



ELSEVIER

Available online at

ScienceDirect

www.sciencedirect.com

Elsevier Masson France

EM|consulte

www.em-consulte.com



GIENS WORKSHOPS 2018/SOCIAL PHARMACOLOGY

How to improve vaccine acceptability (evaluation, pharmacovigilance, communication, public health, mandatory vaccination, fears and beliefs)☆

Alain Dutilleul^a, Jacques Morel^b,
Clémentine Shilte^c, Odile Launay^{d,*},
the participants of Giens XXXIV Round Table “hot topic
No. 1”, Brigitte Autran^e, Jehan-Michel Béhier^f,
Thomas Borel^g, Xavier Bresse^h, Geneviève Chêneⁱ,
Soizic Courcier^j, Véronique Dufour^k,
François Faurisson^l, Arnaud Gagneur^m, Odile Gelpi^y,
Franck Géraldⁿ, Farid Kheloufi^o, Jean-Louis Koeck^p,
Véronique Lamarque-Garnier^q, Telma Lery^r,
Géraldine Ménin^s, Mathieu Molimard^t,
Annick Opinel^y, Claire Roger^j, Franck Rouby^o,
Stéphane Schuck^u, Laurent Simon^v,
Benoît Soubeyrand^w, Marie-Christine Truchet^x

^a Sanofi France, 69007 Lyon, France

^b CHU de Montpellier, 34295 Montpellier, France

^c Institut Pasteur, 75015 Paris, France

^d Inserm, CIC Cochin Pasteur, hôpital Cochin, université Paris-Descartes, 75679 Paris, France

^e COREVAC-AVIESAN, hôpital Pitié-Salpêtrière, 75013 Paris, France

^f Celgene, 92066 Paris-la-Défense, France

^g Leem, 75017 Paris, France

^h MSD vaccins, 69007 Lyon, France

ⁱ Inserm, 33076 Bordeaux, France

^j GSK, 92500 Rueil-Malmaison, France

^k PMI, ville de Paris, Infovac-France, 75116 Paris, France

DOI of original article: <https://doi.org/10.1016/j.therap.2018.11.007>.

☆ Articles, analyses and proposals from Giens workshops are those of the authors and do not prejudice the proposition of their parent organization.

* Corresponding author. CIC de vaccinologie, hôpital Cochin, bâtiment Lavoisier, 27, rue du Faubourg-Saint-Jacques, 75679 Paris cedex 1, France.

E-mail address: odile.launay@aphp.fr (O. Launay).

<https://doi.org/10.1016/j.therap.2018.12.005>

0040-5957/© 2018 Published by Elsevier Masson SAS on behalf of Société française de pharmacologie et de thérapeutique.

Please cite this article in press as: Dutilleul A, et al. How to improve vaccine acceptability (evaluation, pharmacovigilance, communication, public health, mandatory vaccination, fears and beliefs). *Thérapie* (2018), <https://doi.org/10.1016/j.therap.2018.12.005>

^l Inserm, 75013 Paris, France
^m Université de Sherbrooke, J1H5N4 Sherbrooke, Canada
ⁿ ACS-France, 06300 Nice, France
^o CHU Timone, AP-HM, 13005 Marseille, France
^p Direction centrale du service de santé des armées, 94114 Arcueil, France
^q EVAL Santé, 78290 Croissy-sur-Seine, France
^r Janssen Cilag, 92787 Issy-les-Moulineaux, France
^s Sanofi Pasteur Europe, 69007 Lyon, France
^t CHU de Bordeaux, 33076 Bordeaux, France
^u Kappa Santé, 75002 Paris, France
^v Le pharmacien de France, presse professionnelle pharmaceutique, 75009 Paris, France
^w Blossom vaccinology, 69001 Lyon, France
^x Pfizer, 75668 Paris, France
^y Institut Pasteur, 75015 Paris, France

Received 6 November 2018; accepted 19 November 2018

KEYWORDS

Vaccine;
Immunization;
Hesitancy;
Information systems;
Motivational
interviewing;
Education

Summary A flagship recommendation of the citizen's steering committee on immunization, the mandatory immunization for infants extended to 11 vaccines, introduced in January 2018, is part of a set of recommendations that must be considered as a whole, each component being indispensable to the achievement of objectives: restore confidence in vaccination and increase immunization coverage. Roundtable # 6 participants identified a decade of concrete initiatives that could address, at least in part, the committee's recommendations, including: developing information systems and data generation; simplify the vaccination journey and increase vaccination opportunities; developing training of health professionals; learning vaccines at school; using motivational interviewing in educational intervention; undertaking local initiatives; improving supply and communicate on the value of vaccines. To carry out these actions, it has been proposed that a joint ministerial task-force bringing together the different stakeholders at the national level should be set up to promote their implementation and follow-up, and at regional level, the establishment of an *Agences régionales de santé* awareness plan making vaccination a priority.

© 2018 Published by Elsevier Masson SAS on behalf of Société française de pharmacologie et de thérapeutique.

Abbreviations

ARS	French regional healthcare agency (<i>Agence régionale de santé</i>)
CPD	continuing professional development
DTP	diphtheria tetanus polio
EMMIE	motivational interview in maternity for the immunization of children (Québec)
EU-JAV	European joint actions on vaccination
HAS	French health authority (<i>Haute autorité de santé</i>)
IUFM	French university teacher training institute
MFS	medical file sharing
URPS	Regional union of healthcare professionals (<i>Union régionale des personnels de santé</i>)
VIS	vaccination information systems

Introduction

The year 2018 in France was marked by the extension of the number of mandatory vaccinations for children born after

January 1st from three to eleven. The purpose of this measure is to protect the all children's health and to combat the epidemics, which recur in France, mainly because of insufficient infant vaccination. Following recommendations made by the Steering committee of the public consultation on vaccination chaired by Professor Alain Fischer, whose report was published on November 30, 2016, the Health Minister expanded the number of mandatory vaccines by adding eight infant vaccines, (whooping cough, *Hemophilus influenzae* type b, hepatitis B, meningococcus C, pneumococcus, measles, mumps and rubella). This is in addition to the three vaccines, which had already been mandatory for many years (diphtheria, tetanus and poliomyelitis) [1,2].

