BACKGROUND DOCUMENT

AIB Country Meeting

Adult Immunization in Portugal: Successes, lessons learned and the way forward

Lisbon, Portugal
25 – 26 November 2025

Prepared by;
Jade Pattyn, Marco Del Riccio
Adult Immunization Board (AIB) Secretariat

University of Antwerp, Centre for the Evaluation of Vaccination (CEV), Faculty of Medicine and Health Sciences, Drie Eikenstraat 663 – 2650 Antwerp (Belgium)
Università degli Studi di Firenze Dipartimento di Scienze della Salute Viale G.B. Morgagni, 48 50134 Firenze (Italy) adultimmunizationboard@uantwerpen.com

Purpose of the background document

This pre-meeting background document contains a list of, AIB secretariat selected, abstracts/ references from a PubMed Medline and grey literature search on the adult immunization related topic(s) of the country meeting.

In addition, speakers from the different meeting sessions were asked to provide additional relevant and interesting references. The references are ranged by publication year (most recent first, search from earliest dates available to November 2025) and for each year in alphabetical order of the first author's name.

This document should guide you in the preparation of the meeting, it should not be considered as a complete literature review, but hopefully it will give an overview of what has been published on the topic(s) of the country meeting.

Inclusion of references in this document does not indicate that the AIB secretariat agrees with the content or correctness of the content.

Introduction

Meeting Objectives

- Review the **structure of the healthcare system** in Portugal, focusing on **how adult vaccination programs are integrated into the national vaccination plan**. Analyze current **policies and strategies** for adult vaccination. Discuss the **purchase, distribution and funding** of adult vaccines.
- Provide an overview of the **epidemiology and disease burden of VPI among adults in Portugal**. Explain the functioning of infectious disease surveillance and control programs in Portugal. Discuss the **effectiveness of current surveillance systems in detecting and responding to vaccine-preventable diseases** in adults.
- Explore the **organization and delivery of adult vaccination services** from different perspectives (e.g. DGS, nurse, pharmacist, healthcare provider).
- Discuss the **recording and reporting of vaccination data** in Portugal, including coverage rate, vaccine impact monitoring and vigilance practices.
- Analyze the **population's vaccination demand and acceptance**, addressing issues such as vaccine confidence.
- Analyze the **factors contributing to Portugal's consistently high childhood and influenza vaccination coverage compared to other European countries**, and examine how these may inform adult immunization strategies.
- Present the strategies and programs implemented in Portugal to **vaccinate specific adult population groups**, highlighting the challenges and opportunities.
- Explore **future prospects and potential solutions to overcome barriers and enhance adult immunization efforts in Portugal** and other European countries.

Intended Impact and Target Audience

Country meetings are organized to discuss country-specific aspects of adult immunization together with local experts. During these meetings, the board invites local academics, health care professionals, public health representatives and policy makers and representatives from the Ministry of Health to present on adult immunization strategies implemented in the country where the meeting is organized, as well as educational, communication and community initiatives aimed at increasing adult vaccine acceptance and coverage rates. The AIB advisors contribute both their own country's expertise and insights gathered from previous country and technical meetings. The aim of these meetings is to establish a collaborative network of (inter)national experts of different fields, creating a platform for the exchange of knowledge and best practices in adult immunization. The location of the country meeting is determined based on advisors' recommendations, taking into account factors such as the political landscape, public health situation, the current state of adult immunization implementation, potential collaborations with stakeholders, and opportunities for learning.

Topics relevant to discuss during the country meeting were investigated by the AIB scientific office with the help of local experts of the country: Sofia Duque, Henrique Lopes and Filipe Froes.

More information about the adult immunization board:

www.adultimmunizationboard.org // AIB introduction video

List of Abbreviations

Abbreviation	Explanation
ACSS	Central Administration of the Health system (Administração Central do Sistema de Saúde)
ADIFA	Associação de Distribuidores Farmacêuticos
AFP	Associação de Farmácias de Portugal
AIB	Adult Immunization Board
ANF	National Pharmacies Association (Associação Nacional das Farmácias)
ANF	Associação Nacional das Farmácias
CTV	Technical Vaccination Commission (Comissão Técnica de Vacinação)
CTVS	Comissão Técnica de Vacinação Sazonal
DE-SNS	Direção-Executiva do Serviço Nacional de Saúde
DGS	Directorate-General of Health (Direção-Geral da Saúde)
GOVS	Grupo Operacional da Vacinação Sazonal
INFARMED	Autoridade Nacional do Medicamento e Produtos de Saúde
MS	Ministério da Saúde / Ministry of Health
SNS	Serviço Nacional de Saúde (National Health service) since 1979
SPMS	Shared Services of the Ministry of Health (Serviços Partilhados do Ministério da Saúde)
SUCH	Serviço de Utilização Comum dos Hospitais
ULS	Local health units

Part 1 Short Meeting Agenda

Sessions	Topics	Speaker(s)
Session 1: Opening, introduction and objectives	1.1 Introduction of Adult Immunization Board	Paolo Bonanni
	1.2 Overview of the objectives of the meeting + Why is Portugal interesting in context of adult vaccination	Filipe Froes
Session 2: Healthcare system and the adult immunization plan in Portugal	2.1 Portugal: Health system summary	Inês Fronteira
	2.2 Regulatory basis, stakeholders (e.g. DGS, SNS, Infarmed etc.) and organization of the immunization plan in Portugal	Bruno Alves
	2.3 Portugal's National (adult) Immunization Plan: Current status and upcoming changes	Marta Valente Pinto
	2.4 Insights from a Think Tank initiative dedicated to adult vaccination	Henrique Lopes
Session 3: Overview of the epidemiology and disease burden of VPI among adults in Portugal	3.1 Disease burden, surveillance, and control of vaccine-preventable infections in Portuguese adults	TBD
	3.2 *Outbreak management*: Viral genetics and transmission dynamics in the second wave of mpox outbreak in Portugal and forecasting public health scenarios	Rita Cordeiro
Session 4: Implementation and delivery of adult vaccination services in Portugal	4.1 From DGS perspective	Natália Pereira
	4.2 From the GP perspective	Claudia Vicente
	4.3 From the nurse perspective	Tiago Nascimento
	4.4 From the pharmacist perspective	Ema Paulino
Session 5: Recording and reporting of vaccination data	5.1 Registration of vaccines from the Boletim de vacinas to the SNS Portal: Current status and upcoming changes	TBD
	5.2 Vaccine effectiveness monitoring in Portugal: Current status and upcoming changes	Ausenda Machado
	5.3 Vaccine safety surveillance and communication in Portugal	Márcia Silva
Keynote	KN: Differences between the vaccination systems of Madeira and mainland Portugal	Ana Clara Silva
Session 6: Vaccine demand and acceptance	6.1 Portugal's relationship to vaccinations and factors associated with vaccine hesitancy (VAX-TRUST project)	Tiago Correia

	6.2 Health beliefs and attitudes toward Influenza and COVID-19 vaccination in Portugal	Ana João Santos
Session 7: Adult Vaccination in Portugal in specific situations and population groups; the way forward	7.1 Vaccinations of healthcare providers	Ana Isabel Correia
	7.2 Vaccinations of pregnant women	Carolina Sequeira
	7.3 Vaccination of older adults	Sofia Duque
	7.4 Vaccination of immunocompromised	Luis Graca
	7.5 From children to adults: applying Portugal's Pediatric vaccine success to adult immunization	Fernanda Rodrigues
Session 8: Breakout groups		
Session 9: Meeting summary, final discussion and closing remarks		

Part 2 Article references by session

Meeting title definitions

Adult immunization	Adult immunization refers to the administration of vaccines (active immunization) or antibodies (passive immunization) to individuals who are 18 years of age or older in order to protect them against various infectious diseases, before or after exposition. *Source: AIB secretariat*

Session 1: Opening, Introduction and Objectives

Session 1: Opening, introduction and objectives	1.1 Introduction of Adult Immunization Board	Paolo Bonanni
	1.2 Overview of the objectives of the meeting + Why is Portugal interesting in context of adult vaccination	Filipe Froes

1.1 Introduction of Adult Immunization Board (AIB)

Potential questions/outcomes: What is the mission and objectives of the AIB? What is the operating procedure and impact of the AIB? What is an AIB technical and country meeting? Who are the AIB advisors? How is the AIB funded?

1.1.1 *Pattyn J, Jindal S, Hendrickx G, Bechini A, Boccalini S, Del Riccio M, Noehrenberg E, Van Damme P, Bonanni P, Nohynek H, Kontio M, Järvinen A, Salo H, Palmu A. A* Overview of adult immunization in Finland: Successes, lessons learned and the way forward. Expert Review of Vaccines. Submitted September 2025 (under review)

The exchange of knowledge and best practices is essential for improving adult vaccination strategies across the European region. Finland serves as a valuable example, with a centralized, publicly funded National Vaccination Program (NVP) supported by national evaluation for decision-making based on comprehensive population-based registers. These registers enable assessment of disease burden, facilitate the identification of high-risk groups, and enable evaluating vaccination coverage, impact, and safety during the implementation. The NVP allows a centralized tender with lower vaccine prices, centralized vaccine procurement, and uniform processes for vaccine administration by public health care. Despite these strengths, Finland faces challenges in adult vaccination similar to other EU countries, including budgetary constraints, as well as the need for improved implementation, especially for high-risk groups. The complex evaluation, decision, funding, and procurement process causes delays in vaccine introduction into the NVP. This review describes Finland's adult vaccination system, from policy to implementation. The successes, challenges and lessons learned were shared during the Adult Immunization Board country meeting in Finland (December 2024), where local experts, healthcare providers, public health representatives, and policymakers engaged in collaborative discussions and shared insights through case studies and presentations.

1.1.2 Pattyn J, Launay O, Steffen R, Weinberger B, Gabutti G, Ihan A, Weinke T, Jancoriene L, Bonanni P, Van Damme P: Overview of vaccines for adults authorized, recommended, and implemented in the European Union. NPJ Vaccines. 2025 Aug 28;10(1):205

An increasing number of vaccines for adults are being implemented in vaccination programs, reflecting the growing recognition of immunization as a lifelong public health strategy. However, no comprehensive overview of all vaccines for adults authorized, recommended, and implemented in the EU currently exists. To address this, the Adult Immunization Board developed a "vaccines for adults tracker and landscape" to map the range of vaccines for adults approved across the EU.

1.1.3 AIB Technical meeting (April 2024) – Boccalini S, Bechini A, Del Riccio M, Weinberger B, Wysocki J, Martinelli D, Wichmann O, Likki T, Hendrickx G, Van Damme P, Wyndham-Thomas C, Bonanni P, Pattyn J. Strategies for introducing and implementing vaccines for adults into national immunization programs in Europe: Good practices and key insights of the adult immunization board meeting. Hum Vaccin Immunother. 2025 Dec;21(1):2451487.

1.1.4 AIB Country meeting Italy (December 2023) – Bechini, A., Boccalini, S., Del Riccio, M., Pattyn, J., Hendrickx, G., Wyndham-Thomas, C., … Bonanni, P. (2024). Overview of adult immunization in Italy: Successes, lessons learned and the way forward. Human Vaccines & Immunotherapeutics

The exchange of knowledge and best practices in adult immunization are essential to improve vaccination strategies across the European region. Italy has made groundbreaking progress in the field, being one of the first countries to propose a life-course vaccination schedule, broadening the traditional focus on childhood immunization to include adults. All vaccines included in Italy's vaccination schedule are free of charge. Moreover, the country's National Immunization Plan sets clear coverage targets, immunization priorities, and actions to reduce disparities. However, the fragmentation of its National Health System following the constitutional reform of 2001 has led to an increased complexity and regional inequalities

regarding immunization. Other challenges the country faces include growing vaccine hesitancy, data gaps and underserved populations. This review describes Italy's adult immunization system, from policy to implementation. The successes, challenges and lessons learned were shared during the first Adult Immunization Board country meeting in Italy, where local experts, healthcare providers, public health representatives, and policymakers engaged in collaborative discussions and shared insights through case studies and presentations (December 2023). These insights are reviewed and discussed in this manuscript.

1.1.5 Pattyn J, Del Riccio M, Bechini A, Hendrickx G, Boccalini S, Van Damme P, Bonanni P. The Adult Immunization Board (AIB): A new platform to provide multidisciplinary guidelines for the implementation and optimization of adult immunization in Europe. Vaccine. 2024 Jan 1;42(1):1-3. Doi: 10.1016/j.vaccine.2023.11.060. Epub 2023 Dec 3. PMID: 38044243.

1.1.6 Pattyn Jade, Bonanni Paolo, on behalf of the Adult Immunization Board working group. Assessing the health burden of vaccine-preventable infections in European adults: challenges and opportunities translated into action. Euro Surveill. 2023;28(48)

1.1.7 Adult Immunization Board website (link): www.adultimmunizationboard.org

All meeting materials (background document + slides + conclusions) are published on the AIB website. Summary meeting reports are published in peer-reviewed journals.

1.1.8 Adult Immunization Board video (link): https://www.youtube.com/watch?v=4lbpByoI6Ow

1.2 Overview of the objectives of the meeting + Why is Portugal interesting in the context of adult immunization / from the AIB perspective

Potential questions/outcomes: What are the objectives, topics of this AIB country meeting. Why is Portugal interesting in the context of adult immunization?

1.2.1 Barros SG, Cruz DN, Souza JC, Silva LA, Guimarães MCDS, Rezende MM, Paim J, Vieira-da-Silva LM. Surveillance and high vaccination coverage: how Portugal overcame the collapse and regained control of the pandemic. Cien Saude Colet. 2023 May;28(5):1297-1312. Portuguese, English.

The uncertainties about COVID-19 require evaluating national responses to identify successes and failures in the pandemic control. This article analyzes Portugal´s response, particularly the contribution of its health and surveillance systems in dealing with the pandemic. An integrative literature review was conducted, including consultations of observatories, documents, and institutional websites. Portugal´s response was agile and showed unified technical and political coordination, including surveillance structure using telemedicine. The reopening was supported by high testing and low positivity rates and strict rules. However, the relaxation of measures as of November/2020 resulted in an increase in cases, collapsing the health system. The response involved a consistent surveillance strategy with innovative monitoring tools, which, combined with high population adherence to vaccination, led to overcoming that moment and kept hospitalization and death rates at new disease waves at low levels. Thus, the Portuguese case discloses the risks of disease resurgence with the

flexibility of measures and the population´s exhaustion in the face of restrictive measures and new variants, but also the importance of articulation between technical coordination, the political sphere, and the scientific committee.

Session 2: Healthcare system and the adult immunization plan in Portugal

Session 2: Healthcare system and the adult immunization plan in Portugal	2.1 Portugal: Health system summary	Inês Fronteira
	2.2 Regulatory basis, stakeholders (e.g. DGS, SNS, Infarmed etc.) and organization of the immunization plan in Portugal	Bruno Alves
	2.3 Portugal's National (adult) Immunization Plan: Current status and upcoming changes	Marta Valente Pinto
	2.4 Insights from a Think Tank initiative dedicated to adult vaccination	Henrique Lopes

2.1 Portugal: Health system summary

Potential questions/outcomes: How is the healthcare system in Portugal structured? What are the key milestones or policy changes that have shaped the integration of prevention, especially immunization, within the Portuguese healthcare system? Are any future changes anticipated that could affect immunization?

2.1.1 **National Health Plan 2021– 2030** National Health Plan – National Health Plan

Portugal has also implemented the Active and Healthy Aging Action Plan 2023–2026 (PAEAS - Plano de Ação para o Envelhecimento Ativo e Saudável).

2.1.2 OECD/European Observatory on Health Systems and Policies (2023), *Portugal: Country Health Profile 2023*, State of Health in the EU, OECD Publishing, Paris, https://doi.org/10.1787/069af7b1-en. (data from 2022)

The Portuguese National Health Service (SNS) is a centralized, universal, predominantly tax-funded system, ensuring coverage for all residents, including asylum seekers and migrants. It coexists with supplementary professional health subsystems and voluntary private health insurance.

Governance and structure:
The Ministry of Health oversees planning, regulation, and monitoring. In 1999, Portugal introduced Local Health Units (LHUs) to improve care integration. Initially covering 10% of the population, their expansion under the new health system Executive Board aims to reach over 80% by 2024, integrating all hospitals and primary care into a more decentralized, patient-centred model.

Strategic Direction – The National Health Plan 2021–2030 (NHP):
Approved in 2023, the NHP defines long-term health priorities through stakeholder consultation and analysis of population needs. Its goals include reducing inequalities, tackling behavioural risk factors, and addressing communicable and non-communicable diseases. Lessons from COVID-19 highlight

preparedness for future risks, including climate change effects on disease patterns. Implementation is led by the Directorate-General for Health (DGS), supported by monitoring and communication strategies.

Local Health Units (LHUs)

Provide integrated management of primary, hospital, and long-term care within a geographical area. LHU aim to enhance care pathways and system efficiency, integrating all hospitals and primary care into a more decentralized, patient-centred model. The ARS (Administrações Regionais de Saúde) for regional implementation and oversight doesn't longer exists.

Investment and reform:
The Recovery and Resilience Plan (RRP) allocates €1.38 billion (8.3% of its total) to strengthen the SNS by 2026. Priorities include expanding primary care (33%), upgrading digital infrastructure (25%), integrating care, and modernizing mental health and long-term care. EU Cohesion Policy funds (€315.8 million) complement these efforts, focusing on equipment, facilities, and accessibility in underserved regions.

