

IntelliMax

Case Study no 2019/09/01

Infections and IntelliMax Analytics

The problem:

Medical infections – that is: infections a patient contracted during the course of receiving treatment - have become a major headache for hospitals world-wide and the impact and cost of the problem is not always visible to hospital managers or clinicians. Most hospitals have a vague idea that it is costly but are not able to determine the full impact.

Infections may also not be a general problem but may be confined or more prevalent in certain Wards, Specialties or even related to certain doctors only.

About IntelliMax

In this case study, we will show how this issue can be analysed and the full impact made visible to all interested parties, using the IntelliMax hospital business intelligence solution. IntelliMax is a sophisticated business intelligence system built for hospitals - and one of its major strengths is the fact that it has a fully integrated activity-based costing system that calculates the cost of any hospital object or process and allows this to be related to other performance parameters.

Below we will illustrate how IntelliMax can be used to get an in-depth understanding of the impact and cost associated with infections in a hospital.

Medical Infections Key Metrics

In order to understand the impact of Medical Infections, a review can be done of several key metrics. In this section, we will show how answers can be derived in IntelliMax for most of the critical questions around the key issue of medical infections.

1. Overview:

Q: Do we have a summary which would provide an Overview of selected medical infection stats in our hospital for a particular period under review?

A: Please see the Medical Infections dashboard in IntelliMax:

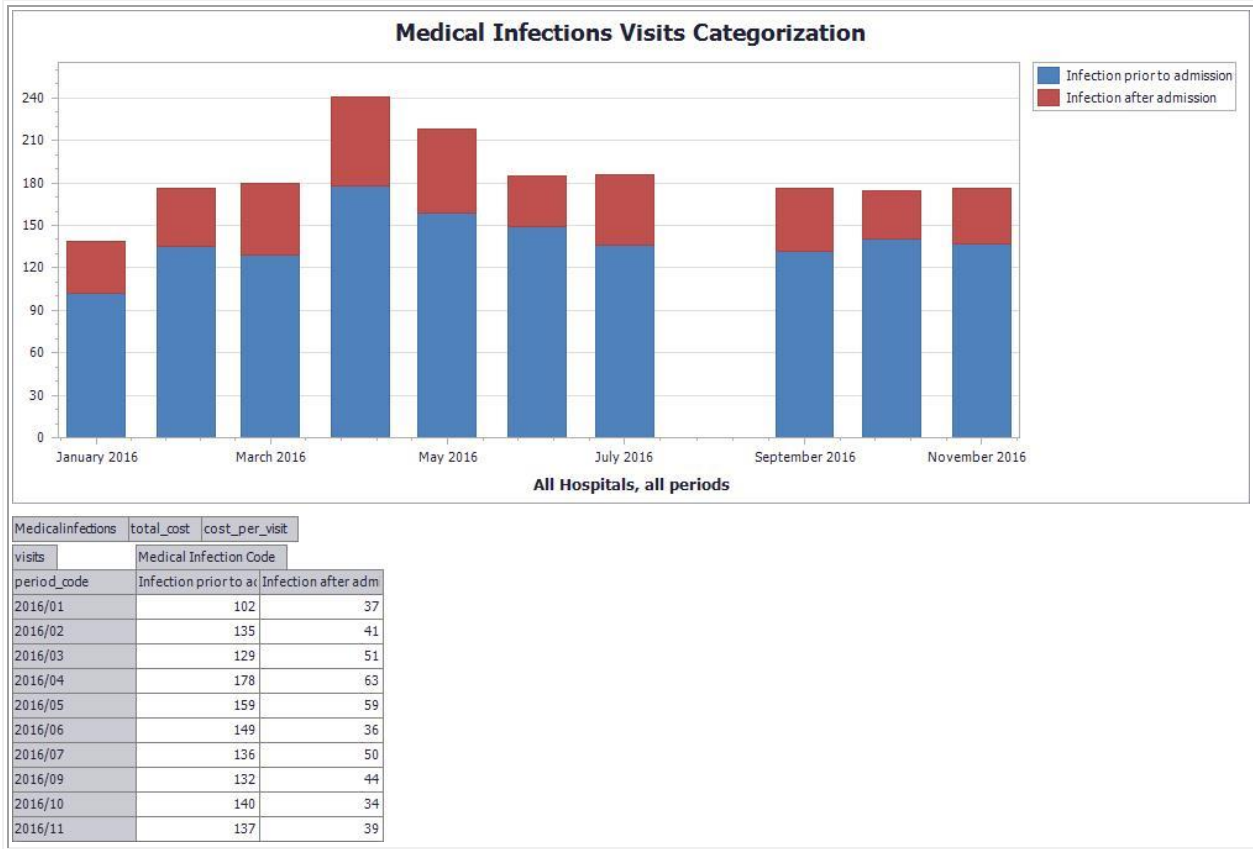
IM Dashboard - Medical Infections - Cost Overview" under
->Quality, Safety and Risk->Medical->Medical Infections->Dashboards

