Data Analysis Starter Kit: How to Apply Informatics and Analyze ROI as an e-HIM Professional

By Diane Dolezel, MSCS, RHIA

The digital era of Big Data has generated a growing need for more electronic health information management (e-HIM) professionals who can assume the emerging role of data analyst.[1] This new role requires learning how to analyze data and perform statistical calculations to support informed decision-making and enable information governance.[2] However, acquiring these new skillsets can be daunting since an e-HIM professional must learn to use unfamiliar software features to create graphs and generate statistics. This article will demystify those features, and provide a practical starter kit for applied informatics analysis.

Importance of Data Analysis

In order to support enterprise level information governance, a typical healthcare facility must collect, analyze, and present large volumes of data rapidly and accurately.[3] Data sources could include electronic health records (EHRs), computerized physician order entry (CPOE), or electronic insurance billing.[4] Additional data collection is necessary to support the mandatory reporting for the Centers for Medicare and Medicaid Services' (CMS) pay-for-performance program, and the Affordable Care Act, which rewards facilities for providing quality care and demonstrating improved clinical outcomes.[5,6]

Raw data must be converted into meaningful information with data analysis in order to provide useful health intelligence. Thus, it is not surprising that AHIMA endorses data capture and analysis as essential HIM quality and safety practices.[7] In fact, the typical HIM professional is already facilitating data capture by using their knowledge of health data content, data storage, and data standards to design CPOE input screens, map data flows from ancillary systems into EHRs, and create data dictionaries to standardize patient data.[8]

HIM professionals should also be performing data analysis to support quality and performance initiatives. They can check compliance with CMS' national patient safety goals, track chart coding accuracy, and assess History and Physical completion and accuracy. Unfortunately, many HIM professionals lack the skills to perform these applied informatics tasks.[9,10]

Steps for Data Analysis

Suppose you are an e-HIM manager tasked with reporting the current state of the electronic release of information (e-ROI) process concerning costs and ability to provide electronic copies of patient information within four business days, as required by the "meaningful use" Stage 2 EHR Incentive Program.[11,12]

The data analysis process begins with these steps:

1. Enable Excel Data Analysis ToolPak
2. Analyze with descriptive statistics
3. Graph with a histogram
4. Summarize with a PivotTable
5. Present with a PivotChart

Enable Excel Data Analysis ToolPak

Assume you have 10 weeks of e-ROI data collected showing the average business days per week to fulfill requests, and total costs for e-ROI. This data can provide an overview of the e-ROI process for identifying problem areas.

First, locate the Microsoft Excel 2013 software in the Microsoft Office suite.[13] Start the software, add three column headers labeled Weeks, Average Business Days Per Week to Fulfill Requests, and Total Costs for e-ROI. Second, label the week rows 1 through 10, and type your data into the other columns.[14]

Now, you must enable the Excel Data Analysis ToolPak, which is a powerhouse tool that allows the analyst to accomplish multiple statistical functions at one time. For this example, that process will be illustrated with pictures created on the computer desktop of the author of this article (see Figures 1 to 13).

The process to enable the TookPak consists of these steps:[15]

1. In Excel, select the File tab.
2. From the File menu on the right, click "Options," as shown in Figure 1.
3. On the Excel Options pop-up sidebar, select "Add-Ins" to get the pop-up shown in Figure 2. If the Analysis ToolPak is listed under "Active Application Add-Ins," as it is in Figure 2, then you can proceed to use it.[16] However, if the Analysis ToolPak is not listed under "Active Application Add-Ins," then click the "Go" button by the dropdown menu labeled "Manage" illustrated in Figure 2.

Figure 1: File Options

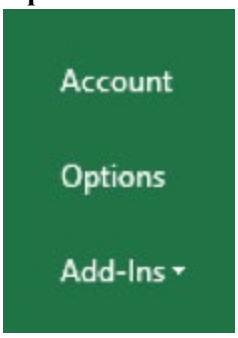
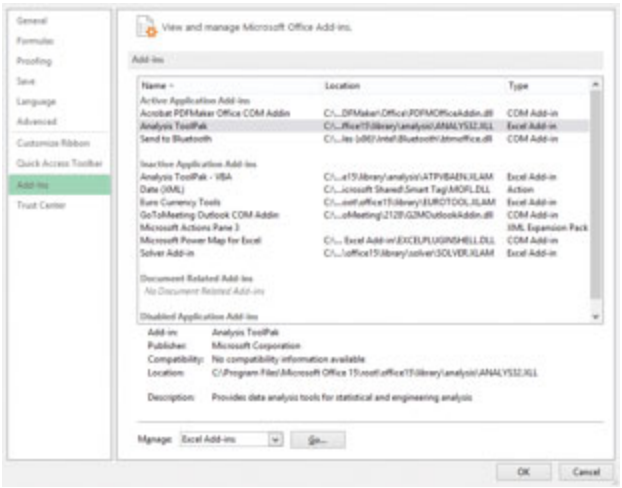


