To the editor:
In their recent article on the large outbreak of measles in Merseyside, England, Vivancos et al. [1] obtained a basic reproductive number \( R_0 \) of 1.2 in week 3 after the start of the outbreak. This result could suggest that measles viruses are less infectious in recent outbreaks than in the pre-vaccination era, when the basic reproductive number \( R_0 \) ranged from 11 to 18 [2]. The basic reproductive number obtained in the study is however the effective basic reproductive number.

The basic reproductive number \( R_0 \) is the average number of individuals directly infected by one infectious case (secondary cases) during the entire infectious period, when the infectious agent has entered a totally susceptible population [3]. The effective basic reproductive number \( R_e \), on the other hand, is the reproductive number observed when a part of the population is immunised (I) [3]. In this situation, the reproductive number decreases from \( R_0 \) to \( R=R_0 - R_0 I \) [3]. Outbreaks can be interrupted when \( R=1 \).

The basic reproductive number \( R_0 \) in the Merseyside outbreak can be determined from \( R_0=R/(1-I) \), where I is the prevalence of protected individuals in the population. Assuming that prevalence of protected individuals was at least equal to 81–87% (85–92% vaccination coverage (V) x 95% vaccine effectiveness (VE)) the value of \( R_0 \) necessary to generate the outbreak was 6.2–9.5, only slightly lower than in the pre-vaccination era. The lowest value is obtained taking into account a vaccination coverage of \( V=85\% \) (two doses of measles-mumps-rubella (MMR) vaccine at five years) and vaccine effectiveness of \( E=95\% \): \( R_e=R/(1-I)=R/(1-VE)=1.2/(1-0.8075)=6.2 \). The highest value is obtained taking into account a vaccination coverage of 92% (first dose of MMR at 24 months) and 95% vaccine effectiveness: \( R_0=1.2/(1-0.874)=9.5 \).

Measles is one of the most contagious infectious diseases, and outbreaks can only be prevented by means of achieving a high vaccination coverage. For a \( R_0=11–18 \), the vaccination coverage required to prevent measles outbreaks is 96–99% [3].

References