

## Durations Based on Date of Event

Description: These instructions will demonstrate how to calculate durations of therapy following a specific event during a hospitalization. For this exercise, we will focus on antimicrobial use after surgical procedures. These instructions will build on information using the Quick Reference Guides for [How to obtain a line list of procedures](#)

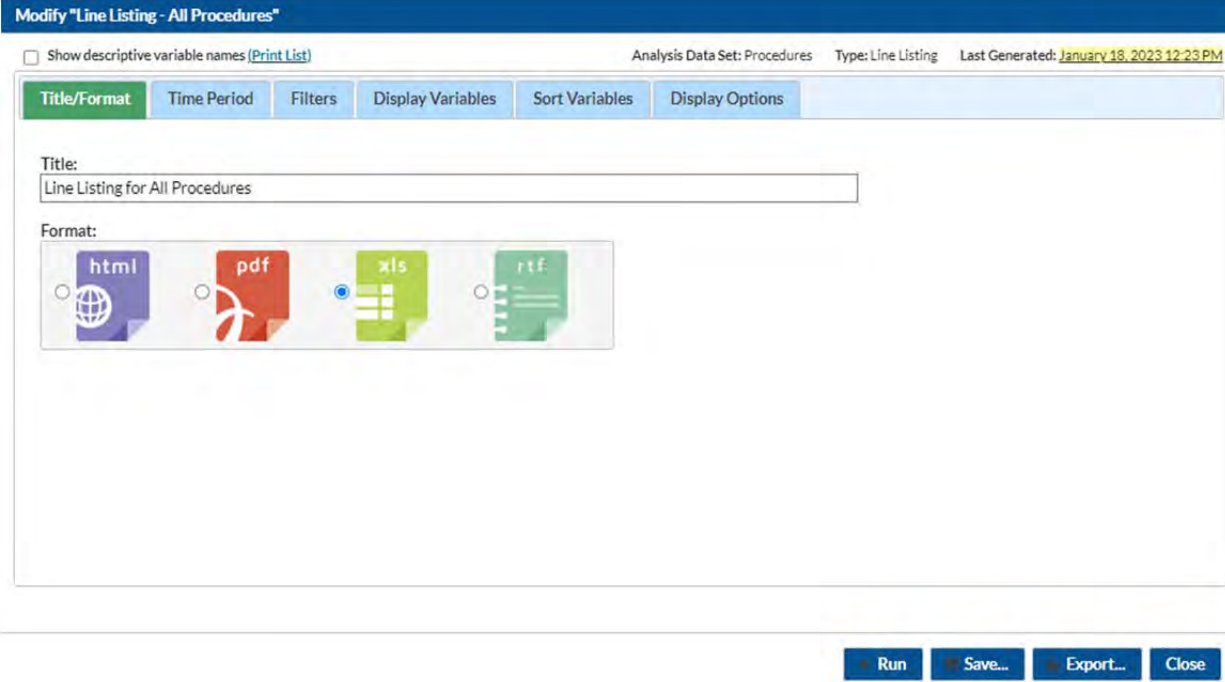
**BEFORE YOU GET STARTED:** Determining the duration of antimicrobial therapy after a surgery will require you to acquire your own data (i.e., NOT exclusively from NSHN) on dates of antimicrobial administration for a given set of patients. This can be done by working with your local data and/or informatics analyst.

For this example, you will be determining the duration of cefazolin use after arthroplasty of knee (KPRO). You would like the data on a monthly basis for 1<sup>st</sup> and 2<sup>nd</sup> quarter 2019. (*Please note, KPRO is one of the procedures that is tracked and reported at the patient level within NHSN, so NHSN can serve as the data source for your procedure dates. A similar approach can be applied if infection prevention or other data sources within your facility are available that include the following data elements: patient identifier, procedure and date of procedure.*)

## Manipulating the Data

1. The first step is to create a line list of patients undergoing arthroplasty of knee. Follow the steps through the Quick Reference Guide for to export your data into Excel. Below is an example of how you can set your Filters before exporting.