Figure 2: Excel with ToolPak Enabled



4. From the resulting Add-Ins pop-up, click the checkbox by Analysis ToolPak, then click the "OK" button as shown in Figure 3. You will be returned to Excel Options and the ToolPak should be listed under "Active Application Add-Ins."[17]
5. After the ToolPak is enabled, a new icon will be added to the Data tab in the Analysis section, shown in Figure 4.

Figure 3: Select Analysis ToolPak to Enable

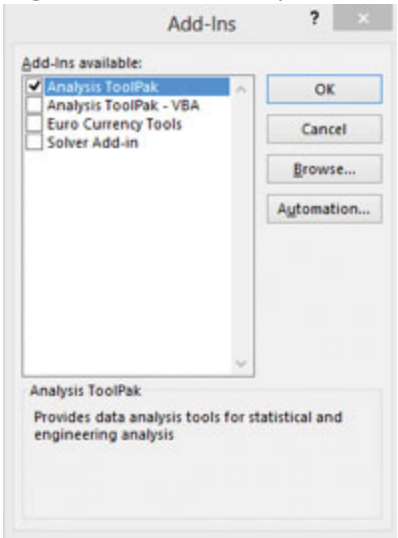
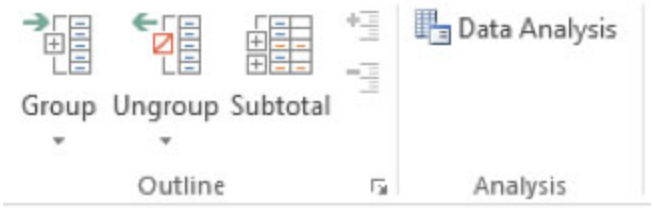


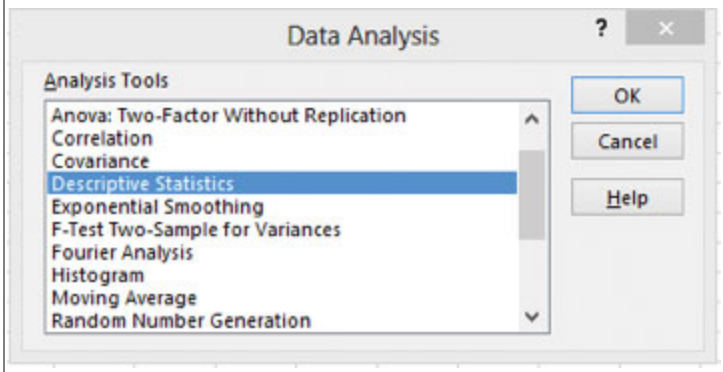
Figure 4: Data Analysis ToolPak Icon



Analyze with Descriptive Statistics

To analyze total e-ROI costs, select the Data tab, click the Data Analysis icon in the Analysis section, and select "Descriptive Statistics" from the pop-up, as shown in Figure 5.[18]

Figure 5: Descriptive Statistics Selection



Click on "Input Range," then select the "Total e-ROI Costs" data and column headers, and select the other options as shown in Figure 6. Also, be sure to select "Labels in the First Row" or you may get an error message.[19]