This dashboard provides an overview of how many infections the hospital had, which were the top 10 procedures this occurred for, the top 10 cases (DRG's) in which it occurred, and the total cost across the various MDCs (Major Diagnostic Categories).

The actual data rows are shown at the bottom with several filters that can be changed in order to review this data from different perspectives. For example, Gender can be selected as a filter and then the data and graphs displayed will be updated to reflect data for the selected gender only.

"Medical Infections Visits Categorization" under

->Quality, Safety and Risk->Medical->Medical Infections->Reporting



This report clearly shows a significant number of infections occurred during the hospital stay. This is significant and these cases often result in non-payment by the medical insurer or even worse, litigation by the patient.

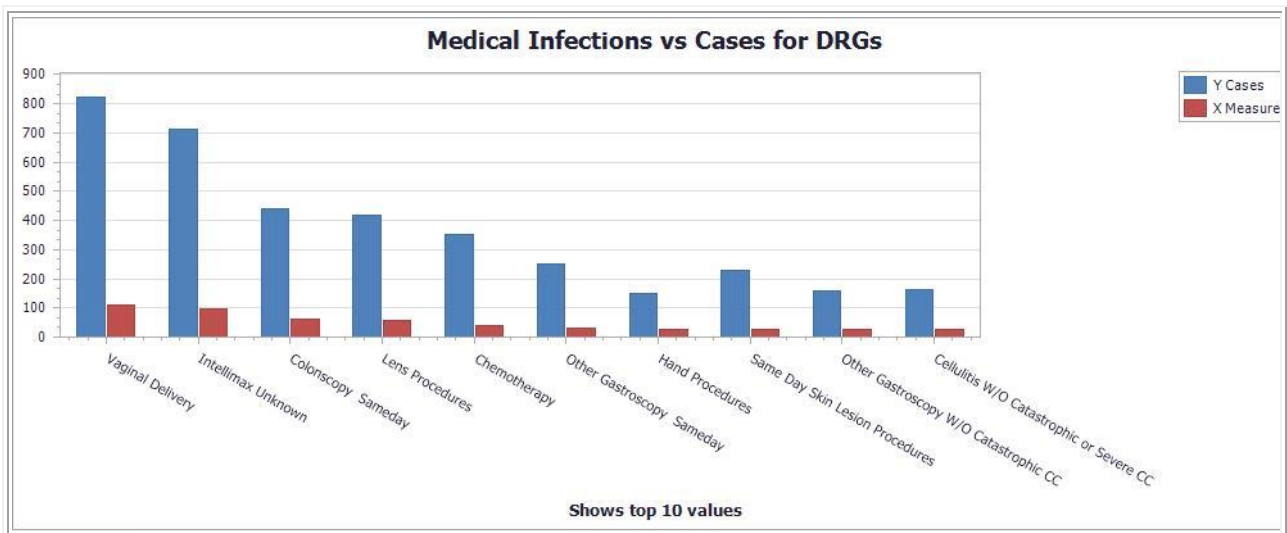
Continuing the review, some further questions can be addressed regarding the infections.

Q: Which cases and procedures are most often associated with medical infections?

A: Please see the following reports: "Medical Infections vs Cases for DRGs" and "Medical Infections vs Cases for Procedures", under