First, you can change the output style to excel:



The screenshot shows a software interface titled "Modify 'Line Listing - All Procedures'". At the top, there is a status bar with the text "Analysis Data Set: Procedures", "Type: Line Listing", and "Last Generated: January 18, 2023 12:23 PM". Below this is a navigation bar with tabs: "Title/Format", "Time Period", "Filters", "Display Variables", "Sort Variables", and "Display Options". The "Title/Format" tab is active. Under the "Title" section, there is a text input field containing "Line Listing for All Procedures". Under the "Format" section, there are four radio button options with corresponding icons: "html" (globe icon), "pdf" (red document icon), "xls" (green spreadsheet icon, which is selected), and "rtf" (green document icon). At the bottom right of the interface, there are four buttons: "Run", "Save...", "Export...", and "Close".

Once exported into Excel, the data should look something like the following:

	A	B	C	D	E	F	G
1	orgID	PatID	dob	Gender	ProcID	ProcDate	procCode
2	45032	17874216	8/29/1944	Male	17874162	1/5/2019	KPRO
3	45032	19687831	1/21/1949	Female	19687777	1/5/2019	KPRO
4	45032	15817754	6/15/1946	Male	15817700	1/6/2019	KPRO
5	45032	18473897	2/25/1942	Female	18473843	1/6/2019	KPRO
6	45032	18304522	2/16/1958	Male	18304468	1/7/2019	KPRO
7	45032	13336272	10/30/1956	Male	13336218	1/10/2019	KPRO
8	45032	17687827	1/26/1946	Female	17687773	1/10/2019	KPRO
9	45032	18472140	9/30/1973	Female	18472086	1/10/2019	KPRO
10	45032	17690441	7/2/1961	Male	17690387	1/11/2019	KPRO
11	45032	11285002	3/3/1963	Male	11284948	1/11/2019	KPRO
12	45032	15510051	8/18/1939	Female	15509997	1/12/2019	KPRO
13	45032	15013442	4/5/1970	Female	15013388	1/12/2019	KPRO
14	45032	19333334	10/13/1934	Male	19333280	1/13/2019	KPRO
15	45032	17421933	5/22/1943	Male	17421879	1/18/2019	KPRO
16	45032	16890991	2/12/1978	Male	16890937	1/18/2019	KPRO
17	45032	14592844	12/7/1969	Female	14592790	1/20/2019	KPRO
18	45032	19402196	3/29/1950	Male	19402142	1/21/2019	KPRO
19	45032	10858144	2/28/1939	Female	10858090	1/23/2019	KPRO
20	45032	10858144	8/22/1956	Female	10858090	1/23/2019	KPRO

*(Please note, if you are interested in procedures outside of what is available in NHSN, this spreadsheet could serve as a template for a local IT analyst to help in obtaining an appropriate list of patients. From there all of the manipulations that follow will be the same).*

2. Since NHSN does not collect patient specific data on antibiotic administration, the antibiotic use for these patients will be outside of what NHSN can currently provide. The specific data you are looking for is all antibiotic administrations for the patients you identified in step 1. You will want the antibiotic name(s), the first date of administration and the last date of administration. For the purpose of this example we will be looking at cefazolin use. The screen shot below includes all patients receiving cefazolin, with the following data elements:

- a. Hospital ID
- b. Patient ID
- c. First Electronic Medication Administration Record (EMAR) Time
- d. Last EMAR Time

