Vaccination as a Tool to Prevent Antimicrobial Resistance: Challenges and Opportunities in Belgium

Marie Hallin [a], Emmanuelle Boishardy [b], Kathleen Commers [c], Hugues Malonne [d], Françoise Mambourg [e], Arnaud Marchant [a], Marc Struelens [f], Stefan Teughels [g], David Tuerlinckx [h,i], Magali Van Steenkiste [j], Pierre Smeesters [a,k]

[a] European Plotkin Institute for Vaccinology, Université Libre de Bruxelles, Brussels, Belgium
[b] GlaxoSmtihKline BeLux, Wavre, Belgium
[c] Pfizer BeLux, Brussels, Belgium
[d] Federal Agency for Medicines and Health Products, Brussels, Belgium
[e] Société Scientifique de Médecine Générale (SSMG), Cellule Vaccination, Brussels, Belgium
[f] Emeritus, Faculty of Medicine, Université Libre de Bruxelles, Brussels, Belgium
[g] Domus Medica, Antwerp, Belgium
[h] Federal Public Service, Superior Health Council, Brussels, Belgium
[i] CHU UCL Namur, Department of Pediatrics, Dinant – Godinne, Belgium
[j] Association Pharmaceutique Belge (APB), Brussels, Belgium
[k] Queen Fabiola Children's University Hospital, Université Libre de Bruxelles, Brussels Belgium

Marie.Hallin@ulb.be

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Executive Summary

Vaccination is one of the most effective preventive healthcare measures, offering significant potential to reduce antimicrobial resistance (AMR). Despite this, Belgium faces systemic challenges in fully integrating vaccination into its healthcare ecosystem. These challenges include fragmented data infrastructure, inequitable access to vaccines, and a lack of coordination among stakeholders.

The present white paper highlights the issues raised during an expert roundtable discussion conducted at the European Plotkin Institute for Vaccinology, ULB, on November 18th, 2024, and outlines actionable recommendations to address these challenges. By improving governance, fostering collaboration, and leveraging data, Belgium can strengthen its vaccination strategy and take a leadership role in combating AMR.

Introduction

Antimicrobial resistance (AMR) is a significant global public health threat, with the World Health Organization (WHO) estimating that bacterial AMR was directly responsible for 1.27 million deaths worldwide and contributed to 4.95 million deaths in 2019. The economic impact of AMR is also substantial, with the World Bank estimating that it could result in additional healthcare costs of up to US$ 1 trillion per year by 2050 (1).

AMR occurs when microorganisms such as bacteria, viruses, fungi, and parasites evolve and develop the ability to resist the effects of antimicrobial drugs that were once effective in treating infections they cause. This resistance makes standard treatments ineffective, leading to persistent infections and increased risk of disease spread, severe illness, and death (1, 2). The primary drivers of AMR are the misuse and overuse of antimicrobials in both humans and animals.

Vaccines have a key role to play against the excessive and/or inappropriate use of antimicrobials. The WHO recently estimated that a better use of vaccines could reduce the number of antibiotics globally needed by 22% or 2.5 billion defined daily doses every year, supporting worldwide efforts to address AMR. To this end, the WHO has specifically developed a strategy for "Leveraging Vaccines to Reduce Antibiotic Use and Prevent Antimicrobial Resistance", as an action plan annexed to the Immunization Agenda 2030 (3).

To mark the 2024 WHO world AMR awareness week, the EPIV-ULB organized, on November 18th, a round table aiming at fostering collective and national commitments in potentiating the role of vaccines in the fight against AMR. As the new AMR National Action Plan (NAP) 2025-2029 is expected early this year, the specific objectives were to delineate the actions that are both first line priorities and reasonably achievable during this next NAP time span, focusing on three critical areas in which Belgium faces systemic challenges meeting the WHO recommendations:

1. How to improve monitoring and data sharing for epidemiological information?
2. How to integrate vaccination more effectively into the primary care ecosystem?
3. How to foster research and development of (future/new) vaccines with AMR impact?

