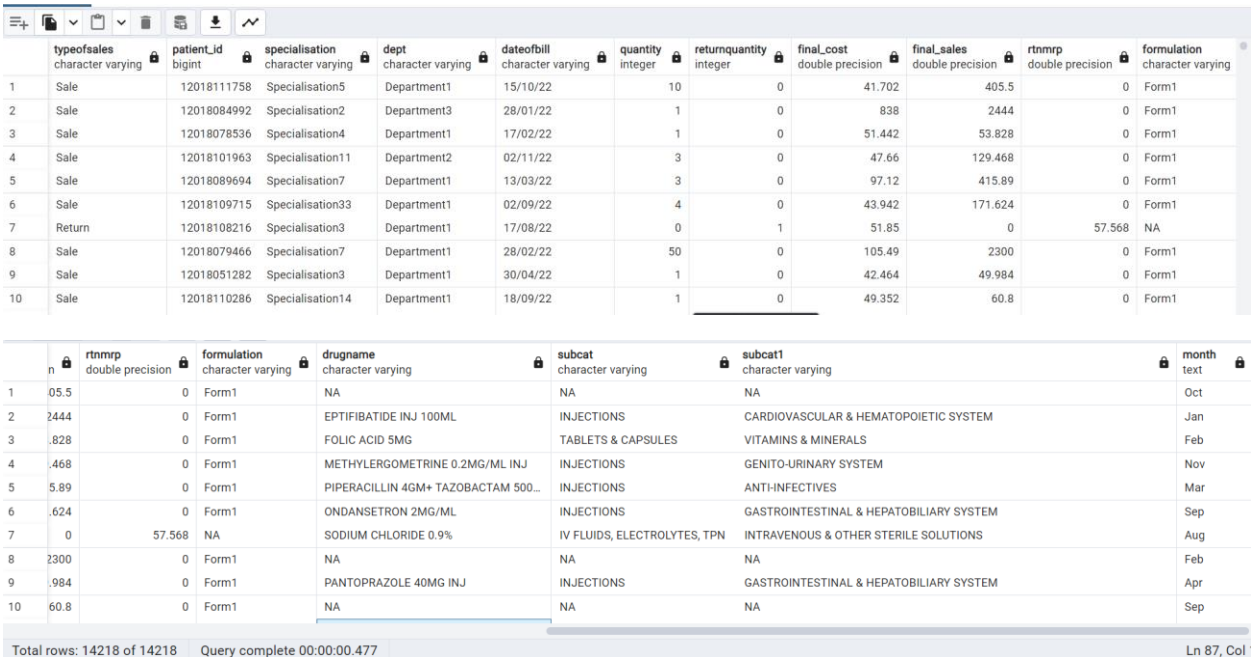
EDA Analysis:

Clean data view:

/* EDA analysis */

select * from MioView1



	typeofsales character varying	patient_id bigint	specialisation character varying	dept character varying	dateofbill character varying	quantity integer	returnquantity integer	final_cost double precision	final_sales double precision	rtnmrp double precision	formulation character varying
1	Sale	12018111758	Specialisation5	Department1	15/10/22	10	0	41.702	405.5	0	Form1
2	Sale	12018084992	Specialisation2	Department3	28/01/22	1	0	838	2444	0	Form1
3	Sale	12018078536	Specialisation4	Department1	17/02/22	1	0	51.442	53.828	0	Form1
4	Sale	12018101963	Specialisation11	Department2	02/11/22	3	0	47.66	129.468	0	Form1
5	Sale	12018089694	Specialisation7	Department1	13/03/22	3	0	97.12	415.89	0	Form1
6	Sale	12018109715	Specialisation33	Department1	02/09/22	4	0	43.942	171.624	0	Form1
7	Return	12018108216	Specialisation3	Department1	17/08/22	0	1	51.85	0	57.568	NA
8	Sale	12018079466	Specialisation7	Department1	28/02/22	50	0	105.49	2300	0	Form1
9	Sale	12018051282	Specialisation3	Department1	30/04/22	1	0	42.464	49.984	0	Form1
10	Sale	12018110286	Specialisation14	Department1	18/09/22	1	0	49.352	60.8	0	Form1

	n	rtnmrp double precision	formulation character varying	drugname character varying	subcat character varying	subcat1 character varying	month text
1	05.5	0	Form1	NA	NA	NA	Oct
2	2444	0	Form1	EPTIFIBATIDE INJ 100ML	INJECTIONS	CARDIOVASCULAR & HEMATOPOIETIC SYSTEM	Jan
3	.828	0	Form1	FOLIC ACID 5MG	TABLETS & CAPSULES	VITAMINS & MINERALS	Feb
4	.468	0	Form1	METHYLERGOMETRINE 0.2MG/ML INJ	INJECTIONS	GENITO-URINARY SYSTEM	Nov
5	5.89	0	Form1	PIPERACILLIN 4GM+ TAZOBACTAM 500...	INJECTIONS	ANTI-INFECTIVES	Mar
6	.624	0	Form1	ONDANSETRON 2MG/ML	INJECTIONS	GASTROINTESTINAL & HEPATOBILIARY SYSTEM	Sep
7	0	57.568	NA	SODIUM CHLORIDE 0.9%	IV FLUIDS, ELECTROLYTES, TPN	INTRAVENOUS & OTHER STERILE SOLUTIONS	Aug
8	2300	0	Form1	NA	NA	NA	Feb
9	.984	0	Form1	PANTOPRAZOLE 40MG INJ	INJECTIONS	GASTROINTESTINAL & HEPATOBILIARY SYSTEM	Apr
10	60.8	0	Form1	NA	NA	NA	Sep