Current challenges:
SNS faces difficulties in retaining general practitioners and nurses due to low pay and demanding working conditions. Staffing shortages are unevenly distributed, with southern regions particularly affected, impacting service accessibility and continuity of care.

Conclusion:
Portugal's national health system is undergoing major structural transformation, guided by the NHP 2021–2030 and supported by EU investment. By expanding LHUs, strengthening primary care, and addressing systemic challenges, Portugal aims to improve accessibility, efficiency, and resilience while ensuring equitable health outcomes for its population.

Highlights from OECD report

- **Health status:** Life expectancy in Portugal increased faster than the EU average in the two decades preceding the COVID-19 pandemic, and its reduction during the pandemic was comparatively less severe. In 2022, life expectancy stood 1 year above the EU average at 81.7 years – about two and a half months below its pre-pandemic level. Circulatory diseases (over 27% all deaths in 2020) were the leading cause of death in 2020, followed by cancer (23% of fatalities).
- **Risk Factors:** Portugal's mortality rate associated with behavioural risk factors remains relatively low, primarily thanks to **below-average and declining numbers of smokers.** While rates of regular heavy drinking are lower than the EU average, they have been on the rise in recent years. **Obesity** is also a growing concern, with over 17 % of adults categorised as obese, and both adults and teenagers reporting among the lowest rates of regular physical activity in the EU.
- **Health system:** In 2021, Portugal's per capita health spending stood at EUR 2 630 – over one third below the EU average. Following a modest rise in 2020, health spending increased by over 11 % in real terms in 2021, driven by continued growth in public spending for COVID-19-related care and a robust recovery of private health spending. *Public sources accounted for 63.2 % of health expenditure – well below the EU average of 81.1 %.*

- **Effectiveness:** In 2020, the rate of mortality from preventable causes in Portugal was 19 % lower than the EU average, and the rate of mortality from treatable causes was 14 % lower. Lung cancer emerged as the leading single cause of preventable deaths, while ischaemic heart disease and colorectal cancer accounted for more than one third of treatable mortality. Portugal outperforms most EU Member States in preventing hospitalisations due to ambulatory care-sensitive conditions, reflecting the Portuguese health system's emphasis on outpatient medical care. Alongside initiatives to expand its primary care network, Portugal is taking measures to tackle the backlog in cancer screening and surgery caused by COVID-19 restrictions, and to improve efficiency and integration of health services at all levels.
- **Accessibility:** In 2022, nearly 3 % of the Portuguese population reported unmet medical needs, surpassing both the EU average (2.2 %) and the pre-pandemic rate of 1.7 %. Most unmet needs were **cost-driven**, with individuals in the lowest income quintile over 20 times more likely to report them than those in the highest quintile.
- **Resilience:** Following significant cuts during the financial crisis, Portugal's public spending on health returned to growth in 2015 at a rate in line with GDP expansion. The pandemic upended this trend, causing government health spending to rise by 8.2 % in 2020 as GDP fell by a comparable amount. As both GDP and private health spending rebounded in 2021, government health spending increased by 9.6 %.
- **Mental health:** Levels of anxiety and depression in Portugal rank among the highest in the EU. Depression is disproportionately reported by women and people on low incomes. While Portugal's suicide rate is below the EU average, southern regions exhibit substantially higher rates than the national average. To address these challenges, the government established a new framework for decentralised service delivery. However, the low number of mental health professionals and regional disparities in service accessibility pose obstacles to its swift implementation.

Demographic and socioeconomic context in Portugal, 2022

Demographic factors	Portugal	EU
Population size	10 352 042	446 735 291
Share of population over age 65 (%)	23.7	21.1
Fertility rate[1] (2021)	1.4	1.5
Socioeconomic factors		
GDP per capita (EUR PPP[2])	27 237	35 219
Relative poverty rate[3] (%)	16.4	16.5
Unemployment rate (%)	6.0	6.2

1. Number of children born per woman aged 15-49. 2. Purchasing power parity (PPP) is defined as the rate of currency conversion that equalises the purchasing power of different currencies by eliminating the differences in price levels between countries. 3. Percentage of persons living with less than 60 % of median equivalised disposable income. Source: Eurostat Database.

2.1.2 Fronteira I, Augusto GF, Maresso A. Portugal: Health System Summary, 2024. Copenhagen: European Observatory on Health Systems and Policies, WHO Regional Office for Europe; 2025. Licence: CC BY-NC-SA 3.0 IGO.

Portugal has a predominantly tax-based health system with universal coverage. The National Health Service co-exists with health subsystems that provide healthcare to specific segments of the population. A comprehensive range of health services are delivered through a mix of public and private contracted providers, with general practitioners (GPs) acting as gatekeepers

to specialist and secondary care. Portugal spent US$ PPP 4464 per person on healthcare in 2022, 62% of which was funded by public sources. **Out-of-pocket (OOP) spending in Portugal accounted for 30% of total health expenditure, double the EU average. Most OOP spending went towards cost-sharing for outpatient services and pharmaceuticals.**

The organization and governance of the health system has been a key target of reforms in recent years, along with enhanced accessibility and the targeted strengthening of primary and integrated care. A new health system Statute passed in 2022 established the health system Executive Directorate, tasked with management and coordination across the different elements of the health system. Since 2016 the reform of primary health care has focused on expanding the network of primary care centres both in number and scope.

2.2 Regulatory basis, stakeholders (e.g. DGS, SNS, Infarmed etc.) and organization of the immunization plan in Portugal

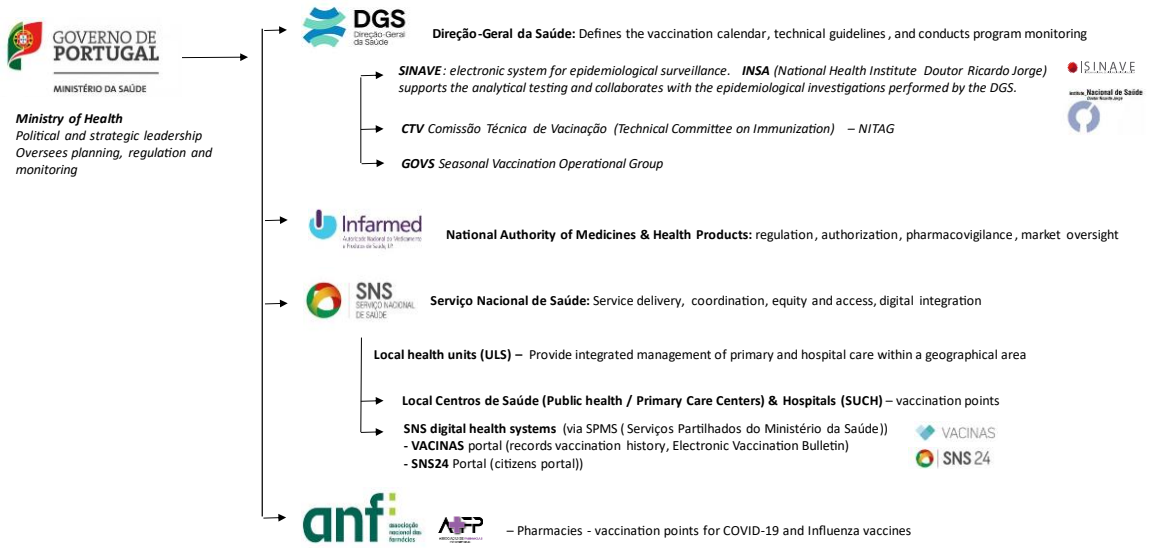
Potential questions/outcomes: Who are the stakeholders regarding (adult) vaccination in Portugal? What are their roles and responsibilities? How is the governance and operational model defined.

2.2.1 Ordinance No. 114/2024/1, of March 22, governance and operational model for national vaccination programs and campaigns

The process of organizational restructuring within the **National Health Service (SNS)** and the entities overseen by the government member responsible for health—such as the creation of the **Executive Directorate of the National Health Service, I.P. (DE-SNS, I.P.),** the expansion of **Local Health Units, E.P.E. (ULS, E.P.E.),** and the abolition of the Regional Health Administrations, I.P.—has necessitated a review of the governance and operational model of the PNV. Thus, Ordinance No. 114/2024/1, of March 22, was published, which defines the governance and operational model for national vaccination programs and campaigns. It establishes a reference **regulatory framework that applies across all national vaccination programs and campaigns**, allowing for the **harmonization and consolidation of best practices regarding vaccination processes**, structurally integrating new partners, and more clearly defining the roles and responsibilities of the various stakeholders. On the other hand, the organizational restructuring of the SNS, with the generalization of Local Health Units (ULS) and the elimination of the Regional Health Administrations (ARS), brought new challenges, requiring the structured integration of new partners into the dynamics of the Seasonal Vaccination Campaign. **The Seasonal Vaccination Operational Group (GOVS), an inter-institutional coordination group led by the DGS, remained operational, contributing to the effective implementation of the campaign, promoting the standardization of procedures at the local level, and strengthening the timely response capacity to logistical and operational challenges.**

Executive Directorate of the SNS (DE-SNS), Shared Services of the Ministry of Health (SPMS), National Authority of Medicines and Health Products (INFARMED, I.P.), Common Use Service of Hospitals (SUCH), Central Administration of the Health System (ACSS, I.P.), National Association of Pharmacies (ANF), Association of Pharmacies of Portugal (AFP), Association of Pharmaceutical Distributors (ADIFA), and Association of Wholesalers of Chemical and Pharmaceutical Products (GROQUIFAR).

2.2.2 **Overview vaccination stakeholders in Portugal** made by AIB secretariat with help from local experts. A final version will be published after the meeting in the meeting report



2.3 Portugal's National (adult) Immunization Plan: Current status and upcoming changes

Potential questions/outcomes: Which vaccines for adults are part of the national vaccination program (NVP) and for which populations? Which products are expected to be (re)evaluated in the coming years? Which changes are expected? Are there specific catch-up programs for

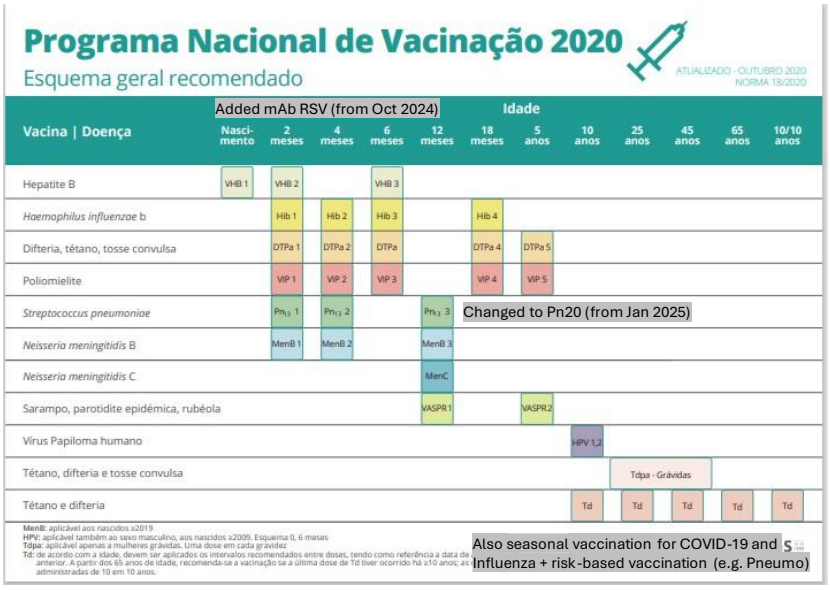
>18 year olds who have missed childhood/adolescent vaccinations (e.g. HPV)? Is the life course immunization policy promoted in the NVP of Portugal? What are the main differences in the NVP compared to other EU-countries. Are all vaccinations in the NVP currently voluntary? Was this always the case? Will this be the case in the future?

2.3.1 Programa Nacional De Vacinacao 2020

The national vaccination program was created in 1965 and since then it has been revised whenever necessary, taking into account several factors, including:

- Scientific knowledge and development;
- The epidemiological characteristics of the different diseases;
- The relationship between the cost and effectiveness of vaccination;
- The availability of vaccine on the market.

https://www.dgs.pt/ficheiros-de-upload-2013/pnv-esquema-recomendado-pdf11.aspx



The last update of the NVP came into force on October 1, 2020.

https://www.dgs.pt/ficheiros-de-upload-2013/4-vacinacao-de-adultos-pdf.aspx

Missing HPV in the overview

Quadro n.º 1 – Vacinas recomendadas a adultos (≥18 anos de idade)

Vacina/ Infeção-Doença	25 anos	45 anos	65 anos	10/10 anos	Grupos de risco	Anualmente
Tdpa | tétano, difteria e tosse convulsa	Tdpa - Grávidas					
Td |Tétano e difteria	Td	Td	Td	Td		
Gripe						Gripe (ver capítulo específico)
VGZ | Gripe zoonótica					VGZ (ver capítulo específico)	
COVID -19						COVID-19 (ver capítulo específico)
Pn20 e Pn23 | *Streptococcus pneumoniae*			Pn23 (ver capítulo específico)		Pn20+Pn23 (ver capítulo específico)	
MVA-BN | mpox					MVA-BN (ver capítulo específico)	

1 Para informação adicional, deverão ser consultados os capítulos específicos de cada doença.
2 Pollard A.J., Bijker E.M. (2020). A guide to vaccinology: from basic principles to new developments. Disponível aqui.
3 Government of Canada, Vaccination for Adults. Disponível aqui.

VHA | hepatite A					VHA (ver capítulo específico)	
VHB | hepatite B					VHB (ver capítulo específico)	
VIP | poliomielite					VIP (ver capítulo específico)	
VASPR | sarampo, parotidite epidémica e rubéola					VASPR (ver capítulo específico)	

Quadro n.º 2 – Vacinação durante a gravidez

Missing Influenza and COVID-19 in the overview

Vacina[a]	Indicação
Tdpa	Recomendada (20-36 semanas de gestação)[b]
Td, VHB, VIP, MenACWY, Pn20 e Pn23	Administrar, se indicadas
HPV	Não recomendada (por evidência insuficiente)
VASPR	Contraindicada Em situação de risco elevado de infeção, a vacina pode ser substituída por imunização passiva

a-A vacinação anual contra a gripe está também recomendada na gravidez, de acordo com as Normas/Orientações específicas em vigor.
b-A vacinação com Tdpa na gravidez deve ocorrer após a ecografia morfológica e, idealmente, até às 32 semanas de gestação.

Many **vaccines included in the National Vaccination Program for adults or at-risk groups are communicated to the public through specific norms**, often in the form of official documents that are complex and difficult for citizens to understand. This complexity may limit their potential for coverage and community protection.

For adults, the National Vaccination Program includes a Td vaccine to be administered at 25, 45, and 65 years of age, followed by boosters every 10 years. Additional Tdap vaccination is recommended during pregnancy between 20 to 36 weeks of gestation.

RSV and Herpes Zoster currently are not listed and/or recommended by NITAG/DGS. Although the Herpes Zoster vaccine is not included in the National Vaccination Program the use is recommended by the Portuguese Society of Internal Medicine and the Portuguese Association of General and Family Medicine.

Diphtheria and tetanus vaccines are compulsory (link). In general, vaccination under the National Vaccination Programme is not compulsory. However, there are exceptions such as the diphtheria and tetanus vaccines, which apply in the following cases: (i) To enrol in an educational establishment, you must have up to date diphtheria and tetanus vaccinations. (ii) In order to take an exam at an educational establishment, you must also have up to date vaccinations against diphtheria and tetanus.

In Portugal, changes (introduction of new vaccines, changes to the vaccination schedule, or changes to the target population) to the National Vaccination Program (PNV) are made based on proposals from the **Technical Vaccination Committee (CTV)**, created and defined by Executive Order (243/2013 DR II series no. 78 of 22 April 2013). This committee is an advisory body to the Directorate-General for Health, made up of experts from various fields of knowledge who scientifically substantiate all their proposals and submit them to the Directorate-General for Health, which in turn submits them to the supervisory authority. cobertura-vacinal-ate-aos-7-anos-mantem-se-elevada-pdf.aspx

2.3.2 Information from DGS (e.g. Norms) and SNS website https://www.sns24.gov.pt/pt/inicio and https://www.dgs.pt/,

Vaccines	Remarks
Influenza COVID-19	The 2025-2026 Autumn-Winter Seasonal Vaccination Campaign against Influenza and COVID-19 started on September 23, 2025, in health units of the National Health Service (SNS) and community pharmacies, running until April 30, 2026. This year, the campaign's motto is "Get vaccinated and protect the most important moments". The main new feature of the Campaign is the extension of free flu vaccination to all children aged 6 to 23 months. National data shows that this age group has hospitalization and intensive care rates comparable to those recorded among older adults. The Directorate-General for Health also recommends vaccinating children aged 2 to 4 to prevent serious illness.As in the 2024/2025 season, the high-dose flu vaccine will be available to all people aged 85 and over and to residents of residential care facilities, similar institutions, and the National Network of Integrated Continuing Care. This vaccination will take place in health centers, as in the previous season. Therefore, vaccination against the Flu and COVID-19 is recommended and free of charge for the defined eligible groups, resulting in: - **in SNS health units**: for children aged 6 to 23 months, for people aged 60 or over, including people aged 85 or over; professionals and users/residents of ERPI, similar and RNCCI; people with high-risk pathologies; pregnant women and professionals in health services (public and private) and other health care providers, students on clinical placements, firefighters involved in patient transport, carers of dependent people and pharmaceutical distribution professionals, homeless people, prison establishments; - **in community pharmacies**: for users aged between 60 and 84 and pharmacy healthcare professionals.

