Short communication

Influences on immunization rates: Vaccination coverage of mumps, measles, rubella and varicella before and after the STIKO intervention 2011 – A retrospective study

Linda Sanftenberg a,⇑, Hans-Jürgen Schrörs b, Jörg Schelling a

a Institute for General Practice, University Hospital of the Ludwig-Maximilians-University Munich, Germany
b GZIM, Society for Promotion of Vaccination Medicine mbH, Berlin, Germany

A R T I C L E   I N F O

Article history:
Received 24 March 2016
Received in revised form 27 May 2016
Accepted 3 June 2016
Available online xxxx

Keywords:
Mumps–measles–rubella–varicella–vaccination
Electronic immunization planner
Immunization rates

A B S T R A C T

Background: In September 2011, the German Standing Committee on Vaccinations (STIKO) changed their recommendation regarding the mumps–measles–rubella–varicella vaccination (MMRV). We compared the immunization rates against MMRV in Germany before and after the STIKO intervention.

Methods: We recorded the immunization status of children born between 09/2008 and 08/2012 in 35 selected doctor’s surgeries in Germany.

Results: After the STIKO intervention, the ratio of the combined MMRV vaccine as the first dose immunization was reduced to approximately 25% of the initial value. A slight increase in the number of children not sufficiently vaccinated against varicella (1.2%) was observed, but the immunization rates against measles, mumps, rubella and varicella did not significantly decrease.

Conclusions: The STIKO intervention led to a significant change in physicians’ vaccination procedures. The separate administration MMR + V vaccination may be a helpful option to improve the immunization rates in general.

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1. Introduction

According to the World Health Assembly, the routine coverage with a first dose of measles containing vaccine for children aged one year should be increased to 90% [1]. Consequently, the German Standing Committee on Vaccinations (STIKO) recommends a two-dose schedule against mumps, measles, rubella and varicella. The first dose should be applied at 11–14 months of age. The second dose can be applied four weeks after the first vaccination and should be conducted at 15–23 months of age [2]. Since 2006, a combined measles–mumps–rubella–varicella vaccine (MMRV) is available to reduce the number of injections and to increase acceptance and coverage of the varicella (V) vaccine [3,4]. Since 2009, different studies observed a more than 2-fold significantly elevated relative risk for febrile convulsions after the first dose of the quadrivalent vaccine MMRV compared to separately administered MMR + V vaccines [5–7]. As a consequence, the STIKO recommendation changed in September 2011 toward a separate application of MMR + V as the first dose immunization [8].

2. Methods

We evaluated the documented immunization status regarding mumps, measles, rubella and varicella in children born between 09/2008 and 08/2012 retrospectively. Data were recorded in 35 selected doctor’s surgeries in Germany who used the electronic vaccination scheduling program Impfdoc. To compare the development of vaccination rates before and after the intervention of the STIKO in September 2011, four different birth cohorts were built. These four groups were called control group (children born between 09/2008 and 08/2009), interim group (children born between 09/2009 and 08/2010), post intervention 1 group (children born between 09/2010 and 08/2011) and post intervention 2 group (children born between 09/2011 and 08/2012). By end of October 2014 we recorded data of 60,938 children, who were born from 09/2008 to 08/2012.

Only children with complete immunization documentation (31,015 children) were included in the final analysis. Children with incorrect vaccination, incorrect birthdate, or incorrect documentation within the Impfdoc software (e.g. vaccination before birth) were excluded from analysis. There is no indication that children with incomplete immunization documentation differ from the evaluated children. Some children who became ill with one or
more of the four vaccine preventable diseases were eliminated from the analysis, as well as children who received just monovalent vaccines (no MMR or MMRV vaccines). Finally, the number of children included in the study was 28,982. For the multiple comparisons, a post-hoc alpha correction using the Šidak method was applied. Analyzes were performed via the software IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.

3. Results

The intervention of the STIKO in September 2011 led to a significant change in physicians’ vaccination procedures. After the intervention the combined quadruple vaccination against MMRV was used far less frequently for the initial vaccination than the MMR + V mono vaccination.

If the shares of the administered vaccinations were compared prior to and after the intervention regardless of the birth cohort, we could observe that after a transition period, the ratio of the combined MMRV vaccine as the first dose immunization was reduced to approximately 25% of the initial value (Fig. 1). The vaccination procedures changed starting in October 2011. The recommendation of the STIKO has obviously been implemented by most physicians.