Total rows: 14218 of 14218 Query complete 00:00:00.477 Ln 87, Col

Finding Maximum and Minimum, average and count of quantity of sale and Maximum and minimum, average and count of returnquantity of return items out of sale

-- Descriptive statistics:

-- Maximum quantity, minimum quantity, maximum return quantity, minimum return quantity, avg of quantity and return quantity and total quantity sales and return quantity

select Max(quantity) as "max quantity",

MIN(quantity) as "min quantity",

AVG(quantity) as "avg quantity",

count(quantity) as "no of country",

MAX(returnquantity) as "max returnquantity",

MIN(returnquantity) as "min returnquantity",

AVG(returnquantity) as "avg returnquantity",

count(returnquantity) as " total returns"

from MioView1

	max quantity integer	min quantity integer	avg quantity numeric	no of country bigint	max returnquantity integer	min returnquantity integer	avg returnquantity numeric	total returns bigint
1	150	0	2.2317484878323252	14218	50	0	0.29195386130257420172	14218

Frequency distribution of type of sales items

--frequency of sales

SELECT typeofsales, COUNT(*) as frequency

FROM MioView1

GROUP BY typeofsales

ORDER BY frequency DESC;

	typeofsales character varying	frequency bigint
1	Sale	12537
2	Return	1681

Out of 14218 sales data 12537 are total sales and 1681 is total returns

First Moment Bussiness Decision:

First Moment Business Decision contains mean, median and mode values

Mean:

select round(avg(quantity)) as "average quantity",

round(avg(returnquantity)) as "average returnquantity",

round(avg(final_cost)) as "average final_cost",

round(avg(final_sales)) as "average final_sales",

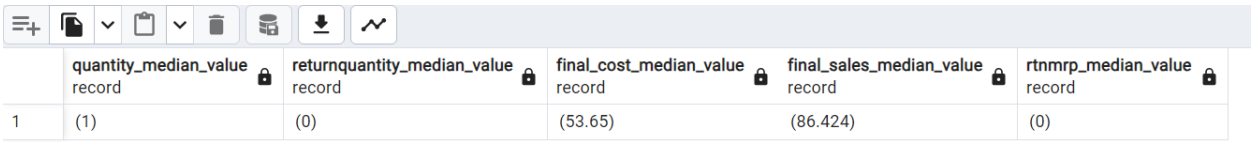
round(avg(rtnmrp)) as "average of rtnmrp"

from MioView1

	average quantity numeric	average returnquantity numeric	average final_cost double precision	average final_sales double precision	average of rtnmrp double precision
1	2	0	125	234	29

Median:

```
SELECT QUANTITY_MEDIAN AS QUANTITY_MEDIAN_VALUE,
RETURNQUANTITY_MEDIAN AS RETURNQUANTITY_MEDIAN_VALUE,
FINAL_COST_MEDIAN AS FINAL_COST_MEDIAN_VALUE,
FINAL_SALES_MEDIAN AS FINAL_SALES_MEDIAN_VALUE,
RTNMRP_MEDIAN AS RTNMRP_MEDIAN_VALUE
FROM
(
SELECT
  PERCENTILE_CONT(0.5) WITHIN GROUP (ORDER BY quantity) AS median
FROM
  MioView1) AS QUANTITY_MEDIAN,
(SELECT
        PERCENTILE_CONT(0.5) WITHIN GROUP (ORDER BY RETURNQUANTITY) AS MEDIAN
FROM
        MioView1) AS RETURNQUANTITY_MEDIAN,
(SELECT
        PERCENTILE_CONT(0.5) WITHIN GROUP (ORDER BY final_cost) AS MEDIAN
FROM
        MioView1) AS FINAL_COST_MEDIAN,
(SELECT
        PERCENTILE_CONT(0.5) WITHIN GROUP (ORDER BY final_sales) AS MEDIAN
FROM
        MioView1) AS FINAL_SALES_MEDIAN,
(SELECT
        PERCENTILE_CONT(0.5) WITHIN GROUP (ORDER BY rtnmrp) AS MEDIAN
FROM
        MioView1) AS RTNMRP_MEDIAN
```



	quantity_median_value record	returnquantity_median_value record	final_cost_median_value record	final_sales_median_value record	rtnmrp_median_value record
1	(1)	(0)	(53.65)	(86.424)	(0)

Mode:

```
select quantity_mode as quantity_mode_value,
return_mode as returnquantity_mode_value,
finalcost_mode as final_cost_mode_value,
finalsales_mode as final_sales_mode_value,
rtnmrp_mode as rtnmrp_mode_valuw
from
(SELECT quantity AS mode_value, COUNT(*) AS frequency
FROM MioView1
GROUP BY quantity
ORDER BY COUNT(*) DESC
LIMIT 1) as quantity_mode,
(SELECT returnquantity AS mode_value, COUNT(*) AS frequency
FROM MioView1
GROUP BY returnquantity
ORDER BY COUNT(*) DESC
LIMIT 1) as return_mode,
(SELECT final_cost AS mode_value, COUNT(*) AS frequency
FROM MioView1
GROUP BY final_cost
ORDER BY COUNT(*) DESC
LIMIT 1) as finalcost_mode,
(SELECT final_sales AS mode_value, COUNT(*) AS frequency
FROM MioView1
GROUP BY final_sales
```

