UCLA Extension – Data Science and Visualization
COM SCI X 450.2
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Streamlining Healthcare Data Distribution

With Tableau & Cloud Storage

Streamlining Healthcare Data Distribution

Abstract:

The unique structure of the healthcare industry makes accessing data particularly challenging. One common area of frustration is quickly and accurately sharing revenue and volume information with the large number of teams in an organization that need access, such as Operations, Revenue Cycle Management (RCM), and Accounting. Revenue information is based on data from medical billing records and there are many opportunities to improve the workflow from the status quo. For example, according to Kaufman Hall's 2018 report on Healthcare CFO Performance Management and Trends, "50%+ CFOs want access to easier report creation, better dashboards and visuals, and enhanced ability to drill into reports to understand underlying details (2/3 struggle to pull data from multiple resources)."

At my role in M&A at Radiology Partners, the largest radiology practice in the US, I work with a wide variety of healthcare data sources on a daily basis. I have seen how medical billing data can be extremely complex: many terms are not standardized, errors are not uncommon, transaction records can number in the millions, and privacy issues must be considered. Depending on the functional area, end users may not have the skills necessary to properly vet and interpret the data, leading to incorrect conclusions. All of these problems compound the inefficiencies already present in the healthcare system today and must be addressed if we would like to create the healthcare system our country deserves.

Problem:

How can we effectively store and disseminate healthcare billing data quickly to multiple teams across an organization, while considering the following?

1) Vast disparities in the data analytics capabilities of end users
2) Divergent needs by functional areas
3) Process standardization & efficiency

Figure 1: Common Healthcare Billing Data Problems (RevSpring)

Data:

Medical billing data varies by billing provider, but usually has several common characteristics. Billing data is stored in a relational database, with common fields being:

- **Timing (Dates):** Date of Service, Date of Post
- **Financial (Floating-Point #):** $ Charged, $ Net Collections
- **Volume (Floating-Point #):** Procedure Count, Total Relative Value Units (tRVUs), Work Relative Value Units (wRVUs)
- **Medical Codes (Strings):** Charge Procedure Code, Modifiers
- **Additional (Strings):** Provider, Location, Insurance Payor

The data can be stored in a number of file formats depending on size. For smaller healthcare businesses, the data may be small enough to be stored as a CSV with row counts in the tens of thousands, while for larger organizations other solutions are necessary.

For this project, I'm using fictional billing data that represents the format of a typical small to mid-sized physician practice. It is stored as a CSV with over 150,000 rows (procedures) and 18 columns. The fields primarily consist of procedure information useful for billing such as timing of the exam/payments, payment records, medical codes, location, and provider. It represents about 2 years of revenue data.

In our organization and many others, these files would be saved as Excel files, modified in Excel using Pivot tables and/or formulas, then then shared with other teams via email or cloud storage programs. However, there are numerous potential problems than can arise from this method: the process is inconsistent, large files limit transfer capabilities, version control is hard to manage, data can be inadvertently modified, and some end users may not have strong data analytics skills.

***Solution Methodology*:**

My solution has two parts:

1. Use the cloud to centralize storage of raw data
2. Create standardized Tableau outputs to disseminate information to end users

Pt. 1) Cloud Storage

First, the raw data is saved to a cloud server. Using cloud storage for the raw data is a great fit for this application for many reasons:

- The centralized location prevents version control and unauthorized access/modification of the raw data
- It simplifies our upload process- data only needs to be uploaded to one place vs. sent to various users
- Because end users don't need instant access to the data, the small lag time to access the data vs. local storage isn't a big concern

Pt. 2) Tableau

Tableau has several capabilities that will help improve the process over the status quo. Initially, we need to create standardized dashboards for each functional area, but we only need to do this once. Then, when we add new data that we want to distribute, all we have to do is connect Tableau- the dashboards then automatically update.

