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How IntelliTide and Transwise helped detect millions in lost revenue using analytics + human knowledge (Part-1)

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WHITE PAPER

The Hospital Revenue Problem

For those who are not directly connected to the healthcare industry, one of the less known issues with its precarious state is the raising expense and continuously reducing income for healthcare providers. Hospitals, clinics and private practices continue to hemorrhage money due to a number of reasons including but not limited to escalating costs, loss of productivity due to administrative complexity, reducing insurance payments, an aging and unhealthy patient population and inadequate adoption of technology.

The issue of financial risk is becoming so severe that many healthcare providers face permanent closure or a drastic reduction in services offered. Others offer themselves for acquisition or mergers none of which is guaranteed to offer financial stability. The problem is more acute with smaller hospitals and practices with limited financial resources and those in rural areas are particularly vulnerable. Unfortunately, a reduction in healthcare providers not only leads to loss of employment but it also puts large patient populations especially in already underserved areas at risk.

A Call For Help

In this white paper we present the case of a particular hospital system that has been suffering from the same financial malice that so many of its peers are. This is a fairly large hospital system that serves a large section of the city and surrounding areas where it is located. This hospital system runs on multiple EHR's and billing systems and all claims and coding is outsourced to third-party companies.

As is typical of hospitals of that size and setting, many of their physicians are contractors that are paid for the services they perform. The goal to engage us was simple – since the hospital had tried to fix their cash flow and AR issues unsuccessfully in the past, this time around they wanted to try their luck using data, technology and deep healthcare financial expertise.

Data Warehousing and Cleansing

The first order of business in any analytics endeavor is to create a data warehouse by consolidating data from different sources into one single source of truth data mart. This involves data modeling, “cleansing” and “normalizing” the data. A number of analytics (especially healthcare AI projects) fail simply because of projects ignoring or undermining this activity.

Following are the steps that were performed to warehouse the data:

1. **Create data models** – data model is a foundational and extremely important step to create a high-quality data store. Claims, payments, insurance, physician, patient and patient visit data elements and their attributes and relationships were modeled.
2. **Integrate the data** – integrate the sources to pull data into the data warehouse. All the above entities (claims, payments, insurance, physician, patient and visit) were pulled and stored in the models created previously.
3. **Cleanse and normalize the data** - cleansing is the process of removing the unwanted or *noise* data as well as merging or discarding the duplicate records. Data normalization involves bringing uniformity to similar data elements. For example, converting different data formats into one. This is another important step in improving the quality of the data.

Now the data has been prepared for analysis.

Analysis By Divide and Conquer

Now that we had the data warehouse with all the necessary data elements in one place, we still had the challenge of defining the problem domain to identify the troubled spots, trends and patterns from a very large and complex dataset with many years worth of data. We started with the three key entities that constitute a healthcare system – Insurance, Physician and Patient and importantly the interactions and relationships between these entities. These entities in themselves have many attributes and need to be narrowed down further. To accomplish this, we traversed from the starting point of when data in a hospital starts getting acquired – the patient visit or encounter. Thus, from the patient visit to exit we traversed the data elements along the workflow and picked up relevant pieces of information and created a graphical map.

From each of the key entities of Insurance, Physician and Patient and the visit that ties them all together, the following are some of the sub-elements of particular interest:

- **Insurance** - the insurance related data of interest is the billing/claims, payments and importantly the insurance contracts
- **Physician** – data elements of interest to us with physician data was their specialty, services and procedures performed and profiles of patients they were treating
- **Patient** – the patient visit information, the insurance if any they were carrying and health conditions were elements of interest

The analytics performed and the insights derived from studying the data from each of these entities (and their relationships) is presented below.

Claim Rejections

It is no secret that claim denials are the greatest source of concern for any healthcare provider and generally the first issue that gets evaluated. Still why are denials such a ubiquitous problem? In our assessment it boils down to two reasons – the sheer volume of claims that get filed in a day by a provider and the associated paperwork are overwhelming the billing staff and claim rejections are a symptom of this systemic problem. Secondly, the payers over the years have refined the processes on their side to detect even minute mistakes in the claim forms. The payers have an extensive set of validation procedures and tools compared to the provider. It's just not fair fight! To overcome these issues providers need to employ smart use of technology to augment their human staff.

