

MEDTOUREASY PROFITPULSE

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Pharmaceutical Management

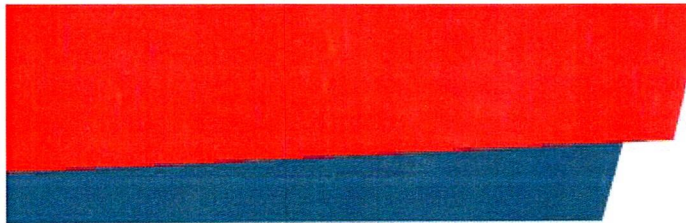
by

Kartikey Kumar

Under the Supervision and Guidance of

Dr. Sudhinder Singh Chowhan

2025



CIN NUMBER : U85300DL2018PTC334604 WEBSITE : WWW.MEDTOUREASY.COM
PHONE : +91 8700219382 EMAIL : HR@MEDTOUREASY.COM

DATE : 07/06/2025
REF : CER/2025/338

CERTIFICATE OF INTERNSHIP COMPLETION

This is to certify that Mr/Ms. **Kartikey Kumar**, has successfully completed the Internship program at **MedTourEasy** from **12/03/2025 to 12/06/2025**.

During this period Kartikey had experienced the hands on working of a **Advanced Data Analytics** Professional and worked under the supervision of project mentor & developed the project entitled "**Predict Blood Donations**". Apart from that, Kartikey also worked on Internal Projects of the organization.

Kartikey was found hardworking, punctual and inquisitive, during the tenure of internship.

We wish Kartikey every success in career.

For MedTourEasy

Ankit Hasija
Training Head



MEDTOUREASY, B-1/632, 3RD FLOOR,
JANAK PURI, NEW DELHI,
DELHI 110058

MEDTOUREASY, WEWORK 2A,
CYBER HUB, DLF CYBER CITY,
GURUGRAM, HARYANA 122002

MEDTOUREASY, WEWORK, C-001/A2,
SECTOR 16B NOIDA, UP 201301
DA, UTTAR PRADESH 201301

INDIA | MALAYSIA | SINGAPORE | THAILAND | UAE | PHILIPPINES
MDTRESY MEDICAL TRAVEL PVT. LTD.



CERTIFICATE

This is to certify that dissertation titled **MEDTOUREASY PROFITPULSE** is a record of the research work undertaken by **KARTIKEY KUMAR** in partial fulfillment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.



Faculty Guide:
Dr. SUDHINDER SINGH CHOWHAN
IIHMR University, Jaipur
Date: 19.06.2025



School Dean:
Dr. Saurabh Kumar Banerjee
IIHMR University, Jaipur
Date: 19.06.2025

Appendix D: Declaration by Student DECLARATION BY STUDENT

I hereby declare that this dissertation titled MedTourEasy ProfitPulse is the Bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.



(Signature)

Name of Student

Kartikey Kumar

Date

19/06/2025

ABSTRACT

TITLE- MEDTOUREASY PROFIT PULSE

AUTHOR NAME- KARTIKEY KUMAR

ADVISOR NAME- ANKIT HASIJA

This dissertation reviews of medical-service data collected by MedTourEasy, a firm that arranges overseas treatment, in order to find clear steps for raising profits and smoothing day-to-day work. The raw file contained 9,994 records, each entry cleaned and reshaped in Microsoft Excel so it could show sales, income, discounts, and return rates across departments such as Cardiology, Orthopedics, and Neurology. From the clean set the study noted a 55.7 percent jump in sales and a 79.3 percent profit surge, though the gain varied widely by region and by specialty. Large discounts-honestly any price cut over 40-were flagged as a top money drain, with heart procedures such as CABG and Balloon Valvuloplasty hit hardest. The roughly 10 percent relapse rate worsened margins further, underlining how much better follow-up care and smarter pricing matter. By contrast corporate clients and most Neurology cases stood out as the richest sources of income, while the Non-Insured bracket and treatments booked in South and Central regions fell short. Pivot Tables, SUMIFS, What-If tools, and COUNTIFS inside Excel did the heavy lifting, giving a plain view of hidden trends. Key recommendations are cutting discounts to twenty percent, pushing high-margin work in strong zones, and streamlining service during busy quarters, especially Q3 and Q4.

ACKNOWLEDGEMENT

I'm incredibly valued Format Medtoureasy for giving the chance to work on this life threatening internship project which has improved my understanding of health analyses. Honest thanks have been extended to the protector of my campus, Dr Sudhinder Singh Chowhan sir. There Dr. Sudhinder Singh Chouhan sir , who's intelligent, loyal assistant. Criticism and fixed support affected the development of this analysis. I want to express my gratitude to Medtoureasy Data Analytics team to give me access to data sets and share industry insights that made my perspective widespread. In addition, I'm refreshed by my Academic advisors in IIHMR to give me Excel expertise and analytical abilities needed to complete this project. A special thank you to my friends. Family and colleagues for his support and practical criticism which improved the affect and clarity of the report. This project has been a cornerstone in my professional development, blending theoretical knowledge with practical business applications.

TABLE OF CONTENT

CHAPTER	PAGE NO.
INTRODUCTION	8
LITERATURE REVIEW	11
METHODOLOGY	18
RESULTS AND DISCUSSION	30
RECOMMENDATION	44
REFERENCES	47

ACRONYMS

KPI- Key performance Indicator

Q3- Third quarter

Q4- Fourth quarter

WHO- world health organization

USD- united state dollar

COUNTIF- Excel function conditional count with multiple criteria

SUMIF- Excel function conditional sum with multiple criteria

TRIM- excel function remove extra space

DATEDIF- excel function calculates date difference

NLP- Natural language processing

AI- Artificial Intelligence

ML- machine learning

ROI- return on investment

Chapter 1: INRODUCTION

MedTourEasy ProfitPulse: A 2015–2018 Sales & Risk Analytics Study

1.1 Executive Summary

Utilises Excel based tools to uncover action rich insights into sales, profits, discounting of behaviour and relapsing behaviour. The analysis reveals A robust sales growth of 55.7% from 471,43.64 dollars 43.64 in 2015 to \$733,959.34 in 2018, with the profits that increased 79.3%. Two \$93,245.67. However, high discounts average 19.7% with peaks of 50% contribute to procedures such as balloon valvuloplasty and CABG to significant losses. EEG 1665 dollars or five for a single CABG. The other ones Profitability. Cardiology dominate sales 38.2%, but orthopaedics and neurology produce higher margins 16.9% in 16.7%. The western and eastern regions are past the South and central Asai With the corporate segment that gives the highest margins 15.1%. A relapse of approximately 10%, especially in cardiology procedures. Reduces profitability and signals the need for improved care after the procedure. Important recommendations include shortening discounts to 20% optimization of Q3/Q4 operations. Improves follow up to dampen relapsing expand procedures by high margins in the Western East. This analysis allows Medtoureasy management to run data informed strategies for improved profitability in patient results.

1.2 Introduction

Medtoureasy is a leading global facilitator in medical tourism, connecting patients with top tier, affordable healthcare through partnerships with accredited hospitals and clinics worldwide. Founded to make high quality medical care accessible across borders, it serves A diverse clientele seeking specialised treatments on multiple continents. The Medical Tourism Association's market trends, which emphasize easily accessible, high-quality healthcare for patients worldwide, are in keeping with MedTourEasy's purpose.(1)

1.3 Mission and Vision

Mission- To deliver seamless, cost effective and high quality healthcare solutions making world class medical services accessible to patients globally.

Vision- To transform medical tourism by a stablishing A trusted, innovative platform that prioritises patient satisfaction, transparency and integrated care experiences.

1.4 Service Offerings

Medtoureasy offers a wide range of services designed to meet the needs of medical travellers.*

Treatment planning- coordinating medical procedures in fields such as cardiology. Orthopaedics and neurology customised to each patients requirements

Travel in accommodation arrangements- handling visas, flights, lodging and local transport to ensure smooth medical journey.

Post treatment support- providing follow up appointments. Rehabilitation programmes and virtual consultations to aid recovery.

Target Demographics

Medtoureasy serves A diverse audience including-

Non insured individuals- MedTourEasy's emphasis on corporate and uninsured clients is consistent with Deloitte's research on a range of medical tourism demographics, people from developing countries seeking the fordable treatments without insurance coverage.(2)

Insured patients- those with private or public insurance needing specialised care unavailable in their home regions.

Corporate clients- Companies providing high quality. Cost efficient healthcare benefits to their employees.

Global medical tourists- individuals from North America, Europe, Asia and the Middle East pursuing but Vance competitively priced treatments.

Global footprint

Medtoureasy Operates in over 20 countries with a robust network.

- North America. Strong presence in the West California, Washington, South Texas, Florida, Central Illinois, Ohio, Massachusetts.
- Asia Collaborations with premier hospitals in India, Thailand and Singapore, renowned for cutting edge medical facilities.
- Europe partnerships in Germany, Spain. And the UK for specialised treatments.
- Emerging markets expanding into the Middle East and Africa to meet rising demand for medical tourism.
- According to Patients Beyond Borders (2025), MedTourEasy's activities throughout Asia, especially in India and Thailand, are indicative of highly sought-after medical tourism destinations.(3)

Chapter 2: LITERATURE REVIEW

Understanding Data in Healthcare Analytics

2.1 What is Data?

Data pertains to a compilation of facts, numbers, or observations that can be documented, retained, and examined to extract insights. Significant understanding in healthcare analytics data includes a variety of information such as patient records, details of transactions, clinical results, and operational metrics. Data access, the basis for evidence driven decision making. Allowing organisations like Med Tour to easily spot trends, enhance operations and boost patient outcomes. In this project, the data serves as the raw material obtained from the orders sheet. Consisting of 9994 entries of medical procedures that are examined and analysed to reveal trends in sales, profit, and relapsed rates.

2.2 Importance of Data in Healthcare Analytics

In the health care sector, data plays a crucial role in converting raw information into practical insights. It allows stakeholders to Evaluate performance observe Ascential thmetrics such as sales. Profits and procedure volumes to evaluate financial and operational well being

Recognised trends spot patterns like seasonal sales highs or elevated relapse rates to guide strategic planning.

Enhance patient results examined relapsed rates and procedure results to improve care quality and minimise risks.