	A	B	C	D	E	F	G	H	I
1	Hospital ID	Patient ID	Birth Sex	Gender Identity	Race	Ethnicity	Age (Days)	First EMAR Time	Last EMAR Time
2	45032	17874216	Male		White/Caucasian		87	2019-1-4 08:45 AM	2019-1-4 08:45 AM
3	45032	19687831	Female		White/Caucasian		74	2019-1-4 09:31 AM	2019-1-24 12:46 PM
4	45032	15817754	Male		White/Caucasian		65	2019-1-4 12:38 PM	2019-1-7 11:27 AM
5	45032	18473897	Female		Black or African Ame		48	2019-1-4 02:41 PM	2019-1-8 05:08 PM
6	45032	18304522	Male		White/Caucasian		65	2019-1-4 04:14 PM	2019-1-8 07:01 PM
7	45032	13336272	Male		White/Caucasian		65	2019-1-9 01:22 AM	2019-1-9 08:11 AM
8	45032	17687827	Female		White/Caucasian		84	2019-1-9 10:11 AM	2019-1-10 01:44 AM
9	45032	18472140	Female		Black or African Ame		82	2019-1-9 05:10 PM	2019-1-9 05:10 PM
10	45032	17690441	Male		White/Caucasian		73	2019-1-9 10:42 PM	2019-1-10 07:55 AM
11	45032	11285002	Male		White/Caucasian		69	2019-1-10 12:06 AM	2019-1-17 12:04 PM
12	45032	15510051	Female		Black or African Ame		73	2019-1-11 09:34 PM	2019-1-16 12:05 AM
13	45032	15013442	Female		White/Caucasian		88	2019-1-11 11:31 PM	2019-1-16 01:58 PM
14	45032	19333334	Male		White/Caucasian		21	2019-1-12 02:27 AM	2019-1-17 10:30 AM
15	45032	17421933	Male		Black or African Ame		19	2019-1-17 11:36 PM	2019-3-12 08:18 PM
16	45032	16890991	Male		White/Caucasian		71	2019-1-18 02:07 AM	2019-1-18 09:44 AM
17	45032	14592844	Female		Black or African Ame		58	2019-1-18 10:27 PM	2019-1-19 09:17 AM
18	45032	19402196	Male		Black or African Ame		65	2019-1-19 12:12 AM	2019-1-19 09:17 AM
19	45032	10858144	Female		White/Caucasian		89	2019-1-19 12:10 PM	2019-1-20 03:59 AM
20	45032	10858144	Female		White/Caucasian		77	2019-1-22 08:00 AM	2019-1-23 09:32 AM
21	45032	17174523	Male		White/Caucasian		82	2019-1-24 01:00 PM	2019-1-25 05:49 AM

3. The next step is to link the two datasets based on Patient ID. This can be done in Excel, or any standard statistical program (eg. SAS, Stata, R). To do this in Excel, we will use the MERGE function. For this exercise we will be referring to two separate datasets, one that has the line listing of procedures, which we call "Procedures". The second dataset includes duration data and will be called "Cef Use"

First, click on the "Data" Tab along the top banner, Then New Query, Then From File, Then Workbook:

NSHN Duration.xlsx - Excel

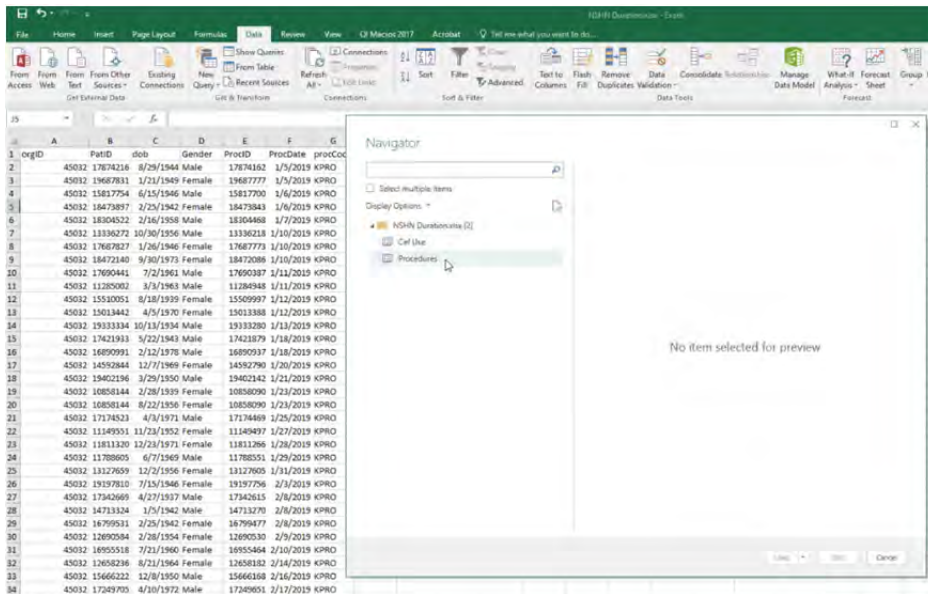
File Home Insert Page Layout Formulas Data Review View Q Macros 2017 Acrobat Tell me what you want to do...

