Determining the optimum vaccination schedule for the MMR vaccine OD Dissertation

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In the United Kingdom, measles vaccination was introduced in 1968 and replaced by MMR (measles, mumps and rubella) vaccine in 1988 [1]. However, eradication has not been achieved for any of these diseases. As such, costs are incurred in two ways; vaccination must be continued to control infection, while infection occurs costing both the health service and society. The current vaccination schedule for MMR in the UK is an initial vaccination at 12 months with a follow up vaccination between 3-5 years [2]. I previously examined the cost of vaccination schemes against measles [7], which showed potential long term savings by changing to a single vaccination schedule if a high enough proportion of infants could be vaccinated. However, there were some shortcomings with the models presented. They did not accurately model how births occur within the population and did not have up-to-date data on the age distribution of protection via maternally derived antibodies. Additionally, the study only included measles.

I intend to build an age-stratified model for each disease, using ideas from Agheksanterian and Gobbert [3] and Keeling and Rohani [9]. Using these models I can determine the number of infections that occur over a period of time, then by factoring in the number of vaccinations it is possible to determine overall cost of vaccination schedules. The cost of vaccination is given in Carabin [5]. Up-to-date average cost per case of measles is given by Beutels [4] and Carabin [6]. If up-to-date average cost per case of rubella and mumps can not be obtained, these can be estimated by comparison to measles using cost-benefit analyses of White[10] and Hinman[8]. Angela McLean is in touch with analysts at the Department of Health who have agreed to help find the best available data on the costs of cases and vaccination in the UK. I will combine my age-structured models of infection with cost data to compare the overall costs of different vaccination schedules.

References

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