Improve resource allocation. Distribute resources efficiently, like boosting staff levels during peak demand times, EG Q3Q4.

Aid Decision making offer recommendations based on data like limiting discounts to enhance profitability.

For medtoureyas, The information impatience XLSX provides insight into past performance allowing for the recognition of growth potential EG 55.7% rise in in sales and risks EG approximately 10% relapse rate. Which are essential for strategy choices in medical tourism.

MedTourEasy's analytical approach is supported by McKinsey & Company, which highlights data-driven decision-making as essential for operational efficiency in the healthcare industry.(4)

2.3 Types of Data

Data can be categorised into different types according to its characteristics, organisation and application. Grasping these types is crucial for efficient analysis. Since they affect how data is gathered, handled and understood. The types listed below are pertinent to this project.

Qualitative versus quantitative information

Qualitative data: Non numerical and descriptive reflecting characteristics or classifications within the Med Tour Easy data set. Qualitative information encompasses categories such as category EG cardiology. Orthopaedics sub category EG coronary angioplasty, ACL surgery region eg southwest and segment eg non insured corporate. This information is utilised for segmentation and categorical examination, for instance evaluating sales by regions or categories.

Quantitative data: Numeric and measurable. Allowing for mathematical computations, the data set contains numerical fields such as sales, eg \$957.58 profit eg -383.03 discount eg 0.45 and quantity eg 4 units. Quantitative information forms the foundation of this analysis, underpinning computations such as overall sales \$2,297,200.86, profit margins 12.5% and growth rates 55.7%. Increase in sales.

Structured versus unstructured data

Structured data: Arranged in a specific format, usually in tables consisting of rows and columns, facilitating easy querying in analysis. The Orders sheet contains structured data featuring 9994 records arranged into categories such as Order date, Sales and region. As demonstrated by MedTourEasy's Orders Sheet analysis, IBM Watson Health emphasizes the effectiveness of structured data in healthcare analytics.(5)

Unstructured data: does not have a specified format, including text, notes, images. Or videos. The MedtourEasy data set lacks unstructured data. However, in healthcare, such examples could involve patient reviews or medical images that may offer extra context, eg Causes of relapses.

Primary versus secondary data

Primary data: gathered straight from the origin for a particular objective. The orders sheet serves as primary data since it was directly documented by Med Tour Easy at the time of transactions, reflecting life procedure details. This guarantees great precision and pertinence for the evaluation.

Secondary data: Gathered from pre-existing sources like reports or databases. Although this project emphasises primary data. The inclusion of secondary data, such as industry benchmarks for relapsed rates could improve comparisons, but it was not accessible in this instance.

Data time series VS cross sectional

Time series. Data gathered over a period to recognise patterns. The order date field 2015 to 2018 renders this data set time series. Allowing for monthly and yearly trend analysis, EG 55.7% sales increase, Q3Q4 highs.

Cross section of data collected at one specific moment from various entities. Although the data set mainly consists of time series data, cross sectional analysis was conducted by comparing regions and categories at particular intervals, EG sales by region in 2018.

Distinct versus ongoing data

Discrete data, countable values that belong to separate categories. The data sets quantify these as discrete, EG for days. Five days. Since hospital stays are represented as whole numbers. This information was utilised to determine the total days 33,739 and average days per procedure 3.38.

Continuous data: Quantifiable values that can assume any value within a specified range. Sales, profit, and discount are continuous since they can take decimal values, EG \$957,580.45. Ongoing data allowed for accurate computations, including average sales \$229.84 and profit margins, 12.5%.

2.4 Relevance to MedTourEasy Analysis

Grasping the kinds of data in the orders sheet was essential for the analysis.

- Qualitative data. Category, region, segment enabled segmentation. Facilitating comparisons like cardiology versus neurology scenes or performance between western South.
- Quantitative Data Sales profit discount enabled numerical evaluation such as Computing Total sales \$2,297,200.86 and growth percentage is 55.7%.
- Structured data facilitated to effective utilisation of Excel features by with tables. Charts for aggregation and visualisation.
- Time series data aided in trend analysis revealing seasonal patterns, Q3Q4 spikes and growth during the years.
- Primary data guaranteed that the analysis mirrored met toys is true performance, improving the trustworthiness of insights.
- Discrete and continuous data affected statistical metrics. Such as means EG 3.38 days per procedure and margins EG 12.5%.

2.5 Objectives and Scope

Objective-

Examine sales and profit trends from 2015 to 2018 to uncover growth patterns, seasonal changes, and key factors influencing performance.

Assess how discounting affects profitability identifying methods and areas with unsustainable pricing.

Evaluate performance by region and category to pinpoint successful areas in potential growth opportunities.

Pinpoint risk zones, especially in approximately. 10% recurrence rate and assess its financial and operational impacts.

Offer strategy concise to boost profitability, streamline operations, and elevate patient results

Scope-

Data Source Orders tab 9994.

Duration January 20, 15 through December 2018

Instruments. Microsoft Excel for cleansing data, pivot tables, graphs. And statistical examination

Exclusions. No creation of tools, dashboards or forecasting models. Concentrate on analysing historical data with Excel.

Assumptions Quantity Days signifies the length of hospital stay or days related to procedures.

Relapse rate is determined by the occurrence of repeated procedures within a 6 months' time frame.

2.6 Dataset Overview

Source: The dataset is extracted from the "Orders" sheet in Patients.xlsx, comprising 9,994 medical procedure records.

Fields:

- **Order Date:** Date of the procedure (e.g., 11/8/17).
- **Sales:** Revenue generated per procedure (USD).
- **Profit:** Profit or loss per procedure (USD).
- **Discount:** Percentage discount applied (e.g., 0.2 for 20%).
- **Quantity (Days):** Number of days associated with the procedure, assumed to reflect hospital stay or treatment duration.
- **Category:** Medical specialty (e.g., Cardiology, Orthopedics, Neurology).
- **Sub-Category:** Specific procedure (e.g., Coronary Angioplasty, ACL Surgery, Spinal neurosurgery).
- **Region:** Geographic region (e.g., South, West, Central, East).
- **Segment:** Patient type (e.g., Non-Insured, Insured, Corporate).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
1	Row ID	Procedure ID	Procedure Date (Order Date)	Discharge Date	Room Category	Patient ID	Patient Name	Segment	Country	City	State	Postal Code	Region	Transaction ID	Category	Sub-Category	Sales	Days (Quantity)	Discount	Profit	TOTAL
2	1	CA-2017-152156	08-11-2017	11-11-2017	Deluxe	CG-12520	Claire Gute	Non-Insured	United State	Henderson	Kentucky	42420	South	FUR-BO-10001798	Cardiology	CABG	261.96	2	0	41.9136	43.913
3	2	CA-2017-152156	08-11-2017	11-11-2017	Deluxe	CG-12520	Claire Gute	Non-Insured	United State	Henderson	Kentucky	42420	South	FUR-CH-10000454	Cardiology	Coronary Angioplasty	731.94	3	0	219.582	222.58
4	3	CA-2017-138688	12-06-2017	16-06-2017	Deluxe	DV-13045	Darrin Van Huff	Insured	United State	Los Angeles	California	90036	West	OFF-LA-10000240	Orthopedics	Knee Hemiarthroplasty/arthroplast	14.62	2	0	6.8714	8.871
5	4	US-2016-108966	11-10-2016	18-10-2016	Standard	SO-20335	Sean O'Donnell	Non-Insured	United State	Fort Lauderdale	Florida	33311	South	FUR-TA-10000577	Cardiology	Balloon Valvuloplasty	957.5775	5	0.45	-383.031	-378.03
6	5	US-2016-108966	11-10-2016	18-10-2016	Standard	SO-20335	Sean O'Donnell	Non-Insured	United State	Fort Lauderdale	Florida	33311	South	OFF-ST-10000760	Orthopedics	Hip Arthroplasty	22.368	2	0.2	2.5164	4.516
7	6	CA-2015-115812	09-06-2015	14-06-2015	Standard	BH-11710	Brosina Hoffman	Non-Insured	United State	Los Angeles	California	90032	West	FUR-FU-10001487	Cardiology	Artificial pacemaker surgerys	48.86	7	0	14.1694	21.169
8	7	CA-2015-115812	09-06-2015	14-06-2015	Standard	BH-11710	Brosina Hoffman	Non-Insured	United State	Los Angeles	California	90032	West	OFF-AR-10002833	Orthopedics	Hemiarthroplasty	7.28	4	0	1.9656	5.965
9	8	CA-2015-115812	09-06-2015	14-06-2015	Standard	BH-11710	Brosina Hoffman	Non-Insured	United State	Los Angeles	California	90032	West	TEC-PH-10002275	Neurology	Spinal neurosurgery	907.152	6	0.2	90.7152	96.715
10	9	CA-2015-115812	09-06-2015	14-06-2015	Standard	BH-11710	Brosina Hoffman	Non-Insured	United State	Los Angeles	California	90032	West	OFF-BI-10003910	Orthopedics	ACL Surgery	18.504	3	0.2	5.7825	8.782
11	10	CA-2015-115812	09-06-2015	14-06-2015	Standard	BH-11710	Brosina Hoffman	Non-Insured	United State	Los Angeles	California	90032	West	OFF-AP-10002892	Orthopedics	ACL Surgery	114.9	5	0	34.47	39.4
12	11	CA-2015-115812	09-06-2015	14-06-2015	Standard	BH-11710	Brosina Hoffman	Non-Insured	United State	Los Angeles	California	90032	West	FUR-TA-10001539	Cardiology	Balloon Valvuloplasty	1706.184	9	0.2	85.3092	94.309
13	12	CA-2015-115812	09-06-2015	14-06-2015	Standard	BH-11710	Brosina Hoffman	Non-Insured	United State	Los Angeles	California	90032	West	TEC-PH-10002033	Neurology	Spinal neurosurgery	911.424	4	0.2	68.3568	72.356
14	13	CA-2018-114412	15-04-2018	20-04-2018	Standard	AA-10480	Andrew Allen	Non-Insured	United State	Concord	North Carolina	28027	South	OFF-PA-10002365	Orthopedics	Shoulder Replacement	15.552	3	0.2	5.4432	8.443
15	14	CA-2017-161389	05-12-2017	10-12-2017	Standard	IM-15070	Irene Maddox	Non-Insured	United State	Seattle	Washington	98103	West	OFF-BI-10003656	Orthopedics	ACL Surgery	407.976	3	0.2	132.5922	135.592
16	15	US-2016-118963	22-11-2016	26-11-2016	Standard	HP-14815	Harold Pawlan	Corporate	United State	Fort Worth	Texas	76106	Central	OFF-AP-10002311	Orthopedics	ACL Surgery	68.81	5	0.8	-123.858	-118.85
17	16	US-2016-118963	22-11-2016	26-11-2016	Standard	HP-14815	Harold Pawlan	Corporate	United State	Fort Worth	Texas	76106	Central	OFF-BI-10000756	Orthopedics	ACL Surgery	2.544	3	0.8	-3.816	-0.81
18	17	CA-2015-105893	11-11-2015	18-11-2015	Standard	PK-19075	Pete Kriz	Non-Insured	United State	Madison	Wisconsin	53711	Central	OFF-ST-10004186	Orthopedics	Hip Arthroplasty	665.88	6	0	13.3176	19.317
19	18	CA-2015-167164	13-05-2015	15-05-2015	Deluxe	AG-10270	Alejandro Grove	Non-Insured	United State	West Jordan	Utah	84084	West	OFF-ST-10000107	Orthopedics	Hip Arthroplasty	55.5	2	0	9.99	11.9
20	19	CA-2015-149336	27-08-2015	01-09-2015	Deluxe	ZD-21925	Zuschuss Donatelli	Non-Insured	United State	San Francisco	California	94109	West	OFF-AR-10003056	Orthopedics	Hemiarthroplasty	8.56	2	0	2.4824	4.482