Towards efficient public health databases

In its action framework, the WHO emphasizes the key role of collecting and analyzing relevant data to assess the impact of vaccines on antimicrobial resistance, including linking vaccination data with antimicrobial use and resistance data, with the highest possible level of geographic and demographic accuracy; further insisting on the fact that these data should be included in AMR national action plans.

Fragmented infrastructure & vaccination data

Belgium's healthcare data landscape is fragmented. Regarding vaccination registration alone, the COVID-19 pandemic demonstrated the advantages of a centralized national registry, but this integration was mainly driven by the emergency nature of the situation, and has not been sustained post-pandemic: Flanders, Brussels, and Wallonia each use separate vaccination registration systems (Vaccinet, Vaccicard, eVax, etc.), which are, despite some efforts, not yet fully interoperable. Healthcare professionals must log in to multiple platforms to access a patient's vaccination history, creating unnecessary administrative burden that not only hinders global access to vaccines (without a unified system, both tracking vaccination coverage and ensuring consistent delivery across regions remain challenging), but also leads to an overall loss of medically relevant information. There is a pressing need to extend existing tools/registries and creating efficient & compatible solutions.

As the goal would be to build a data system that facilitates data sharing for healthcare providers but also public health and research, connecting vaccination coverage data with epidemiological, drug consumption, and more economical data such as days of work lost to incapacity would provide valuable insights, especially when focusing on socio-economic impact of vaccines as well as their impact on AMR. Lastly, the problem of the delay in the availability of data themselves was evoked, raising the possible usefulness of collecting and analyzing data on reimbursement, which are more readily accessible and can help to shed a different light on the links between AMR and vaccination.

It is by linking this information that researchers and public health officials can analyze the effectiveness of vaccines in a multidimensional optic (i.e. reduction of AMR, infections, and hospitalizations), helping understanding the broader impact of vaccination programs on public health outcomes, and inform health authorities. For instance, the effectiveness of combinations of vaccines could be assessed as a secondary endpoint for their health impact and potential to reduce AMR. This data can then be used to guide research, vaccination strategies and public health policies.

Efforts oriented towards creating interoperable registries are underway. But this should happen much faster than what is happening today. While collaboration agreements between regions and federal authorities to share data are necessary, the efficiency of discussions is impaired by the multiplicity of regional authorities involved (AVIQ, Vivalis, ONE, Zorg en Gezondheid…) and approval needed by each competent entity. These barriers should be removed in the near future if we want to have an efficient and structured access to these data for healthcare professionals, researchers & public health authorities.

Data protection regulation

Additionally, legal and GDPR constraints currently hinder the mobilization of such data in many ways. Currently, while vaccination data can be used for research, linking it to disease data is restricted by law, which only allows highly aggregated data to be shared, leading to a loss of valuable information.

While investing in vaccination, evaluating and communicating its public health impact requires data demonstrating its efficacy, data sharing remains a sensitive topic, with fears about personal data being disclosed. A constructive public and professional debate on these sensitive questions appears necessary in Belgium.

The newly created health data agency (HDA)'s aim is to make health data more easily, securely and transparently available under Findability, Accessibility, Interoperability, and Reuse (FAIR) Guiding Principles. This new organization should be allowed to grow in its role and find a way to overcome the hurdles discussed above that are currently keeping it to provide the concrete solutions that are awaited for good quality data access. It should be noted that this issue is not unique to Belgium; many countries face similar challenges.

One Health approach

Finally, when it comes to epidemiological monitoring, the collection scale exceeds the national and human health levels and there is a need of both a European approach and a One Health Approach. The National Action plan has typically integrated these two approaches.

For this reason, vaccination surveillance (in both humans and animals) should be a part of the next National Action plan on AMR along with antibiotic resistance and consumption data.