	This campaign aims to reduce individual susceptibility, the burden of disease, and the impact on health services, particularly the use of hospital emergency rooms and hospitalizations for respiratory infections. For more information see: - Standard No. 009/2025 , referring to the Seasonal Influenza Vaccination Campaign: autumn-winter 2025-2026; - Standard No. 010/2025 , referring to the Vaccination Strategy against COVID-19: Primary Vaccination Schedule and Seasonal Vaccination Campaign autumn-winter 2025-2026; - Guideline No. 004/2025 , referring to Seasonal Vaccination against influenza and COVID-19: Specific Procedures.
Vaccination against zoonotic influenza (Aug 2025) Link 1 Link 2	Vaccination against zoonotic influenza should be carried out in a **pre-exposure context** for workers at increased risk of occupational exposure to the zoonotic influenza virus, as identified in **Table 1 of this Guideline**. 1. **Workers belonging to rapid response and outbreak management teams** for zoonotic influenza in animals* 2. **Laboratory professionals involved in the collection, handling, and analysis of samples** potentially contaminated with zoonotic influenza viruses** 3. **Workers from Wildlife Recovery Centers (CRAS), the Nature and Environment Protection Service (SEPNA), nature rangers from the Institute for Nature Conservation and Forests (ICNF), and municipal/city veterinary services** who have direct contact with sick or dead birds*** * Workers belonging to pre-established teams, identified by the **Directorate-General for Food and Veterinary Affairs (DGAV)** and the **Portuguese Federation of Poultry Associations (FEPASA)**. ** Workers identified by the **National Institute of Health Dr. Ricardo Jorge (INSA)** and the **National Institute for Agrarian and Veterinary Research (INIAV)**. *** Workers identified locally by the **Local Health Authority** and **Local Vaccination Teams**, in coordination with local partners. Vaccine: A(H5N8) of Clade 2.3.4.4b (Zoonotic Influenza Vaccine Seqirus), indicated for protection against the A(H5Nx) virus of Clade 2.3.4.4b. No co-administration with influenza recommended.
Hepatitis A	Vaccination recommended for **travelers and in a post-exposure context** is recommended for contacts of confirmed cases of hepatitis A (cohabitants and sexual contacts), who should be vaccinated up to 2 weeks after the last exposure. **Preventive vaccination is recommended for those who engage in group and/or anonymous sexual practices, or for people living with HIV (PLHIV).** The full vaccination schedule includes two doses of the vaccine, 6 to 12 months. - norma-n-0072025-de-31072025-estrategia-de-imunizacao-contra-a-hepatite-a-pdf.aspx - https://www.dgs.pt/saude-publica1/hepatite-a.aspx

Hepatitis B	- https://www.dgs.pt/ficheiros-de-upload-2013/28-hepatite-b-pdf.aspx - Direção-Geral da Saúde. Circular Normativa n.º 15/DT, de 15/10/2001 – Grupo de risco para a Hepatite B. Direção-Geralda Saúde - Direção-Geral da Saúde. (2025). Relatório do Programa Nacional para as Hepatites Virais 2024. ISBN: 978-972-675-381-0. https://www.dgs.pt/em-destaque/portugal-tem-das-mais-altascoberturas-vacinais-contra-a-hepatite-b-e-supera-os-97-de-taxa-de-cura-na-hepatite-cpdf.aspx • People with end-stage renal disease undergoing hemodialysis or peritoneal dialysis; • People living with someone infected with HBV; • People with hemophilia; • SNS health professionals and health students; • Professionals and users of other institutions for children with psychomotor and/or behavioral development disorders; • People with severe mental disorders • Professionals and users of Cooperatives for the Education and Rehabilitation of Maladjusted Children (CERCIS) • Sex workers. In this group, vaccination should be initiated after screening for detection of • susceptible individuals; • People who use illicit intravenous drugs. In this group, vaccination should be initiated after screening for detection of susceptible individuals
Pneumococcal disease	Norma 19/12/2024 https://www.dgs.pt/normas-orientacoes-e-informacoes/normas-e-circulares-normativas/norma-0132024-de-19122024-atualizacao-da-estrategia-de-vacinacao-pneumococica-programa-nacional-de-vacinacao-e-grupos-de-risco-pdf.aspx Citizens aged 65 and older receive a **69% subsidy for booster vaccination with Pn13 or Pn23**, with the booster fully subsidized for individuals classified as at-risk.

Quadro 5 - Grupos com risco acrescido para DIP para os quais se recomenda a vacinação contra infeções por *S. pneumoniae*, vacinação gratuita e esquema vacinal recomendado. Adultos (≥18 anos de idade)

Condição:	Vacinação gratuita	Esquema vacinal
A – Imunocompetentes		
Adulto com idade ≥ 65 anos, sem as patologias infra [a]	Não	Pn23
Doença cardíaca crónica - Insuficiência cardíaca crónica - Doença cardíaca isquémica - Hipertensão arterial pulmonar - Cardiomiopatias	Não	(Ver situações especiais no Ponto 12)
Doença hepática crónica	Não	Pn20
Dador de medula óssea (antes da doação)	Não	
Diabetes	Não	
Doença respiratória crónica - DPOC - Enfisema - Asma brônquica (sob corticoterapia sistémica ou inalada crónica) - Bronquiectasias - Doença intersticial pulmonar - Fibrose quística - Pneumoconioses - Doenças neuromusculares	Não	(Min. 8 semanas) (6-12 meses após última dose) Pn23
Insuficiência respiratória crónica - Insuficiência respiratória crónica em programa de OLD (Oxigenoterapia de Longa Duração) - Insuficiência respiratória crónica grave (Pa O2 <70mmHg) e FEV1 <50%	Sim	
B – Imunocomprometidos (ou risco acrescido de meningite bacteriana)		
Fístulas de LCR	Sim	(Ver situações especiais no Ponto 12.)
Implantes cocleares (candidatos e portadores)	Sim	
Asplenia e défice do complemento - Asplenia anatómica ou funcional - Hipoesplenismo - Doença de células falciformes - Outras hemoglobinopatias com disfunção esplénica - Défice congénito do complemento - Terapêutica com inibidores do complemento	Sim	Pn20 (Min. 8 semanas) (6-12 meses após última dose) Pn23
Imunodeficiências primárias [b]	Sim	
Infeção por VIH com T CD4+≥500 células/mm3	Não	
Infeção por VIH, com linfócitos T CD4+<500 céls/mm3)	Sim	
Candidatos a transplante (na lista de espera ativa) e transplantados - Células estaminais medulares ou periféricas - Órgãos sólidos	Sim	
Doença neoplásica ativa	Sim	

Página **8** de **16**

NORMA N.º 13/2024 de 19/12/2024

- Leucemias - Linfomas - Mieloma múltiplo		
- Outros tumores malignos	Não	
Síndrome nefrótica	Sim	
Imunossupressão iatrogénica [c] - Terapêutica com fármacos biológicos ou DMARDs (Disease Modifying AntiRheumatic Drugs) - Corticoterapia sistémica - Quimioterapia - Radioterapia	Não	
Doença renal crónica	Não	
Síndrome de Down	Não	

(a) As pessoas que tiverem alguma das doenças listadas, devem cumprir o esquema vacinal de acordo com a patologia em questão
(b) Exclui défice isolado de IgA e doentes em terapêutica de substituição com imunoglobulinas sem função B residual.
(c) Ver situações especiais. Corticosteroides sistémicos:
- Prednisolona ou equivalente em dose ≥20mg/dia, durante ≥14 dias;
- Metotrexato em dose ≥ 0,4 mg/Kg/semana;
- Azatioprina em dose ≥ 3 mg/Kg/dia.

Exemplos de outros fármacos imunossupressores: Leflunomida, Micofenolato de Mofetilo, Ciclofosfamida, Ciclosporina e Tacrolimus, fármacos biológicos ou DMARD (Disease-Modifying AntiRheumatic Drugs utilizados, nomeadamente, na Artrite Reumatóide, Lúpus Eritematoso Sistémico, Síndrome de Sjögren e Doenças Inflamatórias Intestinais), por exemplo Anti-TNF (Infíximab, Etanercept, Adalimumab, Golimumab, Certolizumab pegol); Anti-CD20 (Rituximab); Anti-IL6 (Tocilizumab); CTLA-4-Ig (Abatacept); Anti-BLYS (Belimumab); Anti-IL12 e Anti-IL23 (Ustekinumab); Anti-IL1 (Anakinra).

Mpox	https://www.dgs.pt/normas-orientacoes-e-informacoes/normas-e-circulares-normativas/norma-n-0062022-de-12072022-atualizada-a-21112024-vacinacao-contra-mpox-pdf.aspx
Polio	In adults at increased risk of exposure to the poliovirus, the IPV schedule can be started or completed at any stage, in a 3-dose schedule, complying with the minimum recommended intervals.
Catch up	
MMR	Catch up (adults) - People born after 1970, 18 years of age or older, with no credible history of measles should have at least 1 dose of measles vaccine, administered at or after 12 months of age. All people under 18 years of age should have 2 doses of measles vaccine. All healthcare

	professionals without a credible history of measles should have 2 doses of measles vaccine, regardless of year of birth. https://www.sns24.gov.pt/pt/tema/doencas/doencas-infecciosas/sarampo/
HPV	The recommended age is 10, but vaccination can begin up to age 17 and be completed by age 26 https://eurohealthobservatory.who.int/monitors/pace/case-studies/pace/pace-portugal-2025/advancing-cancer-prevention-through-comprehensive-hpv-vaccination-in-portugal Catch up (adults) – People (male and female) under age of 27 Direção Geral da Saúde Comissão Técnica de Vacinação (NITAG), 2007. Available at: https://www.hpv.pt/pai-mae The maximum age specified by the National Vaccination Program to initiate the vaccination schedule is 17 years for both sexes, with girls able to complete it up to the age of 26 and boys up to the age of 27.

2.3.3 DGS publishes the Blue Book of Vaccines — a new national technical reference for vaccination

Building on the legacy of the National Vaccination Program (PNV), which celebrates its 60th anniversary this year, the Directorate-General for Health (DGS) has launched the Blue Book of Vaccines: National Vaccination Program and other immunization strategies, the new national technical reference on vaccination and immunization, with normative content, which marks a new stage in vaccination in Portugal. The Blue Book of Vaccines aims to streamline information on vaccines and immunoglobulins, keeping pace with their rapid scientific and technological developments, as well as changes in epidemiology, in Portugal and worldwide. It is a collaborative, constantly updated document that will allow for real-time adjustments to vaccination and immunization recommendations, integrating all national vaccination and immunization strategies throughout the life cycle. This technical reference brings together all relevant information on vaccines and immunization. Written based on good practices in healthcare quality and inspired by international models, such as the UK's "Green Book," the Blue Book is the result of interdisciplinary work by experts and institutional partners. By contributing to the evidence-based implementation of vaccination strategies and the dissemination of credible, rigorous, and accessible information, the Blue Book reinforces the DGS's commitment to updating, adapting, and modernizing vaccination strategies in Portugal. This project encourages public participation and social mobilization to strengthen public protection through vaccination. All contributions are welcome.

Cover, Technical Sheet, Preface, Acknowledgments and Index

- **Cover, Technical Sheet, Preface, Acknowledgments and Index** *(last updated 10/03/2025)*

Blue Book of Vaccines: Part 1 – National Vaccination Program

- **Chapter 1 – Framing and historical notes** *(last updated 10/03/2025)*
- **Chapter 2 – PNV - Recommended general scheme** *(last updated 10/03/2025)*

- **Chapter 3 – Emergency vaccination schedules** *(last updated 10/03/2025)*
- **Chapter 4 – Adult vaccination** *(last updated 10/03/2025)*
- **Chapter 5 – Vaccination in special situations** *(last updated 10/03/2025)*
- **Chapter 6 – Vaccination in immunocompromised individuals** *(last updated 10/03/2025)*

Blue Book of Vaccines: Part 2 – General principles of vaccination and immunization

- **Chapter 7 – Immunity and the immune system** *(last updated 10/03/2025)*
- **Chapter 8 – Vaccines and immunoglobulins** *(last updated 10/03/2025)*
- **Chapter 9 – Storage, transportation and disposal of vaccines and immunization products** *(last updated 10/03/2025)*
- **Chapter 10 – Administration of immunization products** *(last updated 10/03/2025)*
- **Chapter 11 – Safety of immunization products** *(last updated 10/03/2025)*

Vaccine Blue Book: Part 3 – Vaccine-Preventable Diseases

- Chapter 12 – Anthrax *(in production)*
- Chapter 13 – Chikungunya *(in production)*
- Chapter 14 – Cholera *(in production)*
- **Chapter 15 – COVID-19** *(last updated 10/03/2025)*
- Chapter 16 – Dengue *(in production)*
- **Chapter 17 – Diphtheria** *(last updated 10/03/2025)*
- **Chapter 18 – Meningococcal disease** *(last updated 10/03/2025)*
- **Chapter 19 – Pneumococcal disease** *(last updated 10/03/2025)*
- **Chapter 20 – Haemophilus influenzae Type b (HIB) Disease** *(last updated 10/03/2025)*
- Chapter 21 – Japanese Encephalitis *(in production)*
- Chapter 22 – Tick-borne viral encephalitis *(in production)*
- Chapter 23 – Yellow fever *(in production)*
- Chapter 24 – Typhoid fever *(in production)*
- **Chapter 25 – Seasonal Flu** *(last updated 10/03/2025)*
- **Chapter 26 – Zoonotic Influenza** *(last updated 10/03/2025)*
- **Chapter 27 – Hepatitis A** *(last updated 10/03/2025)*
- **Chapter 28 – Hepatitis B** *(last updated 10/03/2025)*
- **Chapter 29 – Human papillomavirus infection** *(last updated 10/03/2025)*
- Chapter 30 – Malaria *(in production)*
- **Chapter 31 – Mpox** *(last updated 10/03/2025)*

- **Chapter 32 – Epidemic mumps** *(last updated 10/03/2025)*
- **Chapter 33 – Polio** *(last updated 10/03/2025)*
- Chapter 34 – Anger *(in production)*
- **Chapter 35 – Rotavirus Infection** *(last updated 10/03/2025)*
- **Chapter 36 – Rubella** *(last updated 10/03/2025)*
- **Chapter 37 – Measles** *(last updated 10/03/2025)*
- **Chapter 38 – Tetanus** *(last updated 10/03/2025)*
- **Chapter 39 – Whooping cough** *(last updated 10/03/2025)*
- **Chapter 40 – Tuberculosis** *(last updated 10/03/2025)*
- Chapter 41 – Chickenpox/Herpes Zoster *(in production)*
- **Chapter 42 – Smallpox** *(last updated 10/03/2025)*
- **Chapter 43 – Respiratory syncytial virus** *(last updated 10/03/2025)*

Blue Book of Vaccines: Part 4 – Traveler's Vaccination

- Traveler vaccination *(In production)*

2.4 Insights from a Think Tank initiative dedicated to adult vaccination

Potential questions/outcomes: What were the main outcomes of the Think Tank initiative dedicated to adult vaccination in Portugal in 2024?

2.4.1 George, F., Diogo, J. R., Franco, D., Hermenegildo, C., Castro, M. D., Leite, R. B., Lopes, H., & NOVA Centre for Global Health Lab (2024). ***+Longevity: A Think Tank initiative dedicated to adult vaccination: final report*. Instituto Superior de Estatística e Gestão de Informação da Universidade Nova de Lisboa**. NOVA Information Management School (NOVA IMS).