"Medical Infections vs Cases for DRGs" under

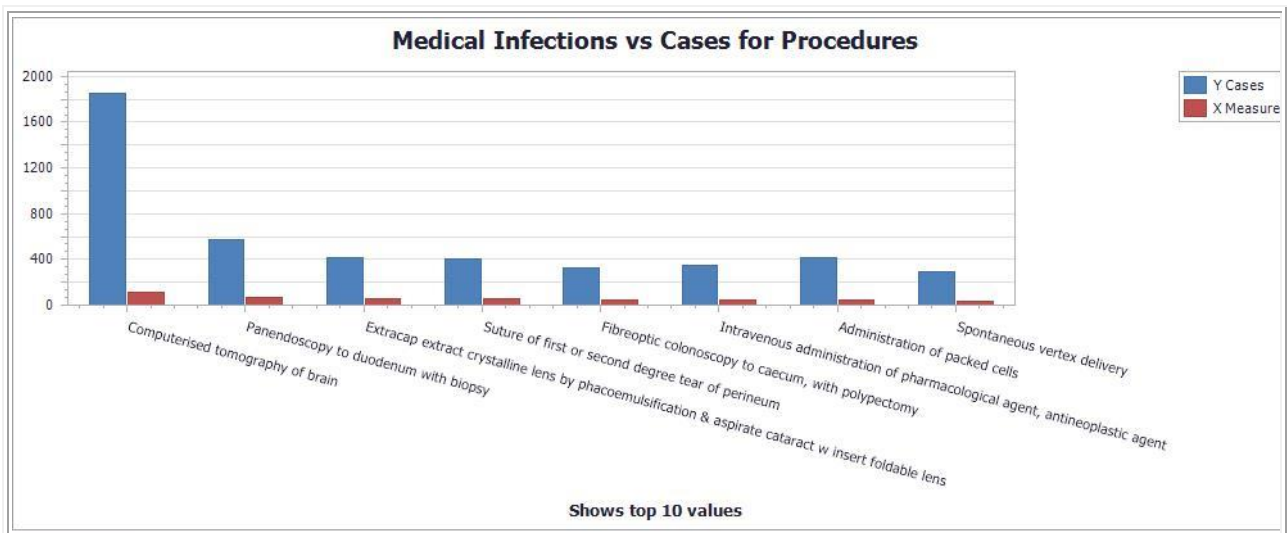
->Quality, Safety and Risk->Medical->Medical Infections->Reporting



DRG	Y Cases	X Measure	percentage
Cellulitis W/O Catastrophic CC	162	25	15.43
Chemotherapy	350	38	10.86
Colonoscopy Sameday	441	62	14.06
Hand Procedures	149	28	18.79
Intellimax Unknown	715	98	13.71
Lens Procedures	420	57	13.57
Other Gastroscopy	251	29	11.55
Other Gastroscopy W/O Catastrophic or Severe CC	160	25	15.63
Same Day Skin Lesion Procedures	228	27	11.84
Vaginal Delivery	824	109	13.23

This not only shows the specific cases (DRGs) where infections are prevalent, but the proportional percentage of cases with infections. The same is done below for the specific procedures involved - see

" Medical Infections vs Cases for Procedures" under
 ->Quality, Safety and Risk->Medical->Medical Infections->Reporting

