Estimation of the burden of influenza using surveillance and epidemiological data

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The cumulative incidence of infectious disease is an essential information to asses the disease burden. However, as for influenza, the cases are tracked only in sentinel medical institutions (SMIs), and we need to somehow estimate the cumulative incidence from such a sample. In this study, we consider employing seroprevalence elevation during one epidemic season for the estimation of incidence rate. Season 2009/10 was induced by pandemic virus 2009pdm and hence vaccination administrated in 2008 is expected to yield very limited gain in seroprevalence. Mizumoto el al. [1] estimated age-specific incidence rates and concluded that the reported proportion is much higher in children while very low in elderly people. Unlike to conventional methods, including the so-called multiplier one [2, 3] and utilization of medical linked to influenza-like illness (ILI) [4], which captures clinical incidences, the proposed one captures biological flu cases including asymptomatic ones. We verify the proposed method by applying the same procedure to both of 2009/10, 10/11 and 15/16 seasons. Though the estimations are limited by large confidence intervals due to the number of serosurveillance participants (n = 500 per age group), the estimate against 2009/10 coincides with those against the other two within the CI except certain age groups. Age-dependence of the proportion reported is roughly the same as that provided by a single season. The detail will be explained in presentation. The estimate of proportion reported against 2009/10 provides roughly three-times larger incidence than those provided by conventional methods [2, 3]. Taking a metanalysis, which stating that the net cases are twice large as symptomatic ones, our estimation may be interpreted to include people who experienced further faint influence from flu than the so-called asymptomatic

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cases. We also carry out an estimation of the proportion reported referring the data of both the two seasons, employing a simplified SIR-like state transition model accounting vaccination effect. However, its age-dependence is roughly the same as each single-season-based estimation.

References

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