21 recommendations (*detailed information from page 57-77*):

1. **Investment in Prevention and Healthy Aging**

- Adult Vaccination Program
- Literacy Narrative for Adult Vaccination and Longevity
- Integration of mechanisms in the preventive approach
- Assessing the impact of vaccination in addressing Global Health challenges
- Redefining management indicators for vaccination strategies
- Personalization in data collection and management
- Incentive models for community prevention

2. **Healthcare System Capacity and Community Synergies**

- Strengthening intervention of Community Care Units (CCU) & Public Health Units (PHU)
- Enhancing installed capacity and synergies for surveillance
- Conducting a study to evaluate barriers to adult vaccination access
- New financing models for vaccination

- Multi-annual contracting of vacines
- Platform for best practices in vaccination strategy and coverage management
- Co-financing complementary interventions for vaccination coverage

3. Safeguarding the Commitment of the Adult Population to Vaccination

- Transparency and quality in communication and dissemination of evidence
- Population segmentation in narratives and action lines
- Real-world simulation and impact assessment of vaccination strategies
- Multisectoral cooperation to promote literacy
- Strategic alignment with the Action Plan for Active and Healthy Aging
- Investment in strategies for infodemiological management
- Interventions supported by behavioral science algorithms

ACCESS	RESOURCES	LITERACY	INFORMATION	HETEROGENEITY
Geographic dispersion	Financial (public and out-of-pocket)	Misinformation and skepticism	Monitoring of vaccination coverage	Vaccination recommendations
Socioeconomic contrasts	Technical	Health professionals	Epidemiological mapping	Social and health profile of adults
Health care network	Physical	Civil society	Identification of at-risk population	

A PROPOSAL FOR AN ADULT VACCINATION PROGRAM

INFECTIOUS AGENT	VACCINATION COVERAGE ASSUMPTIONS
Influenza (seasonal flu)	Universal for individuals **aged 60 and older**
Influenza (HD, high dose)	Residents in nursing homes Individuals **aged 75 and older** (ideally extending to 65 and older) and/or with comorbidities placing them in risk groups
COVID-19	Universal (annual)
Pneumococcal disease	Universal for individuals **aged 65 and older** or with comorbidities placing them in risk groups
Respiratory Syncytial Virus (RSV)	Universal for individuals **aged 65 and older** or with comorbidities placing them in risk groups
Tetanus-Diphtheria-Pertussis	Universal **every 25 years** Universal **every 10 years** starting at **age 65**
Herpes Zoster	Universal **starting at age 50** or from age 18 for individuals in risk groups
HPV	Up to **age 46** for both sexes

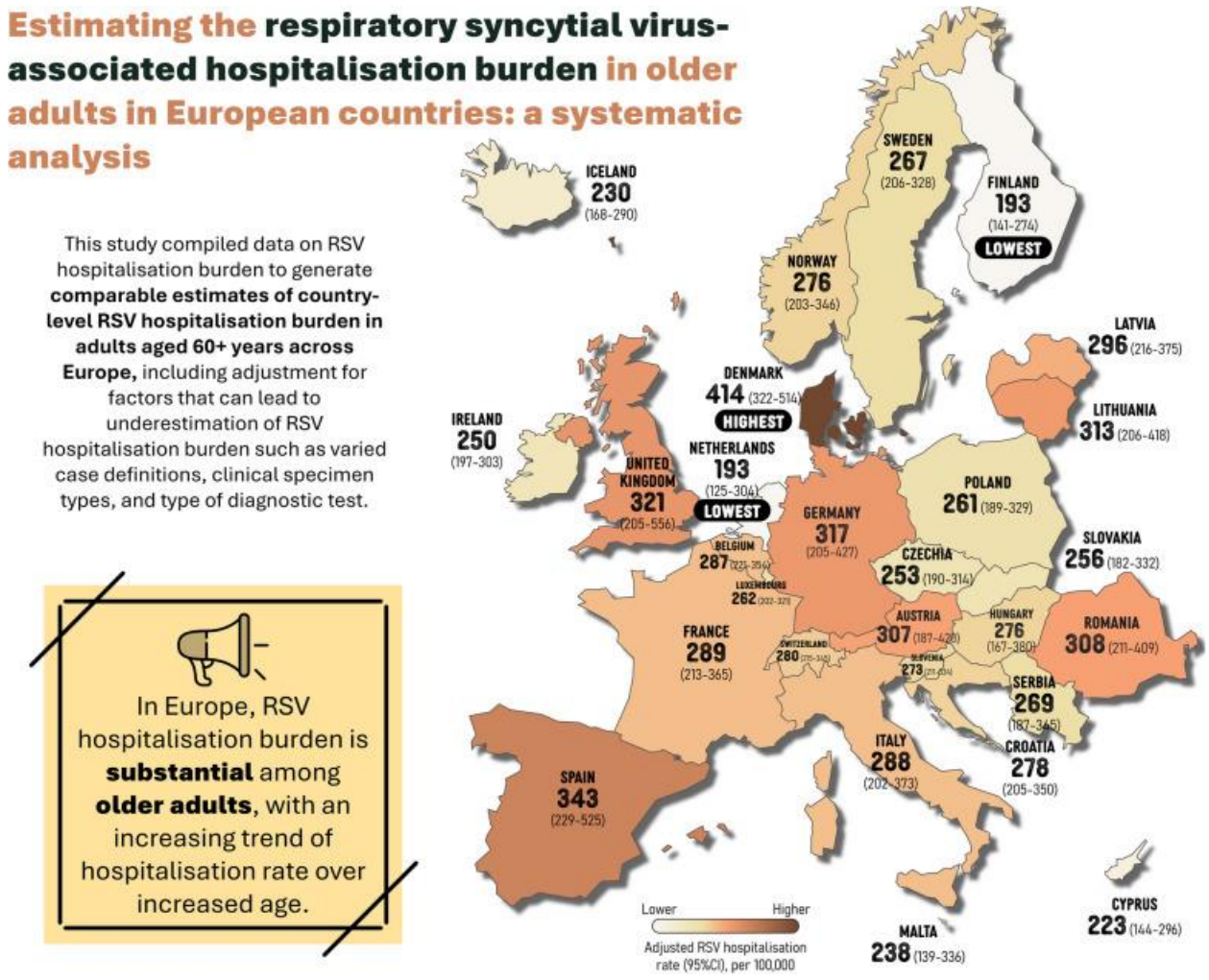
Session 3: Overview of the epidemiology and disease burden of VPI among adults in Portugal

Session 3: Overview of the epidemiology and disease burden of VPI among adults in Portugal	3.1 Disease burden, surveillance, and control of vaccine-preventable infections in Portuguese adults	TBD
	3.2 *Outbreak management*: Viral genetics and transmission dynamics in the second wave of mpox outbreak in Portugal and forecasting public health scenarios	Rita Cordeiro

3.1 Disease burden, surveillance, and control of vaccine-preventable infections in Portuguese adults

3.1.1 Zhang T, Reeves RM, Ma S, Miao Y, Sun S, Orrico-Sánchez A, Panning M, Urchueguía-Fornes A, Vuichard-Gysin D, Nair H, Fonseca MJ, Marijam A, Wang X, Li Y; Respiratory Virus Global Epidemiology Network. Estimating the respiratory syncytial virus-associated hospitalisation burden in older adults in European countries: a systematic analysis. BMC Med. 2025 Aug 4;23(1):453.

Background: With respiratory syncytial virus vaccines recently approved for use among older adults, country-level respiratory syncytial virus (RSV) disease burden estimates are needed to inform local RSV immunisation strategy. We aimed to estimate country-level RSV hospitalisation burden in older adults in Europe. Methods: We compiled data on RSV hospitalisation burden in adults aged ≥ 60 years in Europe from published studies (systematic review: PROSPERO CRD42024516945), surveillance data, and unpublished data from international collaborators. We adjusted for diagnostic testing, clinical specimens, and case definitions through statistical modelling techniques and generated country-level hospitalisation rate estimates; for countries with no available data, we developed an ensemble model to predict RSV hospitalisation rates. We also estimated RSV in-hospital case fatality ratio (hCFR) for countries with available data. Results: We included 14 studies (3 unpublished studies). The adjusted RSV-associated hospitalisation rates were overall 2.2 to 6.4 times higher than unadjusted estimates. Among 5 countries with available data, adjusted annual RSV hospitalisation rates ranged from 193/100,000 person-years in the Netherlands (95% confidence interval [CI]: 125-304) and Finland (141-274) to 414/100,000 in Denmark (322-514). The RSV hospitalisation rates predicted by the ensemble model in 23 additional countries ranged from 223/100,000 to 317/100,000 person-years. RSV hCFR ranged from 6.73% (4.63-9.69) in Spain to 10.14% (4.91-19.79) in Switzerland. Conclusions: This study addresses knowledge gaps in RSV hospitalisation burden among older adults in Europe while highlighting the importance of adjusting for RSV case under-ascertainment. These findings might be relevant for country's considerations of RSV immunisation strategies for older adults.



3.1.2 Almeida ST, Paulo AC, Simões AS, Ferreira B, Sá-Leão R. Streptococcus pneumoniae carriage in adults during the COVID-19 pandemic in Portugal: dominance of serotypes included in broader PCVs and of serotype 3. mSphere. 2025 Jul 29;10(7):e0008225.

Streptococcus pneumoniae (pneumococcus) is a leading cause of infections, particularly in infants and the elderly. Recent advances in molecular methods suggest higher pneumococcal carriage rates among adults than previously estimated, raising questions about their role in transmission. This study aimed to estimate pneumococcal carriage prevalence, identify circulating serotypes, and assess risk factors for colonization among adults during the COVID-19 pandemic in Portugal. We conducted a prospective observational study among civil servants aged ≥18 years in Oeiras Municipality from February 2021 to February 2022. Paired nasopharyngeal and oropharyngeal samples were analyzed using qPCR to detect pneumococcal carriage and 66 serotypes/serogroups. This included novel primers and probes for serotypes 4 and 24B/F, overcoming previous concerns associated with false positivity. Risk factors were identified using Bayesian adaptive sampling for variable selection in generalized linear model. Among 3,574 participants, 6.9% were pneumococcal carriers through qPCR without prior culture enrichment. Carriage rates were higher in oropharyngeal than nasopharyngeal samples (5.3% vs 3.7%, $P < 0.001$). Twenty-six serotypes/serogroups were identified, with **the most common being non-encapsulated (NT), 10A, 23B, 3, 11A/D,**

33A/F/37, 16F, and 31. Excluding NT, the most frequent serotypes collectively accounted for 45.3% of all carriers. **Vaccine coverage estimates were 13.5% for PCV13, 20.4% for PCV15, 40.0% for PCV20, and 64.1% for PCV21.** Contact with children < 18 years increased the odds of colonization by 2.73-fold (95% confidence interval [CI], 2.01-3.75), while being male reduced the odds by 54% (odds ratio = 0.46; 95% CI, 0.30-0.69). **These findings emphasize the need for ongoing surveillance to clarify adults' role in pneumococcal transmission and support prevention strategies, including adult vaccination and community-level interventions, to mitigate pneumococcal disease.**

3.1.3 Guimarães de Oliveira D, Grande A, Belchior F, Costa R, Francisco R, Oliveira N, Calle M. Severe respiratory syncytial virus infection in older adults - burden, clinical outcomes and implications for care. Respir Med Res. 2025 May 6;88:101173.

Background: Respiratory syncytial virus (RSV) infection in adults remains under-researched. Increased testing is revealing an emerging picture of severe outcomes within the most prevalent lower respiratory tract infections. Understanding risk factors is increasingly important, especially in light of the recent approval of prophylactic vaccination. **Methods:** Retrospective evaluation of all real-time polymerase chain reaction-positive RSV cases detected at our institution over three consecutive infection seasons from 2021 to 2024 in adults aged 60 years and older. Subsequent assessment of patients with severe infection requiring hospitalization. **Results:** A total of 574 individuals were included, 57 % of whom were female, with a median age of 81,1 years (IQR 74-87 years). The peak number of cases occurred between September and March. We found a hospitalization rate of 51,2 % (representing an incidence of 1 case per 758 inhabitants per year in the elderly population of our region) and an in-hospital mortality rate of 15,6 % (19,1 % if transferred patients are excluded) among older adults with PCR-confirmed RSV infection. Heart failure ($p \leq 0.001$), asthma ($p = 0005$), chronic kidney disease ($p = 0006$), chronic obstructive pulmonary disease ($p = 0,02$) and active smoking ($p = 0.01$) were risk factors for hospitalization. Older age ($p = 0.003$), residing in long-term care facility ($p = 0.003$), active cancer ($p = 0,01$), lower lymphocytes ($p \leq 0,001$) and higher creatinine ($p = 0,01$) were significantly associated with mortality. **Conclusions:** This is the first review of health outcomes related to RSV infection in the elderly from a Portuguese hospital. It identifies a high burden of hospitalization and in-hospital mortality in the elderly population. Our findings highlight the need for increased awareness of RSV infection in adults, particularly older adults, and underscore the importance of targeted interventions, such as vaccination programs, to reduce the burden of this disease in vulnerable populations in Portugal.

3.1.4 Marques DF, Kovacs D, Sanchez-Ruiz MA, Rodrigues AP, Machado A, Mazagatos C, Monge S, Domegan L, O'Donnell J, Hooiveld M, Emborg HD, Nunes B, Carvalho C, Rose AM. Evaluation of European severe acute respiratory infection (SARI) surveillance, 27 European countries, 2022/23. Euro Surveill. 2025 May;30(20):2400655.

Background Between 2020 and 2023, ECDC has supported 21 of 30 EU/EEA and six Western Balkan countries by enhancing severe acute respiratory infection (SARI) surveillance to monitor trends, detect unexpected events, evaluate public health interventions, identify risk factors and support vaccine effectiveness studies. Using diverse strategies, countries have implemented SARI surveillance and reported data at national/European levels. Aim We evaluated European-level SARI surveillance and provided recommendations to achieve objectives and improve key attribute performance. Methods We analysed 2022/23 surveillance data for completeness. We administered a questionnaire, targeting country-level

representatives, to evaluate surveillance attributes (meeting objectives, usefulness, acceptability, timeliness, representativeness) and identify strengths, weaknesses, opportunities and threats. Results Thirteen countries (13/27) reported data at European level. Data showed good overall completeness but varied across countries and some variables need improvement (vaccination, sequencing). The questionnaire was completed by all 27 countries. Most countries (23/27) reported that the system effectively monitored trends and considered it useful and acceptable (25/27), but only 16 found it timely and 14 representative. **Challenges included insufficient case-based data, data linkage issues and insufficient data completeness. Slow/inefficient manual data extraction affected timeliness, while insufficient geographical coverage affected representativeness. Multi-pathogen surveillance was identified as the main strength, heterogeneity of systems the main weakness, improvements of hospital information systems the main opportunity, and lack of sustainable funding the main threat**. Conclusions SARI surveillance was perceived as effective in monitoring trends, useful and acceptable. To achieve additional objectives and enhance timeliness and representativeness, we recommend **improving data completeness, digitalisation/automation and geographical coverage.**

3.1.5 Silva-Costa C, Gomes-Silva J, Santos A, Ramirez M, Melo-Cristino J; Portuguese Group for the Study of Streptococcal Infections. Adult non-invasive pneumococcal pneumonia in Portugal is dominated by serotype 3 and non-PCV13 serotypes 3-years after near universal PCV13 use in children. Front Public Health. 2023 Dec 20;11:1279656.

Introduction: Non-invasive pneumococcal pneumonia (NIPP) is possibly the most frequent infection by *Streptococcus pneumoniae* in adults. However, the herd effect of vaccinating children in adult NIPP (aNIPP) remains poorly characterized. **Methods:** We determined the serotype distribution and antimicrobial susceptibility of isolates causing aNIPP (>18 years) in 2016-2018 in Portugal; 3 years with near universal vaccination of children with the 13-valent conjugate vaccine (PCV13), following over a decade of significant PCV use in children in the private market. **Results and discussion:** Among the 1,149 aNIPP isolates, the most frequent serotypes detected were: **3 (*n* = 168, 14.6%), 11A (*n* = 102, 8.9%), 19F (*n* = 70, 6.1%), 23A and 23B (*n* = 62, 5.4% each), 9N (*n* = 60, 5.2%), 8 and 29/35B (*n* = 43, 3.7% each); together accounting for 53% of all isolates.** The serotype distribution causing aNIPP was stable in 2016-2018, with the serotypes included in PCV7 still being important causes of disease and serotype 3, a PCV13 serotype, remaining the leading cause of aNIPP. There was an increase in penicillin non-susceptibility from 17% in 2016 to 24% in 2018 (p = 0.018). Some PCV13 serotypes, such as 14, 19A and 19F were associated to resistance, which may have contributed to their persistence. **The fact that close to 20% of aNIPP is caused by four non-vaccine serotypes (23A, 23B, 9N, and 29/35B) and that there were significant differences in serotype distribution relative to invasive disease, stress the importance of maintaining the surveillance of these infections.** The lack of a continued herd effect from vaccinating children and the significant fraction of aNIPP potentially preventable by **PCV13 (30%), PCV15 (34%), PCV20 (53%) and the 23-valent polysaccharide vaccine (61%) underscore the importance of considering the broader use of pneumococcal vaccines in adults.**

3.1.6 Navarro-Torné A, Montuori EA, Kossyvaki V, Méndez C. Burden of pneumococcal disease among adults in Southern Europe (Spain, Portugal, Italy, and Greece): a systematic review and meta-analysis. Hum Vaccin Immunother. 2021 Oct 3;17(10):3670-3686.

The aim was to summarize pneumococcal disease burden data among adults in Southern Europe and the potential impact of vaccines on epidemiology. Of 4779 identified studies, 272 were selected. Invasive pneumococcal disease (IPD) incidence was 15.08 (95% CI 11.01-20.65) in Spain versus 2.56 (95% CI 1.54-4.24) per 100,000 population in Italy. Pneumococcal pneumonia incidence was 19.59 (95% CI 10.74-35.74) in Spain versus 2.19 (95% CI 1.36-3.54) per 100,000 population in Italy. Analysis of IPD incidence in Spain comparing pre-and post- PCV7 and PCV13 periods unveiled a declining trend in vaccine-type IPD incidence (larger and statistically significant for the elderly), suggesting indirect effects of childhood vaccination programme. **Data from Portugal, Greece and, to a lesser extent, Italy were sparse, thus improved surveillance is needed. Pneumococcal vaccination uptake, particularly among the elderly and adults with chronic and immunosuppressing conditions, should be improved, including shift to a higher-valency pneumococcal conjugate vaccine when available.**

3.2 Outbreak management: Viral genetics and transmission dynamics in the second wave of mpox outbreak in Portugal and forecasting public health scenarios

Potential questions/outcomes: How is the National Epidemiological Surveillance System (SINAVE) used during outbreaks? Which teams were part of the Emergency Response Team (ERT), including laboratory services, public health units, and clinical teams? What do the findings show regarding diagnostic performance, viral genetics, transmission dynamics, and outbreak management? What lessons were learned across the different outbreak waves?