End users then analyze/download the graphs relevant to their needs, which usually makes it easier to spot trends, outliers, etc. If the end user needs to download a standard report, that functionality is already built into their dashboard and they can save a CSV with the backup information, which is summarized and filtered to their needs. There are also dashboards that can be used to quickly spot outliers in the data, big advantage over a spreadsheet-based approach. In the Appendix, I included several examples of dashboards designed for specific teams, as well as more general use dashboards.

***Conclusion*:**

By using tools such as Tableau and cloud storage applications, we can exponentially simplify medical billing data distribution internally, ensuring teams across an organization are well-informed in a timely fashion. I am currently working on implementing this idea at Radiology Partners with our Manager of Revenue Analytics, who is excited about the potential to reduce the variance in this process. Using a visualization and dashboard approach increases speed of handoff, allows for scalability, reduces opportunities for errors, and minimizes version control issues. Most importantly of all, this solution provides for a better end user experience, allowing teams to spend their energy on decision-making activities.

Figure 2: Dashboard to screen for outliers in the volume data (General Usage)

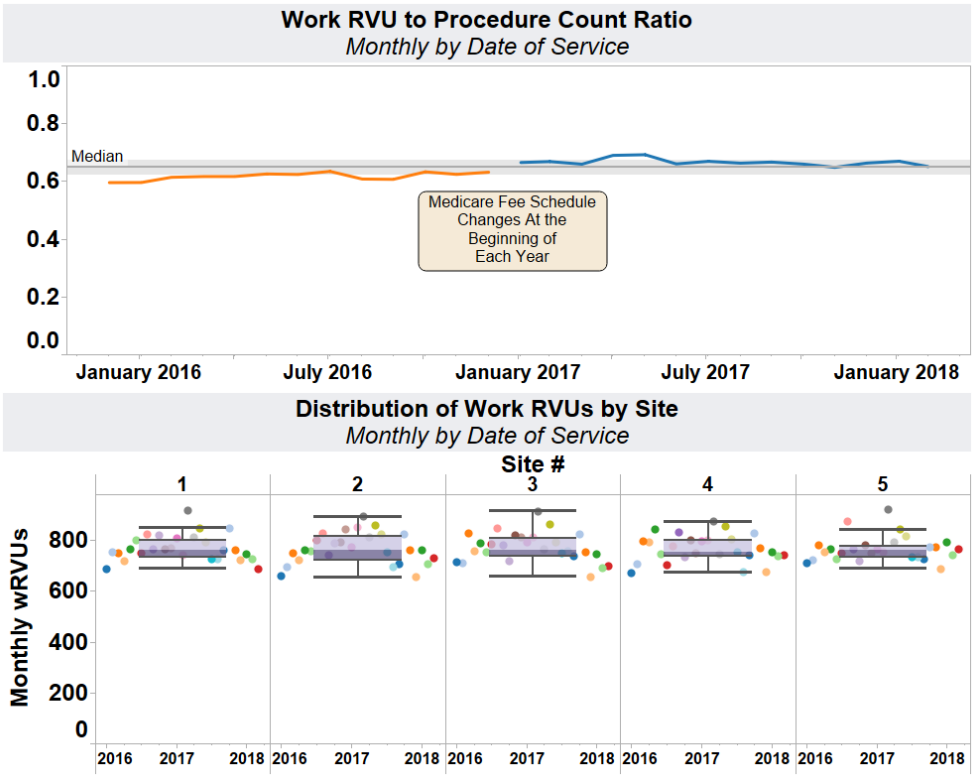

Figure 3: Dashboard to screen for outliers in physician productivity (Operations)

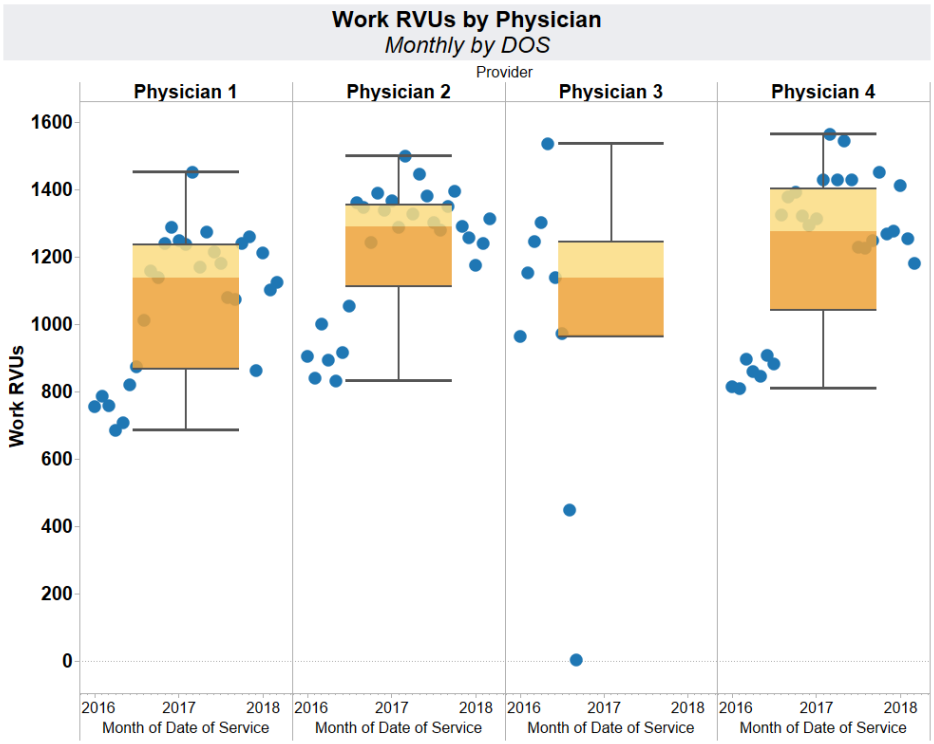

Figure 4: Dashboard for High-Level Stats on Group (General Usage)

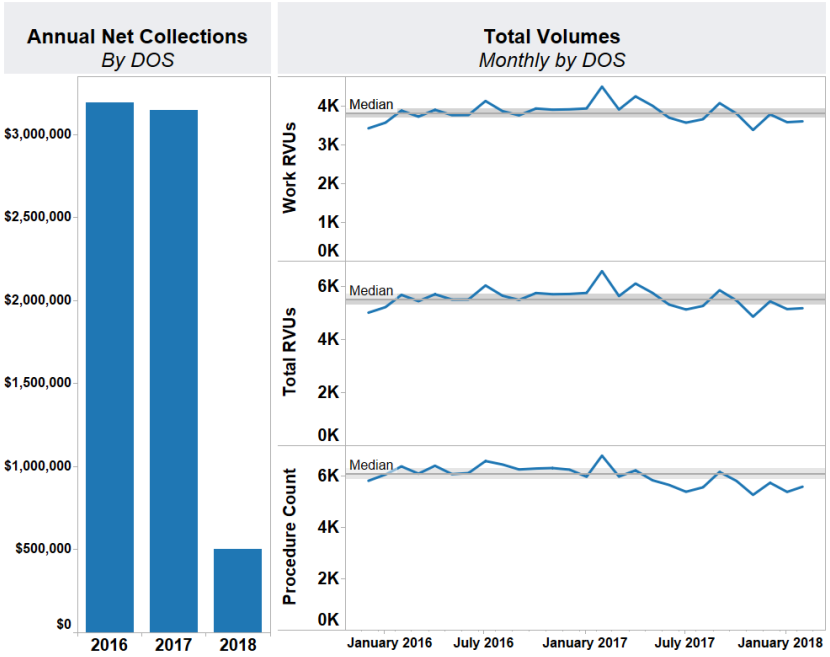

Figure 5: Dashboard for Monthly Volumes & Collections (Accounting, Operations)

