

Data Analysis of Pharmacy Rejection Claims for a Reimbursement Solutions Provider

by

Winston Singleton
B00100353
wsinglet@dal.ca

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36 Solutions Drive
Halifax, NS

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Dalhousie University

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I would like to thank the IT department at STI Technologies Limited for allowing me into their environment to complete this internship. I would specifically like to thank Sylvie Smith-Ford for her guidance throughout my time spent at STI over the course of my internship. I am indebted to her for the knowledge acquired through this internship experience.

ENDORSEMENT

This report has been written by me and has not received any previous academic credit at this or any other institution.

Winston Singleton

EXECUTIVE SUMMARY

The scope of the internship revolved around the flow and use of information stored in the database of a pharmacy reimbursement solutions provider, STI Technologies Limited. This organization, based in Halifax, started out by offering a new, revolutionary way for pharmaceutical companies to sample their medications. The company has since grown to include patient choice programs, which allow patients to remain on brand medications who have loss exclusivity in the marketplace. The organization also offers services to diabetic supply companies, such as Lifescan, for meter reimbursements for patients, as well as coordination of benefit programs and patient assistance programs for high cost medications, such as Humira®.

One of the core responsibilities of the author during the internship was centred on the accuracy and completeness of the information contained in the database. The author used Oracle SQL Developer® to write SQL queries used to insert, update and retrieve information. The author supported the database administrator in her role at maintaining and updating the database as new information became available as well as carrying out quality assurance tasks related to the database.

Another core responsibility of the author was the analysis of pharmacy rejection claims. The organization receives between 20,000 to 25,000 rejection claims daily. These claims for prescription drugs are submitted to a third party provider, ESI Canada, by pharmacies throughout Canada. The author was tasked with analyzing the rejection data to meet the ultimate goal of reducing the overall rate of rejected claims.

The analysis of the rejection claims generated four solutions for the organization to implement to decrease the rejection rate. The solutions centred on making courtesy calls targeting pharmacies

that are generating high volumes of rejection claims. These solution met the needs of the financial department but did not fully meet the requirements of other company members. The author could not explore additional avenues to offset the rejection costs due to the conclusion of the internship.

TABLE OF CONTENTS

ACKNOWLEDGEMENT 2

ENDORSEMENT 2

EXECUTIVE SUMMARY 3

1. INTRODUCTION 6

2. STI TECHNOLOGIES LIMITED BACKGROUND..... 7

3. INTERNSHIP CORE RESPONSIBILITIES..... 10

 3.1 DATABASE QUALITY ASSURANCE 10

 3.2 DATA ANALYST 11

4. HEALTH INFORMATICS APPLICATION 12

5. PROBLEM ANALYSIS..... 14

 5.1 ANALYSIS METHOD 14

 5.2 SOLUTIONS..... 15

6. CONCLUSION 18

7. RECOMMENDATIONS..... 19

8. REFERENCES 20

9. APPENDIX A – SAMPLE QUALITY ASSURANCE SQL QUERIES..... 21

10. APPENDIX B – SAMPLE OF REJECTION DATA SQL QUERIES..... 22

1. INTRODUCTION

STI Technologies Limited (STI) hired the author in the role of data analyst as well as to assist in database quality assurance activities. The organization facilitates the reimbursement of pharmacy claims for a number of pharmaceutical companies. The organization collects thousands of pharmacy drug claims on a daily basis. This information is uploaded and stored into the company's database for use in reporting and analysis. The company is currently using an Oracle® database to store information, and the author used Oracle SQL Developer® to query the database for analysis and quality assurance activities. The internship activities were supervised by Sylvie Smith-Ford whose official title is software developer but her responsibilities also include database administration and reporting. The author took direction from Mrs. Smith-Ford as task priorities changed throughout the internship depending on the needs of the organization. The author was exposed to a number of different facets of the organization throughout the internship period that he found valuable for future endeavours.

The author's knowledge as a licensed pharmacist in Nova Scotia made him a perfect fit for this internship as STI's primary role is as a pharmacy reimbursement solutions provider. This prior knowledge allowed the author to concentrate on activities related to health informatics, as the internship is intended, without the necessity to first comprehend the diverse aspects of the pharmaceutical industry and the prescription drug reimbursement process.