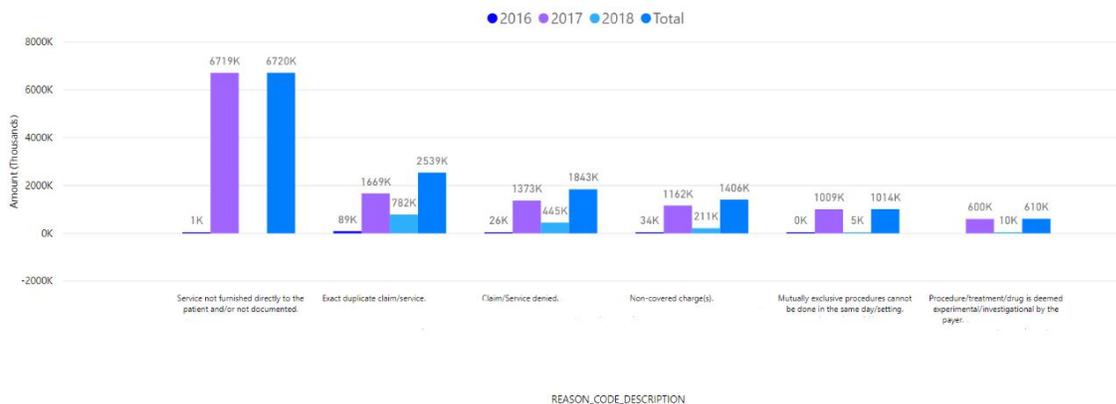
When it comes to rejections this hospital was no exception. In fact, their claim rejection volumes handily beat the industry average with more than 25% denials amounting to more than 10 million dollars in losses per year. Our analysis of claim denials adopted the same divide and conquer theme mentioned above. We broke down the denials data by insurance, patient and reason type categories.

- **Denials by payer** – we analyzed which insurances were rejecting the most claims and the top most reasons for the rejections. Every payer is different when it comes to how they treat claims and our intent was to detect these patterns per payer. We also observed some common patterns emerging from this analysis – most payers complained about eligibility verification,

documentation errors and prescription of unapproved drugs as some of the top reasons for rejection.

- **Denials by patient** – do some patient claims result in higher volume of rejections than others? Do some patients have something particular or peculiar to them that cause more denials. The answer is a - yes - and it helped to isolate those patient claims for special analytical treatment. For example, we found that a lot of patients with higher claim denials were visiting the hospital for radiology related procedures for a particular chronic condition without being referred to a specialist.
- **Denials by reason category** – across the board we analyzed the reasons the payers provided for rejecting claims. A number of insights were derived from this analysis but one standout was the fact that billers were refileing rejected claims without addressing the cause of the denials or in many cases just refileing without modifying the original claim at all!

Here is a simple sample report that demonstrates the top reasons that claims were rejected and the loss in terms of total dollars attributed to the reasons.



Physician Performance

As the healthcare industry transforms from a fee-for-service to a value-based care, a significant feature of this transformation and indeed the success of it will depend on how a physician’s performance is measured and how it is applied towards their compensation. Traditionally, physician and clinical staff (especially those on contract agreements) compensation was determined by the services they provide rather than the outcome of the care. Therefore, generally more patients a doctor treated and more procedures and treatments they prescribed translated to higher fees and incentives paid to the doctor regardless of the outcomes of the claims and the wellbeing of the patients.

We addressed this anomaly for this hospital client by analyzing the physician data by expanding the scope to include billing, patient visit, diagnosis and treatment data that corresponded to each physician. Thus, we were able to paint a 360-degree view of the physician and his or her interaction at key points of the patient visit workflow. Some of the key metrics we measured for each physician were:

- Total number of patients they treated for a given time period and the conditions of those patients

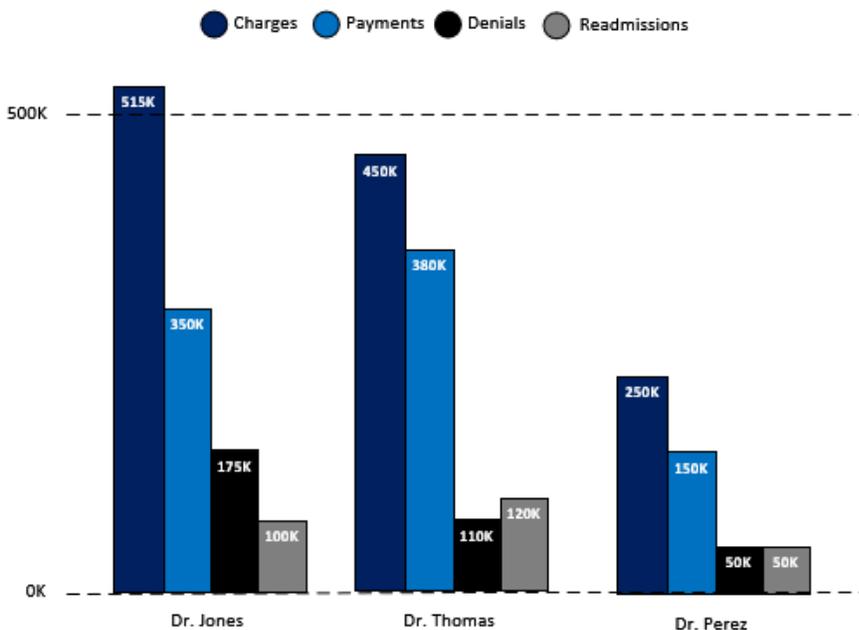
- Number of already treated patients that were readmitted for the same condition. Readmission is defined as in-patients returning for the same condition they were already treated and discharged within 30 days
- Services and procedures prescribed per patient within a time period and the status of claims corresponding to them
- Claims that were filed for services performed for the physician that resulted in denials
- Many other measures that we will leave out for brevity