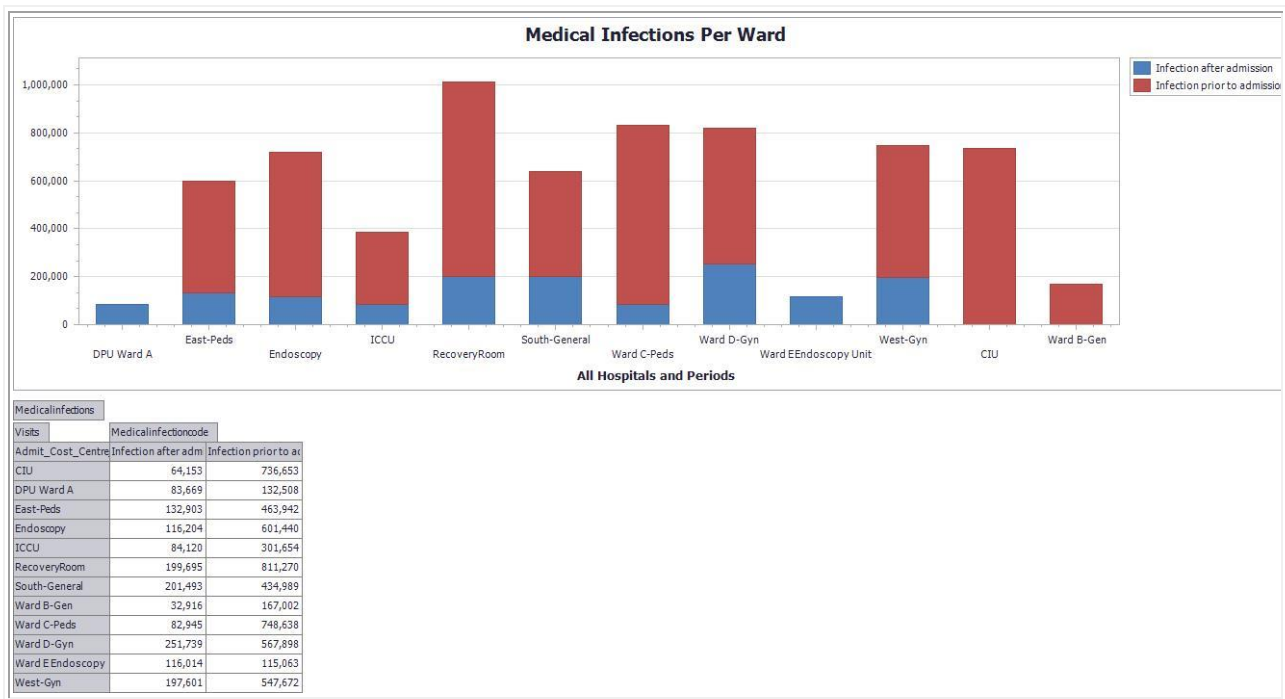


Procedure	Y Cases	X Measure	percentage
Administration of p	412	40	9.71
Computerised tom	1857	111	5.98
Extracapsular cry	419	56	13.37
Fibreoptic colonos	322	43	13.35
Intravenous admini	351	41	11.68
Panendoscopy to d	569	70	12.3
Spontaneous verte	292	35	11.99
Suture of first or sei	409	56	13.69

Q: Which wards have the most medical infections?

A: Please see the report below:

"Medical Infections Per Ward" under
 ->Quality, Safety and Risk->Medical->Medical Infections->Reporting



Looking at the data above, it seems odd that infections appear to be associated with a “Recovery Room” ward – this may point to data being captured incorrectly.

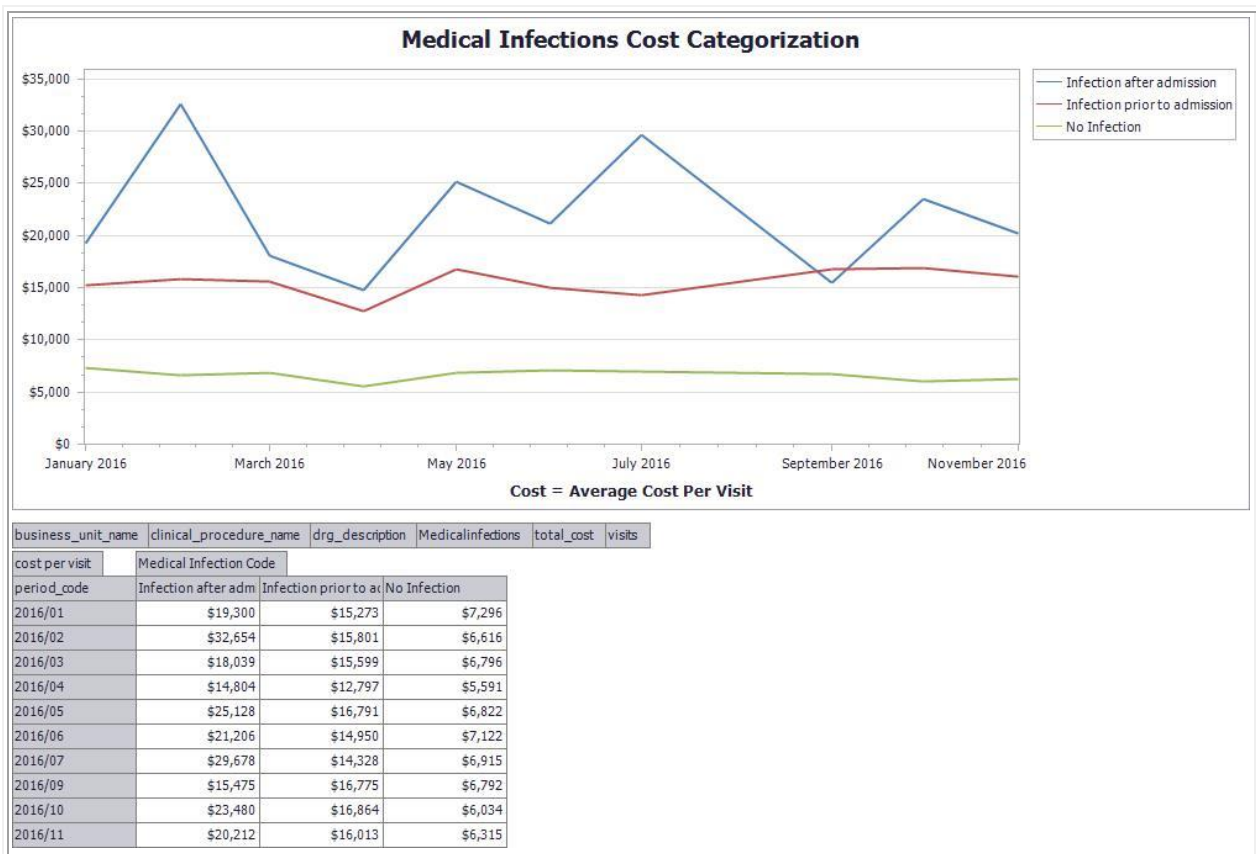
3. Cost Impact:

The cost associated with Infections is often not visible in hospitals. IntelliMax makes it relatively easy with its integrated costing system, to answer questions like these below.

Q: What are the costs associated with the different kinds of infections?

A: As expected, hospital visits where there are medical infections, are associated with higher costs per visit than where the infections were not present. From the graph below, it is clear that cases without infections show consistently lower costs, and without major spikes in costs, than where infections are present.

The "Infections after admission" line has more variance than the other lines, because the number of cases in this category is low. Importantly, note that these costs can often not be recovered from the patient, because patients who contract medical infections will often sue the hospital for the costs incurred.

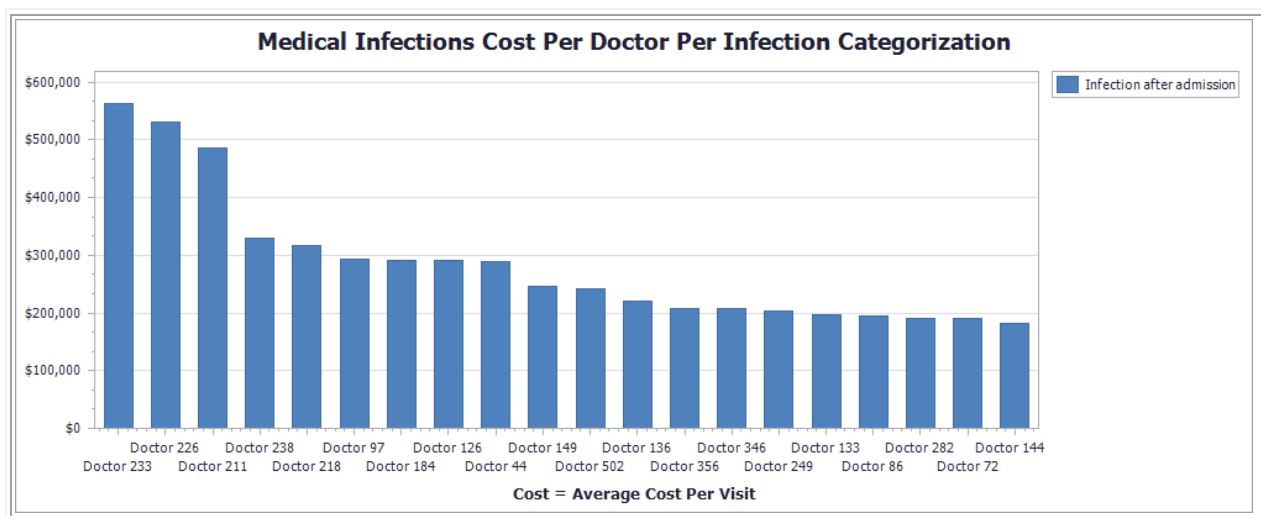


Note there are significant cost differences in cases where patients have an infection and where they do not. This clearly illustrates the hospital has in order to rectify the problems.

Next the question could be asked if this problem is a generic issue for the hospital or more relevant to specific doctors.

Q: Are there specific doctors that have especially high medical infection costs?

A: See the following reports below:



It is clear that is not a uniform problem but a significant part of the problem is caused by just three

doctors (Doctors 233, 226 and 211). These issues would have to be addressed with the doctors concerned and possibly a review of their clinical practices could be conducted.