2. STI TECHNOLOGIES LIMITED BACKGROUND

STI is a pharmacy reimbursement solutions provider; they facilitate reimbursement for prescription drugs and diabetic supply claims. STI partners with pharmaceutical companies to provide solutions for a multitude of reimbursement programs. This organization, based in Halifax, started out by offering a new, revolutionary way for pharmaceutical companies to sample their medications. The company has since grown to include patient choice programs, which allow patients to remain on brand medications, such as Altace®, if they choose to stay with the brand instead of switching to a generic product. The company also offers services to diabetic supply companies, such as LifeScan®, for meter reimbursements for patients, as well as coordination of benefit programs and patient assistance programs for high cost medications, such as Humira®.

The majority of the programs centre on brand drugs that have, or are losing, their drug exclusivity. The process of losing the exclusive right to market a drug, or innovator drug, is referred to in the pharmaceutical industry as loss of exclusivity (LOE). The protection granted by Health Canada (2011) to innovators is 8 years with a possibility of a 6 month extension if certain criteria is met. Brand drugs are also protected by patent laws that protect a new drug molecule for 20-years (Sibbald, 2001). These protections are in place in part to ensure the pharmaceutical companies recoup costs associated with expensive research and development. When exclusivity protection expires, generic drug manufacturers can apply to Health Canada for a notice of compliance (NOC) to allow them to produce and sell to Canadians a generic equivalent of a brand drug at a lower price (Rawdon, 2003; Lechin, 2011). According to most medical experts, generic drugs are considered to be equal to brand drugs in their effectiveness; however, certain

physicians will continue to recommend brand drugs to their patients, and certain patients, regardless if a recommendation by a physician is received, will still choose brand drugs over a generic equivalent (Kesselheim *et al.*, 2008). STI offers pharmaceutical companies a way to maintain partial market share of their products, and hence brand loyalty, by providing solutions in the form of Smart Cards, innoviCares® Cards, and binder programs. As noted, the majority of the programs offered by STI cover medications who lost exclusivity in the pharmaceutical marketplace. The process by which the programs work is as follows: a patient presents, for instance, an innoviCares® Card and a prescription for Altace®, a brand antihypertensive drug, to his/her dispensing pharmacy which uses this card and dispenses this brand drug to the patient as opposed to one of its many generic equivalents. The patient, in this case, receives the brand drug, Altace®, but only pays a price similar to the generic equivalent offered by the dispensing pharmacy. The patient can access a reimbursement card through his/her physician, his/her pharmacy, and online through a web portal. These solutions allow for more choice amongst patients and a continued presence in the pharmacy prescription sales market for brand drug manufacturers.

The process for reimbursement works the same way a patient's private or public prescription drug insurance plan works: a patient presents an insurance card to his/her dispensing pharmacy where the information contained on the card is entered into the pharmacy software and an electronic claim for the drug is sent to the insurance provider's claims adjudicator. In the case of STI, the cards are not generally linked to a particular patient but rather to a select or selection of covered prescription drugs. The reimbursement varies according to the program in which the drug is associated. For STI, claims are sent electronically to their adjudicator, ESI Canada, and they are either accepted or rejected depending on the type of card and the drug requested for

reimbursement. During the overnight, claims processed the previous day, both accepted and rejected, are sent to STI. This file is automatically uploaded into the database and is used to populate several tables contained within the database. The analysis portion of the author's internship concentrated on the table within the database where all the rejected claims are stored.

3. INTERNSHIP CORE RESPONSIBILITIES

The author had several roles and responsibilities while completing the internship at STI: completeness, accuracy and quality assurance of the organization's database and as a data analyst. The following sections will outline in detail the scope of the responsibilities of the author during his internship. The activities complement the knowledge acquired through completion of coursework in the MHI program.

