

Survival Analysis – How You Can Predict Device Failure

There are two certainties in life, death and taxes. This proverb rings true especially for device manufacturing companies be they medical, mechanical or otherwise. According to a [McKinsey & Co report](#), product quality ‘events’ (including recalls, warranties, and lawsuits) cost the medical device industry between \$2.5 and \$5 billion annually. These costs all come down to the fact that manufacturers are unable to predict when their devices are going to fail.

How can manufacturing companies accurately measure the lifetime of a device or even take into account the effect of external factors?

Survival Analysis is the best analysis technique to deal with this issue and is used in both academia and industry (all types of manufacturing industries).

The Bottom Line

In business terms this means that organisations can better understand the lifetimes of their products. This can be used to accurately set warranty periods, allow for better marketing of products based on their known lifetime, and better enable preventative action where a device failure is extremely damaging.

In a previous Survival Analysis consultancy engagement, a medical device manufacturer sought to use survival analysis to quantify the probability of a patient experiencing specific complications. With a record of around 500 patients, information from routine follow up visits opened the possibility for Survival Analysis. With this required ‘time to event’ data, the manufacturer can now quantify failure rates of their implants. This enables them to calculate warrantee periods, recommend follow up visit dates and aid survival times based on positive external factors.

What Are The Results?

Using Survival Analysis, Presidion can enable you to find out the following:

- **What is the probability of my product failing at a given time?**
e.g. After 28 months there is an 8% likelihood of failure.
- **What is the average survival time for my product?**
e.g. The average survival time of my product is 2.5 years.

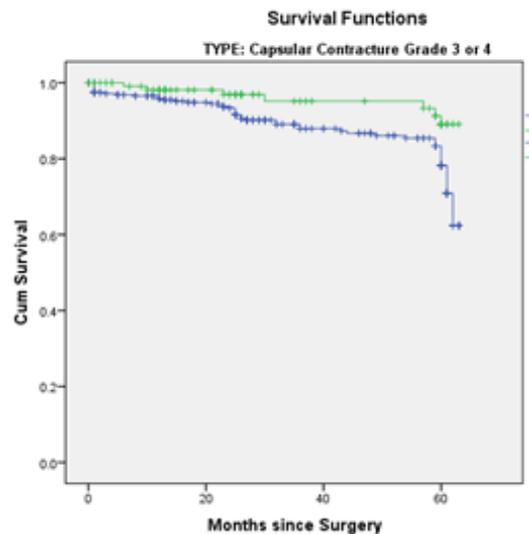
- **What factors increase or decrease the life time of my product?**
e.g Devices produced by a specific plant have a higher average lifespan.

What is Survival Analysis?

This statistical technique has many applications and the event to be predicted may be the occurrence of a surgical complication, the failure of a device or the death of a patient.

In short, survival analysis attempts to answer these questions:

- **What is the average time to failure?**
- **What is the probability at a particular time that failure will occur?**
- **How do survival rates compare between different groups?**
- **What impact do other factors have on survival rates?**



What Are The Pre-Requisites?

To apply survival analysis you only need a sample with the following information:

- **A Starting Point**
When the device was implanted / date of first use / manufactured.
- **Event Occurrence Information.**
Information on the reported failure time of each device.
- **Dropout Information.**
A recorded date where a device was lost from the study/ became unobservable for failure.

About Presidion

Presidion have operated for over 20 years and have been the pioneers in implementing cutting edge predictive analytics solutions with top UK and Irish organisations. We specialise in helping organisations leverage their data to deliver tangible practical returns on investment, aligned with their strategies.

Presidion works with both government and commercial clients, currently partnering with hundreds of organisations enabling them to **understand what has happened in the past, anticipate what may happen next** to take appropriate and timely strategic decisions for their organisation.