3.2.1 Cordeiro R, Francisco R, Pelerito A, Lopes de Carvalho I, Núncio MS. Mpox Surveillance and Laboratory Response in Portugal: Lessons Learned from Three Outbreak Waves (2022-2025). Infect Dis Rep. 2025 Jul 21;17(4):86.

Background/Objectives: Mpox re-emerged in 2022 as a global health concern. Between 2022 and 2025, Portugal experienced three distinct outbreak waves, highlighting the critical role of laboratory surveillance and public health interventions. This study describes the epidemiological trends, diagnostic performance, and key lessons learned to improve outbreak preparedness. Methods: A total of 5610 clinical samples from 2802 suspected cases were analyzed at the National Institute of Health Doutor Ricardo Jorge using real-time PCR methods. Positivity rates and viral loads (Ct values) were assessed across different clinical specimen types, including lesion, anal, oropharyngeal swabs, and urine samples. Results: Mpox was confirmed in 1202 patients. The first outbreak accounted for 79.3% of cases (n = 953), followed by a significant reduction in transmission during subsequent waves. Lesion and rectal swabs provided the highest diagnostic sensitivity (95.1% and 87.9%, respectively). Oropharyngeal swabs contributed to diagnosis in cases without visible lesions, while urine samples showed limited utility. Conclusions: This study underscores the importance of sustained laboratory surveillance and adaptive public health **strategies in controlling mpox outbreaks. Optimizing specimen collection enhances diagnostic accuracy, supporting early detection. Continuous monitoring, combined with targeted vaccination and effective risk communication, is essential to prevent resurgence and ensure rapid response in non-endemic regions**.

3.2.2 Cordeiro R, da Conceição Batista F, …, Núcio MS, Gomes JP. Undetected Circulation of Monkeypox Virus in Portugal: Evidence for a 50-Day Gap Before First Detection. Glob Epidemiol. 2025 (GEPI-D-25-00079R1 - Under review).

Background/Objectives: This study reconstructed the initial phase of the 2022 mpox outbreak in Portugal to determine how long the virus circulated before the first confirmed case. Modelling of symptom-onset data and growth dynamics indicated that mpox transmission had begun in late March 2022, well before clinical suspicion emerged. **The work highlights the challenges of detecting early community spread of emerging infections**. Methods: The analysis included laboratory-confirmed mpox cases notified through national surveillance. **A negative binomial distribution was used to estimate onset-to-sample delays, and a Richards logistic curve was applied to model early outbreak growth.** Missing epidemiological information was addressed through multiple imputation to produce a more accurate reconstruction of the epidemic curve. Results: **The estimated onset date of the earliest infections was 27 March 2022, corresponding to approximately 50 days of undetected viral circulation before the first laboratory-confirmed case on 17 May**. Early delays between symptom onset and testing, combined with incomplete onset data, contributed to the difficulty in recognizing the initial transmission period. **Despite these challenges, once mpox was identified in May, surveillance, laboratory capacity and public health actions were rapidly strengthened. Portugal quickly expanded diagnostic testing, improved detection pathways and intensified case investigation and reporting, which enabled faster recognition and interruption of subsequent transmission chains.** Conclusions: **The findings show that mpox circulated silently in Portugal for nearly two months before detection, revealing the limitations of early outbreak recognition in non-endemic settings**. The reconstruction of hidden transmission underscores the need for more sensitive and adaptive surveillance systems, better data completeness and early integration of modelling approaches. **At the same time, the rapid expansion of testing capacity, reinforced laboratory coordination and prompt activation of public health response mechanisms after the first detected case demonstrate the effectiveness of the national reaction once circulation was identified.**

3.2.3 Cordeiro R, Caetano CP, … , Núncio MS, Borges V, Gomes JP. Viral genetics and transmission dynamics in the second wave of mpox outbreak in Portugal and forecasting public health scenarios. Emerg Microbes Infect. 2024 Dec;13(1):2412635

In 2023, a second wave of the global mpox epidemic, which is mainly affecting men who have sex with men (MSM), was observed in some countries. Herein, we benefited from a large viral sequence sampling (76/121; 63%) and vast epidemiological data to characterise the reemergence and circulation of the Monkeypox virus (MPXV) in Portugal during 2023. We also modelled transmission and forecasted public health scenarios through a compartmental susceptible-exposed-infectious-recovered (SEIR) model. Our results suggest that the 2023 mpox wave in Portugal resulted from limited introduction(s) of MPXV belonging to C.1.1 sublineage, hypothetically from Asia, followed by sustained viral transmission and potential exportation to other countries. We estimated that the contribution of the **MSM high sexual activity group to mpox transmission was 120 (95% CrI: 30-3553) times higher than that of the low sexual activity group. However, among the high sexual activity group, vaccinated individuals likely contributed approximately eight times less [0.123 (95% CrI: 0.068-0.208)] than the unvaccinated ones. Vaccination was also linked to potential reduced disease severity, with a Mpox Severity Score of 6.0 in the vaccinated group compared to 7.0 in**

unvaccinated individuals. Scenario analysis indicated that transmission is highly sensitive to sexual behaviour, projecting that a slight increase in the MSM sub-population with high sexual activity can trigger new mpox waves. **This study strongly supports that continued vaccination, targeted awareness among risk groups and routine genomic epidemiology is needed to anticipate and respond to novel MPXV threats (e.g. global dissemination of clade I viruses).**

Session 4: Implementation and delivery of adult vaccination services in Portugal

Session 4: Implementation and delivery of adult vaccination services in Portugal	4.1 From DGS perspective	Natália Pereira
	4.2 From the GP perspective	Claudia Vicente
	4.3 From the nurse perspective	Tiago Nascimento
	4.4 From the pharmacist perspective	Ema Paulino

Potential questions/outcomes: What role do you play in adults vaccinations in Portugal? What systems are in place to support your work in delivering adult immunization (e.g. training, reminders, guidelines)? What improvements would make it easier for you to promote and administer vaccines?

4.1 From DGS perspective

4.1.1 https://www.dgs.pt/em-destaque/cobertura-vacinal-ate-aos-7-anos-mantem-se-elevada-pdf.aspx

COVID-19 and influenza Vaccination can be done at the following locations:

Community Pharmacies (that meet the defined technical and regulatory criteria) **(https://www.infarmed.pt/web/infarmed/campanha-de-vacinacao-sazonal-do-outono-inverno-gripe-e-covid-19):**

- Users 50-84 years old (no record of serious adverse reaction or hypersensitivity to any of the vaccines, have previously received an mRNA technology vaccine (i.e., those marketed by Pfizer or Moderna laboratories), in the case of COVID-19 vaccination
- Pharmacy health professionals

SNS primary healthcare services:

- Users 50-84 years old
- Users 85+ years old (receive high-dose influenza vaccine)
- Professionals and users/residents of ERPI, similar and RNCCI
- People with risk pathologies
- Pregnant
- Health service professionals (public and private) and other health care providers, students in clinical internship, firefighters involved in the transport of patients, care providers for dependent people and pharmaceutical distribution professionals, homeless people, prisons

Around **3,500 vaccination points** were made available during the Seasonal Campaign, involving **2,570 community pharmacies** and about **1,000 primary healthcare units** of the SNS, and other vaccination sites: outside healthcare units (**at home, Occupational**

Health and Safety Services/Occupational Health units within healthcare facilities, Residential Structures for the Elderly (ERPI) and similar institutions, prisons)

During the period under analysis, **1,569,167 COVID-19 vaccine doses** were administered (**54.9% in community pharmacies** and **45.1% in SNS Health Units**) and **2,405,445 influenza vaccine doses** were administered (**54.4% in community pharmacies** and **45.6% in SNS Health Units**).

Of these, **1,365,764 doses (57%)** were administered through **co-administration.**

If you are eligible for seasonal vaccination, you do not need a prescription, and you only need to present the Citizen Card.

https://www.dgs.pt/publicacoes/relatorio-vacinacao-sazonal.aspx

Tabela 4. Número de pessoas vacinadas por grupo específico.

Grupo específico	COVID-19			Gripe		
	2024/2025	2023/2024	Variação	2024/2025	2023/2024	Variação
Elegível por idade (≥ 60 anos)	1 362 670	1 687 341	-19%	1 923 988	1 992 027	-3%
Residentes ERPI/RNCCI e similares	136 400	139 463	-2%	158 407	153 900	+3%
Profissionais ERPI/RNCCI e similares	19 229	27 183	-29%	38 855	38 699	≈
Profissionais de saúde	39 872	52 105	-23%	63 218	65 182	-3%
Patologias de risco	113 926	153 715	-26%	188 826	185 755	+2%
Estabelecimentos prisionais (residentes e profissionais)	3 632	5 062	-28%	4 936	6 025	-18%
Outros*	12 647	19 751	-36%	75 902	79 180	-4%

Fonte: VACINAS. Dados extraídos a 19/05/2025.
* Neste grupo são consideradas grávidas, pessoas em situação de sem-abrigo e bombeiros/proteção civil.

In comparison with the previous season, the **number of people vaccinated by specific group** shows a **reduction for both vaccines**, except for the **target groups of residents and staff in ERPI/RNCCI and similar institutions**, and for **people with risk pathologies** with respect to **influenza vaccination**, where coverage was maintained or increased.

Tabela 6. Número de pessoas vacinadas e cobertura vacinal por grupo etário.

	COVID-19		Gripe	
Grupo Etário	**Nº de pessoas vacinadas**	**Cobertura vacinal**	**Nº de pessoas vacinadas**	**Cobertura vacinal**
≥ 85 anos	223 242	65,27%	291 068	85,10%
80-84 anos	186 152	53,48%	258 610	74,29%
70-79 anos	517 501	50,85%	743 524	73,05%
60-69 anos	435 775	33,58%	630 786	48,61%
Total ≥ 65 anos	**1 172 046**	**50,21%**	**1 647 708**	**70,58%**
Total ≥ 60 anos	**1 362 670**	**45,34%**	**1 923 988**	**64,01%**
50-59 anos*	121 894		232 405	
25-49 anos**	74 895		189 325	
18-24 anos**	5 922		19 876	
0-17 anos**	3 782		39 848	

Fonte: VACINAS. Dados extraídos a 19/05/2025.
* Foi alargado o acesso à vacinação sazonal contra a gripe e contra a COVID-19 ao grupo dos 50-59 anos a 17/12/2024.
** Vacinação de grupos de risco.

- **Compared with the previous campaign, there was a general reduction in COVID-19 vaccination coverage, while influenza coverage remained similar, with an increase in the 85+ age group.**
- For people aged 60 and older, **the Algarve region** had the lowest coverage for both COVID-19 and influenza (30.51% and 47.48%, respectively)

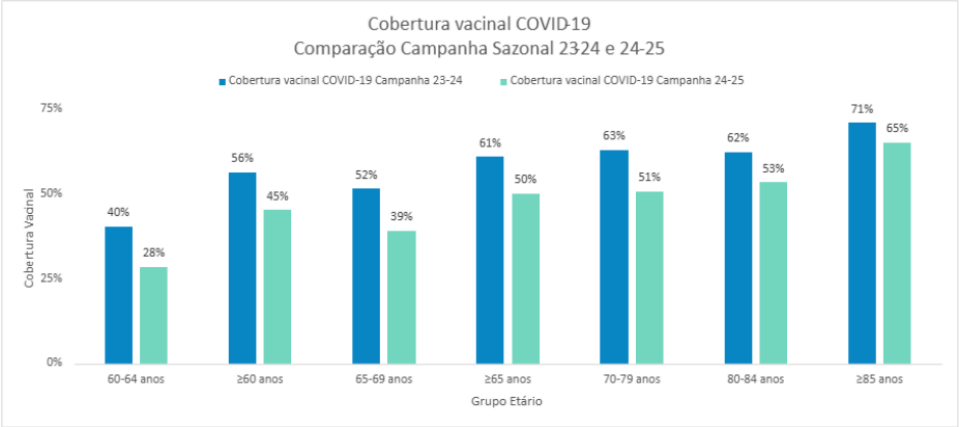


Figura 5. Comparação das coberturas vacinais contra a COVID-19 por grupo etário na Campanha Sazonal 2023-24 e 2024-25.

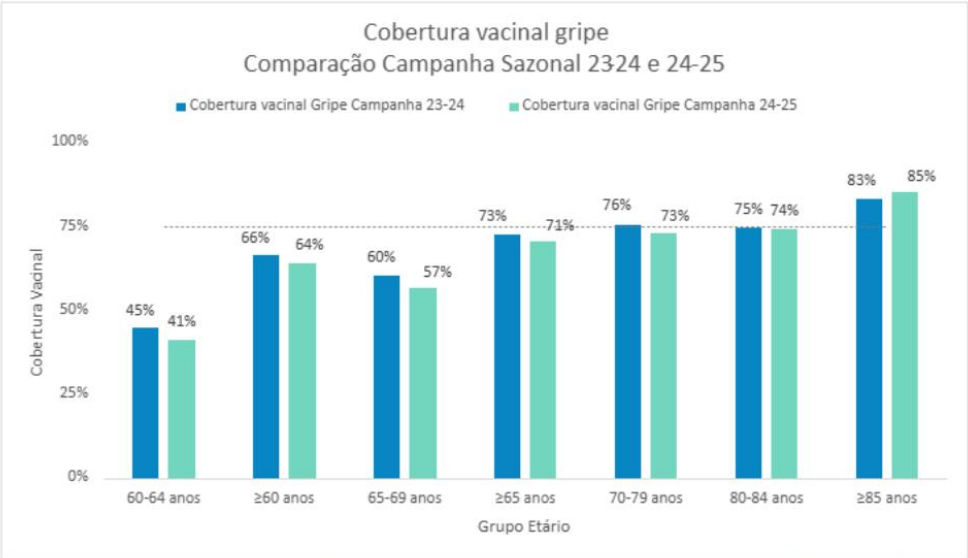


Figura 6. Comparação das coberturas vacinais contra a gripe por grupo etário na Campanha Sazonal 2023-24 e 2024-25.

Recommendations:

- **Maintain or increase the availability of vaccination points** through coordinated efforts between the National Health Service (SNS) and community pharmacies.
- **Direct communication to eligible populations in a personalized manner** for each **age group**, and adapt communication campaigns and their frequency accordingly.
- Implement specific strategies to promote seasonal vaccination and **increase coverage rates among healthcare professionals.**
- Develop a robust module for monitoring and tracking vaccine stocks throughout the campaign.
- Adapt the **operational planning of seasonal vaccination at the local level** regarding vaccine distribution, invitations, and scheduling of eligible individuals, in alignment with the national vaccine distribution plan, taking into account phased and progressive distribution over the course of the campaign.
- Always promote **active invitations to eligible groups**, combined with other strategies to minimize identified barriers, such as providing **self-scheduling platforms and "Open House" vaccination sessions.**

4.1.2 Martinho J, Leite A. Rural-urban differences in healthcare utilization across different outcomes in Portugal. J Public Health (Oxf). 2025 Oct 2:fdaf123.

Background: Urbanization influences healthcare access and utilization, contributing to health disparities. This study aims to assess the effect of degree of urbanization on healthcare utilization in Portugal, where urbanization levels are above global average. Methods: Utilizing data from the 2019 National Health Survey, this cross-sectional study analyzed the association between degree of urbanization and outcomes including general and specialist consultations, flu vaccination, colonoscopy, and wait times. Adjusted prevalence ratios (aPR) were estimated using Poisson regression models. Results: Less populated areas had increased wait times (aPR = 1.54; 95% confidence intervals [95% CI]: 1.06-2.24) and lower colonoscopy utilization

(aPR = 0.86; 95% CI: 0.78-0.95). **Flu vaccination rates were higher in rural (aPR = 1.15; 95% CI: 1.03-1.30) and suburban areas (aPR = 1.16; 95% CI: 1.04-1.30).** No significant association was found for general/specialist consultations or excessive wait times. Conclusions: Geographic constraints limit healthcare access in less populated areas. Urban areas showed suboptimal flu vaccination rates, suggesting a need for improved immunization strategies. Addressing geographical disparities is crucial for ensuring equitable healthcare access across Portugal.

4.1.3 Batista-da-Silva AA, Bastos LSL, Arouca LE, Gonzaga-da-Silva TW, Hamacher S, Bozza FA, Ranzani OT. #VacinaMare campaign: addressing vaccine inequity in socially vulnerabilised communities. Lancet Reg Health Am. 2024 Jun 24;36:100827.

4.1.4 Sandmann FG, van Leeuwen E, Bernard-Stoecklin S, Casado I, Castilla J, Domegan L, Gherasim A, Hooiveld M, Kislaya I, Larrauri A, Levy-Bruhl D, Machado A, Marques DFP, Martínez-Baz I, Mazagatos C, McMenamin J, Meijer A, Murray JLK, Nunes B, O'Donnell J, Reynolds A, Thorrington D, Pebody R, Baguelin M. Health and economic impact of seasonal influenza mass vaccination strategies in European settings: A mathematical modelling and cost-effectiveness analysis. Vaccine. 2022 Feb 23;40(9):1306-1315.