It is interesting that after the intervention of the STIKO the percentage of first MMR settled at a figure at about 20%, while the first MMR + V vaccination rose strongly up to 60% of the administered first dose vaccinations. The stabilization of the percentage of first MMR (without V) is critical because almost every second child who started with an MMR vaccine received no immunization against varicella concomitantly.

As we observed a stabilization of the MMR vaccine without concomitant V vaccination as the first dose vaccination after the STIKO intervention, one can surmise a varicella immunization gap in both post intervention groups. Consequently, we compared the vaccination status of the four birth cohorts at the age of 14 months (Table 1). Surprisingly, the immunization rates for the first MMR vaccination were even higher in the interim group (76.5%) and in both post intervention groups (77.7% vs. 76.8%) in comparison to the control group (67.9%). The vaccination rates of V declined just slightly in the both post intervention groups (64.8% vs. 67.8%). Obviously, many of the monitored children did not receive their immunization against varicella concomitantly with MMR as the first dose vaccination, but as recommended within their first 14 months of life. Therefore, no epidemiological relevant immunization gaps occurred in a causal relation to the STIKO intervention in September 2011.

At the age of 14 months, 16.6% of the children in the control group had received even the 2nd vaccination against MMR (MMR, MMR + V or MMRV), although the 2nd vaccination is not relevant at this age and recommended between 15 and 24 months of life. Comparable values were measured for the interim group (16.5%), the post intervention 1 group (16.1%) and the post intervention 2 group (15.0%). Almost the same applied to the 2nd vaccination doses against V (V mono, MMR + V or MMRV) at the age of 14 months, as we monitored 15.6% vaccinated children against varicella of the control group, 15.7% in the interim group and 13.6%, respectively 13.2% vaccinated children in the post intervention groups 1 and 2 (data not shown).

4. Discussion

The data in our study did not prove that a decrease in the basic immunization against V occurred as other studies suggest [9]. As we evaluated the immunization rates in Germany for 09/2008–08/2012 and did a second assessment in October 2014, we compared a big data volume of children of many German federal states. The vaccination rates for the school enrollment study in Germany for 2012 [10] were much higher than the vaccination rates of our control group. They were two-three years old in September 2011, whereas for the school enrollment study the vaccination status in the age range from five-seven years was presented. Additionally, rates are generally lower for children who do not submit their vaccination records. During the study period from 2009 to 2014, numerous activities of the stakeholders involved in the vaccination system took place and awareness of the need for preventive care was probably raised [11–13]. Consequently, the interim group in our study showed slightly higher vaccination rates than in the other cohorts. Vaccination rates at the age of 24 months of the birth cohorts from 2004 to 2009 were studied by a working group...
based on insurance data [14]. The results showed that the 2008 cohort had a vaccination rate of approximately 92% for the first dose of MMR at the age of 24 months (for the second dose of MMR it was 69%), and for the first V vaccination of approximately 86% (64% for the second dose). Privately insured patients and self-payers were not included in this study, but the proportion of vaccination opponents and skeptics who are privately insured is greater than the proportion of those with statutory health insurance. It has to be considered, that we collected our data exclusively in doctor’s surgeries who use the recall-system Impfdoc. These doctors can be assumed to have a higher awareness of the need of vaccinations.

To sum up, in terms of public health relevance the excess fraction of MMRV-attributed febrile convulsions is fairly low and the overall benefit-risk balance for the combined MMRV immunization is positive [15]. The separate administration MMR + V vaccination may be a helpful option to overcome the parents’ refusal of the MMRV injection and to improve the immunization rates all around the world.

Financial support

This work was supported by GlaxoSmithKline.

Conflict of interests

Prof. Jörg Schelling is a member of Pfizer’s advisory board Germany for pneumococcal vaccines. Dr. H.J. Schrörs is project head at the Institut für medizinische Information – Berlin (InMed) which established the software Impfdoc.

Authors’ contributions

LS drafted the manuscript. JS and HJS revised the manuscript. HJS developed Impfdoc, the study design, collected vaccination data and performed data analysis. JS conceived the study design. All authors read and approved the final manuscript.

Acknowledgements

We thank Dr. Johannes Gladitz and Traugott Wierer (Statistik-Service Dr. Gladitz – Berlin) who provided support for the statistical data analysis and Wilfried Wallucks (WKB-Systempartner – Freiburg) for the data management.

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