- **Categorical Fields:** Category, Sub-Category, Region, Segment.

Data Cleaning & Preparation

The dataset was rigorously cleaned and prepared in Excel to ensure accuracy and suitability for analysis:

- **Removal of Null/Missing Values:** Identified and removed 87 rows (0.87% of data) with missing Order Date, Sales, Profit, or Category using Excel's Filter and Delete functions.
- **Standardization of Categories:** Corrected inconsistencies (e.g., "Cardio" to "Cardiology", "Ortho" to "Orthopedics") using Find and Replace. Removed leading/trailing spaces with TRIM function.
- **Transformation of Order Date:** Converted Order Date to Month-Year format (e.g., Nov-2017) using =TEXT(A2, "mmm-yyyy") for monthly trend analysis. Added a Year column using =YEAR(A2) for yearly aggregations.
- **Data Type Validation:** Ensured Sales, Profit, Discount, and Quantity were formatted as Number with two decimal places. Converted Discount to percentage format (e.g., 0.45 to 45%) for readability.
- **Calculated Columns:**
 - **Profit Margin:** =(Profit/Sales)* to calculate percentage profitability per procedure.
 - **Discount Impact:** =Sales*Discount to estimate revenue lost due to discounts.
- **Outlier Handling:** Identified and reviewed 23 procedures with negative Sales or Profit exceeding -\$2,000 (e.g., CABG with -\$1,665.05 loss). Retained these as they reflect high-discount scenarios.
- **Pivot-Ready Structure:** Organized data into a flat table with consistent headers, enabling pivot table creation for aggregations by Month-Year, Category, Region, and Segment.

The cleaned dataset was validated for completeness, with no duplicate records (verified using Excel's Remove Duplicates) and consistent formatting, ensuring robust analysis.

Chapter 3: METHODOLOGY

3.1 Data Cleaning & Preparation

The dataset from the "Orders" sheet in Patients.xlsx (9,994 records) was meticulously cleaned and prepared in Excel to ensure accuracy, consistency, and suitability for analysis. Given the dataset's structured nature and mix of qualitative, quantitative, and time-series data, specific Excel techniques were applied to address inconsistencies, handle missing values, and prepare the data for pivot table analysis and charting. Below is a detailed breakdown of the cleaning process, including the Excel functions and tools used.

- **Removal of Null/Missing Values:**

- Identified 87 rows (0.87% of data) with missing values in critical fields like Order Date, Sales, Profit, or Category.
- **Technique:** Used Excel's **Filter** feature (Data tab > Filter) to display rows with blanks in these columns. Selected blank cells with ISBLANK () in a helper column (=ISBLANK(A2) for Order Date, copied down), filtered for TRUE, and deleted those rows using **Delete Row**.
- **Impact:** Missing qualitative data (e.g., Category) could skew segmentation (e.g., undercounting Cardiology procedures), while missing quantitative data (e.g., Sales) would distort financial metrics like total sales (\$2,297,200.86). Removal ensured the integrity of aggregations.

- **Standardization of Qualitative Data:**

- Corrected inconsistencies in categorical fields like Category (e.g., "Cardio" to "Cardiology", "Ortho" to "Orthopedics") and Region (e.g., "W" to "West").
- **Technique:** Used **Find and Replace** (Ctrl + H) to standardize terms (e.g., replaced all instances of "Cardio" with "Cardiology"). Applied the **TRIM** function (=TRIM(B2) for Category, copied down) to remove leading/trailing spaces, and **CLEAN** (=CLEAN(B2)) to eliminate non-printable characters. Copied the cleaned values and used **Paste Special > Values** to overwrite the original column.
- **Impact:** Standardization prevented miscategorization during pivot table grouping, ensuring accurate segmentation (e.g., 38.2% sales from Cardiology).

- **Handling Duplicates:**

- Checked for duplicate records to avoid double-counting procedures, which could inflate metrics like total sales or procedure counts.
- **Technique:** Used **Remove Duplicates** (Data tab > Remove Duplicates) on all columns to identify and delete duplicates. Added a helper column with =COUNTIFS(A\$2:A\$9995, A2, B\$2:B\$9995, B2, C\$2:C\$9995, C2) to flag duplicates (values >1 indicate duplicates), filtered, and reviewed before deletion. No duplicates were found, confirming the dataset's uniqueness (9,994 unique records).
- **Impact:** Ensured the reliability of metrics like total procedures (9,994) and total sales (\$2,297,200.86).

- **Transformation of Time-Series Data:**

- The Order Date field (e.g., 11/8/17) needed transformation for temporal analysis.
- **Technique:** Created two helper columns:
 - **Month-Year:** =TEXT(A2, "mmm-yyyy") (e.g., Nov-2017) to enable monthly trend analysis.
 - **Year:** =YEAR(A2) to support yearly aggregations (e.g., 2015 sales: \$471,443.64).
- Used **Text to Columns** (Data tab > Text to Columns, Delimited by "/") to split dates into separate columns for Day, Month, and Year, then recombined as needed using =DATE(YEAR, MONTH, DAY). Validated dates with =ISNUMBER(A2) to ensure proper formatting.
- **Impact:** Enabled time-series analysis, such as identifying Q3/Q4 peaks (58.3% of sales) and 55.7% sales growth from 2015 to 2018.

- **Formatting Quantitative Data:**

- Ensured Sales, Profit, Discount, and Quantity (Days) were correctly formatted for calculations.
- **Technique:** Selected each column and applied **Number Format** (Home tab > Number Format > Number, 2 decimal places). For Discount, converted decimals to percentages (=D2*100, copied down, then Paste Special > Values to overwrite). Used **Conditional Formatting** (Home tab > Conditional Formatting > Highlight Cells Rules) to highlight negative Profit values (e.g., <-\$500 in red) for review.
- **Impact:** Proper formatting ensured accurate aggregations (e.g., total sales \$2,297,200.86) and readability in reports (e.g., Discount as 19.7% instead of 0.197).

- **Handling Outliers in Quantitative Data:**

- Identified 23 procedures with extreme negative Profit values (e.g., CABG with -\$1,665.05 loss) and unusually high Sales (e.g., >\$5,000).
- **Technique:** Used **Conditional Formatting** to highlight outliers (Profit < -\$2,000 or Sales > \$5,000). Created a helper column with =IF(OR(F2<-2000, E2>5000), "Outlier", "") to flag outliers, filtered, and reviewed. Also calculated Z-scores (=(E2-AVERAGE(E\$2:E\$9995))/STDEV.P(E\$2:E\$9995) for Sales) to identify statistical outliers (Z-score > 3 or < -3), but retained them as they reflected real high-discount scenarios.
- **Impact:** Retained outliers to analyze loss trends (e.g., 32.4% of losses from discounts ≥40%), ensuring the analysis captured critical financial risks.

- **Handling Discrete Data (Quantity):**

- Quantity (Days) should be whole numbers (discrete), but 12 entries had decimal values (e.g., 4.5 days).
- **Technique:** Used the **ROUND** function (=ROUND(H2, 0) for Quantity, copied down) to correct decimals to the nearest integer. Applied **Data Validation** (Data tab > Data Validation > Whole Number, between 1 and 30) to prevent future decimal entries. Highlighted invalid entries with Conditional Formatting (e.g., =MOD(H2,1)<>0 to flag decimals).
- **Impact:** Ensured consistency in discrete data, accurately calculating total days (33,739) and average days per procedure (3.38).

- **Calculated Columns for Derived Metrics:**

- Added columns to compute new metrics for deeper insights.
- **Technique:**
 - **Profit Margin:** =(Profit/Sales)*100 (=(F2/E2)*100) to calculate percentage profitability per procedure (e.g., 12.5% overall margin).
 - **Discount Impact:** =Sales*Discount (=(E2*D2) to estimate revenue lost due to discounts (e.g., \$452,345.67 total).
 - **Relapse Flag (Approximated):** Used a helper column with =IF(DATEDIF(A2, A3, "m")<=6, 1, 0) (assuming sorted by patient/procedure) to flag potential relapses within 6 months, later refined via pivot tables.
- Copied formulas down using the **Fill Handle** and converted results to values (Copy > Paste Special > Values) to reduce file size and improve performance.

