論文の内容の要旨

論文題目　Effectiveness of Stepwise Perinatal Immunization Education:

A Cluster-Randomized Controlled Trial

（周産期における段階的に実施する予防接種教育効果の検証：クラスターランダム化比較試験）

氏名　齋藤　あや

Objectives

The “vaccine gap” is a term that has been used for past decades to emphasize the delayed national immunization program (NIP) in Japan. However, the environment surrounding immunization policy in Japan has recently been subject to remarkable changes. Nine new vaccines have been licensed in Japan in rapid succession since 2008. Accordingly, vaccine availability has improved considerably, these changes in the Japanese NIP have increased confusion among providers and recipients, as these groups need to know how and when to deliver and receive vaccines in a timely manner. Additionally, because of the lack of a unified immunization education system, providers vary in the immunization education they offer. Therefore, parents do not receive standardized information on immunizations and the need for their children to receive recommended vaccines at appropriate time. The ideal educational approach would optimize education at these stages in limited opportunities. Consequently, further improvements are necessary in the timing and content of a standardized immunization education program that encourages infantile immunization.

The objectives of this study are to examine the effectiveness of immunization education offered at different perinatal period on the infantile immunization status and knowledge, attitudes and beliefs regarding immunization, and intent to vaccinate infants in Japan.

Methods

This study was a two-arm, pair-matched, cluster randomized controlled trial performed at nine obstetrics hospitals or clinics in metropolitan Niigata city, Japan. Study participants were recruited for approximately 4.5 months, from September 15, 2014 to January 31, 2015. After signing a consent form, participants completed a baseline survey, and data were collected using self-administered paper and pencil surveys at home. Pregnant women aged 18 years or older who were able to communicate in Japanese were recruited by a midwife or physician during gestational weeks 24-30 at antenatal classes or general prenatal

check-ups at each site. Immunization education was provided to the intervention group on 3 occasions: 1) during the prenatal period (34-36 gestational weeks), in an outpatient setting at the hospital or clinic, 2) during the postpartum period (3-6 days after delivery), in an inpatient ward and 3) at a 1-month well baby check-up, in an outpatient setting at a hospital or clinic. A single midwife was the educator and covered specific subjects focusing on content of greatest interest to parents at each perinatal stage. In contrast, the control group only received written information in an educational pamphlet, which covered a wide range of subjects related to immunization and was designed as a supplement to general immunization provided at routine check-up visits, without oral explanation.

The primary outcome measure was self-reported up-to-date immunization status and schedule adherence for the five vaccines provided in an infantile period, including *Haemophilus influenzae* type b, (Hib), pneumococcal conjugate, inactivated polio, diphtheria, tetanus toxoid, acellular pertussis (IPV-DTaP), rotavirus, and hepatitis B virus (HBV) vaccines among infants aged 2, 3 and 4 months. The secondary outcome measure was changes in maternal knowledge, attitudes and beliefs assessed in a pre-study questionnaire (at baseline) and two post-study questionnaires (at age 1 and 6 months).

For the evaluation of this education program, RE-AIM framework which is an evaluation system that balances individual and organizational factors, provides evidence regarding the public health impact of educational programs and emphasizes acceptability and feasibility, was used. Data were collected after the intervention an individual or organizational level at each setting among intervention group.

Results

Five hospitals and four clinics agreed to participate in this study. We approached 490 pregnant women, and 188 (38.3%) of whom agreed to participate in the study at the nine sites: 81 (43.1%) from hospitals and 107 (56.9%) from private clinics. Among the 188 study participants, the numbers of participants in the intervention and control groups were 100 (53.2%) and 88 (46.8%), respectively. A total of 160 post-survey questionnaires were returned (response rate, 90.4%).

Although the percentages of children who completed three doses of Hib vaccine and 13-valent pneumococcal conjugate vaccine (PCV13) at 6 months of age did not differ significantly between the intervention group (85.0% and 85.0%, respectively) and control group (78.4% and 77.3%, respectively) ($P = 0.26$, $P = 0.19$, respectively), the percentage of children who completed three doses of IPV-DTaP vaccine at age 6 months was significantly higher in the intervention groups (85.0%) than in the control group (72.7%) ($P = 0.04$). Additionally, mean duration to completion of the third dose of the Hib vaccine, PCV13, and IPV-DTaP vaccine was shorter in the intervention group than in the control group: Hib vaccine, 129 vs 133 days ($P < 0.01$); PCV13, 130 vs 134 days ($P < 0.01$); IPV-DPT vaccine, 160 vs 165 days ($P = 0.03$). There was a significant difference between groups over time in the interaction for knowledge score ($P = 0.02$); however, no differences were

observed in attitudes or beliefs regarding infant immunization.

