

# On Mann–Whitney tests for comparing sojourn time distributions when the transition times are right censored

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**Abstract** We consider the problem of comparing sojourn time distributions of a transient state in a general multistate system in two samples (groups) when the transition times are right censored. Using the reweighting principle, a two-sample Mann–Whitney type of  $U$ -statistic is constructed that compares only the uncensored sojourn times from the two distributions. A second Mann–Whitney type of statistic is also constructed using a different reweighting that allows for comparisons when one of the two sojourn times is either uncensored or singly censored. Both these statistics are asymptotically unbiased, asymptotically normally distributed and reduce to the standard Mann–Whitney statistic when there is no censoring. A test of equality of sojourn time distributions in two independent samples is constructed by symmetrizing the second statistic. The testing methodology is illustrated using a data set on kidney disease patients.

**Keywords** Censoring · Martingale · Mann–Whitney statistic · Reweighting principle ·  $U$ -statistic · Waiting time