The survival function denoted formally as S(t) = Pr(T > t) is the probability that the survival time T is larger than time t. Or phrased slightly differently, the survival function specifies the probability that the event of interest has not occurred yet by time t.

We assume that T is an absolutely continuous random variable, and we need to look at those individuals who experience the event of interest in a small time interval [t, t + dt]

Mathematically, the hazard rate function can be expressed by

Text

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T – continuous random variable

t <= T <= t + dt – вероятность, что событие произойдет, при том, что оно еще не произошло (T >= t).

The cumulative hazard rate is defined as

There are two important mathematical relations between the cumulative hazard rate and the survival function. The relations are derived as follows:

Text, letter

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Thus , assuming that S(0) = 1, then by integrating both sides, we arrive at − log(S(t)) = R t 0 h(s)ds + C. Finally this implies that

Text

Description automatically generated with low confidence2.4

Т.е. survival function shows the area of probabilities that event will not be occurred, if the event still not occurred (площадь, что событие не произойдет, при условии что еще не произошло).