

ORIGINAL ARTICLE

NATIONAL IMMUNIZATION PROGRAM IN FINLAND

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ABSTRACT

In the national immunization program, all Finnish children are vaccinated against 9 infectious diseases: diphtheria, tetanus, pertussis, polio, severe infections due to *Haemophilus influenzae type b*, measles, mumps, rubella and influenza. In addition, vaccination against tuberculosis, hepatitis A- and B- , influenza or tick-borne encephalitis are given to those at risk of contracting the diseases. More than 95% of children are vaccinated according the optimal schedule. Vaccine preventable diseases are rare in Finland. In Finland, all vaccines are imported. The decisions regarding the vaccination program are made by the Ministry of Social Affairs and Health. The National Public Health Institute is responsible for the control of the communicable diseases and the implementation of the vaccination program in practice. Evaluation of the implementation of new vaccines in the vaccination program is ongoing. (*Int J Circumpolar Health* 2007; 66(5): 382-389)

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INTRODUCTION

In Finland (population 5.3 million), vaccinations of the national immunization program (NIP) are given by public health nurses in public health centres and in schools. The NIP has achieved high rates of vaccination coverage and parental confidence in the benefit of vaccines. The NIP is guided by the National Public Health Institute (KTL), which has a mandate to evaluate communicable disease epidemiology, immunization policy, vaccine safety and optimal vaccination schedules. In this paper the principles and practice of the NIP are described, including recent responses to local and international challenges to achieving optimal vaccine prevention in Finland.

The decision-making process

In Finland, decisions regarding vaccines to be included in the program, schedules and target groups are made by the Ministry of Social Affairs and Health. Expertise in the control of communicable diseases lies with the National Public Health Institute (KTL), which advises the ministry on immunization program issues. An expert body associated with the Ministry of Social Affairs, the National Advisory Board of Communicable Diseases, decides whether or not it is willing to support the detailed evaluations and recommendations produced by KTL.

KTL expert work is done in the KTL Committee on Immunization Practices, in vaccine/disease specific expert groups, and in the National Advisory Committee on Vaccination (KRAR), which also co-ordinates this work. The decision-making structure of NIP is presented in Figure 1.

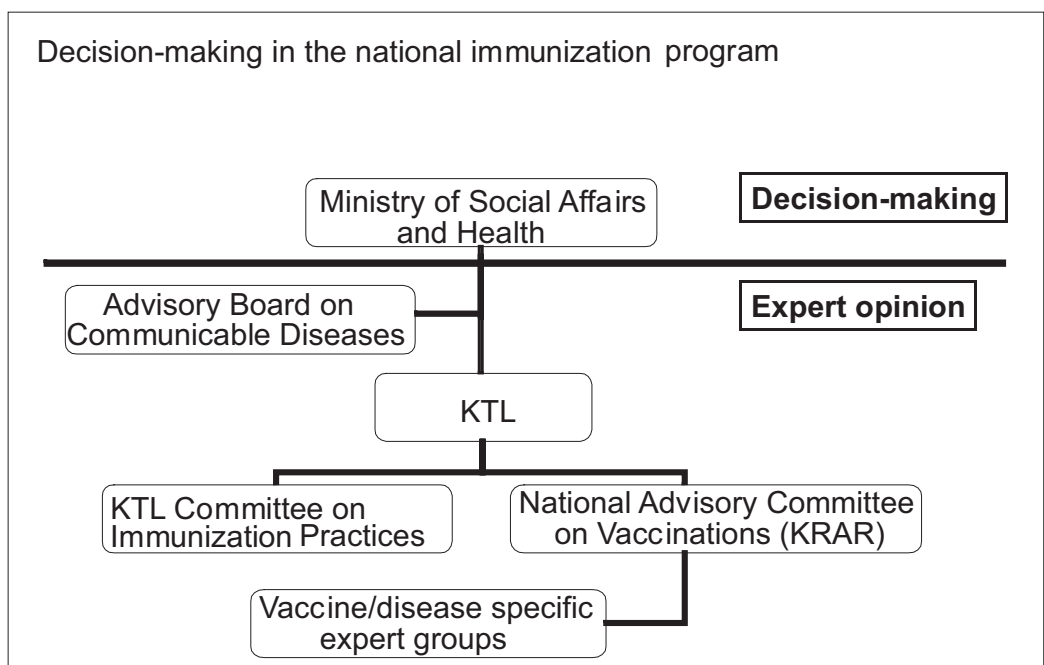


Figure 1. Decision-making in the national immunization program in Finland.

