Statistical Analysis of Competing Risks With Missing Causes Of Failure

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In the competing risks model, a unit is exposed to several risks at the same time, but it is assumed that the eventual failure of the unit is due to only one of these risks, which is called a 'cause of failure'. Thus the competing risks data consist of failure time and the cause of failure of each unit on test. Statistical inference procedures when the time to failure and the cause of failure are observed for each unit are well documented. In this paper we address the problem when the cause of failure may be unknown for some units. Several articles have proposed estimation of the survival or the sub-survival function in this situation. However the problem of testing whether the risks are equal or some risk dominates the other has not received much attention. We review some the estimation procedures and propose tests for the equality of the risks based on the sub-distribution, sub-survival functions and cause-specific hazard rates.

Key Words : Failure time, missing failure causes, Kaplan-Meier , cause-specific failure rate