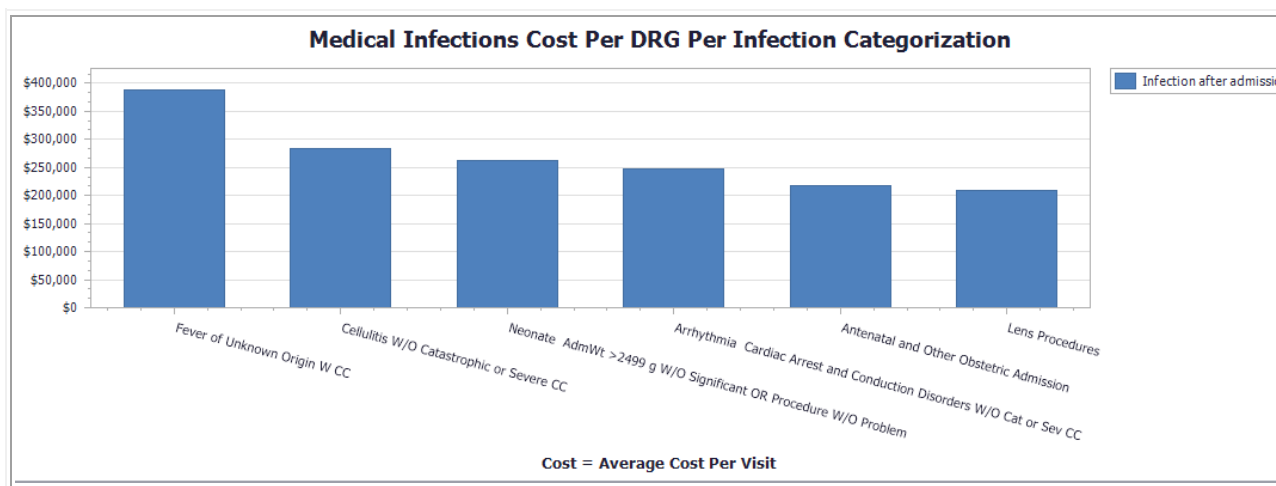
The cost impact can also be analysed across DRGs and Procedures (particularly for infections after admission).

Q: Which DRG's and procedures have the worst cost impact?

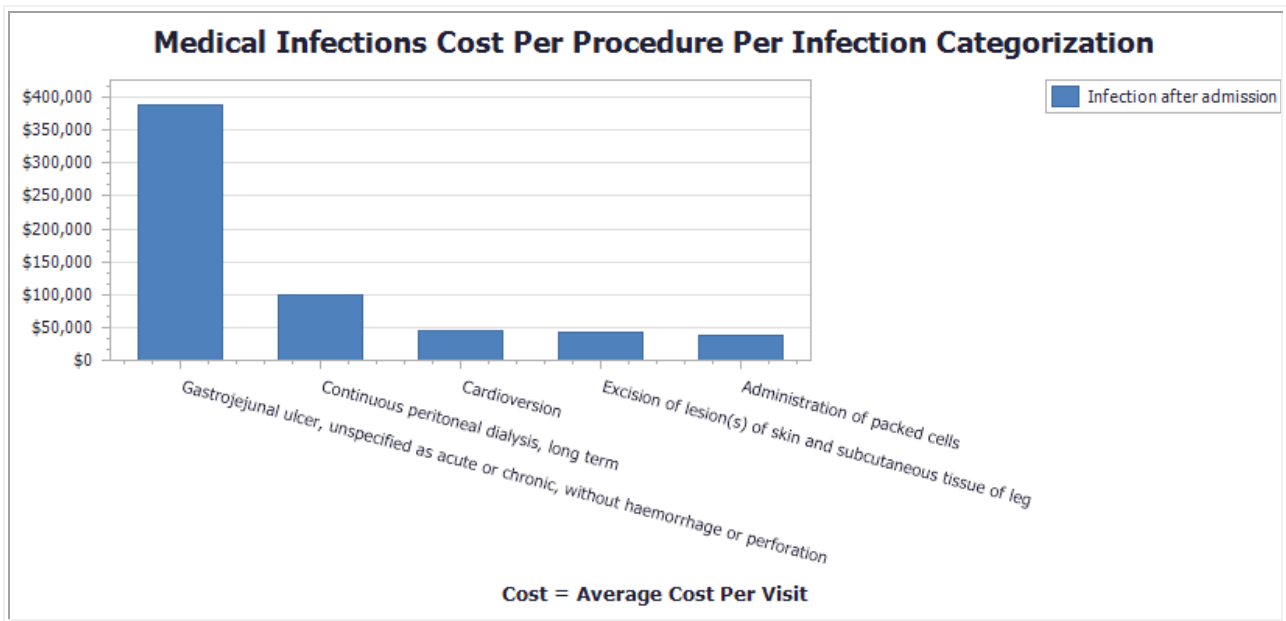
A: Please see the following reports:

- Medical Infections Cost Per DRG Per Infection Categorization
- Medical Infections Cost Per Procedure Per Infection Categorization

"Medical Infections Cost Per DRG Per Infection Categorization" under
->Quality, Safety and Risk->Medical->Medical Infections->Reporting



"Medical Infections Cost Per Procedure per Infection Categorization" under
->Quality, Safety and Risk->Medical->Medical Infections->Reporting



These views indicate that the worst DRG - "Fever of Unknown Origin W CC" - performed very badly in cost per visit. This suggests that a closer look at this DRG may be warranted.