Proposed priority action

1. Prioritize interoperability between vaccination registries across regions or the extension of existing solution to the national level to facilitate data analyses.
2. Establish processes accelerating access to vaccination data, for instance through connection of registration and reimbursement data.
3. Give the HDA the resources and a framework so that they can focus on their core priorities & accelerate speed in having FAIR data for the different stakeholders active in Healthcare.
4. Make vaccination surveillance in both humans and animals part of the next National Action Plan AMR.

Expanding the reach and providing equity in access to vaccines

The WHO action framework also highlights the need to expand the reach of existing vaccines with a known impact on AMR in order to achieve greater coverage, by increasing funding, capacity, functionality and accessibility of supply systems, and by updating the recommendations to include the role of vaccines in combating AMR.

Disincentive for networking in primary care ecosystem

The integration of vaccination into the primary care ecosystem is crucial towards this goal. While General Practitioners (GPs) and pharmacists could and should work together towards improved access to vaccines, current policies foster competition rather than collaboration, including at the financial level. This dynamic is against the extension of accessibility of vaccination point for

the population, especially for those not having a dedicated GP, creating inequity in access. The recent implementation of RSV immunization to prevent infant bronchiolitis in Belgium highlighted this lack of coordination in this integration process. The absence of a unified plan and clear leadership led to significant administrative burden and confusion among stakeholders.

Additionally, and as discussed above, the lack of interoperability of registries is, in itself, an obstacle to penetration and therefore optimal coverage of existing vaccines. Furthermore, the resulting lack of sound data finally lead to inequity in access to vaccines. Indeed, some vaccines, like meningitis type B or RSV vaccines, are not reimbursed (except for pregnant women) because they are deemed not cost-effective which is influenced by the fact that this cost-effectiveness assessment is solely based on the direct effects of vaccination on public health. In turn, the lag between reimbursement and recommendations from National Immunization Technical Advisory Groups put healthcare professionals in uncomfortable position regarding recommending vaccines that are not reimbursed, further limiting their reach and jeopardizing equity in access. The picture might considerably change if indirect (global societal impact) effect of these vaccinations could be considered in such cost-effectiveness assessment.

Limited lifelong vaccination plans

While Belgium has robust childhood vaccination programs, the system falls short for adult vaccination. Currently, there are no clear, lifelong vaccination schedules. Adults aged 18–65, elderly individuals, individuals at risk and pregnant women often do not know which vaccines they should receive and when. Belgian immunization programs should be strengthened to provide proactive support to vaccination throughout the life course.

Vaccine hesitancy, education and awareness gaps

Finally, barriers to vaccine uptake need to be addressed, with a focus on understanding patient reasoning. The proliferation of information sources, including the internet and social media, has shifted the landscape, emphasizing individual freedom over collective good, complicating the communications between healthcare providers and patients regarding vaccination. The COVID-19 pandemic has highlighted the need for healthcare professionals to understand both the importance of vaccination and vaccine hesitancy, and the influence of misinformation and perceived disease severity in the decision process. Additionally, public awareness of adult vaccination remains low, with many individuals unaware of the health and economic benefits of prevention. Even within hospitals (e.g. nurses), vaccination rates have declined post-COVID, underscoring the fact that healthcare professionals (HCP) often lack sufficient training on the importance of vaccination in general, but also more particularly in combating AMR. The importance of prevention is often underemphasized in curricula, despite its proven value.

Proposed priority actions

5. Improve governance between competent authorities to ensure effective vaccination and prevention strategies.
6. Enhance the development of a vaccination schedule for adults, especially targeting pregnant women, the elderly and at risk individuals. Make this schedule part of a health population management approach with defined coverage target.
7. Promote collaboration between GPs and pharmacists to streamline vaccination delivery.
8. Consider including indirect vaccine benefits in the cost-effectiveness analysis.
9. Consider the inclusion of recommended but non-reimbursed vaccines in official vaccination schedules to raise awareness amongst HCP & the population.
10. Increase education in healthcare providers studies curricula about the importance of vaccination and prevention.