3.1 DATABASE QUALITY ASSURANCE

One of the main responsibilities of the author during the internship was centred on the accuracy and completeness of the information contained in the organization's database. The database contains all the information necessary for smooth operation of the organization. All aspects of operations (inventory, tracking, web services, reporting, distribution and invoicing) rely on complete and accurate information contained within the database. The author assisted the database administrator in her role at maintaining and updating the database as well as carrying out quality assurance tasks related to the database. The author wrote queries using Oracle SQL Developer® to retrieve information from the database as well as queries to determine completion and accuracy of certain tables contained within the database. As it can be seen in Appendix A, there are a number of queries needed to maintain ongoing quality assurance of the database. The goal was to incorporate these queries into the organization's business intelligence (BI) software, Crystal Reports®, to generate automatic reports to support the database administrator maintain ongoing quality assurance. The author was included in a high level overview of the process to automate a report using Crystal Reports® based on an initial SQL query developed through

Oracle SQL Developer®. The author was also included in discussions with other BI vendors as the organization looks forward in regards to reporting tools.

3.2 DATA ANALYST

Another key responsibility of the author was the analysis of pharmacy rejection claims. The organization receives between 20,000 to 25,000 rejection claims daily. These claims for prescription drugs are submitted by pharmacies throughout Canada for patients who possess a STI Smart Card or an innoviCares® Card. STI's third party provider, ESI Canada, adjudication software, for a multitude of reasons, can reject the claims. The organization was initially looking for recommendations on reducing the rejection rate since each rejected claim costs the organization money. The data was retrieved from the database using structured query language (SQL) and exported into Excel® for analysis. The author organized the results of the analysis in a PowerPoint® presentation that he presented to his supervisor and several of STI's key individuals including: the chief financial office, the operations manager, and the Vice President and General Manager of the Pharmaceutical Division. The specific results of this analysis are not included in this report at the request of STI as the data is confidential.

4. HEALTH INFORMATICS APPLICATION

According to the National Health Service (2002), UK, health informatics is: “the knowledge, skills and tools which enable information to be collected, managed, used and shared to support the delivery of healthcare and to promote health”. One of the primary aforementioned responsibilities of the author was the collection of information regarding various aspects of the STI’s core activities. This information was collected through various sources and incorporated into the database using SQL statements. The skills required to work with the database to update, insert and retrieve relevant information is based on knowledge acquired through academic course work in MHI program. More specifically, course work based on networks, HINF 6220 - Networks and Web for HI, was instrumental in the author’s ability to perform the technical tasks necessary to complete the internship. Without the basic skills to access the vast amount of data stored by STI then the author would not have been able to perform these tasks effectively. The class introduced the author to mySQL® software program that taught him the basic concepts of SQL that he applied to the software program his internship organization currently uses, Oracle SQL Developer®. These academically acquired skills were further explored and developed by the author’s internship supervisor at STI.

Another core responsibility of the author, while undertaking the internship at STI, was as a data analyst. STI collects vast amounts of information on a daily basis regarding prescription pharmacy claims. The data potentially contains very useful information that STI can use to fuel further growth in their business. The author used his technical informatics skills, such as his ability to write queries with SQL, to retrieve the data from the database, performed an analysis base on the information retrieved, and shared the results of the analysis with core individuals in the organization. The results were generated using simple statistical methods developed through

the author's coursework in statistics, HINF 6030 – HI Statistics. The information shared will help the company target new products for future revenue streams.

5. PROBLEM ANALYSIS

An important issue to STI is the number of rejection claims that are generated on a daily basis. This is of particular concern as each rejection claim costs the company money but currently there is no revenue stream generated out of the rejection data to offset the costs. The main problem that the company had that benefited from a health informatics solution was the question of what to do with the volume of rejection claims. The application the health informatics to this problem concentrated primarily on the necessary skills to retrieve the information and on performing a simple statistical analysis of the rejection data. An analysis of the rejection data was necessary to determine if actionable solutions could be found to offset the escalating costs associated with these claims.