Introduction: Despite seasonal influenza vaccination programmes in most countries targeting individuals aged ≥ 65 (or ≥ 55) years and high risk-groups, significant disease burden remains. We explored the impact and cost-effectiveness of 27 vaccination programmes targeting the elderly and/or children in eight European settings (n = 205.8 million). **Methods:** We used an age-structured dynamic-transmission model to infer age- and (sub-)type-specific seasonal influenza virus infections calibrated to England, France, Ireland, Navarra, The Netherlands, Portugal, Scotland, and Spain between 2010/11 and 2017/18. The base-case vaccination scenario consisted of non-adjuvanted, non-high dose trivalent vaccines (TV) and no universal paediatric vaccination. We explored i) moving the elderly to "improved" (i.e., adjuvanted or high-dose) trivalent vaccines (iTV) or non-adjuvanted non-high-dose quadrivalent vaccines (QV); ii) adopting mass paediatric vaccination with TV or QV; and iii) combining the elderly and paediatric strategies. We estimated setting-specific costs and quality-adjusted life years (QALYs) gained from the healthcare perspective, and discounted QALYs at 3.0%. **Results:** In the elderly, the estimated numbers of infection per 100,000 population are reduced by a median of 261.5 (range across settings: 154.4, 475.7) when moving the elderly to iTV and by 150.8 (77.6, 262.3) when moving them to QV. Through indirect protection, adopting mass paediatric programmes with 25% uptake achieves similar reductions in the elderly of 233.6 using TV (range: 58.9, 425.6) or 266.5 using QV (65.7, 477.9), with substantial health gains from averted infections across ages. At €35,000/QALY gained, moving the elderly to iTV plus adopting mass paediatric QV programmes provides the highest mean net benefits and probabilities of being cost-effective in all settings and paediatric coverage levels. **Conclusion:** Given the direct and indirect protection, and depending on the vaccine prices, model results support a **combination of having moved the elderly to an improved vaccine and adopting universal paediatric vaccination programmes** across the European settings.

4.2 From the GP perspective

4.2.1 Mendonça J, Hilário AP, Gouveia L. Motivational Interviewing to Address Vaccine Hesitancy: Insights from an Intervention in Portugal. Port J Public Health. 2024 Aug 27;42(3):195-205.

Research, to date, suggests the need for healthcare professionals to **adapt their communication style to the needs and characteristics of parents when discussing childhood vaccination.** Motivational interviewing (MI) has been recognized as an important communication style, based on a patient-centred model of care, leading to the responsibility and motivation to change in cases of vaccine hesitancy. The current study intended to assess the attainment of MI competencies by healthcare professionals in Portugal who may interact with vaccine-hesitant parents. The pre- and post-training survey results showed a significant increase in the participants' scores in all three pre-defined dimensions: **acquisition of knowledge, perception of skills application, and sense of confidence**. Our results suggest that integrating MI training into healthcare professionals' curriculum appears to be a promising avenue to pursue to foster their immunization-related communication skills in Portugal and elsewhere.

4.2.2 Holford D, Schmid P, Fasce A, Garrison A, Karlsson L, Taubert F, Verger P, Lewandowsky S, Fisher H, Betsch C, Rodrigues F, Soveri A. Difficulties faced by physicians from four European countries in rebutting antivaccination arguments: a cross-sectional study. BMJ Public Health. 2024 Mar 12;2(1):e000195.

Introduction: Physicians play a critical role in encouraging their patients to get vaccinated, in part by responding to patients' concerns about vaccines. It is, therefore, important to understand what difficulties physicians have in dealing with different concerns they may encounter. The aim of this article was to determine physicians' perceptions of difficulties in rebutting different antivaccination arguments from patients using data collected as part of a cross-sectional, cross-national questionnaire on physicians' vaccine attitudes and behaviours. **Methods:** Physicians in 4 European countries (Finland, Germany, France and Portugal, total n=2718) rated 33 different arguments, chosen to represent 11 different psychological motivations underlying vaccine hesitancy, in terms of their perceptions of how difficult each argument would be to rebut. **Results:** Across all countries, physicians perceived arguments based on religious concerns and 'reactance' (ie, resistance to perceived curbs of freedom) to be the most difficult to rebut, whereas arguments based on patients' distorted perception of the risks of disease and vaccines were perceived to be the easiest. There were also between-country differences in the level of perceived difficulty of argument rebuttal. **Physicians' perceived difficulty with rebutting arguments was significantly negatively correlated with their vaccine recommendation behaviours and their preparedness for vaccination discussions**. **Conclusions:** Physicians may feel better equipped to counter arguments that can be rebutted with facts and evidence but may struggle to respond when arguments are motivated by psychological dispositions or values.

4.2.3 Augusto FR, Hilário AP, Mendonça J. More than meets the eye: Understanding the importance of the materialities of care at the vaccination encounter in Portugal. Health (London). 2025 Jan 18:13634593241313432

Caring practices during vaccination encounters are deeply interwoven with materiality, encompassing everyday objects and elements that play a crucial role for all actors involved.

However, the significance of these materialities in shaping caring relationships within vaccination practices has been largely overlooked. This research seeks to fill that gap by exploring how mundane elements, such as the objects present during vaccination, contribute to the relational dynamics of the experience. Through a qualitative approach involving participant observation of vaccination encounters and interviews with 30 healthcare professionals, **four key themes emerged: (i) objects as comfort devices, (ii) caring as gifts, (iii) reinvented medical instruments, and (iv) creating a friendly environment.** These findings suggest that material elements are not merely passive tools but active "co-participants" in the vaccination process, influencing the interactions and emotional exchanges that occur. By acknowledging the role of materiality, this research enhances our understanding of vaccination as a relational experience, highlighting the importance of considering these often-overlooked factors in both practice and policy. The study offers valuable insights into how healthcare professionals can utilize materialities to foster more empathetic and supportive vaccination environments.

4.2.4 AGuisado-Clavero M, Gómez-Bravo R, Gefaell Larrondo I, Ramos Del Rio L, Fitzgerald L, Vinker S, Vaes B, … , Ares-Blanco S, Astier-Peña MP, Lingner H. Diverse roles of Primary Health Care in COVID-19 vaccination across 28 European countries - Insights from the Eurodata study. Eur J Gen Pract. 2024 Dec;30(1):2409240. Epub 2024 Oct 22. Erratum in: Eur J Gen Pract. 2025 Dec;31(1):2477962.

4.3 From the nurse perspective

4.3.1 Marques-Vieira CMA, Domingues TD, Tholl AD, Nitschke RG, Pérez-Rivas FJ, Ajejas-Bazán MJ, Roquette-Viana MC. Attitudes and Behaviors towards Vaccination in Portuguese Nursing Students. Vaccines (Basel). 2023 Apr 14;11(4):847.

Knowing the attitudes and behaviors of nursing students in relation to vaccination is important because they will soon be determinant for the health literacy of the population. Vaccination remains the most effective response in the fight against communicable diseases, including COVID-19 and influenza. The objective of this study is to analyze the attitudes and behaviors of Portuguese nursing students with regard to vaccination. A cross-sectional study was carried out, with data collection from nursing students at a university in Lisbon, Portugal. A sample of 216 nursing students was obtained, representing 67.1% of the students enrolled in this university. What stands out from the results of the questionnaire "Attitudes and Behaviors in Relation to Vaccination among Students of Health Sciences" is that for the majority of students the answers were positive; in addition, 84.7% had a completed vaccination schedule for COVID-19. **Being a nursing student, being in the final years of the course and being a woman are the factors that most influence the positive attitude of the students**. The results obtained are motivating, because these students will be the future health professionals most likely to integrate health promotion programs through vaccination.

4.4 From the pharmacist perspective

4.4.1 Valeiro C, Silva V, Balteiro J, Patterson D, Bezerra G, Mealiff K, Matos C, Jesus Â, Joaquim J. Pharmacy Technicians in Immunization Services: Mapping Roles and Responsibilities Through a Scoping Review. Healthcare (Basel). 2025 Jul 30;13(15):1862.

Background: Pharmacy technicians are increasingly involved in immunization services, enhancing vaccine accessibility and reducing pharmacies' workload. This scoping review aims

to (1) provide a comprehensive overview of pharmacy technicians' involvement in immunization services across various healthcare settings and countries, and (2) conduct a comparative analysis of training curricula for pharmacy technicians on immunization. Methods: A scoping review was conducted following the Arksey and O'Malley framework. A comprehensive search of the PubMed and Scopus databases was performed using keywords and MeSH terms such as "pharmacy technician(s)", "immunization", "vaccination", "role", and "involvement". Studies included assessed pharmacy technicians' roles in vaccine administration, training, and public health outcomes. Descriptive and thematic analyses were used to synthesize the findings. In addition, a supplementary analysis of immunization training curricula was conducted, reviewing programs from different countries to identify similarities, differences, and gaps in course structure, content, and delivery formats. Lastly, a comprehensive toolkit was developed, offering guidelines intended to facilitate the implementation of immunization training programs. Results: A total of 35 articles met the inclusion criteria, primarily from the United States of America (n = 30), Canada (n = 2), Ethiopia (n = 1), Denmark (n = 1) and United Kingdom (n = 1). **The findings indicate that pharmacy technicians contribute significantly to vaccine administration, patient education, and workflow optimization, particularly in community pharmacies**. The COVID-19 pandemic accelerated their involvement in immunization programs. Key challenges include **regulatory barriers, a lack of standardized training, and resistance from other healthcare professionals**. Facilitators include **legislative support (e.g., the PREP Act), structured training programs, and collaborative pharmacist-technician models.** Conclusions: Pharmacy technicians can play a vital role in expanding immunization services, improving vaccine uptake, and reducing pharmacist workload. **Addressing regulatory inconsistencies, enhancing training, and fostering interprofessional collaboration** are crucial for their effective integration of immunization programs. Since immunization by pharmacy technicians is not yet allowed in many EU countries, this review will provide a foundational basis to address their potential to support the healthcare workforce and improve access to immunization services.

4.4.2 Vogler S, Knoll V, Salcher-Konrad M. Community pharmacy services in the late COVID-19 period: What has driven change? Res Social Adm Pharm. 2025 Jul;21(7):505-516.

Background: Community pharmacy appears to have undergone considerable change over the years. **Objectives:** The objective of this research is to study the range of community pharmacy services provided in late stages of the COVID-19 pandemic and during the last decades and to identify potential drivers for change. **Methods:** Four European countries (Austria, England, Estonia, and Portugal), which represent a balance in terms of income, organization of the health system and pharmacy services, were selected as case studies. For each country, a factsheet on pharmacy services provided in 2023 and recent developments was populated based on a literature review and validated by country experts in community pharmacies. A semi-structured interview was conducted with a community pharmacist in all study countries to gather additional information, in particular on potential drivers for change. **Results:** In all case study countries, community pharmacies offer a range of medicines-related and non-medicines-related services, ranging from core activities such as dispensing and counselling to information on general health topics, point-of-care testing, disposal of returned medicines and needle-exchange programs. Certain services are only permitted in some countries (e.g., vaccinations, generic substitution). Developments (e.g., additional tasks) were observed in the last decades, but some changes were only introduced recently in response to the pandemic (e.g., testing for COVID-19, COVID-19 vaccinations). Several, mostly facilitating, factors, such as high accessibility and acceptance of community pharmacies, the growing relevance of the primary health care concept and an appetite of

community pharmacists to take over additional tasks, have contributed to changes in the range of services in community pharmacy in recent years and over the decades. **Conclusions:** The study confirms changes in community pharmacy, with overall extension of the services offered. The COVID-19 pandemic was reported to have played an important role but was not considered the sole driver for change.

4.4.3 Haems M, Lanzilotto M, Mandelli A, Mota-Filipe H, Paulino E, Plewka B, Rozaire O, Zeiger J. European community pharmacists practice in tackling influenza. Explor Res Clin Soc Pharm. 2024 Apr 22;14:100447.

Background: In many European countries, flu vaccination coverage rates are below the 75% target. During the COVID-19 pandemic, many pharmacists around Europe were involved as vaccine administrators and demonstrated positive results in improving vaccine uptake. This paper explores the challenges, accomplishments, and best practices of various European pharmacists' associations in administering vaccines and positively contributing to public health. **Methods:** Eight pharmacists representing various associations from different countries across Europe (Italy, Belgium, Poland, Portugal, France, and Germany) convened to discuss their role as vaccination providers, the advantages, and strategies for improvement, and to identify barriers and gaps in the vaccination administration process, especially focusing on the administration of seasonal flu vaccines. **Results:** Currently, 15 European countries allow community pharmacists to dispense and administer flu vaccines. Among the ones that attended the meeting, Portugal initiated the flu immunization program at the pharmacy earliest, before the COVID era, but in other countries, the process started only in the last couple of years. Initial hesitancy and reluctance by other HCPs or institutions were overcome as the pilot projects showed positive and cost-effective public health results. Today, pharmacists are considered crucial professional figures to provide immunization services against COVID-19, the flu, and other vaccine-preventable diseases, and pursue important public health goals.Key takeaways to enhance the pharmacist's role in providing immunization services against vaccine-preventable diseases include improving interaction with policymakers and the public, generating real-world evidence highlighting public health benefits, and ensuring ongoing professional education and training for pharmacists. **Conclusion:** Vaccinating pharmacists are gaining recognition of their role and the benefits derived from their broader involvement in the healthcare system, including immunization programs. Further efforts are needed in each country for an adequate recognition of the profession and a broader utilization of pharmacy services to exploit the benefit of immunization, especially against the flu.

4.4.4 https://www.pgeu.eu/vaccination/

https://www.pgeu.eu/wp-content/uploads/2023/11/The-role-of-community-pharmacists-in-vaccination-PGEU-Position-Paper.pdf

Many countries worldwide are moving towards expanding the scope of practice of pharmacists, namely through implementing pharmacist-led vaccination programmes. Currently, pharmacists can vaccinate in their pharmacies in 15 European countries (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Poland, Portugal, Norway, Romania, Switzerland, and the United Kingdom), for influenza and/or COVID-19. In 9 of these countries (Denmark, France, Greece, Ireland, Italy, Norway, Portugal, Switzerland, and the United Kingdom) pharmacists are able to administer other vaccines and medicines such as Pneumococcal, Travel vaccines, Herpes Zoster (shingles), Cholera, Diphtheria,

Tetanus and Pertussis, Anti-Tetanus Serum injection, Meningococcal, Tick-borne Encephalitis, Typhoid Fever and Hepatitis A, Japanese-Encephalitis, Hepatitis A, Hepatitis B, Human Papillomavirus (HPV), Rabies, Human rotavirus, and Varicella. Apart from these, in at least 3 other countries (Croatia, Estonia, the Netherlands) other healthcare professionals (e.g., physicians or nurses) can provide the vaccination service in a pharmacy.

Policy Recommendations

Advocacy and Communication

- European institutions and agencies should continue and strengthen collaboration and communication with community pharmacists and pharmacy organisations at European level, namely through joint initiatives and supporting actions such as the Coalition for Vaccination.
- National governments and stakeholders should support campaigns involving community pharmacists on the fight against disinformation and misinformation about vaccines, combating vaccine hesitancy and promoting vaccination uptake.
- National governments should recognize the valuable role played by community pharmacists in public health emergencies and support these interventions through appropriate service remuneration.
- Pharmacists should be better integrated into primary healthcare systems and services, for example, integration of electronic health records to facilitate efficient notification of pharmacists' interventions to the patient's medical record.

Collaboration

- As proposed by the European Parliament, the European Commission should include the pharmacy sector in EU public health initiatives and Member States should include the pharmacy sector in their health, care, and research programmes.

Vaccination Strategies

- Due to the borderless nature of vaccine-preventable diseases, European institutions should promote sharing national best practices that include the participation of different healthcare professionals in effective vaccination strategies.
- National governments should include and integrate community pharmacists into national vaccination strategies, including communication campaigns.
- Pharmacists, as frontline workers, should get themselves vaccinated against influenza, COVID-19, and other vaccine-preventable diseases. Pharmacists shall be included as priority healthcare staff for vaccination schemes

Pharmacy-Based Vaccination

- Pharmacists should be enabled to provide new and innovative services in response to the threat posed by vaccine-preventable diseases.
- Services such as vaccinations should be globally commissioned within national health systems, supported by national health budgets, assuring economic sustainability of these services.

- Aiming at reinforcing prevention strategies, government-funded/supported pharmacy-based vaccination programs should be included as part of the overall health promotion national plans.
- National governments should expand pharmacy practice with the implementation of pharmacist-led/pharmacy-based vaccination programs.
- Professional bodies and pharmacists' associations should develop, implement, and assess continuous professional development courses, Standard Operation Procedures, and toolkits for pharmacy-based vaccination programs.