From Access From Web From Text From Other Sources Existing Connections New Query From Table Refresh All Show Queries From Database From CSV From File From Workbook From Azure From XML From Other Sources From Text From Folder Combine Queries Data Source Settings... Query Options

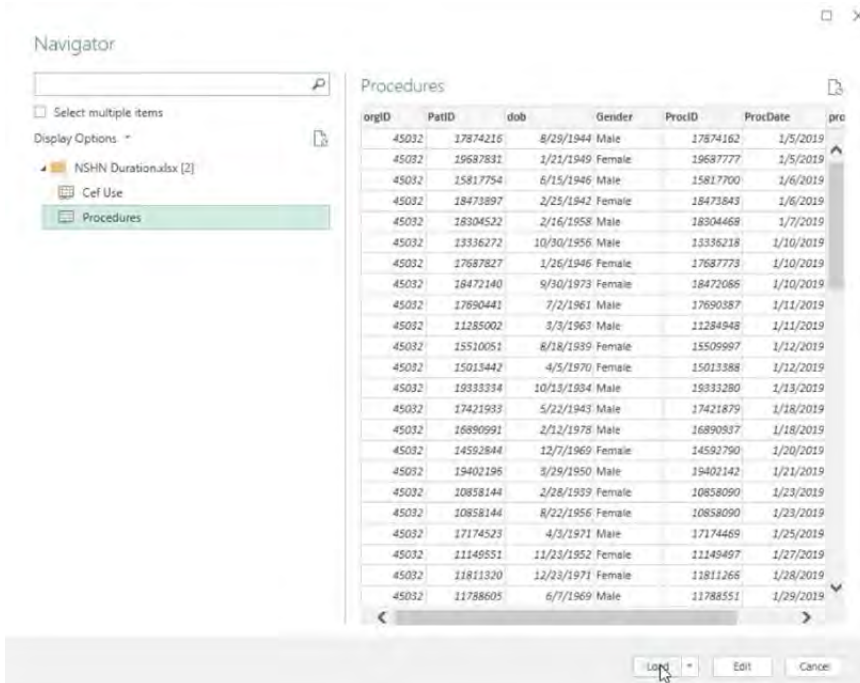
orgID	PatID	dob	Ge	
1				
2	45032	17874216	8/29/1944	Ma
3	45032	19687831	1/21/1949	Fe
4	45032	15817754	6/15/1946	Ma
5	45032	18473897	2/25/1942	Fe
6	45032	18304522	2/16/1958	Ma
7	45032	13336272	10/30/1956	Ma
8	45032	17687827	1/26/1946	Fe
9	45032	18472140	9/30/1973	Fe
10	45032	17690441	7/2/1961	Male
11	45032	11285002	3/3/1963	Male
12	45032	15510051	8/18/1939	Female
13	45032	15013442	4/5/1970	Female
14	45032	19333334	10/13/1934	Male
15	45032	17421933	5/22/1943	Male
16	45032	16890991	2/12/1978	Male
17	45032	14592844	12/7/1969	Female
18	45032	19402196	3/29/1950	Male
19	45032	10858144	2/28/1939	Female
20	45032	10858144	8/22/1956	Female
21	45032	17174523	4/3/1971	Male
22	45032	11149551	11/23/1952	Female
23	45032	11811320	12/23/1971	Female
24	45032	11788605	6/7/1969	Male
25	45032	13127659	12/2/1956	Female
26	45032	19197810	7/15/1946	Female
27	45032	17342669	4/27/1937	Male
28	45032	14713324	1/5/1942	Male
29	45032	16799531	2/25/1942	Female
30	45032	12690584	2/28/1954	Female
31	45032	16955518	7/21/1960	Female
32	45032	12658236	8/21/1964	Female
33	45032	15666222	12/8/1950	Male
34	45032	17249705	4/10/1972	Male
35	45032	18460870	4/5/1932	Female
36	45032	12624975	8/14/1945	Male
37	45032	15718756	9/7/1992	Male
38	45032	16301879	10/18/1969	Female
39	45032	17736517	6/15/1963	Female
40	45032	17736518	2/22/1919	KPRO