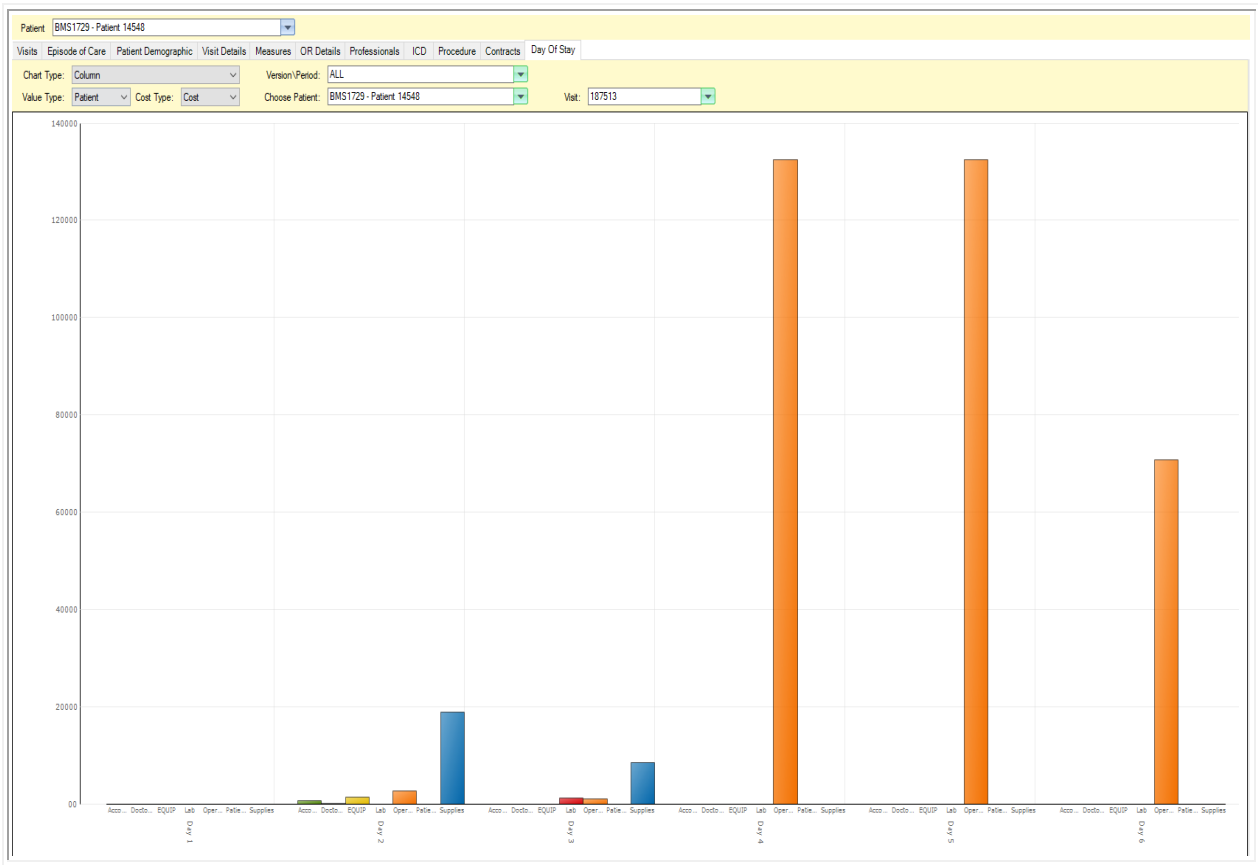
Q: Is it possible to take a closer look at this DRG and possibly some patients?