Session 5: Recording and reporting of vaccination data	5.1 Registration of vaccines from the Boletim de vacinas to the SNS Portal: Current status and upcoming changes	TBD
	5.2 Vaccine effectiveness monitoring in Portugal: Current status and upcoming changes	Ausenda Machado
	5.3 Vaccine safety surveillance and communication in Portugal	Márcia Silva

5.1 Registration of vaccines from the Boletim de vacinas to the SNS Portal: Current status and upcoming changes

Boletim de vacinas

https://www.sns24.gov.pt/pt/servico/boletim-de-vacinas

VACINAS platform is a **centralized digital registry** (*Information*) to monitor vaccination records. In cases of delayed vaccinations, people are notified, ensuring continuity and high vaccination coverage. Further, there is an **Electronic Vaccination Bulletin** on the personal portal of the National Health Service (in portuguese, Serviço Nacional de Saúde – SNS) or the SNS mobile application (SNS 24), where individuals can consult information on administered, overdue and upcoming vaccines.

- For access to vaccination, a medical declaration must be issued through the Electronic Prescription of Medicines Platform (PEM), using a form provided by SPMS, E.P.E. A paper declaration must include a legible signature and the physician's stamp or barcode.
- Free vaccination must be recorded in the VACINAS Platform as "Pn20SNS" or "Pn23SNS," depending on the vaccine administered. Vaccination that is recommended but not free must be recorded as "Pn20" or "Pn23" in the VACINAS system

National Vaccine Registration and Management Platform – VACINAS.

- VACINAS platform, a **centralized digital registry** (*Information*) to monitor vaccination records. In cases of delayed vaccinations, parents or legal guardians are notified, and a schedule for HPV vaccine administration is proposed, ensuring continuity and high vaccination coverage. Further, there is an **Electronic Vaccination Bulletin** on the personal portal of the National

Health Service (in portuguese, Serviço Nacional de Saúde – SNS) or the SNS mobile application (SNS 24), where individuals can consult information on administered, overdue and upcoming vaccin

Invitation and appointment strategies (seasonal vaccination)

Before the start of the scampaign, **SPMS** sent **text messages (SMS)** to all individuals eligible for **influenza and COVID-19 vaccination**. The purpose of these messages was to **raise awareness about the seasonal vaccination campaign** and the **available vaccination sites**. Messages were sent in **phases, in descending order of age**, starting with individuals with **identified comorbidities and older age**. Approximately **3.6 million initial SMS** were sent. **SNS healthcare facilities** scheduled seasonal vaccinations locally by sending **invitation SMS** (approximately **2.3 million SMS**) and, whenever possible, via **telephone contact** for all eligible patients. The **community pharmacy network** provided an **online scheduling system** where individuals could book their influenza and COVID-19 vaccines at the most convenient pharmacy, resulting in approximately **296,000 appointments**. Vaccinations could also be scheduled **in person at the pharmacy counter**. In parallel with scheduled appointments, a **"Open House" system** was implemented, allowing people to **attend vaccination sites without prior appointments**. Centralized communication was also carried out through **digital channels and social media**, and **physical materials related to the Campaign** were distributed. At different stages of the campaign, **SPMS sent large-scale reminder SMS** to all eligible individuals who had not yet received their seasonal vaccination, totaling **more than 1.7 million SMS** sent.

Schedule vaccination (seasonal vaccination):

All users eligible for vaccination will receive an informative SMS message, raising awareness of the vaccination process. **Users aged 85 or over or with risk pathologies** are scheduled by the health units (by SMS message or telephone contact), however they can also actively schedule vaccination with their health unit. The remaining **users (50 to 84 years old)** will be able to actively schedule their vaccination at an NHS health unit or through the scheduling platform of Portuguese pharmacies. People get a confirmation SMS message, 24 hours before the scheduled date. If your pharmacy does not have this option available, you can book directly at the counter or by phone. People who meet the eligibility criteria and who are not contacted should contact health care (NHS health units or community pharmacies) to ensure access to vaccination.

5.2 Vaccine effectiveness monitoring in Portugal: Current status and upcoming changes

5.3.1 Humphreys J, Blake A, Nicolay N, Braeye T, Van Evercooren I, Hansen CH, Moustsen-Helms IR, Sacco C, Mateo-Urdiales A, Castilla J, Martínez-Baz I, Machado A, Brito A, Ljung R, Pihlstrom N, Mansiaux Y, Monge S, Bacci S, Nunes B; VEBIS-EHR working group. Effectiveness of JN.1 monovalent COVID-19 vaccination in EU/EEA countries between October 2024 and January 2025: a VEBIS electronic health record network study. Vaccine. 2025 Sep 19;64:127752.

We estimated vaccine effectiveness (VE) of Omicron JN.1-adapted COVID-19 vaccines administered during the 2024 autumnal vaccination campaign against COVID-19 hospitalisation and death among eligible **individuals aged ≥65 years**. The study period was

October 2024-January 2025. Using a common protocol across **six EU/EEA study sites (Belgium, Denmark, Spain (Navarre), Portugal, Italy and Sweden)**, we linked electronic health records to construct retrospective cohorts and applied Cox modelling to estimate VE via confounder-adjusted hazard ratios. The majority of vaccines administered during the study period were Omicron JN.1-adapted COVID-19 vaccines (99 %). **VE against hospitalisation was 60% (95 % Confidence Interval: 48-70 %) and against COVID-19-related death was 78% (95 %CI: 64-87 %) among individuals aged 65-79 years; 58% (95 %CI: 48-66 %) and 62% (95 %CI: 32-79 %) among those aged ≥80 years.** These results indicate high effectiveness in the initial months of the campaign. Continued monitoring is necessary to confirm these results, including estimates of VE in those with longer time since vaccination and during different variant predominance periods.

5.3.2 Kissling E, Maurel M, Pozo F, Pérez-Gimeno G, Buda S, Sève N, Domegan L, Hooiveld M, Oroszi B, Martínez-Baz I, Guiomar R, Latorre-Margalef N, Mlinarić I, Lazar M, Giménez Duran J, Dürrwald R, Enouf V, McKenna A, de Lange M, Túri G, Trobajo-Sanmartín C, Gomez V, Samuelsson Hagey T, Višekruna Vučina V, Cherciu MC, García Vazquez M, Erdwiens A, Masse S, Bennett C, Meijer A, Kristóf K, Castilla J, Rodrigues AP, Kurečić Filipović S, Ivanciuc AE, Bacci S, Kaczmarek M; European primary care VE group. Influenza vaccine effectiveness in Europe and the birth cohort effect against influenza A(H1N1)pdm09: VEBIS primary care multicentre study, 2023/24. Euro Surveill. 2025 Jun;30(23):2500011. -

Introduction Influenza A(H1N1)pdm09, A(H3N2) and B/Victoria viruses circulated in Europe in 2023/24, with A(H1N1)pdm09 dominance. First influenza infections in childhood may lead to different vaccine effectiveness (VE) in subsequent years. Aim The VEBIS primary care network estimated influenza VE in Europe using a multicentre test-negative study. Methods Primary care practitioners collected information and specimens from patients consulting with acute respiratory infection. We estimated VE against influenza (sub)type and clade, by age group and by year of age for A(H1N1)pdm09, using logistic regression. Results We included 29,958 patients, with 3,054, 1,053 and 311 influenza A(H1N1)pdm09, A(H3N2) and B cases, respectively. All-age VE against influenza A(H1N1)pdm09 was 52% (95% CI: 44-59). By year of age, VE was 27% (95% CI: -2 to 47) at 44 years with peaks at 72% (95% CI: 52-84) and 54% (95% CI: 41-64) among children and those 65 years and older, respectively. All-age A(H1N1)pdm09 VE against clade 5a.2a was 41% (95% CI: 24-54) and -11% (95% CI: -69 to 26) against clade 5a.2a.1. The A(H3N2) VE was 35% (95% CI: 20-48) among all ages and ranged between 34% and 40% by age group. All-age VE against clade 2a.3a.1 was 38% (95% CI: 1-62). All-age VE against B/Victoria was 83% (95% CI: 65-94), ranging between 70 and 92% by age group. Discussion **The 2023/24 VEBIS primary care VE against medically attended symptomatic influenza infection was high against influenza B/Victoria, but lower against influenza A(H1N1)pdm09 and A(H3N2). Clade- and age-specific effects may have played a role in the lower A(H1N1)pdm09 VE.**

5.3.3 Laniece Delaunay C, Verdasca N, Monge S, Domegan L, Sève N, Buda S, Meijer A, Lucaccioni H, López Torrijos M, McKenna A, Enouf V, Dürrwald R, In't Velt E, de Valcárcel Laiglesia MÁ, Bennett C, Masse S, Erdwiens A, Hooiveld M, Mlinarić I, Túri G, Rodrigues AP, Martínez-Baz I, Lazar M, Latorre-Margalef N, Borges V, Kaczmarek M, Bacci S, Kissling E; European primary care VE group. COVID-19 Vaccine Effectiveness Against Medically Attended Symptomatic SARS-CoV-2 Infection Among Target Groups in Europe, October 2024-January 2025, VEBIS Primary Care Network. Influenza Other Respir Viruses. 2025 May;19(5):e70120.

We estimated the effectiveness of 2024/25 COVID-19 vaccination against medically attended SARS-CoV-2 infection in Europe, among target groups. We included 3204 patients (8/139 cases vaccinated: 6%; 517/3065 controls vaccinated: 17%) from a multicentre, test-negative design study at primary care level. Vaccine effectiveness was 66% (95% CI: 34-85) overall, 73% (95% CI: 21-94) and 54% (95% CI: -3 to 83) in the first and second months post-vaccination, respectively. **Overall vaccine effectiveness was 67% (95% CI: 33-86) among older adults (≥ 60 or ≥ 65 years). This relatively high COVID-19 VE (compared with previous seasons), as well as trends by time since vaccination, should be confirmed with additional data, as sample size was low.**

5.3.4 Soares P, Gómez V, Gaio V, Santos JA, Rodrigues AP, Machado A. A protocol for high-dose quadrivalent influenza vaccine effectiveness in the community and long-term care facilities using electronic health records. PLoS One. 2025 May 9;20(5):e0314177.

Since the **2022-2023 season in Portugal, a high-dose quadrivalent influenza vaccine is freely available for individuals living in long-term care facilities (LTCF). In 2024-2025, vaccination was extended to community-dwelling individuals aged ≥85 years.** Given the scarcity of reported high-dose influenza vaccine effectiveness (IVE) estimates for this population, this study aims to estimate the high-dose relative and absolute IVE. A retrospective cohort study using data from electronic health records databases (EHR) will be implemented, using two cohorts, one of individuals vaccinated with influenza vaccine (to estimate relative IVE) and another of individuals eligible for the high-dose quadrivalent influenza vaccine (to estimate absolute IVE). We will consider two subgroups for both cohorts: individuals living in LTCF and community-dwelling individuals aged ≥85. We will use a fixed cohort approach, defining the eligible population by age at the vaccination campaign(s) start and living status. The outcomes are based on the primary cause of hospital admission. The reference population database will be defined by linking EHR on vaccination, comorbidities, and hospitalisations using a unique identifier through a deterministic data linkage procedure, and influenza vaccination status will be assessed retrospectively. We will use Cox proportional hazards regression models to estimate the hazard ratio (HR), considering as event the first hospitalisation due to influenza-like-illness and as exposure the vaccination status. IVE will be estimated as one minus the confounder-adjusted HR of vaccinated with the high-dose quadrivalent influenza vaccine vs vaccinated with standard dose (to estimate relative IVE) or unvaccinated (to estimate absolute IVE). While challenges such as EHR constraints and potential reporting bias pose limitations, using routinely collected data has successfully estimated COVID-19 VE and enables precise monitoring of VE with higher representativeness. **The results of this study will inform the Health Ministry on the future influenza vaccine programme in Portugal.**

5.3.5 Machado A, Kislaya I, Soares P, Magalhães S, Nunes B; PT-EHR vaccine group. Long term bivalent mRNA vaccine effectiveness against COVID-19 hospitalisations and deaths in Portugal: a cohort study based on electronic health records. BMC Infect Dis. 2025 Apr 23;25(1):590.

Background: In Autumn 2022, there were recommendations for a COVID-19 booster vaccination with adapted bivalent vaccines to eligible population. Evaluating vaccine effectiveness (VE), in a short period after the vaccination, is key to guide public health decisions on the vaccine performance, allowing implementation of mitigation strategies promptly. However, to assess long-term protection post-vaccination and evaluate the need for additional boosters, it is crucial to conduct studies that span the maximum duration of the

vaccination program. **This study aims to estimate the VE of bivalent mRNA vaccines against COVID-19-related hospitalisation and death in the Portuguese population aged 65 years or older, from September 2022 to May 2023**. Methods: We used a cohort approach to analyse six electronic health registries using deterministic linkage, with a follow-up period of eight months. Severe outcomes included COVID-19-related hospitalisations and death, classified using discharge **ICD-10 codes** as proxies. The exposure of interest was the bivalent mRNA vaccine. VE was estimated for 14-97, 98-181 and 182-240 days after bivalent vaccination. Confounder-adjusted hazard ratio (aHR) was obtained by fitting a time-dependent Cox regression model with time-dependent vaccination status, adjusted for sociodemographic, history of influenza and pneumococcus vaccination, previous SARS-CoV-2 tests and infection, and comorbidities. VE was estimated by one minus the aHR between vaccinated with bivalent vaccine person-years versus those without bivalent vaccine person-years. Results: The cohort included 2,151,531 individuals aged 65 or older (27.8% with 80 or more years). In the ≥ 80 years old, **VE was 41.3% (95%CI: 34.5-47.5%) and 50.3% (95%CI: 44.6-55.3%) against COVID-19-related hospitalisation and death, respectively. In the 65-79 years old, VE was 58.5% (95%CI: 51.9-64.2%) against COVID-19-related hospitalisation, and 65.1% (95%CI: 59.0-70.4%) against COVID-19-related death**. VE waned for both age groups and outcomes. Among adults aged 65 years or older, we observed long-term moderate VE estimates against severe COVID-19-related outcomes. Conclusions: These results support the need for yearly boosters of COVID-19 vaccination to maximise the protection of the senior population against COVID-19 severe disease. **Additional (spring boosters) during a vaccination campaign should be evaluated considering the epidemiological context and results from long-term VE studies.**

5.3.6 Antunes L, Rojas-Castro M, Lozano M, Martínez-Baz I, Leroux-Roels I, Borg ML, Oroszi B, Fitzgerald M, …, Džiugytė A, Túri G, Duffy R, Hackmann C, Kuliese M, Gomez V, Makarić ZL, Marin A, Husa P, Nicolay N, Rose AMC; VEBIS SARI VE network team. Effectiveness of the XBB.1.5 COVID-19 Vaccines Against SARS-CoV-2 Hospitalisation Among Adults Aged ≥ 65 Years During the BA.2.86/JN.1 Predominant Period, VEBIS Hospital Study, Europe, November 2023 to May 2024. Influenza Other Respir Viruses. 2025 Mar;19(3):e70081.

We estimated the effectiveness of the adapted monovalent XBB.1.5 COVID-19 vaccines against PCR-confirmed SARS-CoV-2 hospitalisation during the BA.2.86/JN.1 lineage-predominant period using a multicentre test-negative case-control study in Europe. We included older adults (≥ 65 years) hospitalised with severe acute respiratory infection from November 2023 to May 2024. **Vaccine effectiveness was 46% at 14-59 days and 34% at 60-119 days, with no effect thereafter. The XBB.1.5 COVID-19 vaccines conferred protection against BA.2.86 lineage hospitalisation in the first 4 months post-vaccination.**

5.3.7 Kassianos G, Civljak R, van Essen GA, Pecurariu OF, Froes F, Galev A, Kõivumägi K, Kristufkova Z, Kuchar E, Kyncl J, Maltezou HC, Marković M, Mosnier A, Leonardo ROLY, Rossi A, Schelling J. Synthesizing and assessing influenza vaccine evidence: Strengths and limitations of the recent ECDC report on the effectiveness of new and enhanced influenza vaccines. Communication on: the "European Centre for Disease Prevention and Control. Systematic review update on the efficacy, effectiveness and safety of newer and enhanced seasonal influenza vaccines for the prevention of laboratory confirmed influenza in individuals aged 18 years and over. Stockholm: ECDC; 2024". Germs. 2024 Sep 30;14(3):301-305.

High quality research is critical for evidence-based decision making in public health and fundamental to maintain progress and trust in immunization programs in Europe. In 2024 the European Centre for Disease Prevention and Control (ECDC) conducted an update of the 2020 systematic review to capture more recent evidence on of the efficacy, effectiveness of influenza vaccines in individuals aged 18 years and older in the prevention of laboratory-confirmed influenza. While this report was highly anticipated due to the strength of the protocol and processes put in place, during our assessment, we expressed two chief concerns. We are concerned by the grading of the evidence certainty applied and being unable to reproduce some data extracted in the report from the primary sources. While the systematic review benefited of strong methods and processes, the execution of the research protocol warrants revision due to the issues discussed. We encourage the ECDC to work towards an updated review within a reasonable time frame to avoid misinterpretation by decision-making bodies across Europe.

5.3.8 Kislaya I, Torres AR, Gomes L, Melo A, Machado A, Henriques C, Verdasca N, Guiomar R, Rodrigues AP, Surveillance Network NI. End of season 2022/2023 quadrivalent influenza vaccine effectiveness in preventing influenza in primary care in Portugal. Hum Vaccin Immunother. 2023 Dec 15;19(3):2263219.