When you open your workbook, you will see the Navigator window pop open:

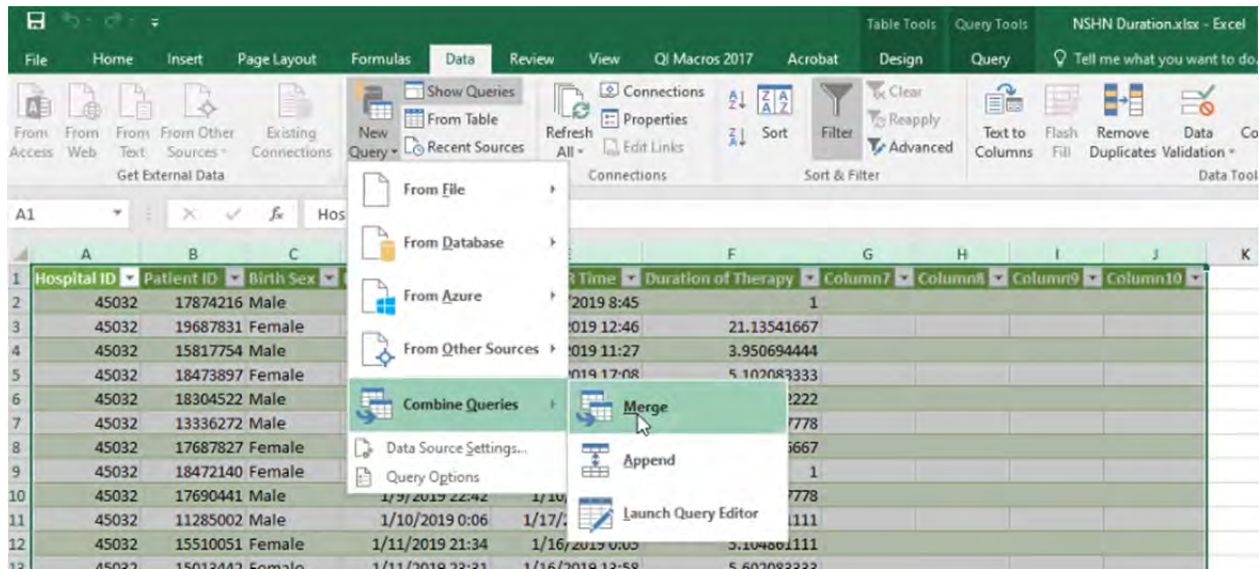


You can choose either file, but we will start with “Procedure”. Open, that file, then click “Load”