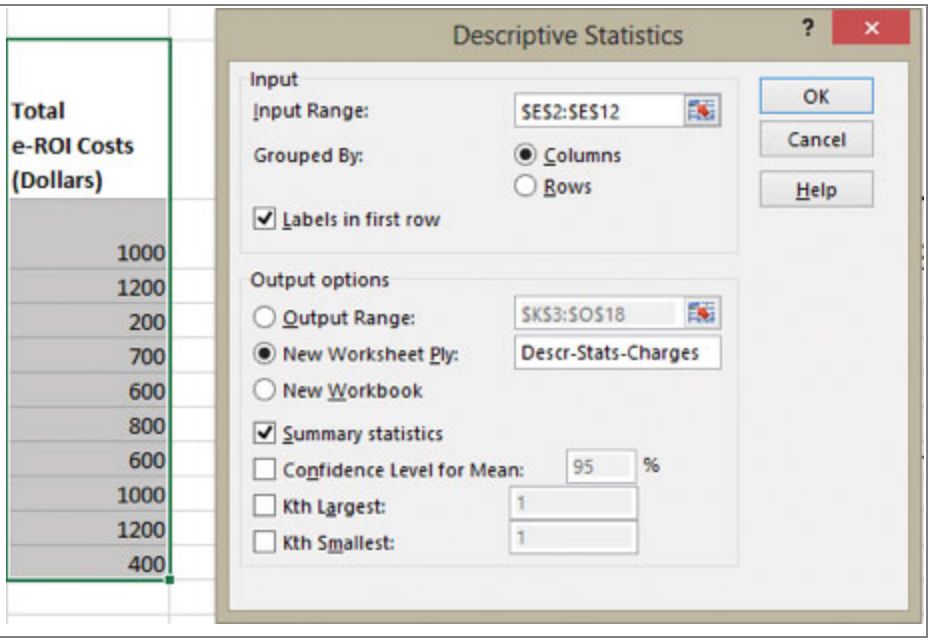


Figure 6: Descriptive Statistics Options

Click the "OK" button to see the resulting descriptive statistics for the total charge data shown in Figure 7.

Figure 7: Descriptive Statistics Results

Total e-ROI Costs (Dollars)	
Mean	770
Standard Error	105.4619
Median	750
Mode	1000
Standard Deviation	333.5
Sample Variance	111222.2
Kurtosis	-0.81117
Skewness	-0.23455
Range	1000
Minimum	200
Maximum	1200
Sum	7700
Count	10

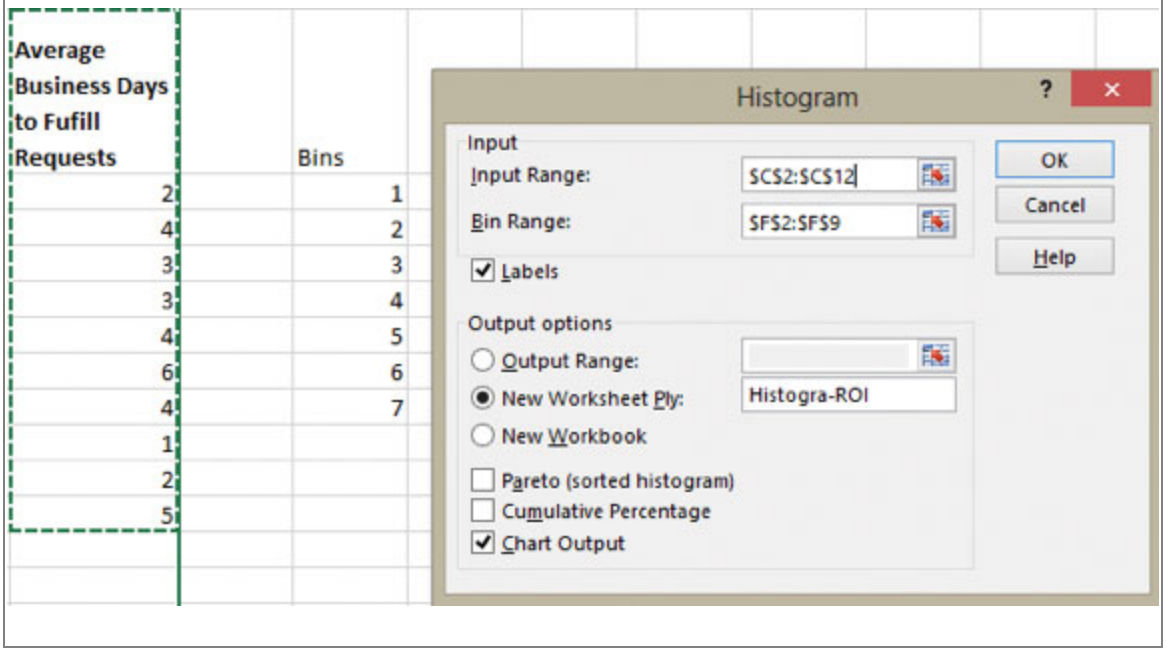
The descriptive statistics values reported most often are the mean (i.e., average), standard deviation, and sum. By looking at the results in Figure 7, you will see the average ROI weekly cost is $770, the sum is $7,700, and the standard deviation, which measures dispersion from the center, is approximately $333.50.[20]