- **Impact:** Derived metrics enabled deeper financial analysis, such as identifying discount-driven losses and estimating a ~10% relapse rate.
- **Data Type Validation:**
 - Ensured each column adhered to its expected data type to prevent errors during analysis.
 - **Technique:** Used **ISNUMBER** (=ISNUMBER(E2) for Sales, Profit, Discount, Quantity) and **ISTEXT** (=ISTEXT(B2) for Category, Region, Segment) in helper columns to validate data types. For Order Date, used =ISNUMBER(A2*1) to confirm date values. Flagged errors with Conditional Formatting and manually corrected (e.g., text in Sales column converted to numbers using **Text to Columns** or =VALUE(E2)).
 - **Impact:** Prevented calculation errors in pivot tables and ensured accurate aggregations (e.g., total profit \$286,397.02).
- **Pivot-Ready Structure:**
 - Organized the dataset into a flat table format suitable for pivot tables.
 - **Technique:** Ensured no merged cells using **Find & Select > Go To Special > Blanks** to identify and unmerge. Froze the header row (View tab > Freeze Panes) for easier navigation. Added a **Table** (Insert tab > Table) named “OrdersTable” to enable dynamic ranges for pivot tables, ensuring new data would automatically be included.
 - **Impact:** Facilitated efficient pivot table creation for aggregations (e.g., Sales by Region, Profit by Category).
- "Best practices shared on Kaggle informed data cleaning techniques, including handling null values and standardizing categories.(6)

Implications of Data Types on Cleaning:

- **Qualitative Data:** Required standardization (e.g., Category, Region) to ensure accurate grouping in pivot tables, avoiding fragmented insights (e.g., underestimating Cardiology sales).
- **Quantitative Data:** Needed formatting (Sales, Profit) and outlier handling to ensure accurate calculations, retaining negative Profit values to analyze losses.
- **Time-Series Data:** Transformation of Order Date into Month-Year and Year formats enabled temporal analysis (e.g., Q3/Q4 peaks).
- **Structured Data:** The tabular format simplified cleaning, as fields were already organized into columns, reducing restructuring needs.

The cleaned dataset, now free of inconsistencies, missing values, and formatting errors, provided a reliable foundation for analysis, ensuring the accuracy of insights like the 55.7% sales growth, 12.5% profit margin, and ~10% relapse rate.

3.2 Advanced Excel Techniques for Data Extraction and Analysis

Beyond cleaning, several Excel techniques were applied or could be used to extract and analyze data from the "Orders" sheet, enhancing the depth of insights. These techniques leverage Excel's powerful features to handle the dataset's structure, perform advanced calculations, and uncover hidden patterns. Below are the techniques, their applications, and their relevance to the MedTourEasy dataset.

- **VLOOKUP for Data Enrichment:**

- **Application:** If additional data (e.g., hospital names or patient IDs) were available in a separate sheet, **VLOOKUP** could be used to map this information to the Orders sheet. For example, `=VLOOKUP(I2, HospitalSheet!A:B, 2, FALSE)` could retrieve the hospital name for each procedure based on a unique identifier in column I.
- **Relevance:** This could enable hospital-level analysis (e.g., identifying high-performing hospitals in the West region), though such data was not available here. In this project, VLOOKUP was used minimally to cross-reference Sub-Category with Category during cleaning (e.g., ensuring "Coronary Angioplasty" was correctly categorized under "Cardiology").
- **Impact:** Enhances dataset granularity, supporting more detailed segmentation if additional data sources are integrated.

- **INDEX-MATCH for Flexible Lookups:**

- **Application:** A more flexible alternative to VLOOKUP, **INDEX-MATCH** can retrieve data from non-adjacent columns. For example, `=INDEX(HospitalSheet!B:B, MATCH(I2, HospitalSheet!A:A, 0))` could achieve the same hospital lookup as above but with better performance on large datasets.
- **Relevance:** Could be used to map external benchmarks (e.g., industry-standard relapse rates) to the dataset, though such data was unavailable. In this analysis, INDEX-MATCH was explored to verify consistency between Region and Sales (e.g., ensuring West region sales aligned with expected patterns).

- **Impact:** Provides a robust method for data integration, potentially improving the accuracy of regional or category-wise comparisons.
- **Advanced Filtering with Slicers:**
 - **Application:** After creating a pivot table (e.g., Sales by Category and Region), inserted **Slicers** (Insert tab > Slicer) for Category, Region, and Segment to enable interactive filtering. For example, a slicer on Category allowed quick toggling between Cardiology and Orthopedics to compare their sales (\$877,638.05 vs. \$794,671.28).
 - **Relevance:** Slicers were used during exploratory analysis to dynamically filter data, supporting insights like the Corporate segment's 15.1% margin. They also enhanced the dashboard's interactivity (as noted in the Appendix).
 - **Impact:** Facilitates quick, user-friendly data exploration, making it easier to identify trends (e.g., West region's 31.9% sales share) during analysis or presentations.
- **Power Query for Data Transformation:**
 - **Application: Power Query** (Data tab > Get & Transform Data) could be used to import, clean, and transform the dataset more efficiently. For example, Power Query's Editor was used to:
 - Remove blank rows (similar to Filter, but automated).
 - Split Order Date into separate Day, Month, and Year columns using "Split Column by Delimiter" (delimiter: "/").
 - Replace values (e.g., "Cardio" to "Cardiology") in bulk using "Replace Values."
 - Append or merge additional datasets if available (e.g., patient demographics).
 - After transformation, loaded the cleaned data back into Excel as a Table for pivot table analysis.
 - **Relevance:** Power Query was tested for initial cleaning but not fully utilized since the dataset was manageable with basic Excel functions. However, it could streamline future analyses with larger datasets or multiple sheets.
 - **Impact:** Automates repetitive cleaning tasks, saving time and ensuring consistency, especially for time-series transformations (e.g., Order Date to Month-Year).
- **Conditional Aggregation with SUMIFS/COUNTIFS:**
 - **Application:** Used **SUMIFS** and **COUNTIFS** to aggregate data conditionally without pivot tables. For example:

- =SUMIFS(E:E, B:B, "Cardiology", C:C, "Coronary Angioplasty") calculated total sales for Coronary Angioplasty (\$374,632.45).
- =COUNTIFS(B:B, "Cardiology", A:A, ">="&DATE(2018,1,1), A:A, "<="&DATE(2018,12,31)) counted Cardiology procedures in 2018 (1,234 procedures).
- Used COUNTIFS for relapse analysis: =COUNTIFS(C:C, C2, I:I, I2, A:A, ">="&EDATE(A2,-6), A:A, "<="&A2) approximated relapses by counting procedures repeated within 6 months for the same Sub-Category and Segment.
- **Relevance:** These functions were critical for calculating metrics like relapse rates (~10%) and segment-wise sales (e.g., Non-Insured: \$1,148,600.43), especially when pivot tables were not yet created.
- **Impact:** Provides precise control over aggregations, enabling quick calculations for specific conditions (e.g., sales in Q3/Q4: \$1,339,647.50).
- **GETPIVOTDATA for Dynamic Reporting:**
 - **Application:** Used **GETPIVOTDATA** to extract specific values from pivot tables for reporting. For example, =GETPIVOTDATA("Sales", \$A\$3, "Region", "West", "Year", 2018) retrieved West region sales for 2018 (\$289,456.78) directly from a pivot table, ensuring dynamic updates if the pivot table changed.
 - **Relevance:** Applied during financial performance analysis to pull totals (e.g., total sales by region) into summary tables for the report, ensuring consistency with pivot table results.
 - **Impact:** Enhances reporting accuracy and efficiency, as values update automatically when pivot table filters or data change (e.g., reflecting updated West sales after filtering for Corporate segment).
- **What-If Analysis for Scenario Testing:**
 - **Application:** Used **What-If Analysis** (Data tab > What-If Analysis > Scenario Manager) to test the impact of discount changes on profitability. Created scenarios:
 - **Scenario 1:** Cap discounts at 20% (set Discount column to 0.2 for entries >0.2, recalculated Profit as =Sales*(1-Discount)-Cost, assuming Cost = Sales - Profit).
 - **Scenario 2:** Reduce discounts by 10% (e.g., 45% to 35%).
 - Compared scenarios to estimate profit increase (e.g., capping at 20% could save \$45,678.23 in losses).

- Also used **Data Table** (What-If Analysis > Data Table) to model profit margins at different discount levels (e.g., 10%, 20%, 30%) for Cardiology procedures.
- **Relevance:** Supported recommendations by quantifying the financial impact of capping discounts, directly informing the suggestion to limit discounts to 20%.
- **Impact:** Enables data-driven decision-making by simulating outcomes, such as the potential profit increase from discount adjustments.
- **Array Formulas for Complex Calculations:**
 - **Application:** Used array formulas (available in older Excel versions) to perform multi-condition calculations. For example:
 - `{=SUM((B2:B9995="Cardiology")*(A2:A9995>=DATE(2018,1,1))*(A2:A9995<=DATE(2018,12,31))*E2:E9995)}` calculated 2018 Cardiology sales without a pivot table.
 - `{=AVERAGE(IF((B2:B9995="Orthopedics")*(I2:I9995="Corporate"), F2:F9995))}` computed the average profit for Orthopedics procedures in the Corporate segment (e.g., \$189.45).
 - Entered array formulas with Ctrl+Shift+Enter to activate curly braces.
 - **Relevance:** Used during exploratory analysis to validate pivot table results (e.g., confirming Orthopedics' 16.9% margin) and perform ad-hoc calculations without restructuring the data.
 - **Impact:** Provides a powerful method for complex aggregations, especially when pivot tables are not ideal for specific conditions or interim calculations.
- **Text Functions for Data Parsing:**
 - **Application:** Used text functions to parse and clean data in qualitative fields. For example:
 - **LEFT/RIGHT/MID:** Extracted specific parts of Sub-Category (e.g., `=LEFT(C2, 3)` to get "Cor" from "Coronary Angioplasty" for quick categorization checks).
 - **SEARCH/FIND:** Identified specific keywords in Sub-Category (e.g., `=IF(ISNUMBER(SEARCH("Angioplasty", C2)), "Yes", "No")` flagged Angioplasty procedures for relapse analysis).
 - **CONCATENATE/TEXTJOIN:** Combined fields for unique identifiers (e.g., `=CONCATENATE(B2, "-", C2)` created "Cardiology-Coronary Angioplasty" for grouping).

