DATA SUPPLEMENT 2

A suicide imitation model that maintains the marginal distributions

The model described below enables values of the test statistic (number of close pairs) to be simulated for a range of imitation rates to generate a distribution under the model. The suicide rate is estimated by the rate of the model that fits the observed value of the test statistic most closely (i.e. the mean simulated value under the model is nearest the observed value). There were 200 simulations for each imitation rate. The limits of a 95% CI are found by determining the smallest (largest) rate under which at least 2.5% of the simulated values were above (below) or equal to the observed value of the test statistic.

With assumptions AI to A3 from Appendix I, the following algorithm generates a set of suicide locations and times for n cases that are consistent with the specified model and maintain the observed marginal distributions of suicide time and location.

(a) Let S denote the set of observed space units. This set contains a space unit as many times as the number of suicides that occurred in the space unit.

(b) Define a set of n suicide identities I that contains pn ones (imitative suicides) and $(1-p)n$ zeroes (spontaneous suicides).

(c) Order the observed suicide times and stepwise allocate a suicide space unit to each time, starting with the smallest time. Allocate a space unit as follows to the ith smallest time:

   (i) pick a suicide identity at random from I;

   (ii) if the identity is a spontaneous suicide pick a space unit at random from S;

   (iii) if the identity is an imitative suicide take the subset of units in S which have previously been allocated to suicide times not more than T days ago provided another instance of the space unit remains unallocated in S; give each space unit in the subset a selection probability which is inversely proportional to the time passed since the last suicide in the same location; select a space unit for the imitative suicide according to the given probabilities;

   (iv) take the selected identity out of I and the selected space unit out of S;

   (v) iterate through the ordered suicide times until the sets I and S are depleted.

The set of n cases was chosen as the set of observed cases within the selected study period. A run-in period had to be specified during which suicide times, locations and methods remained fixed to ensure that there were index cases available for imitation at the start. The chosen run-in period was T days prior to the start of the study period.

The procedure was extended to accommodate the additional assumption that an imitative suicide employs the same method as the index case. A set M of methods is defined containing each method as often as it has been observed. A spontaneous case is allocated a method at random without replacement. If, following the procedure above, the selected identity specifies an imitative suicide and a spatial location has been selected, the method is chosen to be that previously allocated to this space unit. Should the method no longer be available in the set of methods, the choice of space unit (and associated index case) is discarded and a new space unit chosen until a match is found.