5.1 ANALYSIS METHOD

Using Oracle SQL Developer®, the author first queried the database to identify all the drugs contained within the data and the number of claims associated with each drug identified. The query results were exported into an Excel® worksheet and, using the author's knowledge of pharmaceutical drugs, he categorized the drugs into five categories: brand drug – no program, brand drug – program, generic drug – no program, generic drug – program, and diabetic claims. It was necessary to differentiate drugs currently included in a STI program and if it was a brand or generic drug. Diabetic claims were put into a separate category as they dealt with diabetic supplies rather than medications. The data from this initial query was put into a visual representation with the use of Excel's graphing capabilities. The data was then explored further by querying the database for more specific information by using more complex SQL statements. Appendix B contains a sample of the rejection data queries used to explore the data contained

within the database. All query results were exported to Excel®, analyzed and a PowerPoint® presentation was created using information found. The author was asked to explore the rejection data in the context of the following requests:

1. Determine the percent of each category of drug sorted by: brand drug – no program, brand drug – program, generic drug – no program, generic drug – program, and diabetic claims
2. Determine the programs associated with the rejected claims and calculate the percent of each program represented in the rejection data.
3. Determine the pharmacies that are generating the most rejection claims.
4. Determine the UCIs that are generating the most rejection claims.
5. Determine the top generic drugs generating the most rejection claims.
6. Determine the top brand drugs generating the most rejection claims.
7. Determine the overall rejection rate.
8. Determine the top programs creating the most rejections, and deconstruct the top program to generate a list of generic drugs, brand drugs, and innoviCares® program drugs that are driving the rejections
9. Determine the percent of claims affiliated with the different pharmacy software

5.2 SOLUTIONS

The information retrieved from the data queries resulted in a number of key items that the company could address to potentially deal with the sheer volume of rejection data generated. The author had several meetings with key individuals to refine and address areas of interest with

regards to the rejection data. The author initially presented a number of solutions to help reduce the number of rejection claims:

1. The author suggested updating the design of the Smart Cards and innoviCares® Cards to include messaging to pharmacy providers to de-activate cards from their respective software programs so that these cards are not inadvertently adjudicated with claims not covered by a STI program. This is particularly important for single-use cards that are automatically terminated by STI after the first redemption.
2. The author suggested setting up monthly reports, or a frequency that suits their resources, to flag pharmacies with a high number of rejection claims. Customer service could provide a courtesy call to the top 25-50, or a number of their choosing, pharmacies reminding them of appropriate card use.
3. An UCI is the unique card identity attached to each card that allows all claims to be tracked. The author suggested setting up monthly reports to flag the UCIs generating a high volume of rejections. A courtesy call to the pharmacy providers adjudicating these UCIs reminding them of appropriate card use. Unfortunately, due to confidentiality, STI customer service cannot divulge information pertaining to possible patient, and due to limited abilities of pharmacy provider software, the UCI cannot be used to search the system.
4. The author suggested setting up monthly reports to flag the UCIs that are invalid and that are generating a high number of rejections. An invalid card is one that does not exist in the STI database; the pharmacy provider has entered an invalid number that is associated with STI through the card's group number. A courtesy call could be done to remind pharmacies of appropriate card use.

If fully implemented, in the opinion of the author, the above solutions should offset the increasing rate of rejection claims. However, implementation would rely heavily on community pharmacies involvement. Realistically, implementation of all the solutions presented will not be successful due to community pharmacies' conceivable lack of cooperation. To cultivate community pharmacies' cooperation, the organization should first start by only addressing rejection claims that concern unusually billing behaviour, such as high volume of rejection claims generated by a single card in one billing day. In one particular case, a single card generated over 2000 rejection claims in one billing day. From experience working in a community pharmacy, this is highly unusual activity and should warrant further investigation by the organization.

The initial solutions presented by the author satisfied the financial department's initial request to find actionable solutions to counteract the increasing rejection rate. The solutions presented did not, however, completely satisfy a key STI executive but the author's internship concluded and he could not re-focus his analysis.

6. CONCLUSION

The author's internship at STI was both challenging and rewarding. The author gained valuable technical skills related to data analysis. The opportunity given to the author allowed him to use his MHI knowledge for real world applications.

The objectives of the internship were met by the author's tasks of database quality assurance and as a role as a data analyst. The author analyzed rejection data for the organization to develop actionable solutions to their questions.