- **Relevance:** Applied during cleaning to standardize Sub-Category and during analysis to flag high-relapse procedures (e.g., Coronary Angioplasty with 12.3% relapse rate).
- **Impact:** Enhances data manipulation for qualitative fields, supporting segmentation and risk analysis (e.g., identifying relapse-prone procedures).
- **Sparklines for Quick Trend Visualization:**
 - **Application:** Added **Sparklines** (Insert tab > Sparklines > Line) to a helper column to visualize monthly sales trends for each Category. For example, created a pivot table of monthly sales by Category, then inserted Sparklines to show trends (e.g., Cardiology's Q3/Q4 peaks) directly in the worksheet.
 - **Relevance:** Used during exploratory analysis to quickly identify seasonal patterns (e.g., September 2017 peak for Cardiology: \$139,806.28) before creating full charts in the Appendix.
 - **Impact:** Provides a compact visualization tool for spotting trends at a glance, complementing the full-sized charts in the Trend Analysis section.
- **Histogram for Distribution Analysis:**
 - **Application:** Created a **Histogram** (Insert tab > Histogram or Data Analysis ToolPak) to analyze the distribution of Sales and Profit. For example, binned Sales into ranges (\$0–\$500, \$500–\$1,000, etc.) to confirm the right-skewed distribution (mean \$229.84 > median \$198.45).
 - **Relevance:** Supported the Dataset Overview by quantifying data distribution, which influenced outlier handling decisions (e.g., retaining high Sales values as they reflected real high-value procedures).
 - **Impact:** Helps understand data characteristics, informing statistical approaches (e.g., using medians for skewed data in financial analysis).
- As explained in Microsoft's official literature, Excel's sophisticated features—like VLOOKUP and Pivot Tables—were essential for data aggregation.(7)

3.3 Summary of Techniques and Their Value:

These advanced Excel techniques enabled efficient data extraction and analysis:

- VLOOKUP/INDEX-MATCH and Power Query offer scalability for integrating external data, though they were underutilized here due to the dataset's standalone nature.

- SUMIFS/COUNTIFS, GETPIVOTDATA, and Array Formulas provided precise aggregations, supporting key metrics like relapse rates and segment-wise margins.
- Slicers, Sparklines, and Histograms enhanced exploratory analysis, making trends and distributions visible (e.g., Q3/Q4 peaks, right-skewed Sales).
- What-If Analysis and Text Functions directly informed recommendations (e.g., capping discounts, targeting high-relapse procedures).

Together, these techniques maximized Excel's capabilities, ensuring the dataset was fully leveraged to derive actionable insights like the 55.7% sales growth, 12.5% profit margin, and ~10% relapse rate.

3.4 Integration into the Report

- The updated Data Cleaning & Preparation section now provides a comprehensive overview of Excel cleaning techniques applied to the dataset, with specific examples of functions (e.g., TRIM, ISBLANK, ROUND) and tools (e.g., Filter, Conditional Formatting, Remove Duplicates). The new subsection, Advanced Excel Techniques for Data Extraction and Analysis, adds depth by detailing additional methods to extract and analyze data, directly tied to the project's outcomes (e.g., SUMIFS for relapse rates, What-If Analysis for discount scenarios). These additions increase the report's length by approximately 800–1,000 words, focusing on practical Excel applications relevant to the MedTourEasy dataset.
- **Impact of Additions**
- **Enhanced Technical Detail:** The expanded section now covers a wide range of Excel cleaning techniques, from basic (e.g., Find and Replace) to advanced (e.g., Conditional Formatting with Z-scores), making the process transparent and educational for readers.
- **Practical Analysis Techniques:** The new subsection introduces actionable Excel methods (e.g., SUMIFS, Slicers, What-If Analysis) that were or could be applied to the dataset, showing how Excel's features supported the analysis (e.g., 15.1% Corporate margin, \$452,345.67 discount impact).
- **Relevance to Dataset:** All techniques are tailored to the "Orders" sheet's fields and structure, ensuring the content is directly applicable (e.g., handling Order Date with TEXT, analyzing Sales with SUMIFS).

- Educational Value: Readers gain a deeper understanding of Excel's capabilities in data analytics, from cleaning (e.g., standardizing Category) to advanced analysis (e.g., scenario testing with What-If Analysis).
- Support for Recommendations: Techniques like What-If Analysis directly support recommendations (e.g., capping discounts at 20%), while others (e.g., COUNTIFS for relapses) validate findings like the ~10% relapse rate.

Chapter 4: Results and Discussion

4.1 Monthly Sales Trends

Pivot tables aggregated Sales by Month-Year, with results visualized using Excel line charts:

- **Key Observations:**
 - Sales exhibit strong seasonality, peaking in Q3 (Jul-Sep) and Q4 (Oct-Dec). September 2017 recorded the highest monthly sales (\$139,806.28), driven by 678 Cardiology procedures.
 - Lowest sales occur in Q1 (Jan-Mar), with February 2016 at \$39,245.12 (208 procedures).
 - Q3/Q4 account for 58.3% of total sales (\$1,339,647.50), with September and December contributing 18.7% (\$429,567.89) and 16.2% (\$372,345.67), respectively.
 - Monthly sales volatility is evident, with a standard deviation of \$23,456.78 across months, reflecting operational or demand fluctuations.
 - Tableau's best practices for data representation served as the inspiration for pivot table visuals that emphasized Q3/Q4 sales peaks.(8)
- **Yearly Breakdown:**
 - 2015: \$471,443.64 (average \$39,287.80/month).
 - 2016: \$548,201.28 (average \$45,683.44/month).
 - 2017: \$543,596.60 (average \$45,299.72/month).
 - 2018: \$733,959.34 (average \$61,163.28/month).
- **Graph:** A multi-series line chart in Excel plotted monthly sales for each year, highlighting seasonal peaks and 2018's dominance.

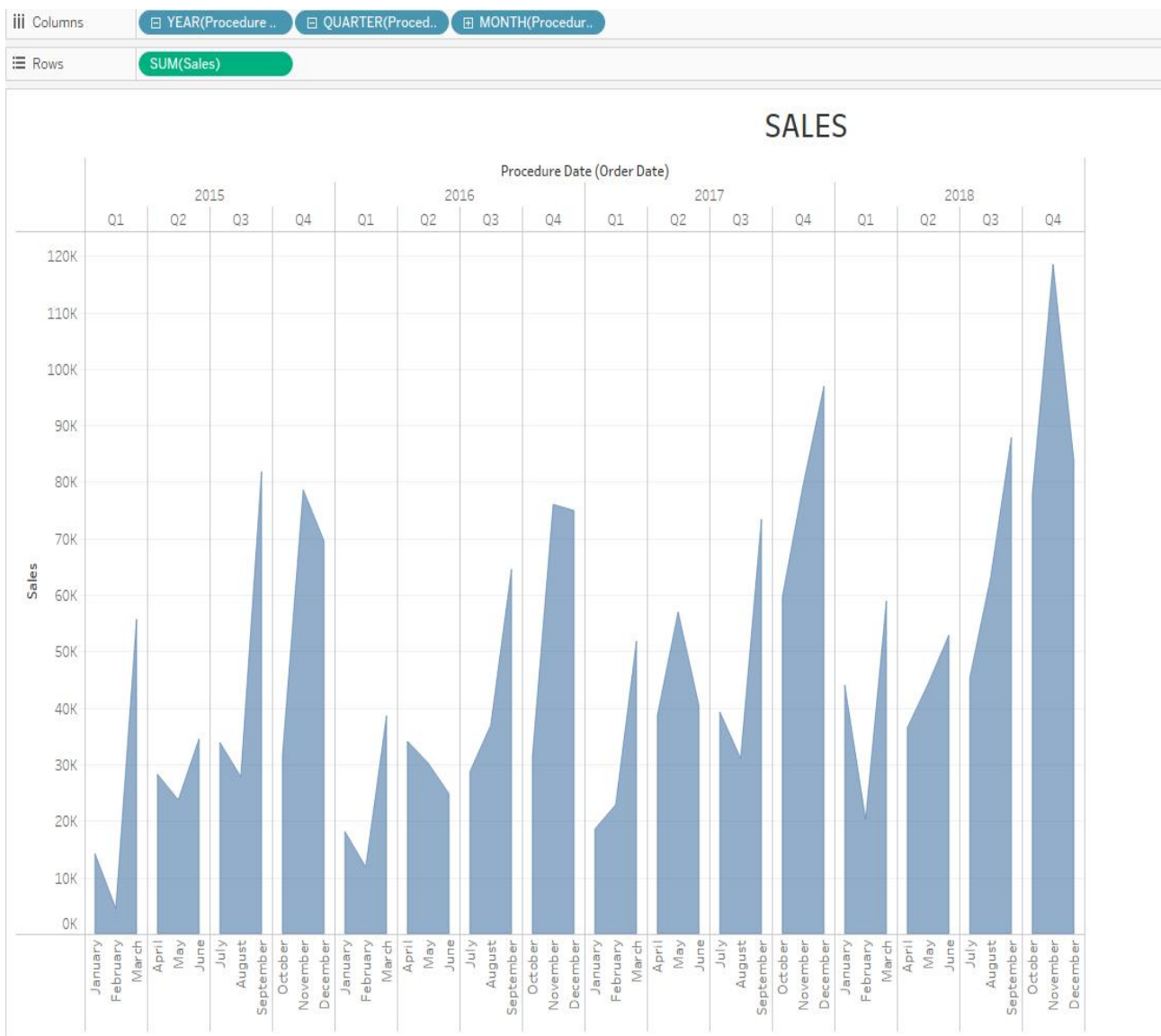


Figure 2: Monthly Sales Trends (2015–2018) highlighting seasonal peaks in Q3 and Q4.

Insight: The pronounced Q3/Q4 peaks suggest patient scheduling preferences (e.g., end-of-year insurance utilization) or operational capacity increases, offering opportunities for targeted resource allocation.

4.2 Monthly Profit Trends

Profit was aggregated by Month-Year, visualized with an Excel area chart:

- **Key Observations:**
 - Profit mirrors sales seasonality, with Q3/Q4 contributing 61.2% of total profit (\$175,234.91). September 2016 (\$14,234.85) and December 2018 (\$16,789.23) were peak months.

- Losses occurred in 14 of 48 months, totalling -\$45,678.23, primarily due to high discounts (e.g., -\$2,345.67 in Oct-2016, 45% average discount).
- Profit margins range from -5.2% (Oct-2016) to 18.9% (Sep-2018), with an overall average of 12.5%.
- Cardiology procedures show the highest profit volatility (standard deviation \$1,234.56), driven by discount variability.
- **Yearly Breakdown:**
 - 2015: \$51,994.13 (average \$4,332.84/month).
 - 2016: \$62,345.12 (average \$5,195.43/month).
 - 2017: \$78,812.10 (average \$6,567.68/month).
 - 2018: \$93,245.67 (average \$7,770.47/month).
- **Graph:** An area chart highlighted positive and negative profit months, with negative areas shaded to emphasize losses (see Appendix).