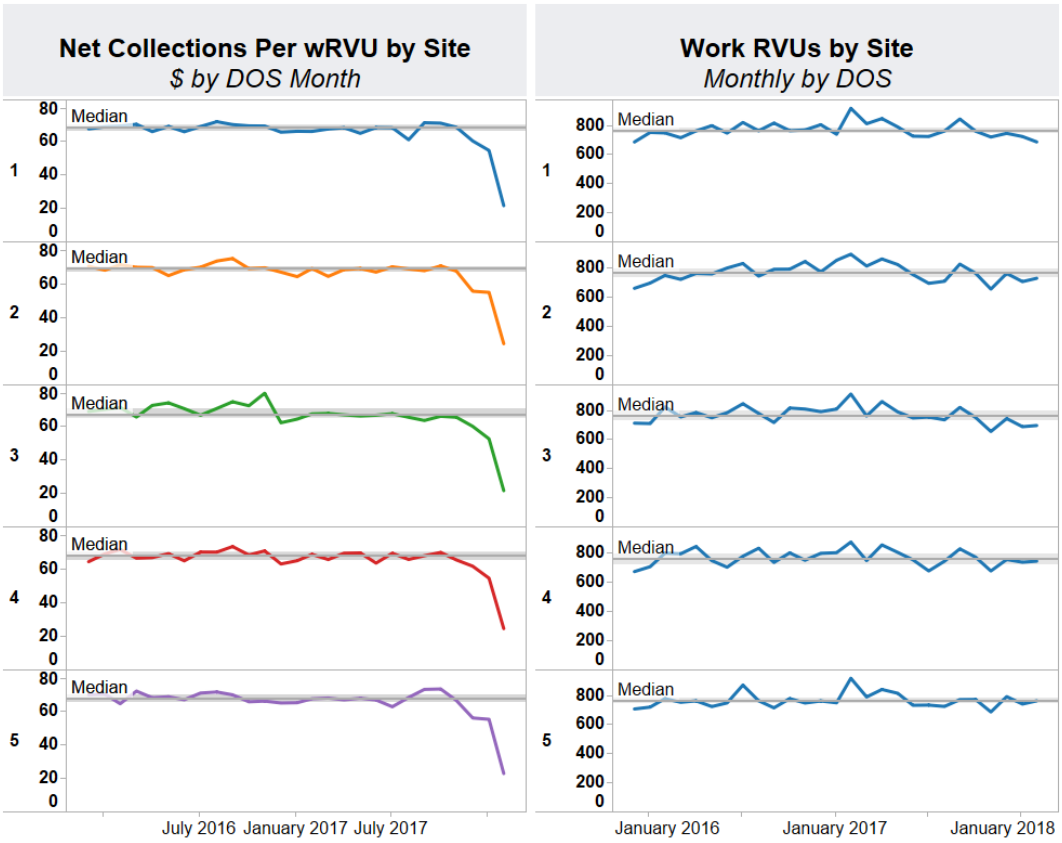

Figure 6: Dashboard for Statistics on Insurance Payors (Payor Contracting)

Payor Mix

Insurance Type	Net Collections Per wRVU ($)			Net Collections ($)			Work RVUs (DOS)		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
Payor 1	133	123	77	1,549,113	1,376,310	207,445	11,669	11,208	2,685
Payor 5	45	49	38	539,017	652,367	114,553	12,085	13,249	2,999
Payor 3	77	80	57	478,480	427,158	58,814	6,214	5,331	1,029
Payor 2	70	69	49	401,235	443,873	79,920	5,752	6,475	1,621
Payor 4	40	42	28	156,089	172,343	29,114	3,900	4,112	1,047
Payor 6	7	7	5	42,423	43,097	7,074	5,785	6,006	1,451
Payor 7	79	83	43	12,105	19,515	2,541	154	236	60
Payor 8	46	51	34	10,551	12,386	2,957	230	242	86
Payor 9		5	2		7	62		1	32
Grand Total	**70**	**67**	**46**	**3,189,014**	**3,147,057**	**502,480**	**45,789**	**46,861**	**11,009**