Other uses of this feature would be calculating average percentage of operative reports having acceptable accuracy, median number of medication errors, or most frequently occurring length of stay (i.e., mode). Note that if the data has outliers the median, also called the midpoint, is more appropriate than the mean because outlier values affect the mean.[21]

Graph with a Histogram

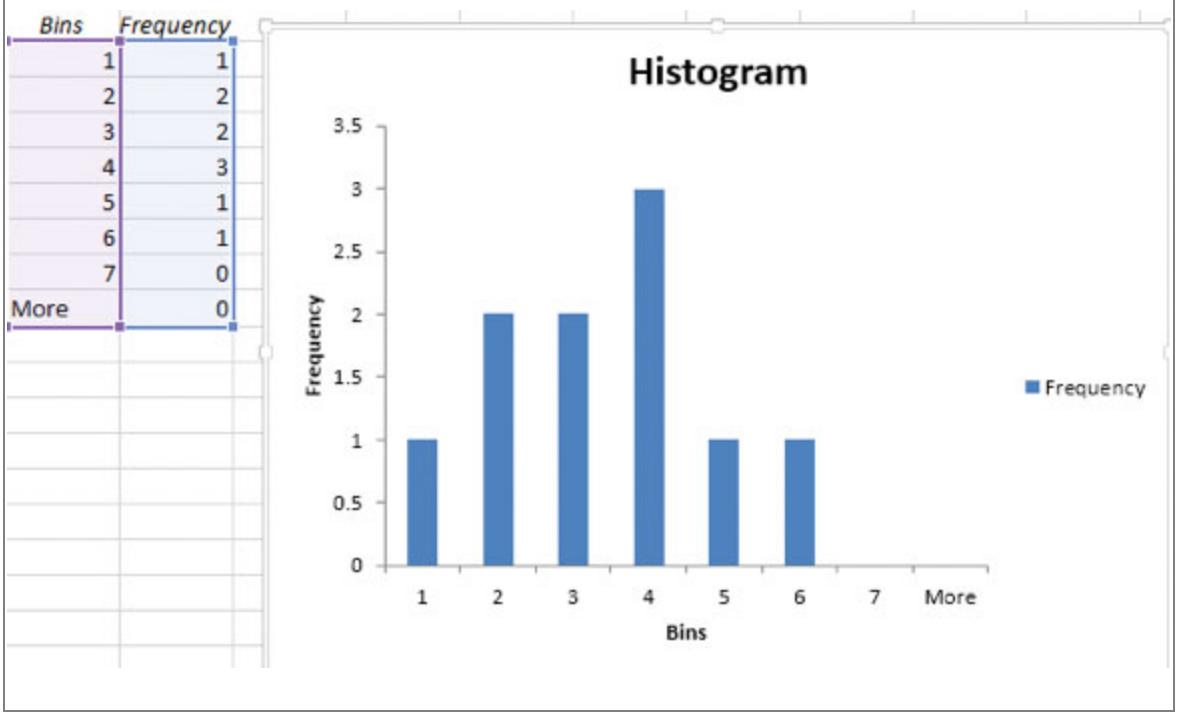
Groups of continuous data, called categories, can be compared with histograms.[22] To create a histogram for the average number of business days needed to fulfill requests, first define the groups by creating and populating an Excel column called a "bin." Next, select the Data Analysis icon, select "Histogram" from the ToolPak pop-up, select the data, and make the other option selections shown in Figure 8.

Figure 8: Histogram Options



Click the "OK" button to see the unfinished histogram in Figure 9. This histogram is unfinished because a histogram has no space between the bars; therefore there is some cleanup work needed.