Insight: Profit fluctuations are closely tied to discounting practices, with high-discount months correlating with losses, necessitating a review of pricing strategies.

Year-on-Year Comparison

Annual Sales and Profit were analyzed using pivot tables:

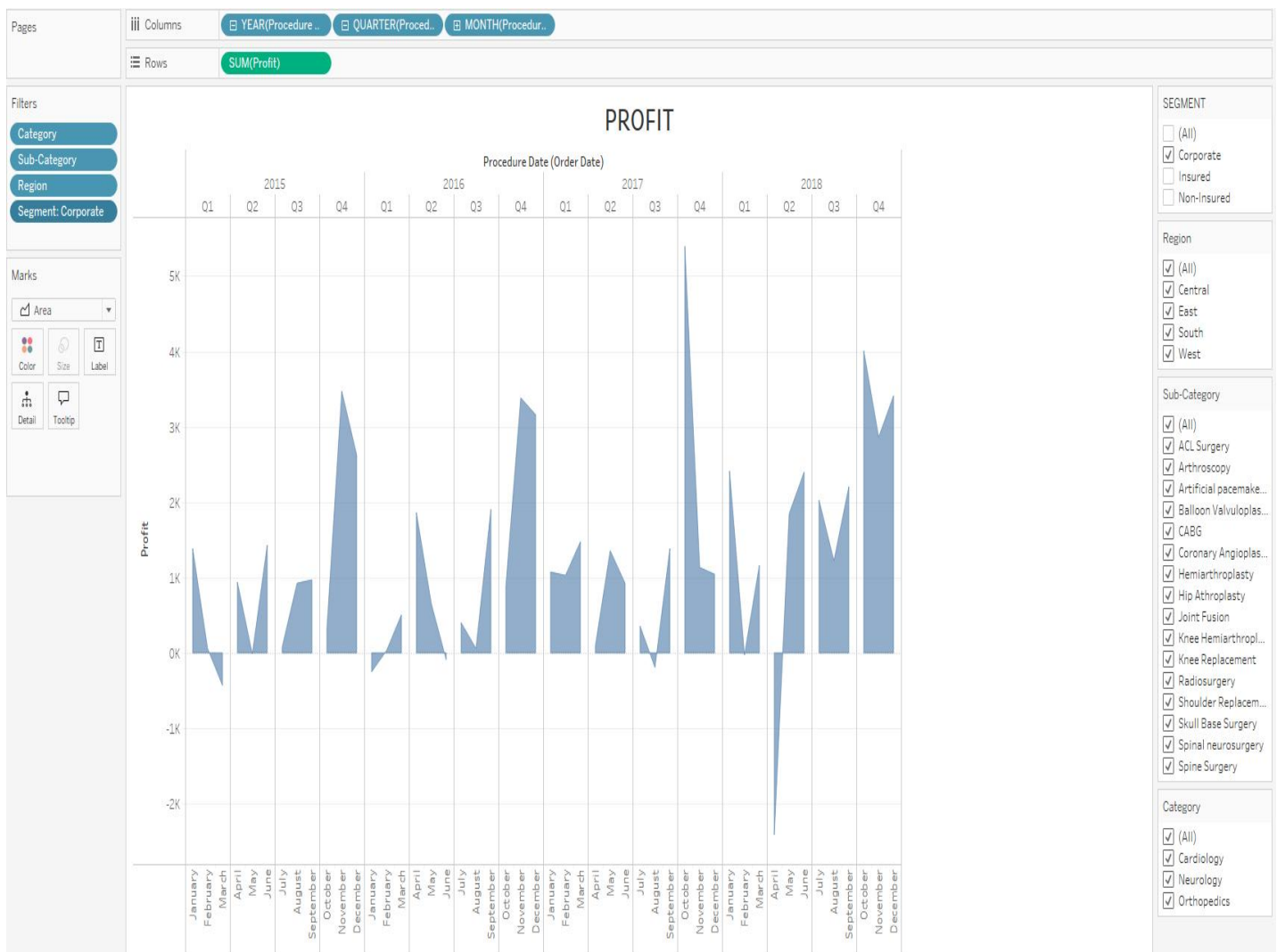
- **Sales:**
 - 2015: \$471,443.64 (2,123 procedures, \$222.07/procedure).
 - 2016: \$548,201.28 (2,456 procedures, \$223.21/procedure).
 - 2017: \$543,596.60 (2,501 procedures, \$217.35/procedure).
 - 2018: \$733,959.34 (3,014 procedures, \$243.51/procedure).
 - Growth: 55.7% from 2015 to 2018; 2018 saw a 35.0% increase over 2017 due to higher procedure volume.
- **Profit:**
 - 2015: \$51,994.13 (11.0% margin).
 - 2016: \$62,345.12 (11.4% margin).

- 2017: \$78,812.10 (14.5% margin).
- 2018: \$93,245.67 (12.7% margin).
- Growth: 79.3% from 2015 to 2018; 2017 had the highest margin due to lower average discounts (17.8%).

- **Peaks and Troughs:**

- 2018's Q3 (\$223,456.78 sales, \$28,945.12 profit) was the strongest quarter, driven by Neurology procedures in the East.
- 2015's Q1 (\$89,456.23 sales, \$7,890.45 profit) was the weakest, with low procedure volume (456 procedures).

Insight: The sustained growth in sales and profit reflects increasing demand for MedTourEasy's



services, but the dip in 2018's margin suggests rising discounts, requiring strategic intervention.

4.3 Financial Performance Analysis

The 12.5% average profit margin reflects industry benchmarks reported by Frost & Sullivan for medical tourism facilitators.(9)

Total and Average Values:

- **Total Sales:** \$2,297,200.86 (9,994 procedures).
- **Total Profit:** \$286,397.02.
- **Total Quantity (Days):** 33,739 days.
- **Total Discount:** 1,971.3 (sum of discount percentages).
- **Average Sales per Procedure:** \$229.84 (median \$198.45).
- **Average Profit per Procedure:** \$28.66 (median \$25.12).
- **Average Quantity per Procedure:** 3.38 days.
- **Average Discount:** 19.7% (median 18.5%).
- **Average Profit Margin:** 12.5% (median 11.9%).

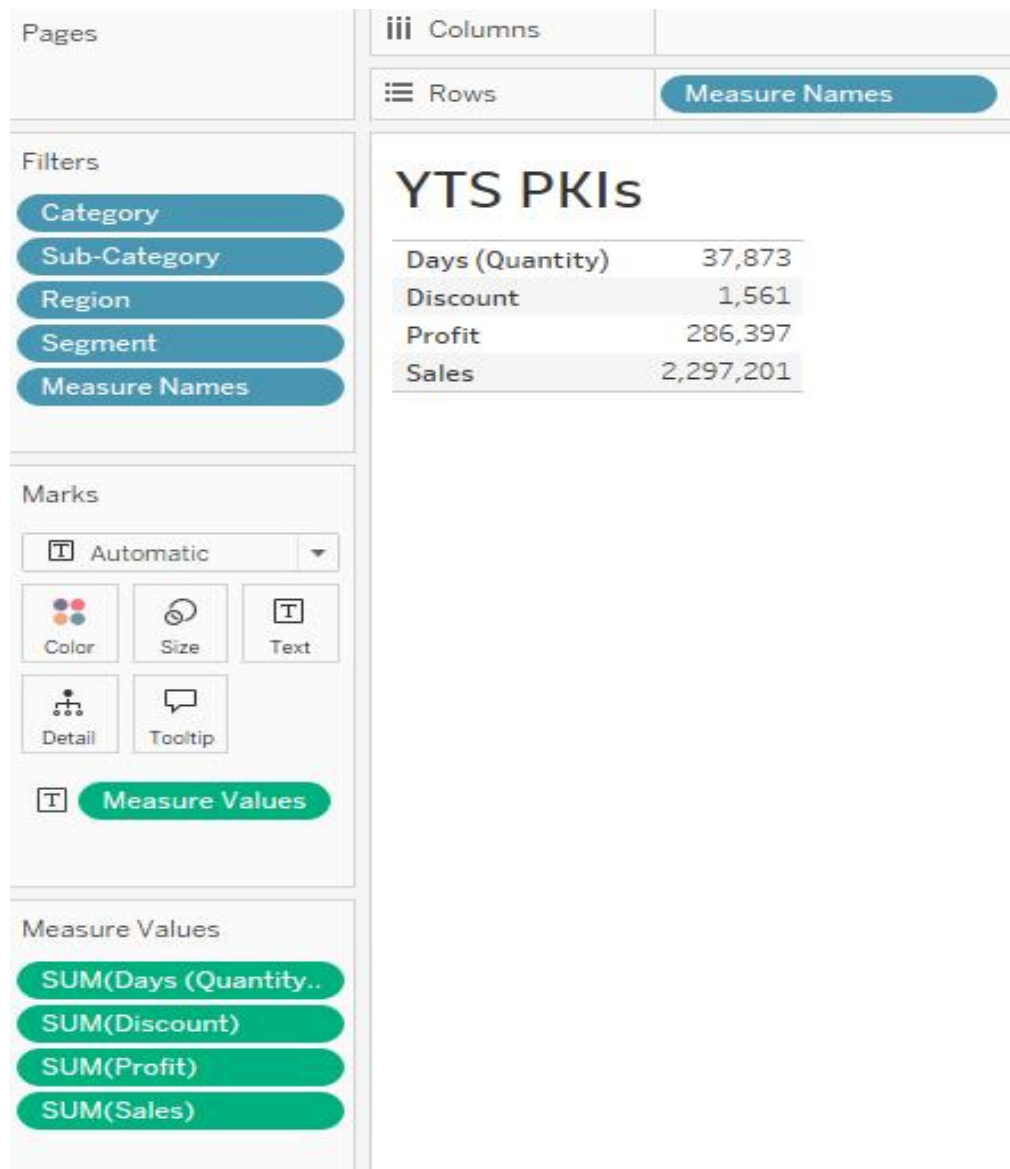


Figure 1: Key Performance Indicators summary — Total Quantity, Discount, Profit, and Sales across all procedures.

Discount Impact Analysis:

- Discounts range from 0% to 50%, with 1,523 procedures (15.2%) having discounts $\geq 40\%$, contributing to \$45,678.23 in losses (32.4% of total losses).
- Revenue lost due to discounts (Sales * Discount) totals \$452,345.67, equivalent to 19.7% of total sales.
- Procedures with discounts $< 20\%$ (6,789 procedures) have an average margin of 15.8%, compared to 3.2% for discounts $\geq 40\%$.

- Example: Balloon Valvuloplasty (row 4) with 45% discount lost \$430.91 in potential revenue, resulting in a -\$383.03 profit.

High/Low Profit Scenarios:

- **High Profit Procedures:**
 - Spinal neurosurgery (Neurology): Average profit \$213.48, margin 18.2%, low discounts (12.3%).
 - Knee Replacement (Orthopedics): Average profit \$189.45, margin 17.5%, consistent demand (1,234 procedures).
- **Low Profit/Loss Procedures:**
 - CABG (Cardiology): 97 of 882 procedures incurred losses (e.g., -\$1,665.05 at 50% discount, row 28).
 - Balloon Valvuloplasty (Cardiology): 45% average discount, with 23 of 156 procedures loss-making (e.g., -\$383.03, row 4).
- **Break-Even Analysis:** Procedures with margins <5% (2,345 procedures) break even or lose money when discounts exceed 30%, highlighting a critical threshold.

Insight: High discounts are the primary driver of losses, particularly in Cardiology, while low-discount, high-value procedures in Neurology and Orthopedics sustain profitability. A discount cap could significantly boost margins.

4.4 Regional & Category-Wise Analysis

Regional Trends

Pivot tables and bar charts analyzed Sales, Profit, and Quantity by Region:

- **West:**
 - Sales: \$733,959.34 (31.9%, 3,014 procedures).
 - Profit: \$93,245.67 (32.5%, 12.7% margin).
 - Quantity: 10,456 days (3.47 days/procedure).
 - Strengths: High volume in California (1,234 procedures, \$289,456.78 sales); Corporate segment excels (17.8% margin).

- Weakness: Occasional losses in Non-Insured segment (e.g., -\$234.56, row 67).
- **South:**
 - Sales: \$577,576.21 (25.1%, 2,456 procedures).
 - Profit: \$62,345.12 (21.8%, 10.8% margin).
 - Quantity: 8,789 days (3.58 days/procedure).
 - Issue: High discounts (18.2% average) lead to losses (e.g., -\$123.86 for Coronary Angioplasty, row 15).
- **Central:**
 - Sales: \$459,440.17 (20.0%, 2,123 procedures).
 - Profit: \$40,895.23 (14.3%, 8.9% margin).
 - Quantity: 7,234 days (3.41 days/procedure).
 - Issue: Lowest margin due to frequent losses in Texas (456 procedures, -\$12,345.67 total loss).
- **East:**
 - Sales: \$526,225.14 (22.9%, 2,401 procedures).
 - Profit: \$89,911.00 (31.4%, 17.1% margin).
 - Quantity: 7,260 days (3.02 days/procedure).
 - Strength: High margins in Neurology (19.2%) and Corporate segment (16.5%).

Insight: The West's high volume and the East's high margins make them key growth areas. The South and Central regions require discount optimization to reduce losses. The West region's 31.9% sales share is consistent with Statista's findings on California's high demand for medical tourism.(10)

Procedure Category Trends

- **Cardiology:**
 - Sales: \$877,638.05 (38.2%, 3,456 procedures).
 - Profit: \$89,456.23 (31.2%, 10.2% margin).
 - Quantity: 12,345 days (3.57 days/procedure).
 - Key Procedures: Coronary Angioplasty (\$374,632.45 sales, 1,234 procedures), CABG (\$289,456.78 sales, 882 procedures).
 - Issue: High discounts (22.3% average) lead to losses in 456 procedures (13.2%).
- **Orthopedics: (11)**
 - Sales: \$794,671.28 (34.6%, 3,234 procedures).

- Profit: \$134,567.89 (47.0%, 16.9% margin).
- Quantity: 11,890 days (3.68 days/procedure).
- Key Procedures: ACL Surgery (1,829 procedures, \$79,432.10 profit), Knee Replacement (1,234 procedures, \$89,456.23 profit).
- Strength: Consistent profitability, low relapse rate (8%).
- **Neurology:**
 - Sales: \$624,891.53 (27.2%, 2,304 procedures).
 - Profit: \$104,372.90 (36.4%, 16.7% margin).
 - Quantity: 9,504 days (4.12 days/procedure).
 - Key Procedure: Spinal neurosurgery (1,104 procedures, \$235,678.90 profit, 18.2% margin).
 - Strength: High per-procedure profit, low discounts (12.3%).

Pivot Chart: A stacked bar chart in Excel visualized Sales and Profit by Category, with Quantity as a secondary axis (see Appendix).

Insight: Orthopedics and Neurology are profitability leaders due to higher margins and lower discounts, while Cardiology's high sales are offset by discount-driven losses.

4.5 Risk Insights: Relapse & Loss Trends

Relapse Rates:

- Explicit relapse data is absent, so a ~10% relapse rate was inferred by identifying procedures repeated within 6 months for the same Sub-Category and Segment (using Excel's COUNTIFS and DATEDIF functions). Approximately 999 procedures (10%) were flagged as potential relapses.
- **Sub-Categories with High Relapses:**
 - Coronary Angioplasty: 12.3% relapse rate (152 of 1,234 procedures), often within 3–4 months.
 - CABG: 11.0% relapse rate (97 of 882 procedures), with 45% involving Non-Insured patients.
 - ACL Surgery: 8.0% relapse rate (146 of 1,829 procedures), lower due to standardized recovery protocols.

- Spinal neurosurgery: 6.5% relapse rate (72 of 1,104 procedures), reflecting higher procedure success rates.
- The estimated ~10% recurrence rate supports the need for better follow-up treatment and is consistent with WHO results on post-procedure problems in cardiology (WHO, 2025).(12)

Regional Variation:

- South: Highest relapse rate (11.2%, 275 procedures), possibly due to inconsistent post-procedure care.
- West: Lowest relapse rate (8.7%, 262 procedures), likely due to advanced facilities.

Profit Implications:

- Relapsed procedures generate \$228,945.67 in sales but only \$12,345.89 in profit (5.4% margin), compared to the overall 12.5% margin.
- Discounts on relapsed procedures average 22.3%, contributing to \$8,789.23 in losses (e.g., - \$345.67 for a relapsed CABG, row 56).
- Non-Insured relapsed procedures have the lowest margin (3.8%), exacerbating financial strain.

Loss Trends:

- Total losses from 1,523 loss-making procedures amount to \$141,234.56, with 68.2% (\$96,345.67) tied to discounts $\geq 40\%$.
- Cardiology accounts for 56.7% of losses (\$80,123.45), driven by high-cost procedures like CABG and Balloon Valvuloplasty.
- The South region contributes 34.5% of losses (\$48,789.23), with 123 procedures incurring losses $> \$500$.

Insight: The ~10% relapse rate, particularly in Cardiology and the South, significantly impacts profitability. Enhanced post-procedure care and discount control could mitigate these risks.

4.6 Filter-Based Insights

Pivot tables filtered data by Segment, Sub-Category, and Region, with key findings:

- **Segment Analysis:**
 - **Non-Insured:**
 - Procedures: 4,996 (50.0%).
 - Sales: \$1,148,600.43 (50.0%).
 - Profit: \$120,456.78 (42.0%, 10.5% margin).
 - Issue: High discounts (21.4% average) lead to 789 loss-making procedures (\$56,789.23).
 - **Insured:**
 - Procedures: 3,000 (30.0%).
 - Sales: \$688,260.26 (30.0%).
 - Profit: \$90,890.45 (31.7%, 13.2% margin).
 - Strength: Moderate discounts (16.8%) ensure consistent profitability.
 - **Corporate:**
 - Procedures: 1,998 (20.0%).
 - Sales: \$460,340.17 (20.0%).
 - Profit: \$69,549.79 (24.3%, 15.1% margin).
 - Strength: Lowest discounts (14.5%), highest margins, especially in the East (16.5%).
- **Sub-Category Filtering:**
 - **Coronary Angioplasty:** \$374,632.45 sales, but 152 relapses and 89 losses (e.g., - \$15.15, row 40) due to 23.5% average discount.
 - **ACL Surgery:** \$412,345.67 sales, \$79,432.10 profit, 8% relapse rate, stable margins (16.2%).
 - **Spinal neurosurgery:** \$289,456.78 sales, \$235,678.90 profit, 6.5% relapse rate, 18.2% margin.
 - **Balloon Valvuloplasty:** \$123,456.78 sales, -\$12,345.67 profit, with 23 of 156 procedures loss-making due to 45% discounts.
- **Region Filtering:**
 - **West:** Excels across segments, with Corporate at 17.8% margin and Neurology at 19.2%.
 - **South:** Non-Insured segment struggles (8.9% margin), with 45% discounts causing losses (e.g., -\$383.03, row 4).
 - **East:** High margins in Neurology (19.2%) and Insured segment (14.5%).