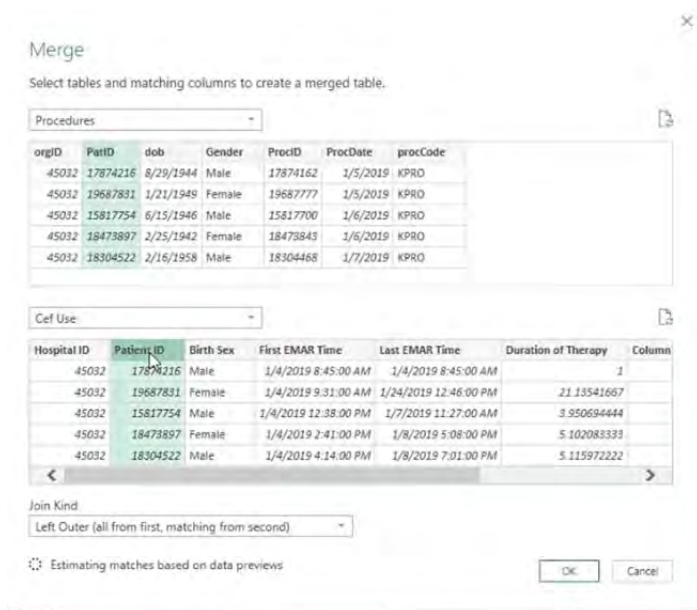


Next, go back to the data tab and repeat these steps for “Cef Use”

Once both files have been loaded, go back to the Data Tab one last time. This time, you want to click “Combine Queries”, then “Merge”

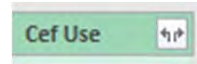


In the Merge window, you must choose with tables you would like to merge, as well as the matching columns. In this case, we selected “Procedures” on the top and “Cef Use” on the bottom, and highlighted “PatID” on the top that provides a 1:1 match for “Patient ID” on the bottom:



Click “OK” – and you will see a screen that looks like this:

orgID	PatID	dob	Gender	ProclD	ProcDate	procCode	Cef Use
45032	17874216	8/29/1944	Male	17874652	1/5/2019	KPRO	Table
45032	19687831	1/21/1949	Female	19687777	1/5/2019	KPRO	Table
45032	15817754	6/15/1946	Male	15817700	1/6/2019	KPRO	Table
45032	18473897	2/25/1942	Female	18473843	1/6/2019	KPRO	Table
45032	18304522	2/16/1958	Male	18304468	1/7/2019	KPRO	Table
45032	13336272	10/30/1958	Male	13336218	1/10/2019	KPRO	Table
45032	17687827	1/26/1946	Female	17687773	1/10/2019	KPRO	Table
45032	18472140	6/30/1973	Female	18472086	1/10/2019	KPRO	Table
45032	17690441	7/2/1961	Male	17690387	1/11/2019	KPRO	Table
45032	11285002	3/3/1963	Male	11284948	1/11/2019	KPRO	Table
45032	15510051	8/16/1939	Female	15509997	1/12/2019	KPRO	Table
45032	15013442	4/5/1970	Female	15013388	1/12/2019	KPRO	Table
45032	19333334	10/13/1934	Male	19333280	1/13/2019	KPRO	Table
45032	17421933	5/22/1943	Male	17421879	1/18/2019	KPRO	Table
45032	16890991	2/12/1978	Male	16890937	1/18/2019	KPRO	Table
45032	14592844	12/7/1969	Female	14592790	1/20/2019	KPRO	Table
45032	18402196	3/29/1950	Male	18402142	1/21/2019	KPRO	Table
45032	10858144	2/28/1939	Female	10858090	1/23/2019	KPRO	Table
45032	10858144	8/22/1956	Female	10858090	1/23/2019	KPRO	Table
45032	17174523	4/3/1971	Male	17174469	1/25/2019	KPRO	Table
45032	11149551	11/23/1952	Female	11149497	1/27/2019	KPRO	Table
45032	11811320	11/23/1971	Female	11811266	1/28/2019	KPRO	Table
45032	11788005	6/7/1969	Male	11788551	1/29/2019	KPRO	Table
45032	13127659	12/2/1956	Female	13127605	1/31/2019	KPRO	Table
45032	19197810	7/15/1946	Female	19197756	2/3/2019	KPRO	Table
45032	17542689	4/27/1937	Male	17542635	2/8/2019	KPRO	Table
45032	14713324	3/5/1942	Male	14713270	2/8/2019	KPRO	Table
45032	16799531	2/25/1942	Female	16799477	2/8/2019	KPRO	Table
45032	12690584	2/28/1954	Female	12690530	2/9/2019	KPRO	Table
45032	16955518	7/21/1960	Female	16955464	2/10/2019	KPRO	Table
45032	17658236	8/71/1964	Female	17658182	2/14/2019	KPRO	Table