ORDER BY COUNT(*) DESC

LIMIT 1) as finalsales_mode,

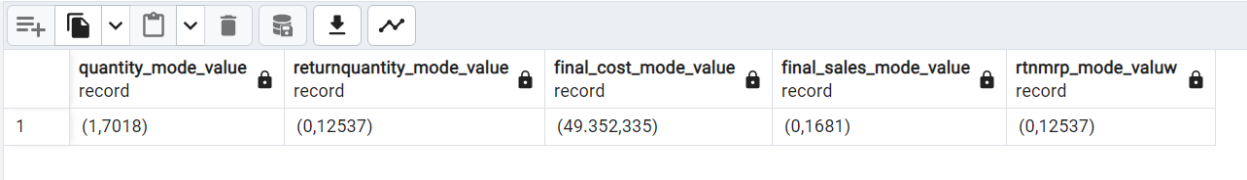
(SELECT rtnmrp AS mode_value, COUNT(*) AS frequency

FROM MioView1

GROUP BY rtnmrp

ORDER BY COUNT(*) DESC

LIMIT 1) as rtnmrp_mode



	quantity_mode_value record	returnquantity_mode_value record	final_cost_mode_value record	final_sales_mode_value record	rtnmrp_mode_valuw record
1	(1,7018)	(0,12537)	(49.352,335)	(0,1681)	(0,12537)

Second Moment Business Decision contains: Variance, standard deviation and range

Variance:

select variance(quantity::numeric) as variance_quantity,

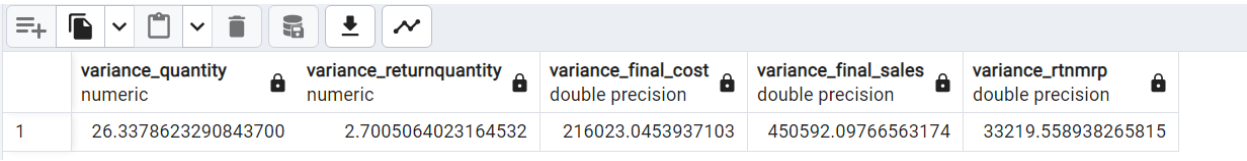
variance(returnquantity::numeric) as variance_returnquantity,

variance(final_cost) as variance_final_cost,

variance(final_sales) as variance_final_sales,

variance(rtnmrp) as variance_rtnmrp

from MioView1



	variance_quantity numeric	variance_returnquantity numeric	variance_final_cost double precision	variance_final_sales double precision	variance_rtnmrp double precision
1	26.3378623290843700	2.7005064023164532	216023.0453937103	450592.09766563174	33219.558938265815

Standard Deviation:

-- standard Deviation:

select stddev(quantity::numeric) as stdev_quantity,

stddev(returnquantity::numeric) as stdev_returnquantity,

stddev(final_cost) as stdev_final_cost,

stddev(final_sales) as stdev_final_sales,

stddev(rtnmrp) as stdev_rtnmrp

from MioView1

	stdev_quantity numeric	stdev_returnquantity numeric	stdev_final_cost double precision	stdev_final_sales double precision	stdev_rtnmrp double precision
1	5.1320427053059847	1.6433217586085974	464.7827937797507	671.2615717182324	182.2623354899904

Range:

select

max(quantity) - min(quantity) as range_of_quantity,

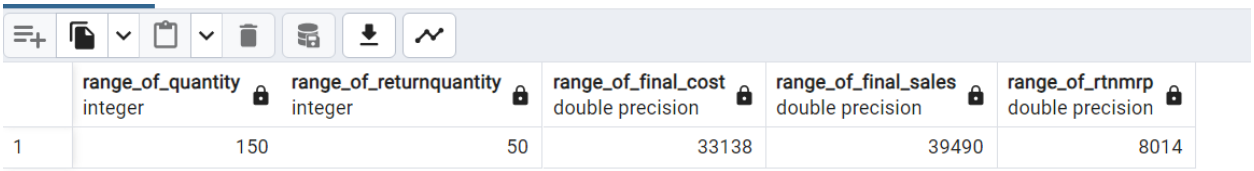
max(returnquantity) - min(returnquantity) as range_of_returnquantity,

max(final_cost) - min(final_cost) as range_of_final_cost,

max(final_sales) - min(final_sales) as range_of_final_sales,

max(rtnmrp) - min(rtnmrp) as range_of_rtnmrp

from MioView1;



	range_of_quantity integer	range_of_returnquantity integer	range_of_final_cost double precision	range_of_final_sales double precision	range_of_rtnmrp double precision
1	150	50	33138	39490	8014

Third Movement Business Decision:

Skewness:

Skewness is a measure of the asymmetry of a distribution

-- Calculate skewness for a numerical column

```
WITH moments1 AS (
   SELECT
      AVG(quantity) AS mean_quantity,
      STDDEV(quantity) AS stddev_quantity,
                  AVG(returnquantity) as mean_returnquantity,
                  STDDEV(returnquantity) as stddev_returnquantity,
                  AVG(final_cost) as mean_final_cost,
                  STDDEV(final_cost) as stddev_final_cost,
```

```
        AVG(final_sales) as mean_final_sales,
        STDDEV(final_cost) as stddev_final_sales,
        AVG(rtnmrp) as mean_rtnmrp,
        STDDEV(rtnmrp) as stddev_rtnmrp
    FROM MioView1
)
SELECT
        --quantity as quantity,
    SUM(POWER(quantity - mean_quantity, 3)) / (COUNT(*) * POWER(stddev_quantity, 3)) AS skewness_for_quantity,
    SUM(POWER(returnquantity - mean_returnquantity, 3)) / (COUNT(*) * POWER(stddev_returnquantity, 3)) AS skewness_for_returnquantity,
    SUM(POWER(final_cost - mean_final_cost, 3)) / (COUNT(*) * POWER(stddev_final_cost, 3)) AS skewness_for_final_cost,
    SUM(POWER(final_sales - mean_final_sales, 3)) / (COUNT(*) * POWER(stddev_final_sales, 3)) AS skewness_for_final_sales,
    SUM(POWER(rtnmrp - mean_rtnmrp, 3)) / (COUNT(*) * POWER(stddev_rtnmrp, 3)) AS skewness_for_rtnmrp
FROM
    MioView1, moments1
GROUP BY stddev_quantity,stddev_returnquantity,stddev_final_cost,stddev_final_sales,stddev_rtnmrp;
```

	skewness_for_quantity numeric	skewness_for_returnquantity numeric	skewness_for_final_cost double precision	skewness_for_final_sales double precision	skewness_for_rtnmrp double precision
1	11.33864142914306593	17.16874156985727547518	34.500933605698066	63.26913076943011	15.794519844521258

Kurtosis: Kurtosis is a statistical measure that describes the distribution of a dataset.

```
-- Kurtoris
WITH moments AS (
  SELECT
    AVG((quantity - (select avg(quantity)from MioView1))::NUMERIC ^ 4) AS fourth_moment1,
    AVG((quantity - (select avg(quantity)from MioView1))::NUMERIC ^ 2) AS second_moment1,
```

```
   AVG((returnquantity - (select avg(returnquantity)from MioView1))::NUMERIC ^ 4) AS
fourth_moment2,

   AVG((returnquantity - (select avg(returnquantity)from MioView1))::NUMERIC ^ 2) AS
second_moment2,

   AVG((final_cost - (select avg(final_cost)from MioView1))::NUMERIC ^ 4) AS fourth_moment3,

   AVG((final_cost - (select avg(final_cost)from MioView1))::NUMERIC ^ 2) AS second_moment3,

   AVG((final_sales - (select avg(final_sales)from MioView1))::NUMERIC ^ 4) AS fourth_moment4,

   AVG((final_sales - (select avg(final_sales)from MioView1))::NUMERIC ^ 2) AS second_moment4,

   AVG((rtnmrp - (select avg(rtnmrp)from MioView1))::NUMERIC ^ 4) AS fourth_moment5,

   AVG((rtnmrp - (select avg(rtnmrp)from MioView1))::NUMERIC ^ 2) AS second_moment5

 FROM

   MioView1

)

SELECT

 fourth_moment1 / (second_moment1 ^ 2) AS kurtosis_for_quantity,

 fourth_moment2 / (second_moment2 ^ 2) AS kurtosis_for_returnquantity,

 fourth_moment3 / (second_moment3 ^ 2) AS kurtosis_for_final_cost,

 fourth_moment4 / (second_moment4 ^ 2) AS kurtosis_for_final_sales,

 fourth_moment5 / (second_moment5 ^ 2) AS kurtosis_for_rtmrp

FROM

 moments;
```

	kurtosis_for_quantity numeric	kurtosis_for_returnquantity numeric	kurtosis_for_final_cost numeric	kurtosis_for_final_sales numeric	kurtosis_for_rtmrp numeric
1	183.090088488486456260	412.27252757316158704295	2028.15369325488495063155 15	951.1887579529289500	406.3826264509184250

Bounce Rate Analysis:

Q1) Total Distinct patients

select count(Distinct patient_id) from MioView1

	count bigint
1	4883

Q2) patient_id count where type of sale is return

select count(Distinct patient_id), typeofsales from MioView1 where typeofsales = 'Return' group by typeofsales

	count bigint	typeofsales character varying
1	1217	Return

Q3) patient_id count where type of sale is sale

select count(Distinct patient_id), typeofsales from MioView where typeofsales = 'Sale' group by typeofsales

	count bigint	typeofsales character varying
1	4632	Sale

Q4) Overall Bounce Rate

SELECT

COUNT(DISTINCT patient_id) AS total_patients,

COUNT(DISTINCT CASE WHEN returnquantity > 0 THEN patient_id END) AS returning_patients,

(COUNT(DISTINCT CASE WHEN returnquantity > 0 THEN patient_id END) * 100.0) / COUNT(DISTINCT patient_id) AS bounce_rate