The National Advisory Committee on Vaccination (KRAR) is composed of experts from KTL, the Ministry of Social Affairs and Health, the National Agency for Medicines and other interested bodies in the field, such as health care professional associations, medical societies and universities. KRAR is appointed by, and gives its recommendations to, the director general of KTL. KRAR typically deals with major immunization policy issues, including the introduction of new vaccines or other significant changes in the NIP.

For evaluation of the need to introduce a new vaccine into the age-based schedule, KRAR has defined the following 4 criteria:

1. Expected public health benefit: Is the disease a public health problem? Is the disease vaccine preventable?

2. Safety of vaccine at the level of the individual.

3. Safety at the population level: Could wide-scale vaccinations have adverse effects in the overall population?

4. Cost-effectiveness: Would the vaccination be cost-effective?

The KTL Committee on Immunization Practices is a practical tool for implementation and development of the NIP. It consists of KTL experts from the fields of general vaccinology, virology, bacteriology, infectious disease epidemiology, immunology, vaccine safety and program implementation. In addition, one member of this committee represents the Finnish Defence Forces.

When introduction of a new vaccine to the NIP is considered, a specific working group, composed of experts from KTL and other bodies and organizations, is established to provide KRAR with an evidence-

based report and conclusions that take into account the 4 criteria listed above.

Procurement and distribution of vaccines for the national immunization program (NIP)

Vaccines are not produced in Finland. All vaccines for the NIP are purchased according to an open EU-tender procedure initiated by KTL. All vaccines are distributed by the wholesale distributors of pharmaceutical products to hospital pharmacies and pharmaceutical centres, which reallocate the vaccines to the health care centres in the municipalities. Altogether 1.5 million doses of vaccines per year are distributed. Vaccine procurement and distribution are financed by the state budget.

Recent changes in NIP

The expert group evaluations that have resulted in program changes during the 2000s are shown in the Table I. In 2005, Finland introduced DTaP-IPV-Hib (diphtheria, tetanus, acellular pertussis, inactivated polio and haemophilus influenzae) combination vaccine in the NIP (Table II).

At the beginning of 2006, a 5-year vaccination campaign against tick-borne encephalitis (caused by a tick-borne encephalitis virus [TBEV], the European subtype of the flavivirus carried by tick species *Ixodes ricinus*) was introduced in Åland Islands. Because of the small population, the relative incidence of tick-borne encephalitis is significantly higher in Åland than in the rest of Finland (3). In European countries where tick-borne encephalitis is endemic, vaccinations have been widely recommended for years (4).

Table I. Recent changes in the national immunization program (NIP).

Year	Vaccine	Type of change	Target group
2002	Influenza, annual	Introduction	All individuals aged >65 years
2003	Diphtheria, tetanus, acellular pertussis (DTaP/dtap)	Introduction	All children at 6 years of age
2005	Pentavalent combination vaccine against diphtheria, tetanus, pertussis, polio, <i>Haemophilus influenzae type b</i> (DTaP-IPV-Hib)	Introduction	All infants at 3, 5 and 12 months of age
2006	Tick-borne encephalitis (TBE)	5-year campaign	All individuals over 7 years of age living permanently in Åland, the island between Finland and Sweden
2006	BCG	Restriction	High-risk groups only (instead of previous universal newborn vaccination program)
2007	Influenza, annual	Introduction	All children aged 6–35 months

Table II. National childhood vaccination program in 2007 in Finland.

Age	Vaccine
3 months	DTaP-Hib-IPV ¹
5 months	DTaP-Hib-IPV
12 months	DTaP-Hib-IPV
14–18 months	MMR ²
4 years	DTaP-IPV
6 years	MMR ²
14–15 years	dtap ³
6–35 months	Influenza, annual

¹ D=diphtheria, T=tetanus, P=pertussis, polio, Hib=*Haemophilus influenzae type b*.

² M=measles, M=mumps, R= rubella.

³ Booster dose, small letters indicating lower amount of antigens.