On the right side of the “Cef Use” column there is a button with two arrows:

Click on that to select the specific data elements from the “Cef Use” table that you would like to include. At a minimum, you must choose “Last EMAR” so you can calculate duration of therapy after the procedure. Select “Last EMAR” and Click “OK”:

The screenshot shows the 'Expand' dialog box for the 'Cef Use' column. The 'Expand' section is selected, and the following options are visible:

- Hospital ID
- Patient ID
- Birth Sex
- First EMAR Time
- Last EMAR Time
- Duration of Therapy
- Column7
- Column8
- Column9
- Column10

The 'Use original column name as prefix' checkbox is also checked. The 'OK' button is highlighted.





orgID	PatID	dob	Gender	ProcID	ProcDate	procCode	Cef Use.Last	EMAR Time	=H:H - F:F
45032	17874216	8/29/1944	Male	17874162	1/5/2019	KPRO		1/4/2019 8:45	
45032	19687831	1/21/1949	Female	19687777	1/5/2019	KPRO		1/24/2019 12:46	
45032	15817754	6/15/1946	Male	15817700	1/6/2019	KPRO		1/7/2019 11:27	
45032	18473897	2/25/1942	Female	18473843	1/6/2019	KPRO		1/8/2019 17:08	
45032	18304522	2/16/1958	Male	18304468	1/7/2019	KPRO		1/8/2019 19:01	
45032	13336272	10/30/1956	Male	13336218	1/10/2019	KPRO		1/9/2019 8:11	
45032	17687827	1/26/1946	Female	17687773	1/10/2019	KPRO		1/10/2019 1:44	
45032	18472140	9/30/1973	Female	18472086	1/10/2019	KPRO		1/9/2019 17:10	

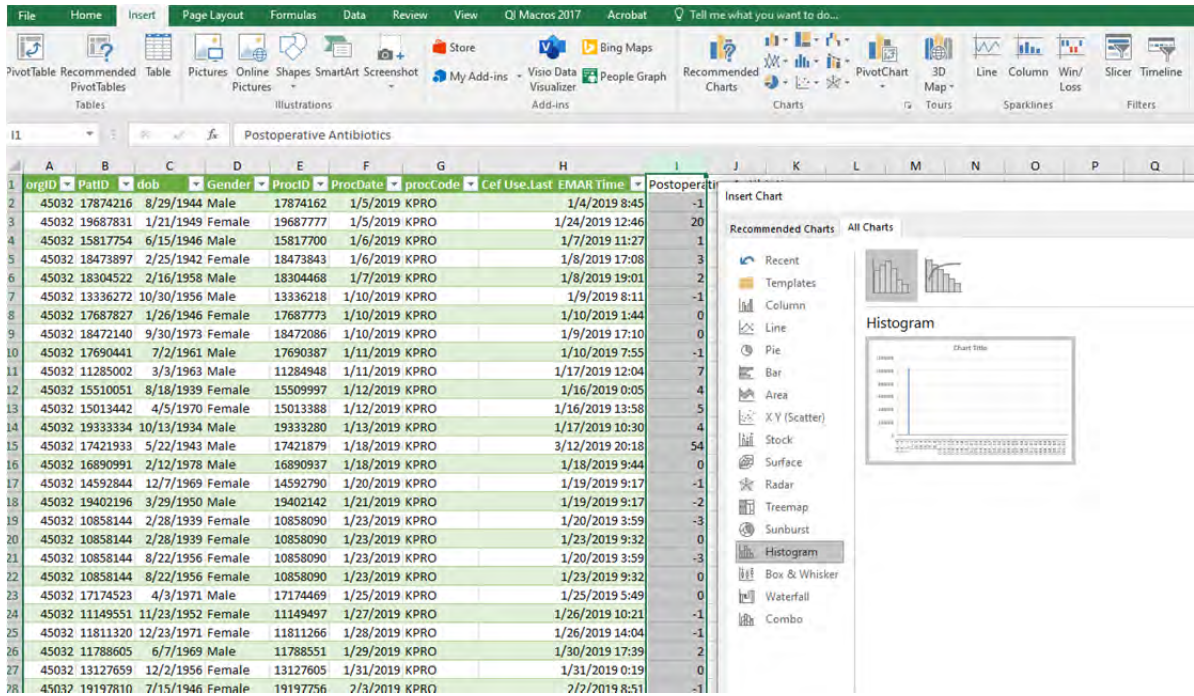
Now we have a variable to describe duration of therapy after a procedure date.