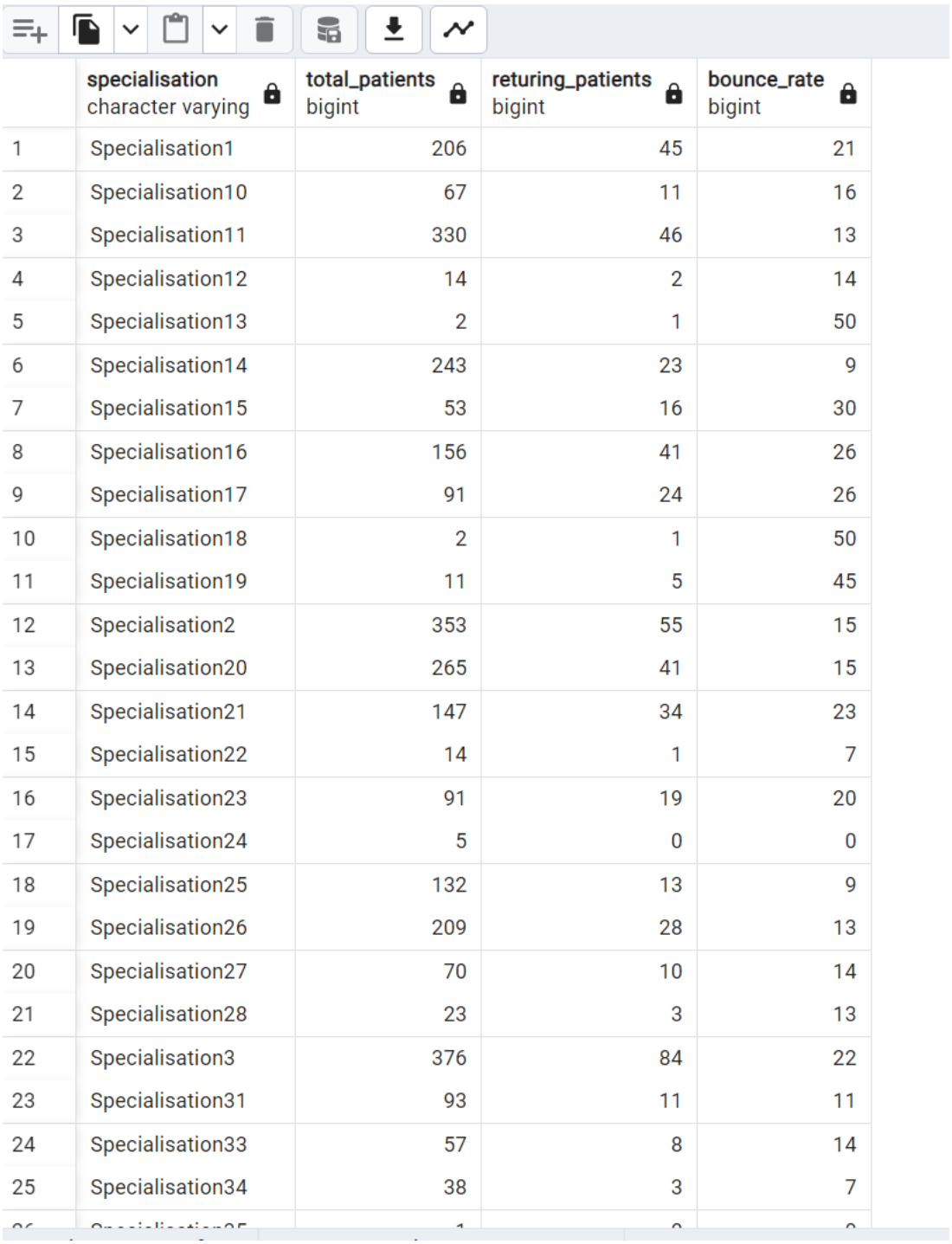
FROM MioView1;

	total_patients bigint	returning_patients bigint	bounce_rate numeric
1	4883	1217	24.9232029490067581

Q4) Bounce rate by specilization

select

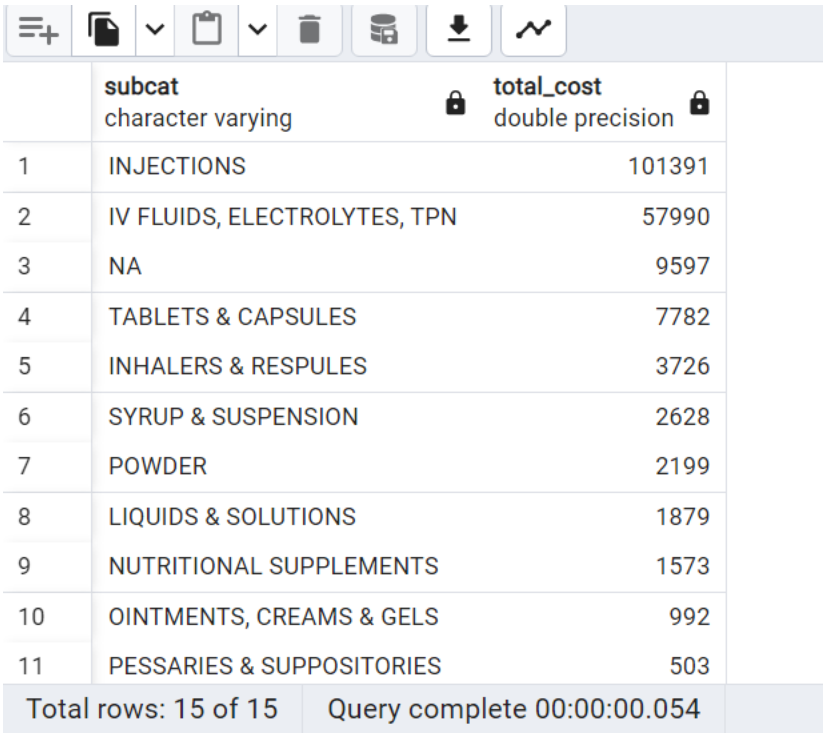
```
specialisation,

count(distinct patient_id) as total_patients,

count(Distinct case when returnquantity > 0 then patient_id end) as returing_patients,

(count(Distinct case when returnquantity > 0 then patient_id end)*100)/count(distinct patient_id) as Bounce_rate

from MioView1

group by specialisation
```



	specialisation character varying	total_patients bigint	returing_patients bigint	bounce_rate bigint
1	Specialisation1	206	45	21
2	Specialisation10	67	11	16
3	Specialisation11	330	46	13
4	Specialisation12	14	2	14
5	Specialisation13	2	1	50
6	Specialisation14	243	23	9
7	Specialisation15	53	16	30
8	Specialisation16	156	41	26
9	Specialisation17	91	24	26
10	Specialisation18	2	1	50
11	Specialisation19	11	5	45
12	Specialisation2	353	55	15
13	Specialisation20	265	41	15
14	Specialisation21	147	34	23
15	Specialisation22	14	1	7
16	Specialisation23	91	19	20
17	Specialisation24	5	0	0
18	Specialisation25	132	13	9
19	Specialisation26	209	28	13
20	Specialisation27	70	10	14
21	Specialisation28	23	3	13
22	Specialisation3	376	84	22
23	Specialisation31	93	11	11
24	Specialisation33	57	8	14
25	Specialisation34	38	3	7

Q5) total cost of purchase that return from subcat

```
select subcat,round(sum(final_cost)) as total_cost
from MioView where typeofsales = 'Return'
group by subcat
order by total_cost Desc
```



	subcat character varying	total_cost double precision
1	INJECTIONS	101391
2	IV FLUIDS, ELECTROLYTES, TPN	57990
3	NA	9597
4	TABLETS & CAPSULES	7782
5	INHALERS & RESPULES	3726
6	SYRUP & SUSPENSION	2628
7	POWDER	2199
8	LIQUIDS & SOLUTIONS	1879
9	NUTRITIONAL SUPPLEMENTS	1573
10	OINTMENTS, CREAMS & GELS	992
11	PESSARIES & SUPPOSITORIES	503

Total rows: 15 of 15 Query complete 00:00:00.054

Insight: We can see Injections which hast highest final cost with 101391 followed by iv fluids, electronics, TPN with 57990. Returning this subcategories items will lead to cost burden to the medical inventory

Q6) count of drug returned without sales

```
select subcat,

count(distinct drugname) as no_of_returned_drugs

from MioView1

where typeofsales = 'Return' and final_sales = 0

group by subcat

order by no_of_returned_drugs desc
```

	subcat character varying	no_of_returned_drugs bigint
1	INJECTIONS	111
2	TABLETS & CAPSULES	65
3	IV FLUIDS, ELECTROLYTES, TPN	21
4	INHALERS & RESPULES	10
5	SYRUP & SUSPENSION	9
6	POWDER	7
7	OINTMENTS, CREAMS & GELS	7
8	DROPS	6
9	LIQUIDS & SOLUTIONS	5
10	PESSARIES & SUPPOSITORIES	4
11	NUTRITIONAL SUPPLEMENTS	3

Total rows: 15 of 15 Query complete 00:00:00.055

Insight: We can observe from above that subcategory Injection has the highest count of returns with 111 following by Tablets and capsules with 65, which can indicate that the customer disatification with this categories or other factors leading to return

Q7) Return items based on month

```
select month,count(*) as return_count

from MioView1

where typeofsales = 'Return'

group by month

order by return_count Desc
```

	month text	return_count bigint
1	May	178
2	Aug	177
3	Jul	156
4	Dec	151
5	Mar	143
6	Sep	135
7	Nov	133
8	Oct	130
9	Apr	129
10	Feb	123
11	Jun	116
12	Jan	110

Q8) total sales when sales is return

```
select typeofsales,
sum(final_sales) as total_final_sales
from MioView1
group by typeofsales;
```

	typeofsales character varying	total_sales double precision
1	Return	0
2	Sale	3327556.555999956

Even though return was done it is not effecting the total sales

Q9) durgs which are mostly return

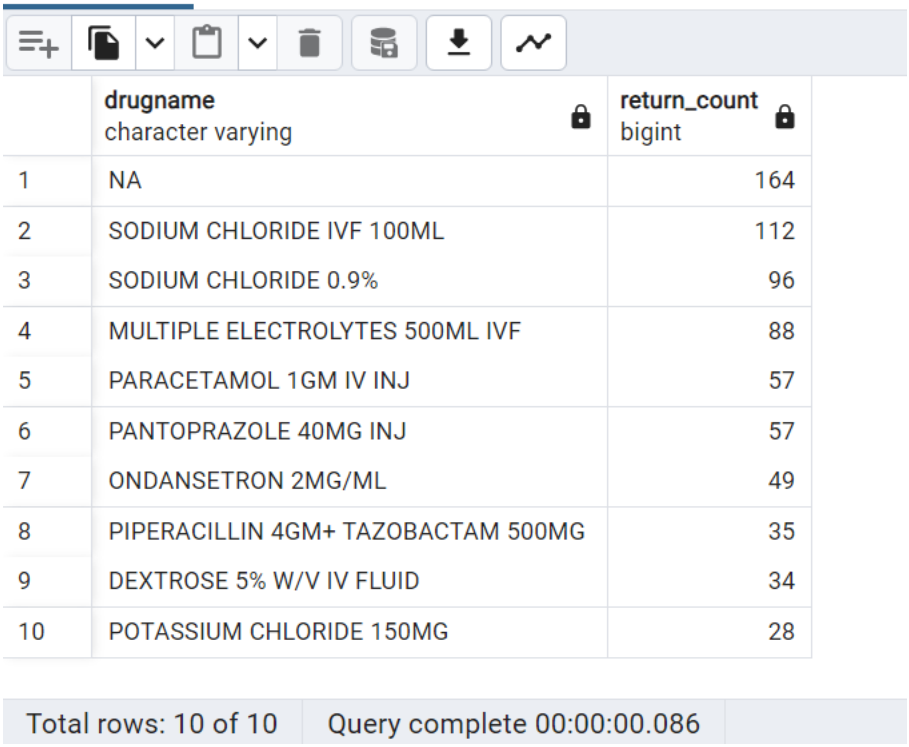
```
select drugname, count(*) as return_count
from MioView1
```

where returnquantity > 0

group by drugname

order by return_count Desc

limit 10;