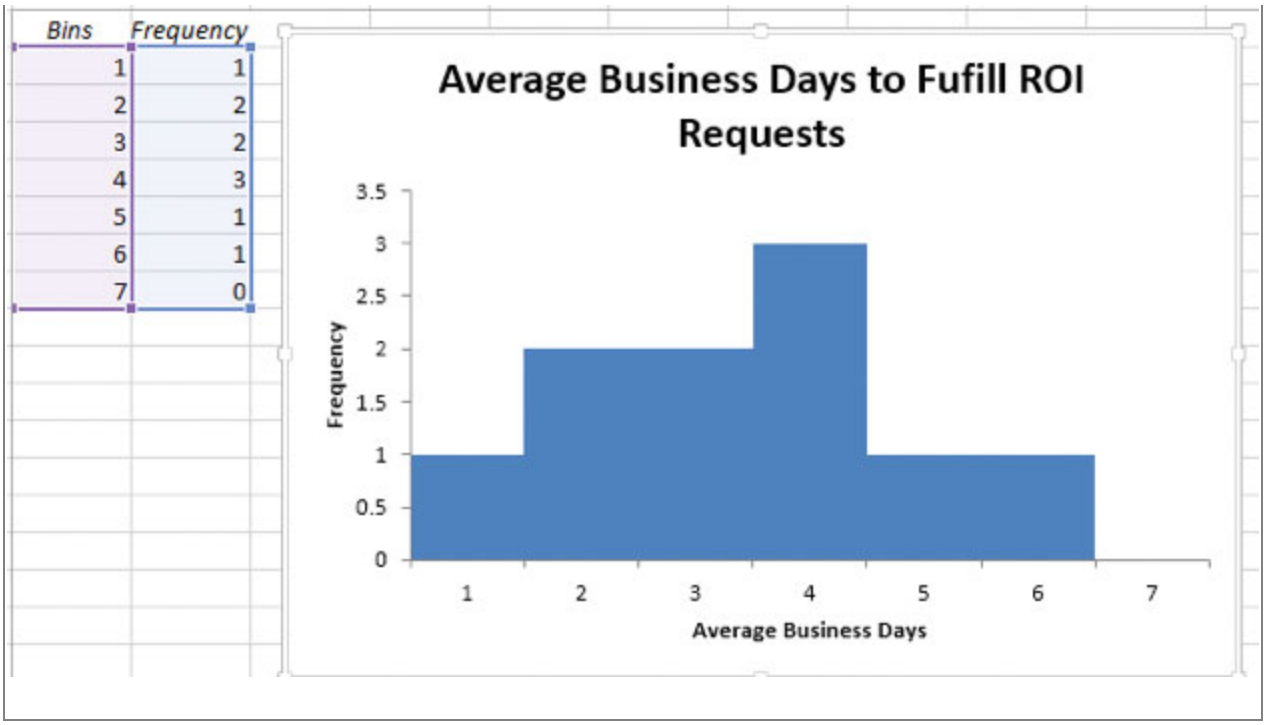
Figure 9: Unfinished Histogram



Complete the following to get the finished results illustrated in Figure 10:

1. Delete the More row in the bins listing.
2. Click on a blue histogram data bar.
3. Right mouse-click and select "Format Data Series."
4. Under Series Options, set the Gap width to zero.
5. Notice that there is now no space between the bars in the histogram.
6. Continue the cleanup by adding appropriate labels and deleting the legend.