A: Please see the visits associated with this DRG by following this link:

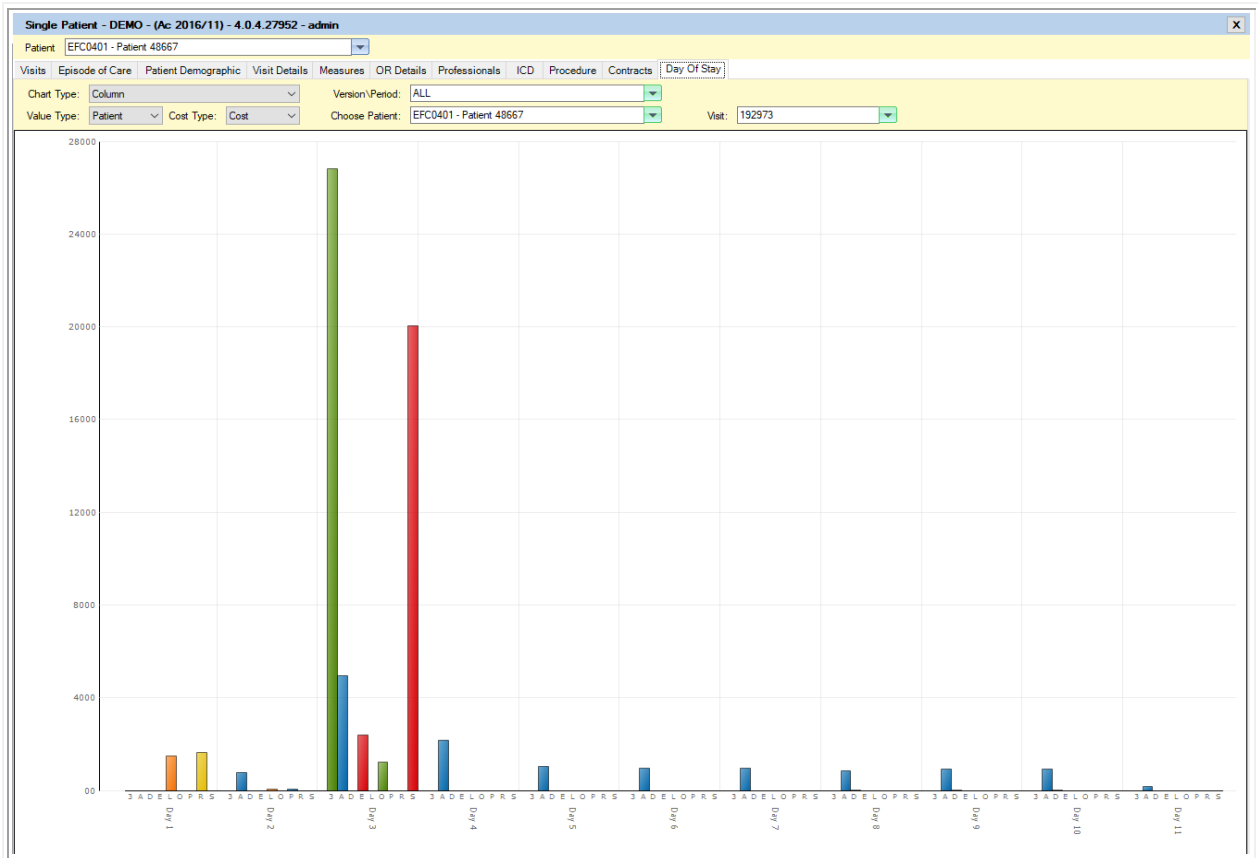
->Financial Management->Main Profitability Analysis->Profitability

Filter on DRG, and specify the DRG Code to be T62A (which is the code for "Fever of Unknown Origin W CC"). Filter on "In patient" (we are only interested in hospital acquired infections), and view the details for patient "BMS1729 - Patient 14548"

This graph shows the actual costs incurred for this case, day by day. Costs were quite "normal" for this patient until day 3, when the patient had to be admitted to the ICU due to infections contracted. Costs then spiked to almost \$140 000 per day. (Total cost for this case \$ 371,118)



Compare this picture to a more normal case for the same DRG - see "EFC0401 - Patient 48667" with no infections where the total cost was \$ 67,817.29:



As expected costs were relatively high on Day 3 when the bulk of the treatment was done but then costs came down considerably due to the patient being stable and going into recovery mode.

4. Conclusion:

Lastly, it's worth noting that the costs associated with cases where a medical infection occurred, are not limited to the cost of additional treatment caused by the medical infection - in some cases, litigation may also occur. The following shows the number of litigations (on the X axis) vs the number of infections (Y axis) - and note that the size of the bubble shows the total cost for the case. As would be expected, an increase in the number of medical infections increases the number of litigations.