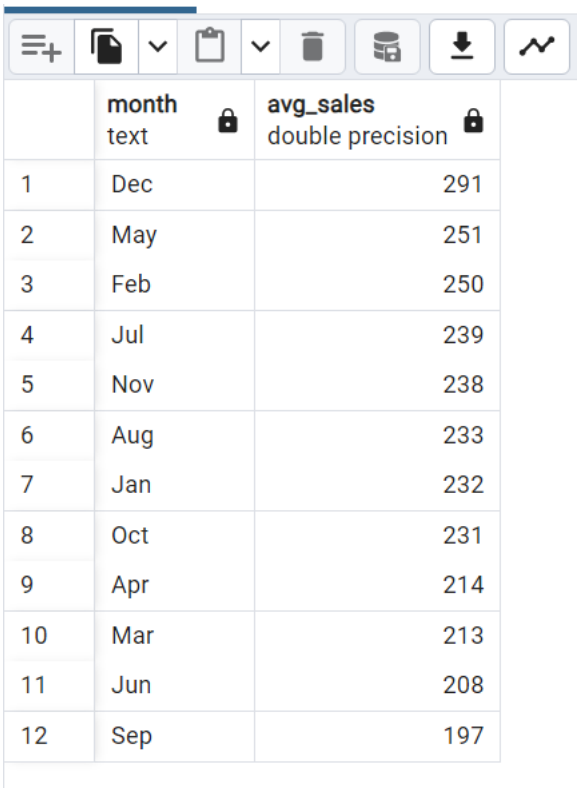


	drugname character varying	return_count bigint
1	NA	164
2	SODIUM CHLORIDE IVF 100ML	112
3	SODIUM CHLORIDE 0.9%	96
4	MULTIPLE ELECTROLYTES 500ML IVF	88
5	PARACETAMOL 1GM IV INJ	57
6	PANTOPRAZOLE 40MG INJ	57
7	ONDANSETRON 2MG/ML	49
8	PIPERACILLIN 4GM+ TAZOBACTAM 500MG	35
9	DEXTROSE 5% W/V IV FLUID	34
10	POTASSIUM CHLORIDE 150MG	28

Total rows: 10 of 10 | Query complete 00:00:00.086

Q10) Total sales based on month

select month,round(avg(final_sales)) as avg_sales from MioView1 group by month order by avg_sales Desc



	month text	avg_sales double precision
1	Dec	291
2	May	251
3	Feb	250
4	Jul	239
5	Nov	238
6	Aug	233
7	Jan	232
8	Oct	231
9	Apr	214
10	Mar	213
11	Jun	208
12	Sep	197

Q11) Average quantity of durg purchases

select drugname,round(Avg(quantity)) as AVG_quantity from MioView1 group by drugname

	drugname character varying	avg_quantity numeric
1	GLYCOPYRROLATE	2
2	CEFOTAXIME 250MG	3
3	HUMAN ALBUMIN 5% 250ML INJ	1
4	GLYCOPYRROLATE 0.5 MG+NEOSTIGMINE 2.5 MG	1
5	TELMISARTAN 40MG + HYDROCHLOROTHIAZIDE 12.5MG TAB	1
6	POLYETHYLENE GLYCOL 118GM+ POTASSIUM CHLORIDE 1.484GM+ SODIUM BICARBONATE 3.37GM	1
7	COENZYME Q10 + OMEGA 3 FATTY ACID 300MG + VITAMIN E 100MG	1
8	KETOROLAC 10MG TAB	1
9	ENOXAPARIN 20MG	1
10	ATORVASTATIN 20MG	1
11	OMEPRAZOLE 20MG + TINIDAZOLE 500MG + AMOXYCILLIN 750MG	1
12	CEFIXIME 200MG	1
13	SALBUTAMOL 2.5MG	4
14	VITAMIN B1 + B6 + B9 + MINERALS TAB	1
15	OXALIPLATIN??50MG	2
16	HUMAN ALBUMIN 25% INJ	1
17	METHYL PREDNISOLONE 4MG TAB	1
18	PROPOFOL 2% 50ML INJ	1
19	AMBROXOL 30MG/5ML + GUAIFENESIN 50MG/5ML + LEVOSALBUTAMOL 1MG/5ML SYP	1
20	HYDROCORTISONE 100MG INJ	1
21	AQUA,CETEARYL ALCHOL,GLYCERIN.SORRBITOL,PARAFFINUM	1
22	METHYL PREDNISOLONE 500MG INJ	1
23	METOCLOPROMIDE 2ML/10MG INJ	2
24	CARBOXYMETHYL CELLULOSE 15ML	0
25	ESCITALOPRAM 10MG	1