The author addressed a health informatics problem within the organization by analyzing claims data contained in the organization's database. The rejection claims analysis resulted in four actionable solutions for implementation. The organization chose to look at possibly implementing some of the solutions, such as courtesy calls to high volume pharmacies, but to not to discourage all rejection claims.

7. RECOMMENDATIONS

The author did not get the opportunity to fully explore all the rejection claims data. The author, at the time of the internship, had not taken course work in data mining. The analysis performed by the author was purely statistical in nature. An in-depth analysis would help the organization identify potential patterns in the data that would help grow their business. The author requested to continue working with the organizations's rejection data and to apply data mining skills acquired through current coursework; however, the organization does not wish to see their confidential data used outside the organization. The author recommends that the organization remain focused on the rejection claims by hiring an individual to apply data mining techniques to complete the analysis of their rejection data.

8. REFERENCES

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9. APPENDIX A – SAMPLE QUALITY ASSURANCE SQL QUERIES

--searching for web_access that are incomplete

```
select * from sti.all_programs p
left join sti.web_access w on p.program_id=w.program_id
where esi_group = '444'
and w.ws_permission_id is null;
```

--searching for pp_kind info that are incomplete

```
select p.program_id, p.program_type_id, p.program_code_id,t.program_name
from sti.all_programs p
left join sti.pp_kind k
on p.program_id=k.program_id
join sti.p_type t on p.program_type_id=t.program_type_id
where k.program_kind_id is null
order by p.program_id;
```

--searching for p_enroll info that are incomplete

```
select * from sti.esi_program e
left join sti.p_enroll p
on e.program_id=p.program_id
where e.esi_group = '444'
and p.p_enroll_id is null;
```

--check for p_drud_code info

```
select p.program_id, pr.din_number, pr.brand_name,pr.generic_name
from sti.all_programs p
left join sti.p_drug_code d on p.program_id=d.program_id
join sti.prod on p.prod_id=pr.prod_id
where d.program_id is null order by p.program_id;
```

10. APPENDIX B – SAMPLE OF REJECTION DATA SQL QUERIES

--Total Rejection

```
select drug_description, count(distinct rej_claim_id) Total from sti.rejected_claims
where date_processed >=to_date('2013-01-01','yyyy-mm-dd')
group by drug_description
order by total desc;
```

--Total rejections by Pharmacy

```
select ph.pharmacy_id, count(re.rej_claim_id) Total, ph.pharmacy_name, ph.Pharmacy_address_line3,
ph.pharmacy_telephone_number
from sti.rejected_claims re join sti.chain_info ph
on re.pharmacy_id=ph.pharmacy_id
where re.date_processed >=to_date('2013-01-01','yyyy-mm-dd')
group by ph.pharmacy_id,ph.pharmacy_name, ph.Pharmacy_address_line3,
ph.pharmacy_telephone_number
order by total desc;
```

--Total rejection by Pharmacy returning CO (Din Not a Benefit) rejection code

```
select ph.pharmacy_id, count(re.rej_claim_id) Total, ph.pharmacy_name, ph.Pharmacy_address_line3,
ph.pharmacy_telephone_number
from sti.rejected_claims re join sti.chain_info ph
on re.pharmacy_id=ph.pharmacy_id
where re.date_processed >=to_date('2013-01-01','yyyy-mm-dd')
and re.ecl_error_codes like '%CO%'
group by ph.pharmacy_id,ph.pharmacy_name, ph.Pharmacy_address_line3,
ph.pharmacy_telephone_number
order by total desc;
```

--Invalid UCIs

```
select re.rejected_uci, count( re.rejected_uci) Total, ph.pharmacy_id, ph.pharmacy_name,
ph.Pharmacy_address_line3, ph.pharmacy_telephone_number
from sti.rejected_claims re
left join sti.smart_cards c on re.rejected_uci=c.uci
join sti.chain_info ph on re.pharmacy_id=ph.pharmacy_id
where re.date_processed >=to_date('2013-01-01','yyyy-mm-dd')
and c.uci is null
group by re.rejected_uci, ph.pharmacy_id, ph.pharmacy_name, ph.Pharmacy_address_line3,
ph.pharmacy_telephone_number
order by Total desc;
```