On 1 September 2006, Finland switched from universal tuberculosis vaccinations for all newborns to targeted risk group vaccinations (5,6). In Finland, the BCG vaccine is offered to all newborn children whose risk of becoming infected is high. A child's risk of developing tuberculosis is increased if the child's mother, father, brothers or sisters, or person with whom he/she lives has at one time been diagnosed as having tuberculosis or the child itself, his/her mother, father, brothers or sisters, or person with whom the child lives was born in a country with high incidence of tuberculosis ($\geq 50/100\ 000/\text{year}$) or the child will, during the first year of his/her life, spend more than one

month in a country with high rates of tuberculosis ($\geq 50/100\ 000/\text{year}$).

Of the 57,000 babies born in Finland annually, 3,000 are estimated to belong to these risk groups for tuberculosis and will be vaccinated as newborns with BCG vaccine. In addition, approximately 500 older children will annually be given BCG vaccine due to increased risk of contracting tuberculosis. This decision was made because tuberculosis has become rare in Finland and adverse effects associated with BCG vaccinations increased in 2003–2005 (7,8). In most western European countries, BCG vaccinations also target select risk groups (9).

In 2007, state-funded influenza vaccina-

tions were extended to cover all children aged 6–35 months in Finland. In most other European countries, influenza vaccination of healthy young children is not included in their vaccination programs. In the U.S., influenza vaccination is recommended for healthy children aged 6–59 months, and in Canada for children aged 6–23 months (10,11).

Current national immunization program (NIP)

Vaccinations in the NIP are given on a voluntary basis and they are offered free of cost to all citizens (12). The current NIP vaccinations for children are shown in Table II. In addition to the vaccinations described in Table II, hepatitis A and B vaccines and BCG vaccine are given to those who are at increased risk of disease. Influenza vaccine is offered to patients in medical risk groups as well as to all healthy persons 65 years of age and older.

The incidence of hepatitis A and hepatitis B infection (0,5/100 000 and 0,7/100 000, respectively) is low in Finland compared with many European countries (8). Although WHO has for years recommended universal immunization against hepatitis infection, Finland as well as other Nordic countries recommend immunization of high risk groups only (13).

Expert groups are currently evaluating whether rotavirus vaccine, pneumococcal conjugate vaccine and varicella vaccine should be included in the NIP. Reports of these expert groups are expected to be finalized in the near future. Vaccines that are not included in the NIP are available in pharmacies, where parents who have a physician's prescription can purchase them. Vaccine manufacturers lead active commercial campaigns on new vaccines, and consequently parental interest in new vaccines

is gradually increasing. The NIP continues to monitor changes to the vaccination programs in other countries within North America and Europe (14–17).

Adverse events monitoring

The expert authority on vaccine safety issues in Finland is the Vaccine Safety Unit of the KTL (18). The unit monitors the safety and the quality of the vaccines distributed in Finland. It also maintains a register for vaccine-related adverse events reported by health care personnel. According to national regulations, the health care workers must report all serious adverse events. In addition, reporting any adverse events of special interest is encouraged. The online register enables constant evaluation of the incidence and severity of possible adverse events linked to each vaccine. Approximately 1,000 adverse events following immunization are reported yearly; of these, 4–7% are graded as serious by the Vaccine Safety Unit (19).

Monitoring the effectiveness of the NIP

The effectiveness of the immunization program is evaluated through infectious diseases surveillance performed by KTL. For evaluating a specific vaccination, immunization records of disease cases as well as information on travel, and other risk behaviour, are of importance. In particular, intensive disease surveillance is being carried out for polio, invasive *Haemophilus influenzae* type b (Hib) and tuberculosis/BCG. Serological surveys as well as other immunological studies performed in specific KTL laboratories (e.g., for measles, mumps, rubella and pertussis) provide valuable information on the effectiveness of the immunization program (20–22). Additional studies are launched when vaccines or schedules are changed.

Immunization against invasive Hib disease was included in the NIP in 1993, following extensive clinical trials in Finland (23). Before inclusion of Hib vaccine in the NIP, 150–200 invasive Hib infections in children were diagnosed in Finland each year. Since then Hib infections in children have been very rare (24).

In 1982 an attenuated live virus MPR vaccination program was launched for the prevention of measles, mumps and rubella. Cases of domestic transmission of these diseases have not been detected in Finland since the mid-1990s. A few diagnosed infections have been acquired from travel abroad (8). In some European countries epidemics are ongoing and vaccination strategies are being improved (25–28).

