent in Department1 compared to other departments which likely corresponds to the Pharmacy department, has a high demand or usage of the "Form1" formulation. This could indicate that "Form1" is a commonly
prescribed or requested medication within this department.

5. Finding the count of occurrences of Typeofsales as 'Return' for each Department (Dept).

```
SELECT Dept, COUNT(*) AS return_count
FROM cleaned_table
WHERE Typeofsales = 'Return'
GROUP BY Dept;
```

Output:

Dept	return_count
Department1	1405
Department2	1

Insight:

Department1 has a relatively higher count of return occurrences compared to other departments. This suggests that there may be more instances of customers returning products in Department1.

6. Finding the count of occurrences of Typeofsales as 'Return' for each Specialisation within Department1 and Formulation as 'Form1'

```
SELECT Specialisation, COUNT(*) AS
return_count FROM cleaned_table
WHERE Typeofsales = 'Return' AND Dept = 'Department1' AND Formulation =
'Form1' GROUP BY Specialisation
ORDER BY return_count DESC;
```

Output:

Specialisation	return_count
Specialisation4	197
Specialisation7	143
Specialisation5	40
Specialisation6	38
Specialisation11	37
Specialisation8	33
Specialisation3	32
Specialisation2	32
Specialisation1	29
Specialisation20	25
Specialisation21	23
Specialisation16	22
Specialisation26	19

Insight:

We can observe that Specialisation4 and Specialisation7 are experiencing a relatively higher number of returns compared to other Specialisations within Department1 and Formulation as 'Form1'.

Conclusion:

Based on the patterns and trends gained from the analysis of the dataset, the following conclusions can be drawn:

1. Focus on Subcategories: The subcategories "INJECTIONS" and "TABLETS & CAPSULES" require special attention due to their higher counts of returned drug names. The hospital should conduct a thorough analysis of these subcategories to identify the underlying causes and take necessary steps to address customer satisfaction, product quality, or other issues contributing to returns.

2. Evaluation of Formulation: The "Form1" formulation stands out with the highest return counts in both the "INJECTIONS" and "TABLETS & CAPSULES" subcategories. It is essential to thoroughly evaluate this formulation, considering factors such as product effectiveness, potential side effects, and customer preferences. Improvements in the formulation or alternative options should be explored to reduce returns.

3. Supplier Assessment: Assess the performance of suppliers providing products to Department1, particularly those supplying the "Form1" formulation. Evaluate factors such as product quality, reliability, and adherence to customer requirements. Consider alternative suppliers or negotiate with existing ones to improve the quality and availability of these products.

4. Inventory Management: Ensure efficient inventory management for Department1, particularly for products with the "Form1" formulation. Optimize stock levels, expiration dates, and replenishment processes to minimize instances of expired or obsolete products. Proper inventory management can help reduce returns and maintain a more cost-effective inventory.

5. Efficient Return Management: Department1, representing the Pharmacy department, experiences a relatively higher count of return occurrences. The hospital should focus on implementing efficient return management practices, such as streamlining return processes, improving inventory management, and addressing any issues specific to Department1 that contribute to returns.