

Minimum intravenous thrombolysis utilization rates in acute ischemic stroke to achieve population effects on disability: A discrete-event simulation model.

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Abstract

BACKGROUND:

The only pharmacological treatment with proven cost-effectiveness in reducing acute ischemic stroke (AIS) associated disability is intravenous thrombolysis with recombinant tissue plasminogen activator but its utilization rate is still low in most of the world. We estimated the minimum thrombolysis utilization rate needed to decrease the prevalence of stroke-related disability at a population level by using a discrete-event simulation model.

METHODS:

The model included efficacy according to time to treatment up to 4.5h, and four scenarios for the utilization of intravenous thrombolysis in eligible patients with AIS: a) 2%; b) 12% c) 25% and d) 40%. We calculated the prevalence of AIS related disability in each scenario, using population based data. The simulation was performed from 2002 to 2017 using the ARENA software.

RESULTS:

A 2% utilization rate yielded a prevalence of disability of 359.1 per 100,000. Increasing thrombolysis to 12% avoided 779 disabled patients. If the utilization rate was increased to 25%, 1783 disabled patients would be avoided. The maximum scenario of 40% decreased disability to 335.7 per 100,000, avoiding 17% of AIS-related disability.

CONCLUSION:

The current utilization rate of intravenous thrombolysis of 2% has minimal population impact. Increasing the rate of utilization to more than 12% is the minimum to have a significant population effect on disability and should be a public policy aim.