Figure 10: Finished Histogram Chart



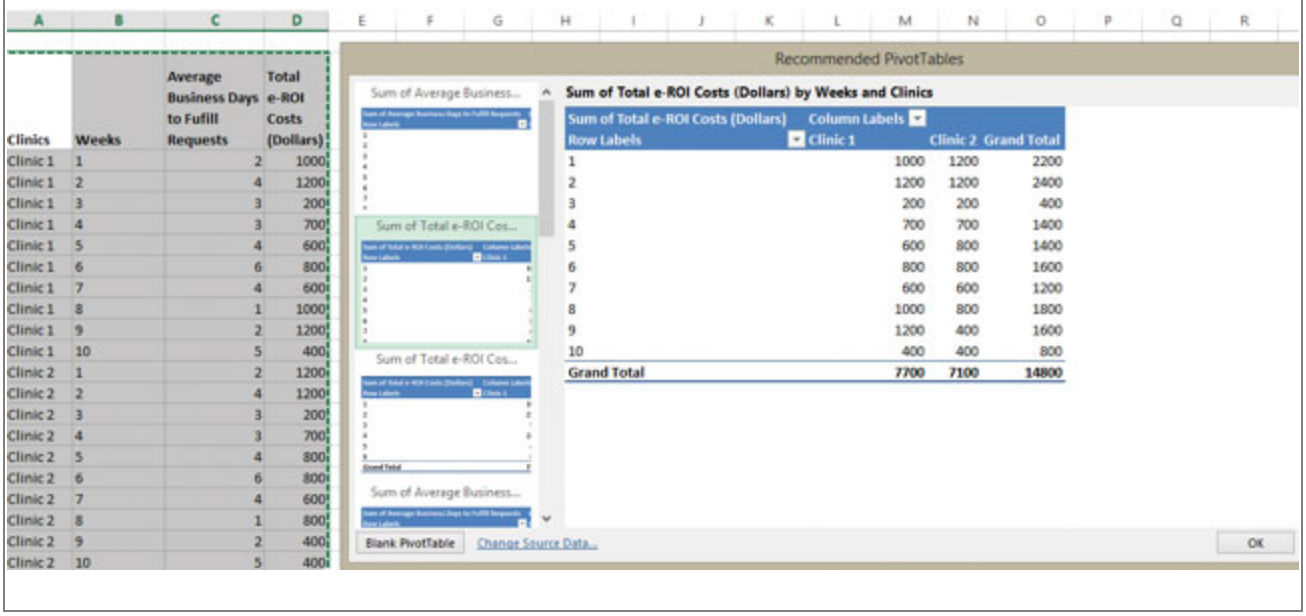
Summarize with a PivotTable

As an e-HIM analyst works on data collection, there is often a need to compare the performance of two clinics for decision-making. Excel has a powerful tool called a PivotTable that efficiently summarizes worksheet data into a table by fields.[23]

An e-HIM analyst should ensure that all data columns have headers, and that the data selected for analysis does not have any empty cells. To begin, select all the table data, including the headers, click the "Insert" tab, and click on "Recommended PivotTables" to see the pop-up shown in Figure 11, which allows you to see how the recommended chart(s) would look.

Scroll until the chart shown in Figure 11 is displayed, then click the "OK" button.

Figure 11: Recommended Pivot Table



The PivotTable in Figure 12, which summarizes the data, will be displayed on a separate worksheet.

Figure 12: Summarize by Average Business Days to Fulfill Requests

Sum of Total e-ROI Costs (Dollars)	Column Labels		
Row Labels	Clinic 1	Clinic 2	Grand Total
1	1000	1200	2200
2	1200	1200	2400
3	200	200	400
4	700	700	1400
5	600	800	1400
6	800	800	1600
7	600	600	1200
8	1000	800	1800
9	1200	400	1600
10	400	400	800
Grand Total	**7700**	**7100**	**14800**

In summary, this is a powerful, highly customizable tool that facilitates comparing different categories of data such as length of stay in days and age group, or age group and payer class. This PivotTable provides an easy method for summarizing data for multiple clinics for the same time in order to visualize their differences.

For example, Figure 12 indicates that Clinic 1 had a higher total of e-ROI costs (i.e., $7,700) than Clinic 2 (i.e., $7,100) during this 10-week stretch. At this point, descriptive statistics (i.e., average ROI weekly costs) and histograms showing average business days to fulfill requests could be completed for both clinics in order to further analyze the differences.