Vaccination coverage

Administrative compliance with the immunization program (i.e., how well the program is accepted and whether vaccines are taken as advised) is evaluated by regular vaccination coverage surveys. These surveys study

1,000 children sampled from a population register of children born in a certain year. Their vaccination data for the first 2–3 years of life are collected from child health centres. The latest survey among children born in 2001 indicates that by 24 months of age 95% of children receive all vaccinations as scheduled in the NIP (Table II). For each vaccine taken separately, the point estimates for coverage are approximately 97% (29) (Fig. 2).

Communication and training

All changes in the NIP are communicated, along with detailed instructions on their implementation, by KTL through several channels. To be able to reach the personnel who are responsible for the administration of vaccines in local health centres, KTL has established a network of contacts. Through this network, the health care personnel in the health centres are provided with detailed instructions. Contact persons distribute the information further in their regions.

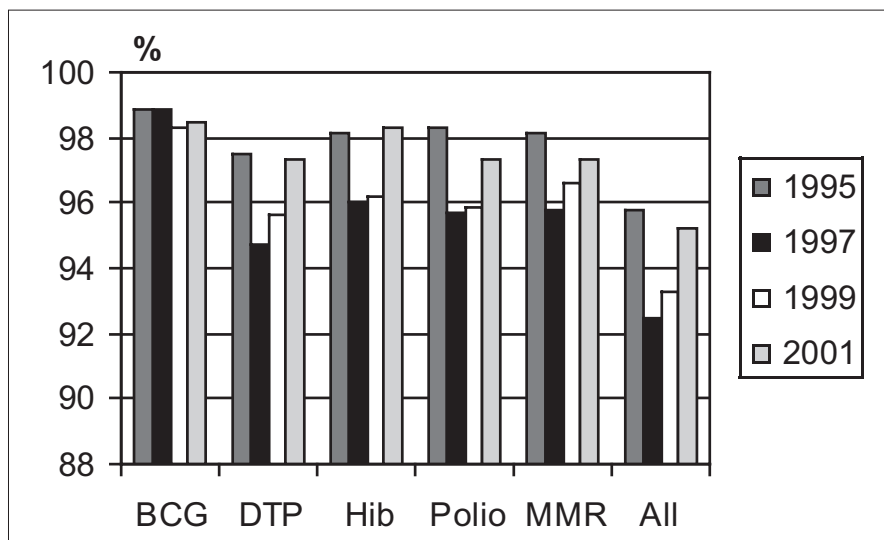


Figure 2. Immunization coverage in Finland. Children born in 1995, 1997, 1999 and 2001 who received all recommended doses by the age of 2 years.

Internet-based communication allows easy access to information for vaccinators all over Finland. KTL maintains comprehensive web pages that seek to provide all essential information on vaccines and immunizations. The core guidance for vaccinators is published in the Vaccinator's Manual. The handbook is electronically available from the KTL website (www.ktl.fi), and the electronic version is continuously updated. The web pages also contain a range of materials, including vaccine recommendations, booklets, leaflets, slides and videos on immunization techniques. In addition to the web pages, information for vaccinators is also communicated through professional journals. Specific campaigns to support influenza vaccination are organized yearly. When appropriate, the experts of the KTL Department of Vaccines give lectures and organize education programs in collaboration with other health organizers.

A telephone service is available to health care professionals each working day. Specially trained public health nurses of the Department of Vaccines, working in conjunction with a physician, assist health care professionals in solving vaccine-related questions or problems. The "Frequently Asked Questions" directory on the KTL website receives most of its questions through this counselling service and is updated regularly.

Conclusions

Vaccination coverage is high and vaccinepreventable diseases are rare in Finland. International "false alarms," such as the alleged and subsequently discredited link between autism and MMR vaccine, have given rise to discussion among parents and in the media about the safety of vaccines (30). In addition, modern young parents are not familiar with the serious

and potentially lethal nature of many of the diseases that vaccines target; hence, they may consider vaccinations troublesome and unnecessary. These facts are challenges to disease prevention and maintaining high vaccination coverage today. Introduction of the combination vaccines in the NIP in 2005, and focusing BCG vaccinations on high risk groups in 2006, resulted in a reduced number of injections during the first 2 years of life. These changes have been welcomed by parents and have helped to maintain compliance and vaccination coverage rates. The constant education of the public and of health care personnel about vaccines is, however, warranted.

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