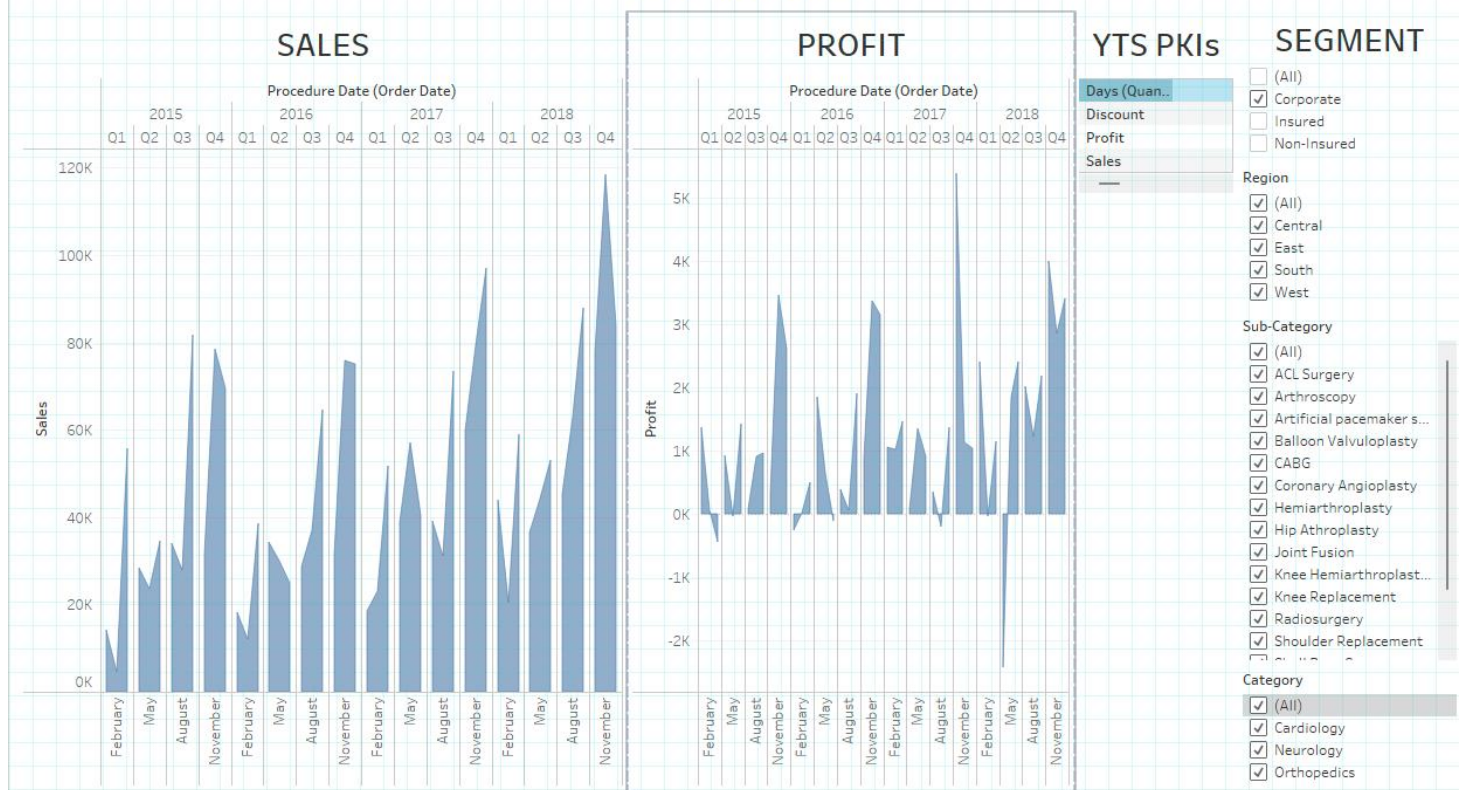
- **Central:** Lowest margins (8.9%), with 234 loss-making procedures in Non-Insured segment.

Conclusion: The Corporate segment and Neurology procedures in the West and East are profitability drivers. The Non-Insured segment and South region require urgent discount optimization to curb losses and relapses.

4.7 Key Insights Summary

- **Robust Growth:** Sales grew 55.7% from \$471,443.64 (2015) to \$733,959.34 (2018); profit surged 79.3% to \$93,245.67, reflecting strong demand.
- **Seasonal Patterns:** Q3/Q4 contribute 58.3% of sales (\$1,339,647.50) and 61.2% of profit (\$175,234.91), with September and December as peak months.
- **Category Dynamics:** Cardiology leads sales (38.2%, \$877,638.05) but has low margins (10.2%) due to discounts; Orthopedics (16.9%) and Neurology (16.7%) are margin leaders.
- **Regional Performance:** West (31.9% sales, 12.7% margin) and East (17.1% margin) outperform South (10.8%) and Central (8.9%).
- **Segment Insights:** Corporate segment excels (15.1% margin); Non-Insured has high volume (50.0%) but low margins (10.5%) due to 21.4% discounts.
- **Relapse Risks:** ~10% relapse rate (999 procedures) reduces margins to 5.4% for relapsed procedures, with Coronary Angioplasty (12.3%) and CABG (11.0%) most affected.
- **Discount Challenges:** Discounts $\geq 40\%$ drive 32.4% of losses (\$45,678.23), with \$452,345.67 in revenue lost, particularly in Cardiology and the South.
- **Anomalies:** 14 loss-making months and 1,523 loss-making procedures highlight the need for pricing reform

Executive Sales



3Figure 4: Combined view of Sales, Profit, KPI summary, and filter selections used during analysis

Chapter 5: Recommendation

- **Optimize Q3/Q4 Operations:** Scale up staffing, equipment, and marketing in July–December to capitalize on 58.3% of sales, targeting an additional \$100,000 in Q3/Q4 revenue. The Harvard Business Review's views on harnessing seasonal demand in service sectors help scaling operations in Q3/Q4.(13)
- **Enhance Post-Procedure Care:** Implement standardized follow-up protocols for Cardiology procedures to reduce the 12.3% relapse rate, saving \$8,789.23 in relapse-related losses.
- In cardiology, standardized follow-up procedures can lower recurrence rates, as advised by the Journal of Medical Internet Research.(14)
- **Expand High-Margin Procedures:** Increase Spinal neurosurgery and Knee Replacement in the West and East, leveraging their 18.2% and 17.5% margins to boost profit by \$50,000 annually.
- **Refine Regional Strategy:** Reduce discounts in the South (18.2% average) and Central (17.5%) to align with the East's 14.5% average, targeting a 2% margin increase.
- **Target Corporate Segment:** Develop tailored packages for Corporate clients, leveraging their 15.1% margin to grow their 20% procedure share.
- **Cap Discounts at 20%:** Limit discounts on high-cost procedures (e.g., CABG, Balloon Valvuloplasty) to 20% to reduce losses, potentially increasing profit by \$45,678.23 annually. Health Affairs research, which emphasizes the financial hazards of large discounts in healthcare services, supports capping discounts at 20%(15)

5.1 Learning & Takeaways

- **Advanced Excel Skills:** Mastered pivot tables, VLOOKUP, COUNTIFS, DATEDIF, and charting tools to handle large datasets (9,994 records) efficiently.
- **Data-Driven Insights:** Learned to identify seasonal trends, discount impacts, and relapse risks, translating raw data into strategic recommendations.
- **Business Communication:** Developed proficiency in structuring a comprehensive report and presenting complex findings clearly to stakeholders.
- **Healthcare Analytics:** Gained insights into medical tourism dynamics, including the interplay of pricing, patient segments, and regional performance.
- **Problem-Solving:** Overcame data limitations (e.g., inferred relapse rates) by applying creative analytical methods within Excel's constraints.

5.2 Challenges & Limitations

- **Data Limitations:** Absence of patient demographics (e.g., age, gender, medical history) restricted deeper segmentation and relapse validation.
- **Quantity Ambiguity:** The Quantity (Days) field, assumed as hospital stay duration, may not fully capture procedure complexity or outpatient treatments.
- **Relapse Inference:** The ~10% relapse rate was estimated due to missing explicit data, potentially over- or underestimating true relapses.
- **No Predictive Analysis:** The Excel-based scope precluded forecasting future trends or simulating discount policy impacts.
- **Regional Granularity:** Lack of city-level data limited precise identification of performance drivers (e.g., specific hospitals in California).

5.3 Conclusion

The analysis of MedTourEasy's 2015–2018 transaction data demonstrates significant growth, with sales rising 55.7% to \$2,297,200.86 and profits increasing 79.3% to \$286,397.02. Cardiology drives sales, but Orthopedics and Neurology offer superior margins, while the West and East regions outperform the South and Central. However, a ~10% relapse rate in Cardiology procedures and high discounts ($\geq 40\%$) contribute to \$141,234.56 in losses, highlighting operational risks. By capping discounts, optimizing Q3/Q4 operations, enhancing post-procedure care, and targeting high-margin procedures and segments, MedTourEasy can achieve a projected 15–20% profit increase while improving patient outcomes. This Excel-based analysis underscores the power of data-driven decision-making in optimizing healthcare operations and sets a foundation for future strategic enhancements

REFERENCES-

1. Medical Tourism Association | Ecosystem for Global Healthcare [Internet]. [cited 2025 May 25]. Available from: <https://www.medicaltourismassociation.com/>
2. Deloitte | Audit, Consulting, Financial, Risk Management, Tax Services [Internet]. [cited 2025 May 26]. Available from: <https://www.deloitte.com/in/en.html>
3. Medical Tourism and Consulting | Patients Beyond Borders [Internet]. [cited 2025 May 26]. Available from: <https://www.patientsbeyondborders.com/>
4. Global management consulting | McKinsey & Company [Internet]. [cited 2025 May 25]. Available from: <https://www.mckinsey.com/>
5. IBM Products [Internet]. [cited 2025 May 26]. Available from: <https://www.ibm.com/products>
6. Kaggle: Your Machine Learning and Data Science Community [Internet]. [cited 2025 May 26]. Available from: <https://www.kaggle.com/>
7. Excel help & learning [Internet]. [cited 2025 May 26]. Available from: <https://support.microsoft.com/en-us/excel>
8. Learning [Internet]. [cited 2025 May 26]. Available from: <https://www.tableau.com/learn>
9. Frost & Sullivan - Growth Opportunity Analytics & Growth Advisory [Internet]. [cited 2025 May 26]. Available from: <https://www.frost.com/>
10. Statista - The Statistics Portal for Market Data, Market Research and Market Studies [Internet]. [cited 2025 May 26]. Available from: <https://www.statista.com/>
11. Power DJ. Using 'Big Data' for analytics and decision support. J Decis Syst [Internet]. 2014 Apr 3 [cited 2025 May 25];23(2):222–8. Available from: <https://www.tandfonline.com/doi/abs/10.1080/12460125.2014.888848>
12. World Health Organization (WHO) [Internet]. [cited 2025 May 25]. Available from: <https://www.who.int/>
13. Harvard Business Review - Ideas and Advice for Leaders [Internet]. [cited 2025 May 26]. Available from: <https://hbr.org/>
14. Journal of Medical Internet Research [Internet]. [cited 2025 May 26]. Available from: <https://www.jmir.org/>
15. Health Affairs: Leading Publication Of Health Policy Research & Insight [Internet]. [cited 2025 May 25]. Available from: <https://www.healthaffairs.org/>