Fostering research and development

There is a need to focus on developing vaccines that address the most pressing public health needs, with an emphasis on efficacy. Fostering research and development (R&D) for vaccines to combat antimicrobial resistance (AMR) is a multifaceted challenge in which aligning the perspectives of private companies and public entities is essential.

The challenging new European Clinical Trial Information System (CTIS)

The implementation of the Clinical Trials Information System (CTIS) aims to improve the evaluation of clinical trials by providing a standardized method for assessing data across multinational studies. Belgium, with its center of excellence, has taken a leading role in evaluating vaccine trials.

Scientific advice for clinical trials is available at the national level before filing, and companies need to seek early advice to adapt their research to comply with regulations.

But, while big pharmaceutical companies have the experience to navigate the system, and despite the fact that multiple support mechanisms are being offered, smaller companies often seek advice too late, after they have already begun their clinical trials, which can lead to significant challenges.

Professionalization of ethical committee

The networking of ethical committees is also a challenge, particularly regarding complex products, such as vaccines. In Belgium, ethical committees are often "general" ones, linked to organizational entities (such as hospitals) that might lack the necessary expertise to analyze adequately vaccines trials, leading to inconsistent decisions. To circumvent this, the Netherlands, for instance, have created ethical committees that are dedicated to specific drug groups.

The Belgian ecosystem in a global world

The strengthening of EU regulations versus others (US, China, etc.) is becoming a barrier to European and Belgian biotech entrepreneurship. The Medical Device Regulation has led to a 30% decrease in startups in Belgium, as companies move from EU to the US to avoid regulatory hurdles. However, recent vaccine trials, particularly during the COVID-19 pandemic, have shown that countries like Belgium can have a significant impact by conducting small, specific, targeted clinical trials that can complement larger multicentric, competitive international studies.

Proposed priority actions

11. Develop a centralized public support to CTIS complexities for vaccine trials.
12. Develop a framework for specialized ethical committees on vaccines both in terms of content to be given & timing to provide an answer.
13. Develop a framework where pharmaceutical companies, government and research institutions work together and align on priorities like AMR.
14. Strengthen dialogue between funding agencies and Belgian regulatory authorities to sustainably facilitate (pre-)clinical research in the field of AMR.

Conclusion

We here propose 14 priority actions that are reasonably achievable during the next Belgian AMR National Action Plan timespan.

PRIORITY ACTIONS

1	Prioritize interoperability between vaccination registries across regions or the extension of existing solution to the national level to facilitate data analyses.
2	Establish processes accelerating access to vaccination data, for instance through connection of registration and reimbursement data.
3	Give the HDA the resources and a framework so that they can focus on their core priorities & accelerate speed in having FAIR data for the different stakeholders active in Healthcare.
4	Make vaccination surveillance in both humans and animals part of the next National Action Plan AMR.
5	Improve governance between competent authorities to ensure effective vaccination and prevention strategies.
6	Enhance the development of a vaccination schedule for adults, especially targeting pregnant women, the elderly and at risk individuals. Make this schedule part of a health population management approach with defined coverage target.
7	Promote collaboration between GPs and pharmacists to streamline vaccination delivery.
8	Consider including indirect vaccine benefits in the cost-effectiveness analysis.
9	Consider the inclusion of recommended but non-reimbursed vaccines in official vaccination schedules to raise awareness amongst HCP & the population.
10	Increase education in healthcare providers studies curricula about the importance of vaccination and prevention.
11	Develop a centralized public support to CTIS complexities for vaccine trials.
12	Develop a framework for specialized ethical committees on vaccines both in terms of content to be given & timing to provide an answer.
13	Develop a framework where pharmaceutical companies, government and research institutions work together and align on priorities like AMR.
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