ESTIMATING THE ILLNESS STAGE-SPECIFIC INFECTIOUSNESS OF SMALLPOX

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Purpose of study: To evaluate the illness stage-specific transmission potential of smallpox.
Methods: The distributions of both incubation period and generation interval of smallpox were used. Samples were obtained through retrospective collection and review of literature on previous smallpox outbreaks. First, the incubation period was fitted to the lognormal distribution.
A likelihood-based approach was then employed to backcalculate the illness stage-specific infectiousness based on the fitted lognormal distribution and generation interval, assuming two different duration of exposures.
Results: The distribution of infectiousness peaked between 3 and 8 days after onset of fever. Thereafter, this dramatically decreased, exhibiting the long-tailed distribution. Prodromal period appeared to be non-negligible for the infectiousness. Similar qualitative patterns were obtained for both assumptions; single date exposure and continuous exposures.
Conclusions: Obtained estimates were compatible with the hypothesis based on virological studies during the mid-20th century. Whereas the infectiousness during prodromal period was suggested, its smaller impact on secondary transmission compared initial 5 days after appearance of rash confirms potential usefulness of contact tracing and isolation.