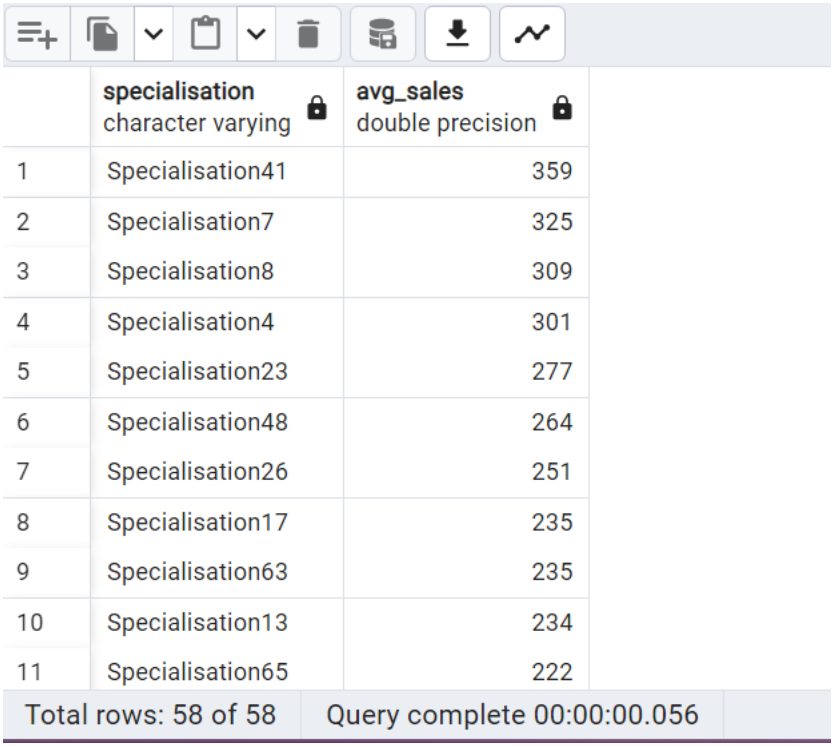
Q12) Relation between quantity and total sales

```
SELECT
  CORR(quantity, final_sales) AS correlation
FROM MioView1;
```

	correlation double precision
1	0.35987669105911646

Q13) Average Sales based on Sepcialisation

```
SELECT
  specialisation,
  ROUND(AVG(final_sales)) AS avg_sales
FROM MioView
GROUP BY specialisation
ORDER BY avg_sales DESC;
```

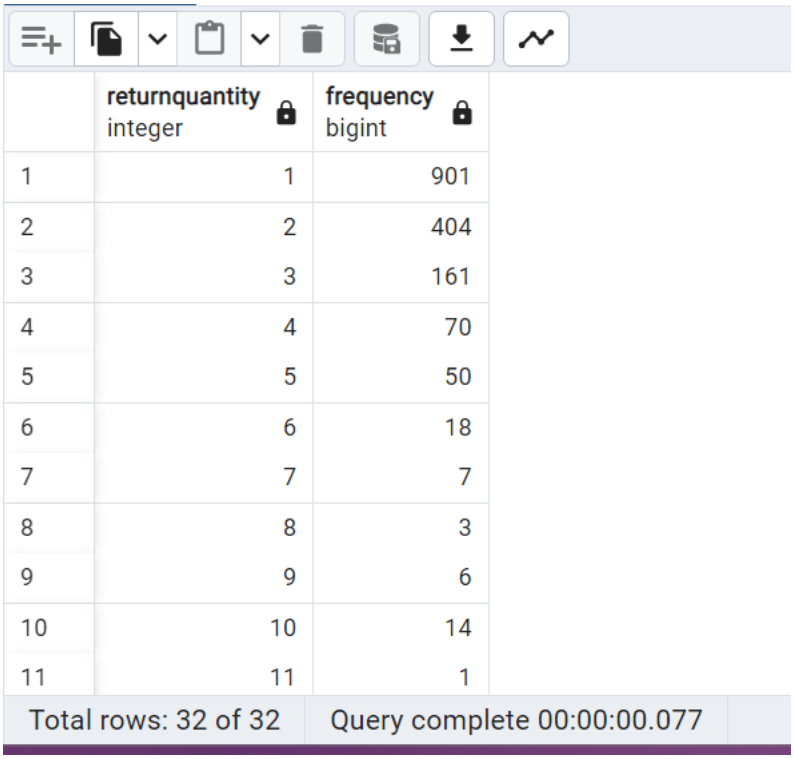


	specialisation character varying	avg_sales double precision
1	Specialisation41	359
2	Specialisation7	325
3	Specialisation8	309
4	Specialisation4	301
5	Specialisation23	277
6	Specialisation48	264
7	Specialisation26	251
8	Specialisation17	235
9	Specialisation63	235
10	Specialisation13	234
11	Specialisation65	222

Total rows: 58 of 58 Query complete 00:00:00.056

Q14) Frequency of return quantity

```
select returnquantity,count(*) as frequency
from MioView1
where returnquantity > 0
group by returnquantity
order by returnquantity
```



	returnquantity integer	frequency bigint
1	1	901
2	2	404
3	3	161
4	4	70
5	5	50
6	6	18
7	7	7
8	8	3
9	9	6
10	10	14
11	11	1

Total rows: 32 of 32 Query complete 00:00:00.077

901 times 1 item is returned after purchase followed by 401 times for 2 items. 50 items also returned at 3 times

Conclusion and insights:

From the above analysis we can see the sub categories Injections and tablets were returned frequently , so there may be some dissatisfaction with this products we need to check for those reasons for the items returned, the data we analyse does not consists that field so there is no correct finding for the reasons

We can these two categories injections, tablets, IV fluids return frequently and it costs lots of money, finding the reason for these returns we can reduce the amount of money lose to inventory

We can find highest average sales in December month and the highest returns in may month. Finding the reason we can increase the sales in other months.