The increase in the number of mandatory vaccines is only one of several recommendations made by the Committee, whose overall aim is to restore confidence in vaccines and increase vaccination coverage. In addition to increasing the mandatory nature of vaccination, five approaches were considered: a requirement for transparency; information and communication; simplification of the vaccination process; improving the training of healthcare professionals; research into public concerns. These recommendations in part reprise

Please cite this article in press as: Dutilleul A, et al. How to improve vaccine acceptability (evaluation, pharmacovigilance, communication, public health, mandatory vaccination, fears and beliefs). *Thérapie* (2018), <https://doi.org/10.1016/j.therap.2018.12.005>

those of the 2012–2017 national program of improvement in vaccination policy some of whose initiatives have already been implemented, including the launch of the French public health agency's (*Santé publique France*) information website "vaccination-info-service.fr/" and the extension of vaccination skills to additional healthcare professionals. This was first tested amongst volunteer pharmacists in the Rhône-Alpes-Auvergne region in 2017/18 and will be extended to two other regions in the 2018/19 season, then rolled out over the entire country the following year [1,2].

The round table which met on this current topic had the goal of identifying concrete measures and helping to improve vaccine acceptability in the context of the recommendations of the Steering committee of the public consultation on vaccination. Of the initiatives discussed during the workshop, this article just discusses those which seemed the most pragmatic or which serve as examples.

Proposed concrete measures aimed at improving vaccine acceptability

Develop information systems and the generation of data

Vaccination programs are complex public health interventions, which provide significant benefits to the population. They are vulnerable to fluctuations in confidence and public opinion. Recently, vaccination programs have been the subject of controversies which have hampered the adoption of certain vaccinations, such as the human papillomavirus vaccine, or lessened the acceptability of others, such as the flu vaccine. Citizen support for vaccination, including healthcare professionals, requires real time proof of vaccine efficacy and safety.

Immunization schedules are regularly reviewed and revised as a function of new vaccines becoming available, catch-up campaigns, the introduction of temporary schedules due to a change in the epidemiology of illnesses preventable by vaccines, shortages or specific vaccination campaigns. Many stakeholders participate in the implementation of vaccination programs, including general practitioners, pediatricians, infectious disease specialists, occupational health doctors, pharmacists, nurses, gynecologists and midwives, in contexts, which can be very different. The need for specialized advice on the indications and contraindications for vaccines has consequently increased.

This new complexity can furthermore be perceived as a lack of transparency in the information distributed, a suspicion which fuels discussions on the internet and social networks which are then a factor in the scrambling of the available messages, reinforcing reticence and the reluctance to vaccinate [3].

It was considered that three initiatives in the fields of information and data generation could improve the acceptability of vaccination: the implementation of an information system, the monitoring of discussions on the internet and social networks, and the development of interventional research in human and social sciences.

Table 1 Expected benefits of vaccination information systems.

Safeguarding individual vaccination histories
Consolidation of the different vaccines administered by different healthcare professionals
Determination of the vaccines which should have, or should be, done
Elimination of paper
Elimination of over- and under-vaccination
Determination of vaccination coverage rates
Notification of adverse events
Establishment of official vaccination certificates
Management of supply and forecasts of vaccine needs
Help to identify strategies
Research

Implementation of a vaccination information system

At population level, the current system allows the vaccination coverage of infants, children and adolescents to be monitored through analysis of health certificates and academic investigations. However, it lacks responsiveness to changes in vaccination schedules, suffers from a delay between vaccination and its evaluation (several years) and does not allow for a detailed geographic analysis. Furthermore, there is no existing system for the regular monitoring of vaccine coverage in adults and at-risk populations. At individual level, healthcare professionals cannot access complete vaccination histories of the persons being monitored in a digital format in order to evaluate their situation and respond to their needs as regards vaccination [2].

Vaccination information systems (VIS) are confidential, digital, population-based information systems which record the vaccination data considered to be pertinent and give access to individual information on vaccination. Their goal is to be complete, extend over the entire population of a health region and reach the various stakeholders in the region's vaccination process. The expected benefits of such systems are presented in Table 1.

They allow individuals to keep, and have access to, their complete vaccination history. They also allow authorized healthcare professionals to have access, thus allowing them to appropriately update the vaccination status (missed vaccinations or boosters). At population level, VISs furnish aggregated and consolidated data on vaccinations for the purposes of monitoring, orientation and the implementation of healthcare programs. The goal is to improve vaccination coverage and reduce the burden of illnesses which can be avoided by vaccination. Having reliable, stratified data on vaccination coverage can help to detect under-vaccinated subgroups and to precisely determine the causes of under-vaccination and therefore to adapt public healthcare initiatives. In France, VISs could be integrated into the shared medical record (SMR), the implementation of which is currently being carried out by the national French health insurance organization (*Assurance maladie*). One VIS (the electronic vaccine schedule of MesVaccins.net) has been tested by doctors of the Regional union of healthcare professionals (URPS) in the Auvergne-Rhône-Alpes region. This tool

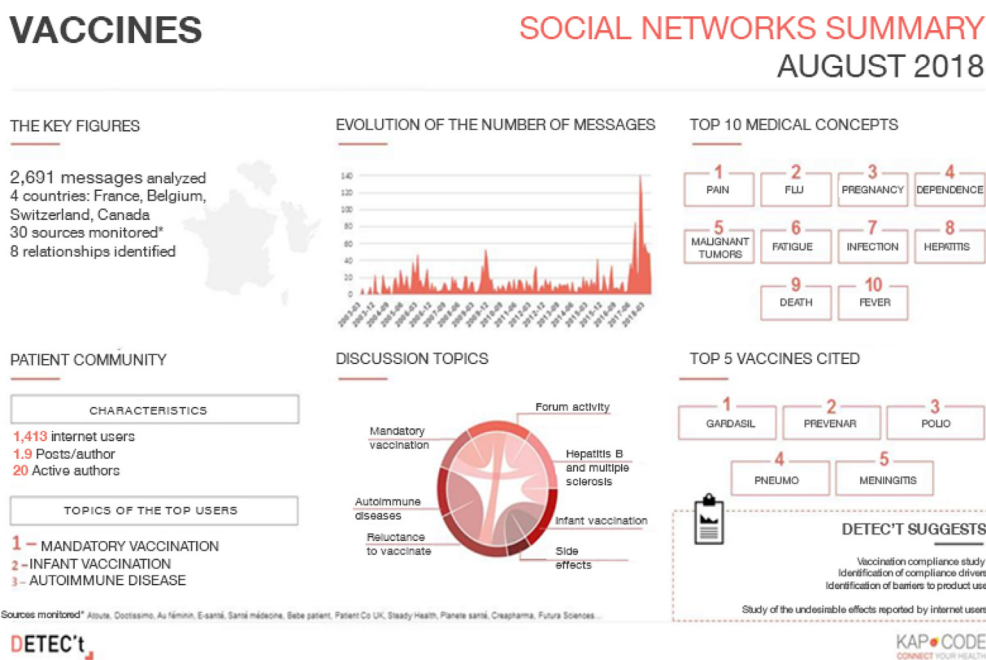


Figure 1. Example of observation and analysis of the traffic on social networks (source KAP Code). From the observation of a sample of almost 1500 internet users from 4 countries (France, Belgium, Switzerland, Canada), a cross-sectional analysis of the themes tackled on the discussion forums was performed in August 2018 using the keyword, vaccine. The tops themes dealt with were as follows: 1) Mandatory vaccination, 2) Vaccination of infants, 3) Induction of autoimmune diseases by vaccines. Courtesy Dr Stéphane Schuck, CEO KAP Code, Paris, France. <http://www.kapcode.fr>.

allows the “near-user” collection of data (including from the citizens themselves) with the aid of interfaces adapted to the context (office or mobile interfaces, integration into the management software of doctor’s surgeries or dispensaries, academic, university or occupational health services, as well as into hospital information systems).

The European Council, underlining the importance of monitoring immunity in the Union’s populations, also issued a suggested recommendation in April 2018 relating to reinforced cooperation in the fight against diseases preventable by vaccination. This envisages the possibility of implementing a European system of information sharing on vaccines with a view to formulating general guidelines for a common vaccination schedule, a European vaccination booklet, and a web portal containing updated and reliable information on the benefits and safety of vaccines [4].

In September 2018, France and 19 other countries made a commitment to European citizens’ health by creating a platform to reinforce national responses to the challenges posed by vaccinations by means of a joint initiative (European joint action on vaccination, EU-JAV) [5]. One of the mechanisms of cooperation identified is digital data sharing tools to improve the precision of the epidemiological monitoring of vaccination coverage.

Monitoring discussions on the internet and social networks

The use of social networks is increasing in several fields of medicine: monitoring epidemics, measuring the effect of healthcare policies and reactions to public health campaigns, estimating disease incidence [6], observing patient adherence to treatments, analyzing healthcare crises [7]

and evaluating the proper use of medicines [8]. Two areas of intervention seem particularly suited to responding, at least in part, to the needs identified by the public consultation in order to improve confidence in vaccination:

- a rapid reaction, founded on validated scientific arguments, to erroneous information spread by the media or the social networks;
- improvement in the detection and monitoring of vaccine tolerance.

The analysis of non-structured real-life data can be repeated over time, allowing preparation of responses to the various fears, fake news and other myths. Internet users express themselves in discussion forums, blogs, Twitter, Facebook, Instagram or even YouTube (Fig. 1). Their messages regarding medicines and diseases can nowadays be analyzed with the help of semantic analysis algorithms coming from big data and artificial intelligence. In the vaccination field, it is also possible to identify messages talking about reluctance to vaccinate, to identify their most frequent themes, and to prepare a dynamic map of the impediments to vaccination expressed by internet users.

Social networks are also used in the field of pharmacovigilance and allow detection of repeated weak signals [9,10]. The algorithms identify the names of the healthcare products and the medical concepts expressed by the patients. Undesirable effects are then detected with an algorithmic result which gives a satisfactory metrological performance [10]. Databases of undesirable effects reported on social networks have thus been constructed on which either frequentist or Bayesian methods can be used to detect signals. Implementation of the early monitoring of these signals has

Please cite this article in press as: Dutilleul A, et al. How to improve vaccine acceptability (evaluation, pharmacovigilance, communication, public health, mandatory vaccination, fears and beliefs). Therapie (2018), <https://doi.org/10.1016/j.therap.2018.12.005>

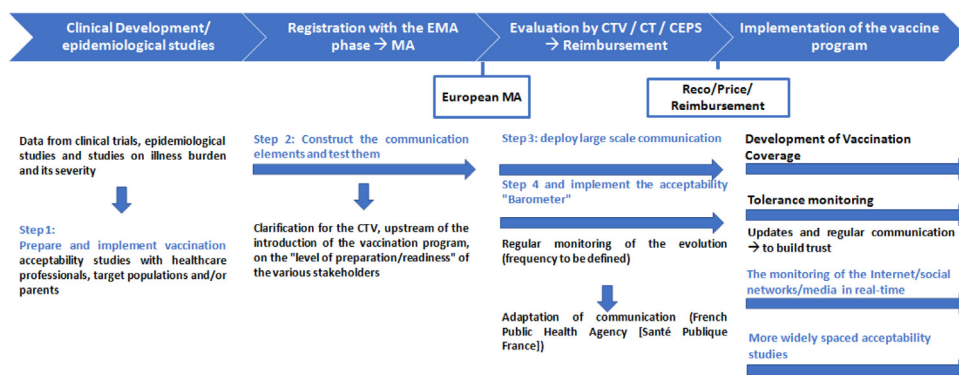


Figure 2. Place of human and social sciences research in monitoring of the life cycle of a vaccine. This strip illustrates the life cycle of a vaccine during which interventional human and social sciences research might occur. They may thus be an important factor in assisting with decisions on vaccine recommendations, supporting the establishment of programs and implementing corrective actions during monitoring. CEPS: Healthcare products financial committee (*Comité économique des produits de santé*); CTV: Technical vaccination commission (*Commission technique des vaccinations*); CT: Transparency Commission (*Commission de la transparence*); EMA: European medicine agency; HSS: human and social sciences; MA: marketing authorization.

been subjected to proof of concept testing [11] and constitutes an additional tool in the drug monitoring chain.

Finally, it appeared to be necessary to encourage pro-vaccination groups on social networks, such as "VAXXEUSES", which has a Facebook page, or the "vaccins France : informations et discussions", a discussion forum providing responses to questions on vaccination, or "DECODEURS"; the aim is to have a presence in digital space so that it is not only the anti-vaccine groups which are visible. This increased visibility should not only be based on institutional communication and the rationale behind the benefits of vaccination but should also employ individual testimonies of patients or healthcare professionals confronted with tragedies linked to non-vaccination. Young people who are used to the new communication tools and are trained in vaccination, such as medicine or pharmacy students, could be the main vectors for this communication during their healthcare work.

Developing research in interventional human and social sciences

As regards vaccination, research in human and social sciences remains essentially observational and is conducted in retrospect to understand the causes of low vaccination coverage and the reluctance to vaccinate which is often its origin [12].

However, the success of a vaccination program, and its impact in terms of public health, comes from the rapid development of vaccination coverage. This is itself conditioned by good vaccine acceptance by the main parties involved (healthcare professionals, the general public and, in particular, the target population, or the parents in the case of a pediatric vaccination). The workshop members suggested that early human and social science research should be undertaken and integrated into the clinical development program from the initial phases for all new vaccines, in order to evaluate the level of demand or acceptability. This interventional research would continue throughout the vaccine's life cycle (Fig. 2).

The benefit of having psychosocial data of the type anticipated is two-fold:

- allowing, through integration into the global analytical context, a systematic analysis of the evaluation of all the factors to be considered before making decisions about the pertinence of new vaccination programs [13,14];
- allowing communications to be drawn up depending on the target public, to test and adapt them for the program's launch, a critical period for its success, and then to serve as references for evaluating changes in the perception of the program and its determinants [15].

This human and social sciences research on the level of demand or acceptability of the vaccination program by the different stakeholders (general population or target populations, healthcare professionals, public health employees) according to the perception of the risk of the disease and the anticipated cost-benefit balance of the vaccine examined, is equally of interest to both industry and the public authorities. This common interest could justify its being funded through a public-private partnership.

Simplify the vaccination process and increase the opportunities for vaccination

Whilst the vaccination coverage of infants is very satisfactory, it is clearly insufficient as regards the second dose against measles, mumps and rubella, the vaccination of children against meningococcus C, diphtheria-tetanus-polio (DTP) boosters in adolescents and adults, the hepatitis B vaccine in adolescents and at-risk adults, or vaccination against pneumococcus or flu in vulnerable populations (the immunosuppressed or those suffering from chronic conditions, pregnant women for flu). Some are even tending to decrease, such as the vaccination of young girls against the human papillomavirus or the target population for flu vaccination (especially, people over 65 years of age and healthcare professionals) [1].

This difference in vaccination coverage by age simply reflects the distrust as regards vaccination; it is also the result of the opportunistic organization of vaccination in France which is mainly provided by private medicine. In

fact, the frequent, mandatory consultations for infants are an opportunity for vaccination as is evidenced by their high vaccination coverage. In contrast, vaccination opportunities are rare for older children, adolescents and adults because consultations, except for requests for certificates for sporting activities, are motivated by a request for care which is not conducive to vaccination.

Although it is tending to become simpler with the extension of flu vaccination to non-physician healthcare professionals (nurses, midwives and pharmacists), the vaccination process remains complicated in France. It requires an initial consultation with a doctor for a prescription followed by a visit to the pharmacy to purchase the vaccine and then, finally, a return to their doctor or going to a nurse for administration. To simplify access to vaccination and increase the opportunities for vaccination, the following possibilities were discussed:

A stock of vaccines available at the doctor's

By having a rolling stock of a few vaccines in their surgery's fridge, doctors could vaccinate as soon as the need arises, without the administration being deferred. The stock could easily be replaced by the actual person vaccinated who would return with the vaccine after having visited the closest pharmacy with a prescription to purchase it or, as is done in other European countries such as Belgium, doctors who wished could be supplied with the vaccines.

Availability of vaccines in hospital pharmacies

Similarly, having a stock of vaccines in hospital pharmacies, which could be dispensed to outpatients would allow vaccination of at-risk patients as the need arose in the department or in a consultation. There would be no need to give a prescription on discharge from hospital or during a consultation, a prescription which, it is known, is unlikely to be used. In this context, several studies have shown the efficacy of providing vaccines in care locations in significantly increasing the acceptability and coverage of vaccination (flu vaccination in hospital, anonymous and free hepatitis B vaccination in screening centers).

The integrated management of vaccine purchase by mandatory health insurance schemes would be an important factor in the administrative simplification of dispensing by community doctors and hospital pharmacies.

Home visits in the postpartum period

Home visits by midwives who already have vaccination skills in the postpartum period could be an opportunity for an overall assessment of the family's vaccination status and the updating of vaccinations, from the perspective of both individual and collective protection or "cocooning" (pertussis, flu).

Vaccination at school

The state organization of vaccination in schools, carried out in Northern European countries and the United-Kingdom, obtains remarkable results. In France, initiating a vaccination such as that of vaccination against human papillomavirus concomitantly with the diphtheria-tetanus-whooping cough-polio booster in schools is an ambitious project and, to judge by the experience of the hepatitis B vaccination, a risky one [16,17]. It will require rigorous preparation and the collaboration and support of many stakeholders. As part of a more global school project,

including a prevention consultation and vaccination training initiatives, vaccination could be an excellent opportunity to raise future adults' awareness of vaccination. It was suggested that a vaccination day might be organized in schools every year during the European vaccination week.

Develop training and education in vaccinology

The training of healthcare professionals

Healthcare professionals play a key role in maintaining public confidence in vaccination, including meeting parents' concerns. They are the cornerstone of the acceptance of vaccination by the public and their recommendations are routinely cited as the main reason for vaccination [18].

Insufficient training is an important factor in the reluctance to vaccinate. In France this constitutes an impediment to vaccination and compromises certain prevention policies such as those of measles, hepatitis B, flu, meningococcal infections and human papillomavirus infections.

In its recommendations, the public consultation steering committee on vaccination underlined that it was essential to reinforce the teaching of vaccinology, especially to healthcare professionals. The new French vaccination policy, with its extension of mandatory vaccination in infants, requires the support of healthcare professionals. It warrants the reinforcement of this training as early as possible in the medical studies curriculum in general and, in particular, for junior doctors and other specialties specifically affected by the teaching of vaccinology.

To do this, it is necessary to specify the goals, and the number of teaching hours required to allow sufficient training, in teaching programs. Similarly, the provision of training tools is essential. The ongoing reform of the healthcare professions is an opportunity not to be missed.

Initial training

For medical students

Two courses should be developed as a priority for medicine students of the "3rd cycle" in France:

- a universal interdisciplinary course (ETU) dealing with the essential prerequisites and particularly the importance of vaccinating caregivers; all French doctors, whatever their specialty, should be made aware of vaccination and know the basic principles in order to respond to the general public's questions;
- shared interdisciplinary expertise (CTP) for post-graduate specialization courses (DES) more directly involved with vaccination and the prescribing of vaccines (some medical DES and that of public health).

If it is important to deal with the pathophysiological and epidemiological aspects of vaccination and the rationale of the vaccination schedule. Human and social sciences aspects should also be an important part of this teaching and should involve the necessary elements to help practitioners convince the population of the benefit of vaccination. Secondly, when the "1st and 2nd cycles" of medical studies in France are reformed, teaching materials for students in the "1st and 2nd cycle" should be produced and widely distributed.

For other healthcare students

Additional training materials for other healthcare students (nurses, students in midwifery, pharmacists, physiotherapists) whose role in implementing vaccination will increase in future years, should also be rapidly developed. The ongoing change to university training of the paramedical professions represents an opportunity to standardize the training of all healthcare professionals.

Continuing education

Available studies in the literature show that healthcare professionals are more likely to prescribe and recommend a vaccine than to explain its potential risks and benefits to the patient [19]. In addition to the internet site vaccination-info-service of *Santé publique France*, it seems essential to promote the continuing education of healthcare professionals involved in vaccination, not just of general practitioners but also of specialists, midwives, nurses and pharmacists. To do this, easily accessible training tools produced independently of the pharmaceuticals industry need to be developed. One such initiative is proposed by the Bordeaux university hospital, "FORMeDOC". This online course is geared primarily towards general practitioners, specialists, pharmacists and nursing staff but is also for school doctors, occupational health doctors and more broadly all healthcare professionals involved in vaccines and vaccination. This online course is based on the latest recommendations of the French national authority for health (*Haute autorité de santé* [HAS]). This training qualifies as continuing professional development (CPD) and follows the formal recommendations: prior analysis of practices or knowledge before access to training and then analysis and summary of its outcome [20].

Education: learn about vaccines at school

Vaccination is currently only taught in the 3rd year in the French school system and in "Terminal S" (the last year of the 'scientific' high school) in the context of health education. Being at the crossroads of multiple disciplines (biology, epidemiology, mathematics, history, civic instruction etc.), it lends itself remarkably well to interdisciplinary teaching and merits extension to other classes under this heading. Several initiatives have been discussed: suggesting initial and ongoing training to teachers by university teacher training institutes (*Instituts universitaires de formation des maîtres* [IUFM]); the raising of awareness and an explanation of vaccination to pupils during a dedicated day in the annual animated vaccination week by health service, PhD or master degree students working on vaccination in research institutes such as the Pasteur Institute, in collaboration with the teachers. Finally, it has been suggested that educational tools could be developed, for both teachers and pupils, from a collaboration between vaccinology experts and teachers, as this could be carried out by the Association of biology and geology professors [*Association des professeurs de biologie et géologie*] [21].

The members of the round table considered that reinforcing the understanding of vaccination in schools was an essential prerequisite for implementing school vaccination of the human papillomavirus vaccine.

Specific initiatives to encourage vaccination

Use of motivational interviews in educational intervention

Mandatory vaccination does not provide the best possible information about vaccines and vaccination, perhaps even the opposite, to ensure that populations have an informed choice. This is due to the bias of the publications, internet sites or information sheets provided during vaccination appointments.

In fact, analysis of the literature on the educational strategies of vaccination promotion usually demonstrates their ineffectiveness in changing beliefs and behaviors. Yet a recent meta-analysis on what communication parents want concludes that they would like more information about vaccination! However, parents want clear, simple, balanced information about the risks and benefits, adapted to their needs and provided in a timely manner [22]. Finally, confidence in the healthcare professional who delivers this information is the dominant factor.

Motivational interviews have a collaborative conversation style allowing reinforcement of a person's own motivation and their commitment to the change [23]. They have been successfully tested in many areas of prevention (alcohol, nutrition, exercise, smoking, etc.) [24]. More recently, motivational interviews were tested for the promotion of vaccination in Quebec. PromoVac is based on an educational intervention with parents during maternity using the techniques of motivational interviewing to provide suitable information to guide them in the choice of vaccination for their child. The use of motivational interview techniques allows educational interventions to be targeted to the needs and prior understanding of each parent in a non-judgmental atmosphere [25]. In Quebec, the feasibility and efficacy of this strategy was demonstrated in a regional cohort study. Its applicability and efficacy in various socio-cultural and regional areas was then validated in a provincial multicenter randomized trial. The use of this strategy allows a 12 to 15% increase in the intent to vaccinate the child and a decrease in the reluctance to vaccinate score of 40% [26–28]. As regards vaccination coverage, children whose parents received the educational intervention during maternity were 9% more likely to have full vaccination, with no delay in the 0 to 2-year period [29].

In collaboration with the Canadian public health agency [*Agence canadienne de santé publique*], the Quebec ministry of health [*ministère de la Santé du Québec*] has now rolled out this strategy to all maternities in Quebec (motivational interview in maternity for the immunization of children program [EMMIE], ongoing) [30]. It should be noted that this is both a short-term and a long-term strategy as it not only aims to obtain a rapid increase in coverage but also, and perhaps especially, progressive education of the entire Quebec population about vaccination, through involving adults in an of informed decision to vaccinate.

On this template, the round table proposed to use motivational interviewing to improve acceptance and vaccination coverage against human papillomavirus. Motivational interviews could take place during the adolescent's prevention/vaccination consultation. It could be part, initially in the form of pilot initiatives, of theoretical training and of

the performance of concrete prevention initiatives by students wanting to work in the health service who need to undertake a formal project involving a prevention initiative carried out for a target audience. These pilot initiatives, aimed at testing new healthcare organizations to help to improve the process of accessing vaccines, could be funded under Article 51 of the 2018 social security funding law.

The trial on this vaccine could then be expanded to other vaccines during maternity by training healthcare professionals, especially nurses and midwives, in this initiative so that, in the end, the French population will be part of an informed consent approach to vaccination, ensuring a permanent level of coverage and thus driving mandatory vaccination.

Undertaking local initiatives, the example of "Immunize Lyon" [Immuniser Lyon]

There is room for local initiatives in the regions alongside the national awareness and vaccination promotion campaigns and individual motivational interviews. "Immuniser Lyon" is an example of such an initiative undertaken locally which other cities such as Nice or Bordeaux have drawn inspiration from.

"Immuniser Lyon", launched during the 2015 European vaccination week, is an initiative pioneered in France and Europe in the field of public health and prevention. It brings together a group of stakeholders (City of Lyon [*Ville de Lyon*], the Regional healthcare agency [*Agence régionale de santé*], the Metropolis, Lyon public hospitals [*hospices civils de Lyon*], representatives, pharmacists, nurses, midwives, insurers, web platform patients, Sanofi Pasteur MSD etc.) to raise everyone's awareness about the prevention of infectious diseases by inviting the public and healthcare professionals to check their vaccinations, and by facilitating access to information and vaccination in Lyon.

The campaign posters, brochures and messages are distributed by healthcare professionals from private medicine (doctors, pharmacists, midwives, nurses etc.), several hospitals (Lyon public hospitals [*hospices civils de Lyon-HCL*]), health centers and networks (mother and baby care [*protection maternelle infantile*], the Regional social hygiene committee [*Comité départemental d'hygiène sociale*], Sévigné Center [*Centre Sévigné*], international vaccination centers, etc.), participants from institutions (City of Lyon [*Ville de Lyon*], the Regional healthcare agency [*Agence régionale de santé-ARS*], the Metropolis, the Family allocations fund [*Caisse des allocations familiales*]), and from education (National education [*Éducation nationale*], the Carrel Institute [*Institut Carrel*]) as well as two insurance agencies (Apicil, Klesia) and participants from civil society (students, Patients world, patient associations).

The group also proposes promoting local initiatives on vaccination identical to the "Immuniser Lyon" event. This type of event has the advantage of uniting public and private stakeholders and communities around a vaccination project which cannot but help to promote vaccination by focusing the attention of the media and the population on this subject [31].

Improving the supply and communicating the value of vaccines

The Steering committee underlines that breaks in the supply of vaccines contribute to challenging the population's confidence as regards the state, pharmaceutical companies and more generally as regards vaccination.

Perfect, perennial harmony between vaccination demand and supply "at any time and in any place" is in fact a challenge, for reasons inherent to biological production, just-in-time, structurally delicate (management of biological hazards) and poorly responsive production, which explains the recurring breaks in supply [32].

The workshop emphasized the importance of communication to the public which was both simple, through the use of suitable educational materials, and clear about the specificity of vaccine production and its economic aspects [33]. However, attention was also been drawn to the difficulty, linked to the regulations, of industry communicating directly with the public on these matters. An additional difficulty is the real complexity of vaccine production; yet, presenting something which is complicated in a simple way may be perceived as a deliberate lack of willingness to be transparent.

Concrete measures to improve the smooth flow of supply processes were discussed, including, a simplification of the batch release process, the implementation of a system facilitating the transfer of vaccine doses between countries, and a single package leaflet available on the Internet in all European languages.

Over the long term, the harmonization of schedules within the European Union should allow optimization of predictions of need and the rationalization of production, including pharmaceutical (presentation, package leaflets, packaging) which would further help the transfer of doses between countries.

Finally, from the perspective of resources, vaccination currently represents a small fraction of the Union member states' prevention budgets (up to 0.5% of healthcare budgets) and it has been shown that these costs are continuing to decrease. Vaccination costs should be considered as an essential and judicious investment in health given their societal value and their broader economic impact [4].

Conclusion

The impetus given by mandatory vaccination appears to have rapidly given positive results with increased vaccination coverage observable since May 2018 for several of the vaccines in the vaccination schedule, including in the age groups which are not targeted by the requirement [34]. Mandatory vaccination, the leading recommendation of the public steering committee on vaccination, is part of a set of recommendations which should be considered as a whole, each component of which is essential for the goals to be achieved: restoring confidence and increasing vaccination coverage. Participants in round table No. 6, steered to think about ways to improve vaccine acceptability, identified around ten

concrete initiatives which might respond, at least in part, to the Committee's recommendations, including; developing information systems and generating data; simplifying the vaccination process and increasing the opportunities for vaccination; developing training for healthcare professionals; learning in schools; using motivational interviews in educational interventions; undertaking local initiatives; improving supply and communicating the value of vaccines.

The Committee hopes for a strong, resolute commitment from the health authorities. In this perspective, participants in the round table suggest the creation of a national, interministerial committee of all the various stakeholders to encourage the implementation and monitoring of initiatives meeting the recommendations and, at regional level, the raising of the awareness of the Regional healthcare agencies (ARS) making vaccine prevention a priority in Regional healthcare plans.

Disclosure of interest

Odile Launay declares being the principal investigator for industry-sponsored clinical trials (Sanofi Pasteur, GSK, MSD, Pfizer, Sanofi Pasteur-MSD, Janssen) and participating as a consultant in expert panels in the field of vaccines (Sanofi Pasteur, Pfizer, Janssen).

Jacques Morel declares having received a research grant from BMS and Pfizer for clinical trials on vaccines sponsored by the Montpellier University Hospital [CHU and University of Montpellier].

Alain Dutilleul declares being employed by Sanofi Aventis France.

The author Clémentine Shilte has not supplied his declaration of competing interest.

References

- [1] Concertation citoyenne sur la vaccination. Rapport du Comité d'orientation; 2016 [Accessed 19 november 2018 (49 pp.)] <http://concertation-vaccination.fr/wp-content/uploads/2016/11/Rapport-de-la-concertation-citoyenne-sur-la-vaccination.pdf>.
- [2] Vaccination info service. Suivi et évaluation des programmes de vaccination [cited 18 oct 2018]; 2018 [Accessed 19 november 2018] <http://professionnels.vaccination-info-service.fr/Aspects-scientifiques/Epidemiologie/Suivi-et-evaluation-des-programmes-de-vaccination>.
- [3] Kata A. A postmodern Pandora's box : anti-vaccination misinformation on the Internet. *Vaccine* 2010;28(7):1709–16 [Accessed 19 november 2018] <http://linkinghub.elsevier.com/retrieve/pii/S0264410X09019264>.
- [4] Eur-Lex Europa. Communication de la Commission au Parlement européen, au Conseil, au Comité économique et social européen et au Comité des régions. Coopération renforcée contre les maladies à prévention vaccinale; 2018 [Accessed 19 november 2018] <https://eur-lex.europa.eu/legal-content/FR/ALL/?uri=CELEX%3A52018DC0245>.
- [5] Inserm. Vacciner, c'est protéger. In: Communiqué; 2018 [Accessed 19 november 2018] <https://presse.inserm.fr/vacciner-cest-protoger/32352/>.
- [6] Fung IC-H, Tse ZTH, Fu K-W. The use of social media in public health surveillance. *Western Pac Surveill Response J* 2015;6(2):3–6 [Accessed 19 november 2018] <http://ojs.wpro.who.int/ojs/index.php/wpsar/article/view/319/500>.
- [7] Schück S, Voillot P, Foulquié P, Faviez C, Mebarki A, Texier N, et al. Que nous apportent les réseaux sociaux quant à la crise sanitaire du Levothyrox® d'août 2017 ? *Rev Epidemiol Sante Publique* 2018;66(S4):S225, <http://dx.doi.org/10.1016/j.respe.2018.04.029> [Accessed 19 november 2018] <http://www.em-consulte.com/article/1215559/que-nous-apportent-les-reseaux-sociaux-quant-a-la->.
- [8] Foulquié P, Voillot P, Faviez C, Mebarki A, Chen X, Texier N, et al. Étude de l'usage du méthylphénidate sur les réseaux sociaux. *Rev Epidemiol Sante Publique* 2018;66(S4):S225, <http://dx.doi.org/10.1016/j.respe.2018.04.030>. <http://www.em-consulte.com/article/1215560/etude-de-l-usage-du-methylphenidate-sur-les-reseau> [Accessed 19 november 2018].
- [9] Yang M, Kiang M, Shang W. Filtering big data from social media—Building an early warning system for adverse drug reactions. *J Biomed Inform* 2015;54:230–40 [Accessed 19 november 2018] <https://www.sciencedirect.com/science/article/S1532046415000131?via%3Dihub>.
- [10] Chen X, Faviez C, Schuck S, Lillo-Le-Louët A, Texier N, Dahamna B, et al. Mining patients' narratives in social media for pharmacovigilance: adverse effects and misuse of methylphenidate. *Front Pharmacol* 2018;9:541, <http://dx.doi.org/10.3389/fphar.2018.00541>. <https://www.frontiersin.org/article/10.3389/fphar.2018.00541/full> [Accessed 19 november 2018].
- [11] Kürzinger ML, Schück S, Texier N, Abdellaoui R, Faviez C, Pouget J, et al. Web-based signal detection using medical forums data in France: comparative analysis; 2018, <http://dx.doi.org/10.2196/10466> [Accessed 19 novembre] <https://preprints.jmir.org/preprint/10466/accepted143007>.
- [12] Raude J. Vaccine hesitancy: some insights from social and psychological sciences. *Bull Acad Natl Med* 2016;200(2):199–209.
- [13] Erickson LJ, De Wals P, Farand L. An analytical framework for immunization programs in Canada. *Vaccine* 2005;23(19):2470–6 [Accessed 19 november 2018] <https://www.sciencedirect.com/science/article/pii/S0264410X04008527?via%3Dihub>.
- [14] EUnetHTA. EUnetHTA JA2 WP8 deliverable HTA core model version 3.0; 2016 [Accessed 19 november 2018 (410 pp.)] <https://www.eunetha.eu/wp-content/uploads/2018/03/HTACoreModel3.0-1.pdf>.
- [15] Chen RT, Orenstein WA. Epidemiologic methods in immunization programs. *Epidemiol Rev* 1996;18(2):99–117 [Accessed 19 november 2018] <https://academic.oup.com/epirev/article-lookup/doi/10.1093/oxfordjournals.epirev.a017931>.
- [16] Birebent J, Dupouy J, Roussel C, Bourrel R, Bismuth M, Oustric S. Impact de l'avis du Haut conseil à la santé publique du 28 septembre 2012 à propos de la vaccination antipapillomavirus : une étude de l'évolution de la co-délivrance des vaccins antipapillomavirus et vaccin tri ou tétravalent DTP ou DTCP en Midi-Pyrénées. *Therapie* 2016;71(5):501–6, <http://dx.doi.org/10.1016/j.therap.2016.03.003>.
- [17] Ramière C, Roche L, Scholtès C, Iwaz J, Saison J, Ecochard R, et al. Evolution of the incidence of hepatitis B virus infection and immunization rates in a large French cohort born between 1960 and 1994. *Clin Microbiol Infect* 2016;22(10):889, e1–889.e7. [Accessed 19 november 2018] [https://www.clinicalmicrobiologyandinfection.com/article/S1198-743X\(16\)30238-5/fulltext](https://www.clinicalmicrobiologyandinfection.com/article/S1198-743X(16)30238-5/fulltext).
- [18] Leask J, Kinnersley P, Jackson C, Cheater F, Bedford H, Rowles G. Communicating with parents about vaccination: a framework for health professionals. *BMC Pediatr* 2012;12:154 [Accessed 19 november 2018]

Please cite this article in press as: Dutilleul A, et al. How to improve vaccine acceptability (evaluation, pharmacovigilance, communication, public health, mandatory vaccination, fears and beliefs). *Therapie* (2018), <https://doi.org/10.1016/j.therap.2018.12.005>

- 2018] <https://bmcpediatr.biomedcentral.com/articles/10.1186/1471-2431-12-154>.
- [19] Verger P, Fressard L, Collange F, Gautier A, Jestin C, Launay O, et al. Vaccine hesitancy among general practitioners and its determinants during controversies: a national cross-sectional survey in France. *EBioMedicine* 2015;2(8):891–7 [Accessed 19 november 2018] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4563133/>.
- [20] Université de Bordeaux. FORMeDOC. Formation au bon usage du médicament. Médicaments des maladies obstructives des voies respiratoires; 2018 [Accessed 19 november 2018] <http://www.formedoc.org/catalogue/R03.php>.
- [21] APBA. Vacciner, c'est protéger, vacciner c'est sauver. In: APBG Nationale; 2014 [Accessed 19 november 2018] <http://www.apbg.org/ressources/ressources-pedagogiques/vacciner-cest-protoger-vacciner-cest-sauver/>.
- [22] Ames HM, Glenton C, Lewin S. Parents' and informal caregivers' views and experiences of communication about routine childhood vaccination: a synthesis of qualitative evidence. *Cochrane Database Syst Rev* 2017;2:CD011787 [Accessed 19 november 2018] <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD011787.pub2/full>.
- [23] Miller WR, Rollnick S. *Motivational interviewing: helping people change*. United States: Guilford Press New York; 2012 [ISBN: 9781609182274].
- [24] VanBuskirk KA, Wetherell JL. Motivational interviewing with primary care populations: a systematic review and meta-analysis. *J Behav Med* 2014;37(4):768–80 [Accessed 19 november 2018] <https://link.springer.com/article/10.1007%2Fs10865-013-9527-4>.
- [25] Gagneur A, Lemaître T, Gosselin V, Farrands A, Carrier N, Petit G, et al. A postpartum vaccination promotion intervention using motivational interviewing techniques improves short-term vaccine coverage: PromoVac study. *BMC Public Health* 2018;18(1):811 [Accessed 19 november 2018] <https://bmcpubhealth.biomedcentral.com/articles/10.1186/s12889-018-5724-y>.
- [26] Gagneur A, Lemaître A, Gosselin V, Farrands A, Carrier N, Petit G, et al. Promoting vaccination at birth using motivational interviewing techniques improves vaccine intention. *J Infect Dis Ther* 2018;6:5, <http://dx.doi.org/10.4172/2332-0877.1000379>. <https://www.omicsonline.org/open-access/promoting-vaccination-at-birth-using-motivational-interviewing-techniques-improves-vaccine-intention-the-promovac-strategy-104659.html> [Accessed 19 november 2018].
- [27] Gagneur A, Gosselin V, Dubé È. Motivational interviewing: a promising tool to address vaccine hesitancy. *Vaccine* 2018;36(44):6553–5 [Accessed 19 november 2018] <https://www.sciencedirect.com/science/article/pii/S0264410X17314573?via%3Dihub>.
- [28] Gagneur A, Petit G, Valiquette L, de Wals P. Une promotion novatrice de la vaccination en maternité peut-elle améliorer les couvertures vaccinales des nourrissons. In: Résultats de l'étude PROMOVAC en Estrie. Bibliothèque et archives nationales du Québec; 2013. p. 112. <http://www.santecom.qc.ca/Bibliothequevirtuelle/Estrie/9782981383013.pdf>. [Accessed 19 november 2018 (138 pp.) ISBN: 978-2-9813830-1-3 (version PDF)].
- [29] Lemaître T, Carrier N, Farrands A, Gosselin V, Petit G, Gagneur A. Impact of a vaccination promotion intervention using motivational interview techniques to improve vaccination during infancy: The PromoVac Strategy. *Hum Vaccin Immunother* 2018, <http://dx.doi.org/10.1080/21645515.2018.1549451>. <https://www.tandfonline.com/doi/full/10.1080/21645515.2018.1549451> [Accessed 19 november 2018].
- [30] Ministère de la santé du Québec. EMMIE. Programme entretien motivationnel en maternité pour l'immunisation des enfants; 2018 [Accessed 19 november 2018] <http://www.msss.gouv.qc.ca/professionnels/vaccination/programme-d-entretien-motivationnel-en-maternite-pour-l-immunisation-des-enfants-emmie/a-propos/>.
- [31] Immuniser « Lyon ». Le concept; 2018 [Accessed 19 novembre] <http://www.immuniser-lyon.org/operation/concept>.
- [32] Soubeyrand B. De la fabrication d'un vaccin à sa mise à disposition en pharmacie. *Rev Mal Respir* 2018 [Accessed 19 november 2018]; 50761-8425(18)30238-9 <https://linkinghub.elsevier.com/retrieve/pii/S0761842518302389>.
- [33] Tournay V, Pariente A. Comprendre la défiance à l'égard de l'évaluation des risques médicamenteux. Au-delà des conflits d'intérêts. *Thérapie* 2018;73(4):341–8.
- [34] Ministère des solidarités et de la santé communiqué de presse [Accessed 19 november 2018 (1 pp.)] https://solidarites-sante.gouv.fr/IMG/pdf/180927_-_cp_-_couverture_vaccinale_2018-2.pdf.

Please cite this article in press as: Dutilleul A, et al. How to improve vaccine acceptability (evaluation, pharmacovigilance, communication, public health, mandatory vaccination, fears and beliefs). *Thérapie* (2018), <https://doi.org/10.1016/j.therap.2018.12.005>