In terms of the educational program evaluation by RE-AIM framework, the response to recruitment was approximately 38.4%. In total, 80.3% of eligible subjects participated in the program until completion. The overall adoption rate was 56.3% (9 of 16 invited settings participated). Approximately 80% of the participants who received the intervention answered the content of the intervention according to the protocol. The required time for the intervention was usually 3-4 minutes. Thirty percent of the educators wanted to continue the educational intervention, whereas 10% of them did not want to continue, and 60% of them answered undecided. The educators stated that they were able to implement the interventions at each setting without any difficulties; however, most difficult part was that this was an individual session, not a group session.

Discussion

The results of current study showed that all required vaccines, including the Hib vaccine, PCV13, and IPV-DTP vaccine, were given earlier in the intervention group than in the control group. These results suggest that stepwise immunization education helps improve adherence to the schedule of required vaccines. In general, although vaccination rates are an important measure of immunization program penetration, they may not be indicative of appropriate vaccination timing. Delays in the immunization schedule are an important public health concern for children and the community. It will cause a lack of immunity at most vulnerable period to certain vaccine preventable diseases (VPDs), a domino effect that leads to delays in receiving other vaccines in a timely manner and extends the period of high VPDs risk, and increase the incidence of certain VPDs, which could result in a community VPDs outbreak.

The current study showed that the percentage of participants who completed the third dose of IPV-DPT vaccine was significantly higher in the intervention group than in the control group at age 6 months. Because the first dose of IPV-DTP vaccine is currently recommended at age 3 months, rather than at age 2 months (for Hib vaccine, PCV13, and HBV), it may be that a delay in the first IPV-DPT dose led to a delay in receiving subsequent doses of IPV-DPT, which caused the third dose to be given after age 6 months. The results showed that vaccination rates for all vaccines except IPV-DTP did not differ between the intervention group and control group. For the required vaccines, high vaccination rates were most likely due to the fact that these vaccination fee were 100% covered by the local sectors and vaccine information was distributed widely to the public. For the voluntary vaccines such as HBV and rotavirus vaccines, a possible explanation for this is that dissemination of vaccine information by providers and understanding of the information by recipients for the last few years improved vaccination rates. Additionally, knowledge score of the intervention group was better than that of the control group. Sufficient knowledge and information are believed to be important determinants of successful vaccination programs. These findings emphasize the importance of vaccine education and incorporated immunization education into routine prenatal care may be warranted in the future to sustain high

vaccination rates with an appropriate vaccination timing.

This study used the RE-AIM framework to evaluate the impact of the stepwise educational intervention. Overall reach into the target population was 38%. It is possible that potential participants who were uninterested in immunization or lacking in immunization knowledge chose not to enroll in the study. These mothers might be more important target population for immunization education. The overall adoption rate among those who agreed to participate was 56.3%, more than half of obstetric institutions in Niigata city participated in the study. In addition, participating hospitals and clinics were located in all six city districts, which indicate that the regional balance and distribution of participant characteristics were satisfactory. Regarding the fidelity of an intervention's protocol, approximately 80% of participants in the intervention group were able to receive the educational intervention. The educational intervention, including its timing, duration and content, was universally implemented according to the study protocol, at all study sites. With respect to maintenance, the program should be modified so that it is consistent with current clinical settings. To improve sustainability, future efforts should improve the efficiency of educational sessions by making them shorter, improving the content of education materials and adopting group sessions instead individual sessions.

We have several study limitations when interpreting the current findings. First, study participants could have used other sources to obtain information on immunization, which might have reduced the effectiveness of the intervention. Second, selection bias for the study participants may exist given they participated in the study because they were interested in immunization. Third, during the study period the Japanese media extensively reported a story that suggested that the human papilloma virus vaccine had caused neurological disorders with/without motor impairment, which increased attention towards concerns regarding the immunization safety of immunization, which may explain why little change difference in the attitudes and beliefs of toward immunization between the two groups. Fourth, the generalizability of the present findings may be limited, as the participants were recruited from one region and the sample size was relatively small. Last, the data were self-reported and the author was unable to verify the actual content of clinical immunization education, therefore, it is possible that response bias affected the validity of the results.

Conclusions:

In conclusion, the present results indicate that stepwise perinatal immunization education improved immunization schedule adherence and increased maternal knowledge of infant immunization practice. In addition, knowledge score was significantly improved by the intervention. These findings confirm the importance of perinatal immunization education. Future efforts should focus on developing a standardized perinatal immunization education system that improves infant immunization outcomes.