Each of these measures determine the quality of care offered by the physician. For example -

- Readmissions are expensive and are an avoidable overhead
- We analyze treatments and services within a timeframe to detect frivolous, unnecessary or repetitive treatments
- Rejected claims are not always the fault of a physician but some are. Prescribing opioids or experimental drugs or treatments that have been repeatedly rejected for the same patient in the past are responsibilities of the physicians

We developed a proprietary and unique physician performance scoring system that considers a number of key but inconspicuous metrics and we applied it to this hospital. The ultimate goal is to arm the hospital to pay its clinical staff for their performance and value they bring and not just for service. With this system in place the hospital is projected to improve physician productivity, improve patient care and save the hospital millions of dollars per year.

Below is a sample report that measures each doctor's performance. It plots the total charges associated with the doctor, the total payments received against the charges, the total amount of claim denials tied to the doctor's patient visit and readmissions caused by the doctor. Many more performance scores can be plotted in this way.



Claim Analysis

In this whitepaper we already discussed the analysis of claim denials. However, it is extremely useful to analyze even the paid or partially paid claims to uncover obscure patterns and trends that lead to financial inefficiencies. For these categories of claims the questions we asked were –

- Why was a claim paid only partially? Do claims with partial payments show a trend or pattern?
- What is the contractual payment for the claim versus what was actually received?
- Are there claims that show a steep (or gradual) drop in payments over the years?
- Are there categories of claims that are being paid consistently for some patients but the same get rejected for other patients with similar profiles and insurance?
- Is there a significant difference in payments of similar claims between two insurances?
- What trends emerge by grouping claims by categories? For example, do we see an unusually high incidence of opioid claims or radiology claims?
- And many more...

Answering these questions using analytics unearthed a number of significant cost saving insights including:

- Billers were adjusting hundreds of thousands of dollars with no accountability. Some CT scans which were being performed at the hospital were coded as performed at home
- Another finding was a number of patients were needlessly being prescribed repeated imaging procedures many of which was being flagged by the payers
- Outdated fee schedules and poorly negotiated contracts with payers leading to loss of revenue were detected

Aging & AR

Delayed and unrecovered payments either from payers or patients is another big problem dogging the healthcare industry. We focused on payments that have not been paid for more than 90 days from the invoice date. Our analysis of payments and AR data consisted of the usual drivers – the patient, provider and payer. After identifying the patients with the most outstanding amounts and intersecting this data with their insurance and doctor profiles we uncovered some key insights to help the hospital to update their AR procedures.

The Human Intervention

Our use of technology and leveraging data and analytics for this hospital client primarily solved the challenge of scale and complexity. A hospital is a busy place – lots of humans to deal with, lots of procedures and processes to follow and lots of workflows involved. It's a complex setup that generates a lot of information and thus a lot of data. However, hospitals are usually understaffed and overworked to handle all the complexity that generally leads to errors and inefficiencies committed by the human staff. This is where technology helps to mitigate the dual risks of scale and complexity. However, this does not mean technology can completely replace the human. Technology is just a digital assistant. It can only augment but not replace the human. Ultimately, phone calls need to be made. Complex scenarios and issues need to be manually dealt with. Contracts need to be negotiated and finally areas where technology has not caught up yet still needs to be handled by the human. This is where our partner

[Transwise](#) which an SME in hospital financial and claim management played a vital role. Together we combined technology and human expertise to financially turn around this particular hospital.

Conclusion

We reported a number of other categories of findings which we will exclude from this paper. The cumulative impact of all these insights however provided tremendous financial windfall for the hospital. Also, this whitepaper only discusses one type of analytics – the descriptive analysis. Future whitepapers will present the solutions we implemented using predictive and diagnostic analytics as well as optimization techniques.

Finally, contrary to the ever-growing perception that technology can totally replace human involvement in healthcare, our project at this hospital still reinforces the value of using human subject matter experts in conjunction with technology. Thus, using Transwise as the human SME and analytical solutions from [IntelliTide](#) we were able to bring tremendous value to our customer.

Project Executive Team/Authors



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