5. Depending on your Excel setup, your new “Postoperative Antibiotics” may have several decimal places. Because we are only interested in whole numbers (days of therapy after procedure), we can reformat the cells by selecting the column (left click), then right clicking on the column. Select “Format Cells”, then Number and change the Decimal Places to 0:

orgID	PatID	dob	Gender	ProcID	ProcDate	procCode	Cef Use.Last	EMAR Time	Postoperative Antibiotics
45032	17874216	8/29/1944	Male	17874162	1/5/2019	KPRO		1/4/2019 8:45	-1
45032	19687831	1/21/1949	Female	19687777	1/5/2019	KPRO		1/24/2019 12:46	20
45032	15817754	6/15/1946	Male	15817700	1/6/2019	KPRO		1/7/2019 11:27	1
45032	18473897	2/25/1942	Female	18473843	1/6/2019	KPRO		1/8/2019 17:08	3
45032	18304522	2/16/1958	Male	18304468	1/7/2019	KPRO		1/8/2019 19:01	2
45032	13336272	10/30/1956	Male	13336218	1/10/2019	KPRO		1/9/2019 8:11	-1
45032	17687827	1/26/1946	Female	17687773	1/10/2019	KPRO		1/10/2019 1:44	0
45032	18472140	9/30/1973	Female	18472086	1/10/2019	KPRO		1/9/2019 17:10	0
45032	17690441	7/2/1961	Male	17690387	1/11/2019	KPRO		1/10/2019 7:55	-1
45032	11285002	3/3/1963	Male	11284948	1/11/2019	KPRO		1/17/2019 12:04	7
45032	15510051	8/18/1939	Female	15509997	1/12/2019	KPRO		1/16/2019 0:05	4
45032	15013442	4/5/1970	Female	15013388	1/12/2019	KPRO		1/16/2019 13:58	5
45032	19333334	10/13/1934	Male	19333280	1/13/2019	KPRO		1/17/2019 10:30	4
45032	17421933	5/22/1943	Male	17421879	1/18/2019	KPRO		3/12/2019 20:18	54
45032	16890991	2/12/1978	Male	16890937	1/18/2019	KPRO		1/18/2019 9:44	0
45032	14592844	12/7/1969	Female	14592790	1/20/2019	KPRO		1/19/2019 9:17	-1
45032	19402196	3/29/1950	Male	19402142	1/21/2019	KPRO		1/19/2019 9:17	-2
45032	10858144	2/28/1939	Female	10858090	1/23/2019	KPRO		1/20/2019 3:59	-3
45032	10858144	2/28/1939	Female	10858090	1/23/2019	KPRO		1/23/2019 9:32	0
45032	10858144	8/22/1956	Female	10858090	1/23/2019	KPRO		1/20/2019 3:59	-3
45032	10858144	8/22/1956	Female	10858090	1/23/2019	KPRO		1/23/2019 9:32	0
45032	17174523	4/3/1971	Male	17174469	1/25/2019	KPRO		1/25/2019 5:49	0
45032	11149551	11/23/1952	Female	11149497	1/27/2019	KPRO		1/26/2019 10:21	-1
45032	11811320	12/23/1971	Female	11811266	1/28/2019	KPRO		1/26/2019 14:04	-1

6. Now we can use these data to make charts for data visualization. With the column highlighted, click on the “Insert” button and then the “Charts” button to select the type of chart you would like.

For the purposes of data visualization we suggest either the “Histogram” option that will show frequency counts:



OR the “Box and Whisker” option that will visually summarize the mean and interquartile range for duration of therapy, as well as outliers:

