



Vaccine hesitancy

Deconstructing the challenge and finding solutions

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1. Vaccine Hesitancy Today

Vaccination hesitancy is the delay in or refusal of vaccination when offered.¹

Vaccine hesitancy exists across the globe and is seen not just in the public sphere, but also among health care professionals^{11 1 8}- reducing uptake and ultimately costing lives. Vaccine hesitancy is driven by several factors: poor confidence in vaccines, experts, health authorities and industry; inconvenience of vaccination services and difficulties of access; and lack of knowledge or even complacency around infectious diseases.^{2 7}

Globally, vaccination is a well-accepted social norm with a strong evidence-base,³ however many individuals of all ages still do not receive their routine vaccinations. Vaccination requires not just a sound evidence-base, but also a high degree of confidence and trust in the system that delivers it – from research and development to delivery and monitoring.³ In many countries vaccinations and health care improvements have been successful in lowering the risk of vaccine preventable infectious diseases, so that many have never heard of, or have forgotten, the devastation they may bring.^{3 3}

Overall, confidence in vaccinations has increased in many European countries since 2015, but it has declined in others, for example Poland.^{11 5} Large variations in perceptions of vaccination value are also apparent between countries: the value of vaccines is recognized by 85% of people interviewed in the UK and 80% in Spain, compared to just 40% in Austria and 42% in Denmark.¹¹

‘Nowadays, fake news spreading on social media, is a main factor influencing vaccine hesitancy. We should research the causes that influence sentiments towards immunisation in order to establish strategies to improve public information on these platforms’

Francisco Gimenez-Sanchez, Specialist Pediatrician,
Hispalense Institute of Pediatrics. President of Balmis Institute of Vaccines, Spain.

Allegations of adverse events and misinformation, amplified through social media algorithms, have driven mistrust and increased vaccine hesitancy.⁴ Vaccine-hesitant parents are often more active in looking for online information than vaccine-compliant parents, and are vulnerable to reading these claims.⁴ Insufficient action from health administrations and governments on vaccination has compounded the problem and ‘fake news’ has continued to grow.⁶ Globally, ‘bad news’ has more impact than ‘good news’!

‘It is vital that we address complacency about diseases rarely seen thanks to vaccination, and that there are no practical or economic barriers to accessing vaccination. In terms of public sentiment, online communication is one of several components shaping opinion and behaviour. We should ensure that when people with questions search for information online, they can easily find clear answers from reputable sources. All stakeholders have a role in ensuring that the quiet majority is heard on social media networks.’

Gary Finnegan, Editor of Vaccines Today

Impact of COVID-19 on vaccination and attitudes

The COVID-19 pandemic has shown the threat and devastation infectious diseases can cause.

This has turned the global spotlight onto rapid and urgent vaccines' research and development. Yet even in the wake of this crisis, distrust in 'the system' prevails among parts of the population to the point that some would refuse a vaccine before it even exists. For Example a survey in Poland, found that 12% of respondents would not take a COVID-19 vaccine if available, 23% were unsure and 66% would agree to receive the vaccine.⁵

Ironically, the COVID-19 pandemic has reduced vaccination uptake for two main reasons: during the periods of confinement introduced by many countries in Europe, national healthcare services either suspended or slowed down vaccinations and screening campaigns during the containment period, along with any non-urgent care. Out of fear of contracting COVID-19, people were reluctant to attend outpatient clinics and other health services. Early indications suggest that routine vaccination coverage has strongly decreased, putting some countries at risk of outbreaks of vaccine-preventable infectious diseases like measles.^{6 7}

'Initial estimates for Italy indicate a fall in vaccination coverage, particularly in adolescents and older adults, to 2014 values - the year with the highest level of hesitancy. The next months must therefore be characterized by a recovery of vaccinations not performed in the early months of 2020, pending important campaigns in the 2020 winter season.'

Professor Carlo Signorelli, Hygiene & Public Health, University of Parma, Italy

Individuals most at risk of COVID-19-related disease are also those whom vaccination programmes still don't reach with any consistency – those with pre-existing conditions, and aging adults. The SARS-Cov2 pandemic has rendered obvious **the usefulness of a life-course approach to vaccination - where multi-generational groups protect themselves and each other.** Community-wide prevention like this helps build and sustain resilience to vaccine-preventable diseases and their long-term effects.

Capitalising on preventative medicine for health threats we are aware of can improve our response to emerging health threats. For example, COVID-19 may present similarly to influenza or pneumococcal pneumonia which can lead to misdiagnosis and treatment delays.⁸ Increasing uptake of recommended vaccinations, such as pneumococcal pneumonia and influenza, can help reduce common viral symptoms such as high temperature in the population – allowing those displaying symptoms of a new virus to be flagged and treated quicker.

Any disease prevented through vaccination may help to free up resources for the fight against COVID-19.

'It is very important to stress the COVID-19 situation and the importance of further strengthening life-course immunisation promotion, and in particular immunisation of the 65+ age group. The influenza vaccine is recommended in many EU countries, however the pneumococcal conjugate vaccine (PCV) in this age group is not widespread. We do not know yet about the burden of influenza and pneumococcal superinfection with SARS-Co2, however pneumococcal superinfection with influenza strongly indicates the need for PCV in 65+ age group.'

Professor Vytautas Usonis, Clinic of Children Diseases,
Institute of Clinical Medicine, Faculty of Medicine, Vilnius University, Lithuania

2. CLCI perspectives and methods of action

‘COVID-19 has brought Europe and the world to a new place in the dialogue around vaccines. It is now imperative that CLCI and all vaccine advocates redouble their efforts to bring positive vaccine messages to the public, healthcare professionals and policy makers alike, using all proven methods.’

Daphne Holt, Chair of the CLCI

The members of CLCI believe in the power of partnership. The CLCI is built on collaboration and knowledge-sharing, we represent a network of experts and practitioners working together closely to identify emerging trends in public and expert opinion. We continue to expand our partner network to inform our work.

We believe in community-level research and analysis to define barriers and drivers in the public, with a special focus on hesitant populations. Ultimately, leading to effective communication and engagement interventions which resonate with the target populations and increase vaccination coverage.

‘Communication and engagement campaigns should be tailored to people in each life stage - whether they are teens, parents, pregnant women, older people or other groups with distinct needs or questions. After the easing of ‘lockdown’ due to the COVID-19 situation in Spain, the Ministry of Health and many regional governments launched campaigns to restore vaccine uptake.’

Francisco Gimenez-Sanchez, Specialist Pediatrician,
Hispalense Institute of Pediatrics, President of Balmis Institute of Vaccines, Spain

We believe in the power of positive messages delivered through accessible, reliable and engaging information which we release with partners. Based on the queries and perceptions of the public, in a bottom-up approach, we intend to create a reliable public bank of best practice examples and vaccination information, which we will share proactively with relevant stakeholders.

‘CLCI are committed to supporting activities that promote the spread of understanding and knowledge of vaccinations and their vital impact on public health.’

Gary Finnegan, Editor of Vaccines Today

3. Promising ways forward

Adapting the reward system of gaming to raise awareness

A Finnish start-up company Psyon Games has developed, and is now piloting, **Antidote** - a defensive strategy game where the player must defend a stem cell from infectious diseases using vaccines.⁹ Following user feedback demonstrating improvements in attitude and understanding of vaccinations, Finland's National Institute for Health and Welfare is interested in testing the game in schools to improve HPV vaccination uptake.¹⁰

Vaccination mandates and communication strategies

France had the lowest confidence in the safety of vaccines in 2016. Following recurring measles outbreaks France implemented a comprehensive communication strategy, including public

consultations, to improve confidence.¹¹ A mandate for 11 vaccinations (already recommended) for under-2s followed on 4 December 2017, which allows schools and nurseries to restrict access to unvaccinated children.¹² Although France continues to see low vaccine confidence in some population groups, assertive government action has contributed to a 16% increase in vaccine confidence between 2015 and 2018, and more than a 36% increase in meningococcal C vaccine uptake following the mandate.¹³ This led to a decrease in meningitis C cases from 17 per year between 2012 and 2016, to 4 in 2018.¹³ Though HPV vaccines, recommended for adolescent girls, were not included in the mandatory vaccination schedule at the time, an increase in uptake was also observed.¹⁴

In July 2017, following a large measles outbreak, Italy made 6 vaccines mandatory in addition to the previous 4. Subsequently, measles vaccination coverage increased from 87% of 2-year-olds in 2016 to 94% of 2 ½ year-olds.¹³ Governments have a social responsibility to protect population health and wellbeing, and therefore a responsibility to analyse the effectiveness and appropriateness of methods, including mandates, which protect public health and society at large.¹⁵

'In Italy, the only vaccinations performed during the pandemic at sufficient levels were the 10 mandatory vaccines for children, thus underlining the value of the mandatory law of year 2017.'

Professor Carlo Signorelli, Prof Hygiene & Public Health, University of Parma, Italy

Listening to the public and understanding their opinion is key

Researchers have started analysing vaccination sentiments on social media to better understand the factors influencing differential opinions. By analysing common words, emojis and hashtags across social media channels The Vaccine Confidence Project is building a picture of social media conversations and attitudes in the UK towards COVID-19.¹⁶ The Balmis Institute of Vaccines in collaboration with the University of Almeria in Spain, and many other research projects and institutions have been using machine learning in different ways to better understand sentiments and opinions about vaccines in different languages and cultures.^{17 18}

4. Deep dive analyses of best practice

As an example of life-course vaccination interventions, we present a snapshot of best-practices from across Europe and communicate the transferable lessons to relevant partners. We have chosen 2 case studies flagged by our member network, who are engaged in the field of vaccination at different levels.

The World Health Organization Tailoring Immunization Programmes (TIP)^{19 20}

The WHO Europe Regional Office has tested and developed the WHO guide to TIP. This offers countries a process to diagnose barriers and motivators to vaccination in groups with low coverage, and design tailored interventions. The TIP FLU pilot programme took place in Kaunas, Lithuania between February 2015 - June 2016. The programme focused on pregnant women, a high-risk group which had a very low influenza vaccination uptake of around 1%.

Impact

The impact of this programme was measurable - influenza vaccination coverage in Kaunas rose from 1.1% in the 2013/2014 influenza season to 10% in the 2015/2016 influenza season.

Success factors

- Multi-disciplinary partnerships
- Pre-testing communication materials with partners and target audiences
- Encouraging a vaccination conversation by a tick-box reminder on routine assessments.

Description of the action

Lithuania started this project with a multi-disciplinary stakeholder consultation to understand the low vaccination uptake, its barriers, drivers and opportunities for change. The Ministry of Health, the Centre for Communicable Diseases and AIDS (ULAC), the Lithuanian University of Health Sciences and Vilnius University, the National Public Health Centre, Lithuanian Society of General Practitioners and Lithuanian Midwives Association among others were invited to contribute.

This was followed by qualitative research through interviews with pregnant women and healthcare workers. Researchers identified themes across policy-, institution-, community-, interpersonal- and individual- related beliefs and behaviours. Interviews helped researchers understand the knowledge, attitudes, beliefs and practices around influenza and maternal influenza vaccination.

Following the research, a number of changes were made to improve influenza vaccine uptake:

- Communication interventions were implemented, evaluated/refined and extended to broader areas.
- A flu vaccination tick box was included as a standard question in pregnancy cards.
- Flu vaccination was included in new guidelines for antenatal care.
- Training, seminars and information leaflets for HCPs were issued.
- Information leaflets, posters, articles, billboards and various social media sites communicated the benefits of maternal influenza vaccinations.

Conclusion

The WHO TIPS FLU intervention was effective and scalable. The WHO released TIPS FLU guidelines, which can be adapted to any setting. This intervention clearly demonstrates the effectiveness and scalability of an evidence-based process which guides the collaboration, research and implementation necessary to understand the population's need and effectively address it. TIPS has been used across Europe to understand barriers and enablers to vaccination in hard-to-reach populations and groups with religious concerns.

Through partnership and research, tailored and more effective interventions were identified, which could improve vaccine uptake in under-vaccinated populations.

The Vienna Vaccine Safety Initiative (ViVI) VAccApp^{21 22 23}

The VAccApp is a family-orientated app developed by the [Vienna Vaccine Safety Initiative](#) which educates and empowers parents and families to better understand their vaccination status, and the reasons why they are vaccinated. In a playful way, the VAccApp invites families to take a closer look at their vaccination record and to see how much of its information they can 'explain' to the avatars in the app.

The WHO mandates that every medical encounter should be used to ascertain a patient's vaccination status and to catch up on missing immunisations when possible. In clinical routine practice, this is rarely the case. In reality, only a minority of doctor's visits are used to talk about vaccination. In countries where patients and families are the keepers of the vaccination card, this important document is often missing in emergency visits, and vaccination recall is often inaccurate.

Preliminary research at ViVI identified an intact doctor-patient relationship as a key component of vaccination awareness and trust in the immunisation system.²³

The VAccApp aims to deepen the doctor-patient relationship in this important aspect. It can be used at home, or while spending time in a waiting rooms, allowing parents to seek clarification about the level of vaccine protection in their family.

Nowadays, medical visits are time limited. Questions that have been on a parents' mind often remain unanswered. The VAccApp helps families to sort through their vaccination records ahead of time. A "traffic light system" allows users to mark aspects in their vaccination history that may be unclear to them, and to seek clarification when they visit a medical professional.

Impact

Scientific validation of the VAccApp in a busy emergency room setting in Germany showed that use of the VAccApp lead to a significant increase in accurate knowledge about the child's vaccination status, and a high level of satisfaction with the subsequent medical visit. After using the VAccApp, parents were more likely to remember key aspects of the vaccination history: 62% of parents were able to recall their child's complete vaccination status and 95% of multiple choice questions were answered correctly. Comparing to parents who did not use the VAccApp, only 9% of this group were able to provide a complete vaccination status and only 39% of the questions were answered correctly.

Success factors

- User-centred approach
- Multidisciplinary partnership
- Time was taken to develop a tool that can withstand scientific scrutiny

Description of the action

The project began with a collaboration between scientists and design thinkers. A multi-disciplinary team took a deep-dive into the Design Challenge question: 'How might we enable physicians to encourage parents and children to prevent infectious diseases?'²¹ The process is centred around the end-user, i.e. it starts with broad questioning and problem solving and through iterations narrows the focus until an innovative intervention is defined. This process lends itself to finding tangible, evidence-based solutions that are taking 'the edge off' a highly emotional and polarized debate. Sometimes it is necessary to take a step 'outside the box' to find new avenues for collaboration and synthesis of different viewpoints and positions.

Conclusion

Knowledge is the foundation of trust – using digital tools such as the VAccApp can improve vaccine confidence, therefore reduce hesitancy and ultimately, improve vaccine protection. The identified solution, which took a decade to build, refine and validate scientifically, could substantially increase public knowledge about vaccines in a short period of time by playfully taking families through the vaccination record, while educating and raising awareness of the benefits of vaccination for the whole family. Use of the VAccApp throughout the life course also reminds family members of the importance of knowing your vaccination status, and to ask the questions that you may have, in order to make the most out of a doctor's visit.

'Adults, children and adolescents alike, across the family network, are becoming more aware of their vaccination status and learning the terminology to empower their own vaccination process, reducing factors contributing to vaccine hesitancy.'

Barbara Rath, Co-founder & Chair of Vienna Vaccine Safety Initiative

5. Call to Action

There is not one 'silver bullet' to vaccine hesitancy, it is a complex challenge, which is influenced by variable internal and external factors.

Stakeholder engagement and sector experience show that there are multiple approaches to address vaccine hesitancy, rather than one specific solution. Grass roots, multi-centric solutions informed by data and knowledge sharing across a broad European stakeholder network may in fact be the most effective way forward.

Key procedural success factors include:

- Team work and knowledge sharing from the start
- In-depth research and stakeholder consultation to understand the barriers and drivers in a defined population
- Multidisciplinary innovative thinking to develop effective interventions
- Measurement and validation of impact
- Reporting of results, so that other teams can learn and develop strategies suitable for their respective settings.

We call on all policy makers to:

- Invest in interventions that follow the procedural success factors identified in this paper.
- Be patient – effective, scalable interventions take time to develop.

We call on the public to:

- Think about their close contacts (family, friends...) and their current state of vaccine protection, especially in the light of the coronavirus situation. We urge at-risk groups to protect themselves against vaccine preventable respiratory infections.
- Be careful and critical when seeking information online; ask your doctor for advice and recommendations of reliable news sources on vaccines and immunisation.

We call on all innovators to:

- Work in partnership with all relevant stakeholders to address vaccine hesitancy challenges with innovative solutions. Don't be afraid to think 'outside the box'.
- Implement quantitative and qualitative research to better understand the 'real world' impact of an intervention.
- Allow peer reviewers to voice queries and share learning, when submitting findings for publication.

Only together can we understand and tackle vaccine hesitancy across different age groups.



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- ¹ World Health Organization. 2020. Immunization, Vaccines and Biologicals: Improving vaccination demand and addressing hesitancy. [Accessed 17 June 2020]
- ² Gary Finnegan written correspondence 30 May 2020
- ³ The Sabin-Aspen Vaccine Science & Policy Group. 2020. Meeting the Challenge of Vaccination Hesitancy.
- ⁴ Vaccine hesitancy: a generation at risk editorial. 2019. *The Lancet Child & Adolescent Health*;3.
- ⁵ Sas, A. 2020 Attitude towards vaccine for coronavirus (COVID-19) in Poland 2020. [Accessed 12 June 2020] <https://www.statista.com/statistics/1111564/poland-attitude-towards-vaccine-for-the-coronavirus-cov-id-19/>
- ⁶ Hirabayashi, K. 2020. The impact of COVID-19 on routine vaccinations: Reflections during World Immunization Week 2020. [Accessed 12 June 2020] <https://www.unicef.org/eap/stories/impact-covid-19-routine-vaccinations>
- ⁷ Professor Carlo Signorelli. Written correspondence. 21 June 2020.
- ⁸ Cucchiari D, Pericàs JM, Riera J, et al. 2020. Pneumococcal superinfection in COVID-19 patients: A series of 5 cases. *Med Clin (Barc)*;S0025-7753(20)30349-3. doi:10.1016/j.medcli.2020.05.022
- ⁹ Psyon Games: Antidote [Accessed 31 May 2020] <https://psyongames.com/antidote/>
- ¹⁰ Finnegan, G. 2019. Has Finland found a Antivax antidote? [Accessed 31 May 2020] <https://www.vaccinestoday.eu/stories/has-finland-found-an-antivax-antidote/>
- ¹¹ Larson, H., de Figueiredo, A., Karafillakis, E. and Rawal, M. 2018. State of Vaccine Confidence in the EU 2018.
- ¹² Lévy-Bruhl D, Desenclos JC, Quelet S, Bourdillon F. 2018. Extension of French vaccination mandates: from the recommendation of the Steering Committee of the Citizen Consultation on Vaccination to the law. *Euro Surveillance*;23(17). doi:10.2807/1560-7917.ES.2018.23.17.18-00048
- ¹³ Warren, M. 2019. Vaccination rates rise in Italy and France after law change. [Accessed 3 June 2020] <https://www.nature.com/articles/d41586-019-02193-4>
- ¹⁴ Professor Catherine Weil-Olivier. Written correspondence. 7 August 2020.
- ¹⁵ C. Signorelli, A. Odone, W. Ricciardi, B. Lorenzin. 2019. The social responsibility of public health: Italy's lesson on vaccine hesitancy. *The European Journal of Public Health*, 29(6):1003–1004
- ¹⁶ Vaccine Confidence Project. 2019. Advancing research on social media and vaccine confidence. <https://www.vaccineconfidence.org/summary-vaccine-confidence-social-media-monitoring-report-2019>
- ¹⁷ Francisco Gimenez-Sanchez, President of Balmis Institute of Vaccines. Written correspondence. 20 June 2020.
- ¹⁸ Du, J., Xu, J., Song, H. et al. Optimization on machine learning based approaches for sentiment analysis on HPV vaccines related tweets. *J Biomed Semant* 8, 9 (2017). <https://doi.org/10.1186/s13326-017-0120-6>
- ¹⁹ Eve Dubé, E., Leask, J., Wolff, B., Hickler, B., Balaban, V., Hosen, E. and Habersaat, K. The WHO Tailoring Immunization Programmes (TIP) approach: Review of implementation to date. *Vaccine*;36(11):1509-1515. doi:10.1016/j.vaccine.2017.12.012
- ²⁰ World Health Organization Europe. 2017. Tailoring immunization programmes for seasonal influenza (TIP FLU): A guide for promoting uptake of maternal influenza vaccination.
- ²¹ Seeber, L., Conrad, T., Hoppe, C., Obermeier, P., Chena, X., Karsch, K., Muehlhans, S., Tief, F., Boettcher, S., Diedrich, S., Schweiger, B., Rath, B. 2015. A Design Thinking Approach to Effective Vaccine Safety Communication. *Current Drug Safety*; 10(1):31-40. doi: 10.2174/157488631001150407105400.
- ²² Seeber, L., Michl, B., Rundblad, G., Trusko, B., Schnjakin, M., Meinel, C., Weinber, U., Gaedicke, G. and Rath, B. 2017. Educating parents about the vaccination status of their children: A user-centered mobile application. *Prev Med Rep*;5:241-250. doi: 10.1016/j.pmedr.2017.01.002.
- ²³ Kundi, M., Obermeier, P., Helfert, S., Oubari, H., Fitzinger, S., Yun, J.A., Brix, M. And Rath, B. 2015. The Impact of the Parent-Physician Relationship on Parental Vaccine Safety Perceptions. *Current Drug Safety*; 10(1):16-22; doi: 10.2174/157488631001150407104320