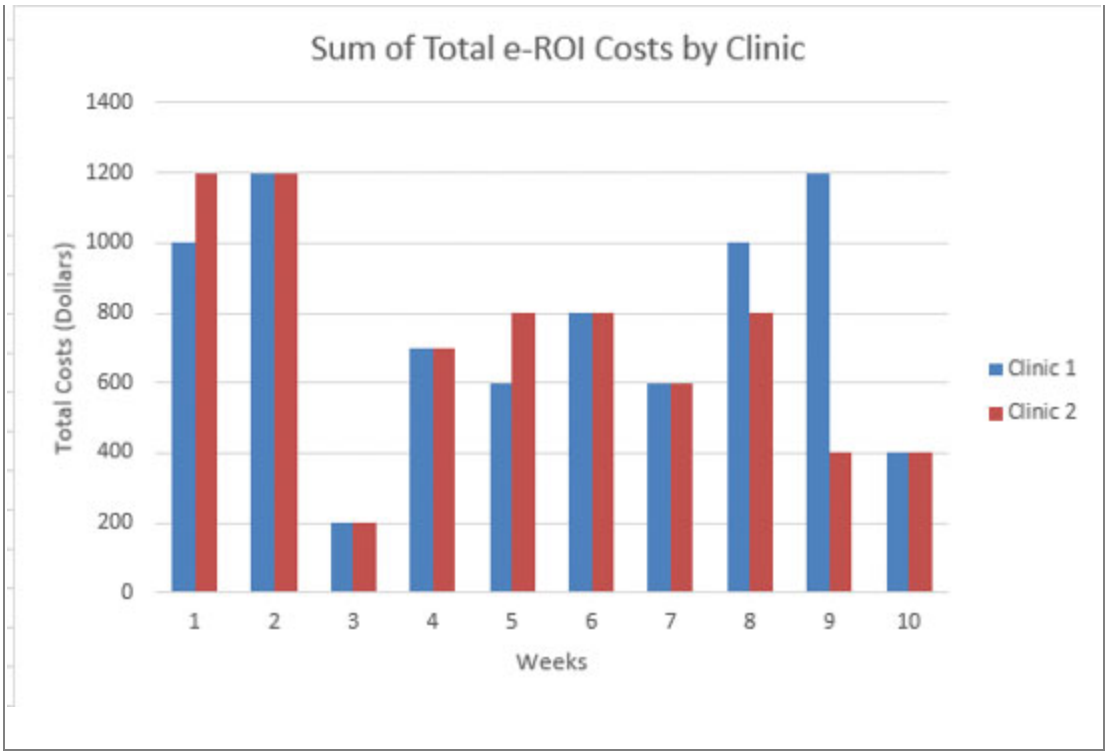
Present with a PivotChart

The e-HIM analyst that creates a PivotTable will be rewarded by the ease with which a PivotChart can be generated from the PivotTable. Here are the steps:[24]

1. Select the data in the PivotTable.
2. Click on the Insert tab.
3. Click on the Recommended Charts icon.
4. Select the Bar chart.
5. Select the gray buttons, right mouse-click and select “Hide All Field Buttons and Legend.”
6. Label the axis and create a chart title.
7. The resulting chart is shown in Figure 13.
8. Label the axes and create a chart title.

The PivotChart provides a quick way to spot problem areas. For example, one can see in Figure 13 that for weeks one, two, eight, and nine the e-ROI costs were much higher than usual.

Figure 13: PivotChart of Total e-ROI Costs



Analytics Skills are Necessary Today, Not Tomorrow

Data analytics is an emerging role for HIM professionals, especially with the advent of Big Data, the demands of the Health Information Technology for Economic and Clinical Health (HITECH) Act, and the need for greater accountability in healthcare for providing quality outcomes.

HIM professionals should equip themselves to meet these challenges by obtaining the CHDA credential, which demonstrates competency in data analytics, as well as learning and practicing the basic data analysis techniques discussed in this data analysis starter toolkit.[25]

Notes

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[14] Microsoft. "Basic tasks in Excel 2013." https://support.office.microsoft.com/en-us/article/Basic-tasks-in-Excel-2013-363600c5-55be-4d6e-82cf-b0a41e294054?CorrelationId=484fa17b-4e38-4109-b9c4-f47af572112c&ui=en-US&rs=en-US&ad=US.

[15] Microsoft. "Use the Analysis TookPak to perform complex data analysis." https://support.office.microsoft.com/en-US/article/Use-the-Analysis-ToolPak-to-perform-complex-data-analysis-b0f0a249-11af-4570-a9cc-becfa6bc0c31?ui=en-US&rs=en-US&ad=US.

[16] Ibid.

[17] Ibid.

[18] Ibid.

[19] Ibid.

[20] LaTour, Kathleen M. and Shirley Eichenwald-Maki. Health Information Management Concepts, Principles, and Practice. 4th ed. Chicago, IL: AHIMA Press, 2013.

[21] Ibid.

[22] Ibid.

[23] Microsoft. "Create a PivotTable to analyze your data." https://support.office.com/en-us/article/Create-a-PivotTable-and-analyze-your-data-7810597d-0837-41f7-9699-5911aa282760?ui=en-US&rs=en-US&ad=US.

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Diane Dolezel (dd30@txstate.edu) is an assistant professor in the health information management department at Texas State University, based in San Marcos, TX.

Article citation:
Dolezel, Diane. "Data Analysis Starter Kit: How to Apply Informatics and Analyze ROI as an e-HIM Professional" *Journal of AHIMA* , no. (May 2015): -.

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