Using a test-negative case-control design, we aim to estimate influenza vaccine effectiveness (VE) against medically attended laboratory-confirmed influenza in Portugal in 2022/2023 season. Between week 41/2022 and week 14/2023, data on 592 patients with influenza-like illness aged 18 or more years old were collected by the national sentinel influenza surveillance system in primary care settings. Of those, 218 were positive for influenza and 374 were negative controls. We estimated seasonal influenza VE as (1-odds ratio)*100% of being vaccinated in laboratory-confirmed influenza cases vs. negative controls using logistic regression model adjusted for age group, sex, presence of chronic conditions, and month of symptoms onset. **The seasonal VE was 59.3% (95% confidence interval (CI): 27.3 to 77.3) against any laboratory-confirmed influenza and not statistically significant 44.5% (95% CI: -5.6 to 70.8) against influenza A (H3N2). In the 2022/2023 season, characterized by early and low influenza activity and predominant A (H3N2) circulation, vaccination provided a moderate protection against medically attended laboratory-confirmed influenza in primary care.**

5.3.9 Gaio V, Santos AJ, Amaral P, Faro Viana J, Antunes I, Pacheco V, Paiva A, Pinto Leite P, Antunes Gonçalves L, Araújo L, Silva A, Dias C, Kislaya I, Nunes B, Machado A. COVID-19 vaccine effectiveness among healthcare workers: a hospital-based cohort study. BMJ Open. 2023 May 2;13(5):e068996.

Objectives: Healthcare workers (HCWs) were the first to be prioritised for COVID-19 vaccination. This study aims to estimate the COVID-19 vaccine effectiveness (VE) against SARS-CoV-2 symptomatic infection among HCWs in Portuguese hospitals. **Design:** Prospective cohort study. **Setting and participants:** We analysed data from HCWs (all professional categories) from three central hospitals: one in the Lisbon and Tagus Valley region and two in the central region of mainland Portugal, between December 2020 and March 2022. VE against symptomatic SARS-CoV-2 infection was estimated as one minus the confounder adjusted HRs by Cox models considering age group, sex, self-reported chronic disease and occupational exposure to patients diagnosed with COVID-19 as adjustment variables. **Results:** During the 15 months of follow-up, the 3034 HCWs contributed a total of 3054 person-years at risk, and 581 SARS-CoV-2 events occurred. Most participants were

already vaccinated with a booster dose (n=2653, 87%), some are vaccinated with only the primary scheme (n=369, 12.6%) and a few remained unvaccinated (n=12, 0.4%) at the end of the study period. **VE against symptomatic infection was 63.6% (95% CI 22.6% to 82.9%) for HCWs vaccinated with two doses and 55.9% (95% CI -1.3% to 80.8%) for HCWs vaccinated with one booster dose. Point estimate VE was higher for individuals with two doses taken between 14 days and 98 days (VE=71.9%; 95% CI 32.3% to 88.3%). Conclusion:** This cohort study found a high COVID-19 VE against symptomatic SARS-CoV-2 infection in Portuguese HCWs after vaccination with one booster dose, even after Omicron variant occurrence. The small sample size, the high vaccine coverage, the very low number of unvaccinated individuals and the few events observed during the study period contributed to the low precision of the estimates.

5.3.10 Kislaya I, Casaca P, Borges V, Sousa C, Ferreira BI, Fonte A, Fernandes E, Dias CM, Duarte S, Almeida JP, Grenho I, Coelho L, Ferreira R, Ferreira PP, Borges CM, Isidro J, Pinto M, Menezes L, Sobral D, Nunes A, Santos D, Gonçalves AM, Vieira L, Gomes JP, Leite PP, Nunes B, Machado A, Peralta-Santos A. Comparative Effectiveness of COVID-19 Vaccines in Preventing Infections and Disease Progression from SARS-CoV-2 Omicron BA.5 and BA.2, Portugal. Emerg Infect Dis. 2023 Mar;29(3):569-575.

We estimated comparative primary and booster vaccine effectiveness (VE) of SARS-CoV-2 Omicron BA.5 and BA.2 lineages against infection and disease progression. During April-June 2022, we implemented a case-case and cohort study and classified lineages using whole-genome sequencing or spike gene target failure. For the case-case study, we estimated the adjusted odds ratios (aORs) of vaccination using a logistic regression. For the cohort study, we estimated VE against disease progression using a penalized logistic regression. We observed no reduced VE for primary (aOR 1.07 [95% CI 0.93-1.23]) or booster (aOR 0.96 [95% CI 0.84-1.09]) vaccination against BA.5 infection. Among BA.5 case-patients, booster VE against progression to hospitalization was lower than that among BA.2 case-patients (VE 77% [95% CI 49%-90%] vs. VE 93% [95% CI 86%-97%]). **Although booster vaccination is less effective against BA.5 than against BA.2, it offers substantial protection against progression from BA.5 infection to severe disease.**

5.3.11 Kislaya I, Machado A, Magalhães S, Rodrigues AP, Franco R, Leite PP, Dias CM, Nunes B. COVID-19 mRNA vaccine effectiveness (second and first booster dose) against hospitalisation and death during Omicron BA.5 circulation: cohort study based on electronic health records, Portugal, May to July 2022. Euro Surveill. 2022 Sep;27(37):2200697.

We measured vaccine effectiveness (VE) against COVID-19-related severe outcomes in elderly people in Portugal between May and July 2022. In ≥ 80 year-olds, the second booster dose VE was 81% (95% CI: 75-85) and 82% (95% CI: 77-85), respectively, against COVID-19-related hospitalisation and death. The first booster dose VE was 63% (95% CI: 55-70) in ≥ 80 year-olds and 74% (95% CI: 66-80) in 60-79 year-olds against hospitalisation, and 63% (95% CI: 57-69) and 65% (95% CI: 54-74) against death.

5.3.12 Machado A, Leite A, Larrauri A, Gomez V, Rodrigues AP, Kislaya I, Nunes B. No effect modification of influenza virus vaccine effectiveness by age or chronic condition was observed in the 2010/11 to 2017/18 seasons. Pharmacoepidemiol Drug Saf. 2021 Oct;30(10):1411-1419.

Purpose: Most European influenza vaccine strategies target individuals at higher risk of complications, which include, among others, individuals aged ≥65 years and with chronic conditions. These individuals not only have a high-risk of post-infection complications but also could have lower capacity of acquiring adequate vaccine-induced protection. As such, chronic conditions and age could modify the effect of vaccines. This study aimed at assessing the potential effect modification of influenza vaccine effectiveness (IVE) by age and chronic conditions. **Methods:** We used eight-season data from the Portuguese vaccine effectiveness study. Every season, physicians at primary care units recruited patients with influenza-like illness. Clinical data and swabs were collected for Reverse Transverse Polymerase Chain Reaction (RT-PCR) detection of influenza. Trivalent inactivated IVE was estimated as 1 - odds ratio (OR) of being vaccinated in cases (RT-PCR positive for influenza) versus negative controls. ORs were obtained using a multivariable conditional logistic regression model, paired by week of onset within each season. Confounders were assessed by designing a specific causal diagram. Age (< 65 or ≥65 years) and chronic conditions (diabetes, cardiovascular disease, chronic renal disease, chronic hepatic disease, obesity, chronic respiratory disease, and congenital or acquired immunodeficiency) were studied as effect modifiers by including an interaction term in the regression models. Significance was established at 5%. **Results:** Point estimates indicate a higher IVE in the chronic condition strata compared to that in the no chronic condition strata. Regarding age, different results were obtained considering the virus type and (sub)type. When comparing the ≥65 years with the <65 years of age strata, we observed a higher IVE against A(H1N1)pdm09, an equal IVE against A(H3N2) and a lower IVE against B virus. However, all interaction terms were statistically insignificant, and this may be due to a small sample size. **Conclusion:** The potential effect modification of age or chronic condition was not observed within our study.

5.3 Vaccine safety surveillance and communication in Portugal

Vaccine safety monitoring is conducted through the National Pharmacovigilance System, managed by INFARMED, I.P.

Farmacovigilância

Tabela 39. Número de casos de reações adversas a medicamentos (RAM), por vacina e por gravidade

Descrição	Administrações	RAM	RAM/ 100 000	RAM Graves	RAM Graves/ 100 000
Vacina contra a difteria e o tétano	786949	25	3	14	2
Vacina contra a hepatite B	137964	4	3	3	2
Vacina contra a poliomielite	19082	1	5	0	0
Vacina contra a tuberculose	41405	13	31	4	10
Vacina contra o Haemophilus influenzae tipo B	2916	1	34	0	0
Vacina contra o papilomavírus humano (tipo 9)	253459	24	9	12	5
Vacina contra o sarampo, a parotidite epidémica e a rubéola	268348	21	8	12	4
Vacina hexavalente	165511	23	14	17	10
Vacina meningocócica	463837	34	7	17	4
Vacina pentavalente	164032	49	30	41	25
Vacina pneumocócica com 13, 20 e 23 serotipos	485006	140	29	70	14
Vacina tetravalente	92792	35	38	25	27

https://www.dgs.pt/ficheiros-de-upload-2013/relatorio-pnv-2024-pdf.aspx

Tabela 5. Número de casos de reações adversas a medicamentos (RAM) por tipo de vacina e por gravidade.

	Gripe	COVID-19	Total
Nº de administrações	2 405 445	1 569 167	3 974 612
Nº de casos de RAM	67	89	156*
Nº de casos de RAM por 100 000 administrações	**2,79**	**5,67**	**3,92**
Nº de casos graves de RAM	30	39	69**
Nº de casos graves de RAM por 100 000 administrações	**1,25**	**2,49**	**1,74**

Fonte: INFARMED. *20 casos com atribuição às duas vacinas. **9 casos com atribuição às duas vacinas.

https://www.dgs.pt/ficheiros-de-upload-2013/relatorio-sazonal-2024-2025-pdf.aspx

5.4.1 Ferreira-da-Silva R, Lobo MF, Pereira AM, Morato M, Polónia JJ, Ribeiro-Vaz I. Network analysis of adverse event patterns following immunization with mRNA COVID-19 vaccines: real-world data from the European pharmacovigilance database EudraVigilance. Front Med (Lausanne). 2025 Feb 19;12:1501921.

Objective: To analyses real-world safety data of mRNA COVID-19 vaccines within the European Economic Area (EEA), using Individual Case Safety Reports (ICSR), and to evaluate the variability in safety profiles between different vaccine versions. **Methods:** We utilized EudraVigilance data from 1 January 2020, to 31 December 2023, focusing on Moderna (Spikevax) and Pfizer/BioNTech (Comirnaty) vaccines against COVID-19. We performed descriptive statistics, co-occurrence analysis, and correspondence analysis to identify patterns and clusters of adverse events following immunization (AEFI). **Results:** We retrieved 993,199 ICSR (Moderna: 394,484; Pfizer: 605,794), with most reports related to women patients (69%) and non-healthcare professionals (65%). A total of 10,804 distinct AEFI terms were described across the retrieved ICSR, with a cumulative occurrence frequency of 3,558,219 (Moderna: 1,555,638; Pfizer: 2,031,828). The most prominent serious clusters included headache, fatigue, pyrexia, myalgia, arthralgia, malaise, nausea, and chills, which frequently co-occurred with vaccination failure. Specific AEFI like fever, chills, malaise, arthralgia, injection site pain, inflammation, and warmth were more often linked to Moderna, while Pfizer was more commonly associated with vaccination failure, menstrual disorders (heavy menstrual bleeding and dysmenorrhea), and hypoesthesia. In older adults, serious clusters included confusional states, cerebrovascular accidents, and myocardial infarctions, while myocarditis and pericarditis were noted in younger males. Although rare, serious systemic AEFI, like anaphylactic reactions, were identified but require further causality evaluation. **Conclusion:** The overall safety of mRNA COVID-19 vaccines for mass vaccination is supported, but continuous pharmacovigilance remains essential. Identified clusters of AEFI, particularly serious and systemic ones, although rare and potentially influenced by other underlying causes, underscore the need for continuous monitoring and further epidemiological investigations to explore potential causal relationships.

5.4.2 van Vliet E, Lipovec NČ, van der Goot M, Abtahi S, Ribeiro-Vaz I, Poplavska E, Dermiki-Gkana F, Oikonomou C, Deligianni E, Kontogiorgis C, Silva AM, Ferreira PBS, Kos M, Almarsdóttir AB, Jacobsen R, Buhl C, de Bruijn A, Hegger I, Alves TL. Impact of Regulatory Risk Communication on Thrombosis With Thrombocytopenia Syndrome for COVID-19

Adenovirus Vector Vaccines on European Healthcare Professionals. Pharmacoepidemiol Drug Saf. 2024 Dec;33(12):e70057.

Purpose: The European Medicines Agency (EMA) issued regulatory actions and communications in 2021 on thrombosis with thrombocytopenia syndrome (TTS) associated with adenovirus vector vaccines Vaxzevria or Jcovden. This study aimed to evaluate the impact of these actions on awareness, knowledge and implementation in practises of healthcare professionals (HCP). **Methods:** Web-based cross-sectional surveys were conducted on HCPs engaged in the vaccination, monitoring or counselling about the vaccines. We measured awareness and knowledge of the risk of TTS and their implementation of recommendations in practise. Descriptive and qualitative analyses were conducted. This study took place in Greece, Latvia, Netherlands, Portugal and Slovenia. **Results:** We surveyed 1659 HCPs. From these, 914 were included in the analysis. Most were aware about the reports of TTS associated with COVID-19 adenovirus vector vaccines, with countries reporting percentages between 85% and 97%. Mainstream media, health authorities and peers were the main sources of TTS risk information. Most HCPs were able to identify key symptoms from TTS but were less familiar with minor symptoms. Guidelines from health authorities on COVID-19 vaccination impacted on professional practise of 55%-77% of HCPs. The reported use of product information across countries was moderate, with some variations. **Conclusions:** Awareness about and knowledge of TTS risk from COVID-19 adenoviral vector vaccines were high among HCPs. HCPs reported a clear preference for national guidelines as source of risk information and the implementation of product information remained moderate across countries.

5.4.3 Barosa M, Prasad V. Characteristics of Vaccine Safety Observational Studies and Authors' Attitudes: A Systematic Review. Am J Med. 2025 Feb;138(2):254-261.e5.

Background: Postlicensure observational studies are the mainstay of vaccine safety evaluation. However, these studies have well-known methodological limitations, rendering them particularly vulnerable to unmeasured confounding. We sought to describe high-impact observational studies of vaccine safety, investigate the authors' attitudes toward their study's findings and limitations, and report on spin practices. **Methods:** We conducted a PubMed systematic review of comparative observational studies of vaccine safety published in the 6 top medical journals from inception to March 2024. **Results:** Thirty-seven studies were included, spanning publications from 1995 to 2024. Most studies focused on COVID-19 and influenza vaccines (n = 11, 30%, and n = 10, 27%, respectively). Study designs and methodologies varied. Electronic health records (54%), passive surveillance databases (32%), and national registries (27%) were the most common data sources. Negative control outcomes were used in a single study. Residual confounding was conceded in 54% of studies, and an additional 24% did so implicitly. Spin was noted in 48.6% of the studies. This systematic review found that authors of observational vaccine safety studies in high-impact medical journals often acknowledge residual confounding, but rarely use methods like negative control outcomes to better detect unmeasured confounding. Furthermore, spin is common, occurring in approximately 50% of the studies. **Conclusions:** Although our findings are somewhat limited by subjectivity in study assessments, they suggest that editors and reviewers of high-impact journals should ensure that the language used in reporting observational studies accurately reflects the findings and their limitations.

KN: Recording and reporting of vaccination data	Differences between the vaccination systems of Madeira and mainland Portugal	Ana Clara Silva

KN1: https://www.madeira.gov.pt/srs/Pesquisar?LiveSearch=vacina%C3%A7%C3%A3o

Vacinação news

- *Flu vaccination 2025-2026:*
    - *For the first time, high-risk veterinary and livestock professionals, as well as children aged 6 months and older and under 24 months, are now covered*
    - In line with national and international guidelines, vaccination is strongly recommended and free of charge for several groups, including people aged 60 and over; people with chronic illnesses; pregnant women; healthcare, social, daycare, and critical care professionals; other caregivers; and institutionalized individuals.
    - High-dose vaccination for people aged 75 or over

Influenza and Covid-19 Vaccination Campaign, 2025/2026.

"We're going to get vaccinated. Protect ourselves and others." Strengthen your defenses against the flu and Covid-19".

Vaccination administration is carried out at the RAM Health Centers

KN2: https://www.ecdc.europa.eu/en/dengue/surveillance-and-updates/risk-assessment

Dengue is an Aedes-borne disease widely distributed in tropical and subtropical regions. Globally, the virus is predominantly transmitted by the Ae. aegypti and Ae. albopictus mosquitoes. Aedes albopictus is established in a large part of Europe. Aedes aegypti is established notably in Cyprus, around the Black Sea and in the outermost region (OR) of Madeira. *Gizaw Z, Salubi E, Pietroniro A, Schuster-Wallace CJ. Impacts of climate change on water-related mosquito-borne diseases in temperate regions: A systematic review of literature and meta-analysis. Acta Trop. 2024 Oct;258:107324.*

Session 6: Vaccine demand and acceptance

Session 6: Vaccine demand and acceptance	6.1 Portugal's relationship to vaccinations and factors associated with vaccine hesitancy (VAX-TRUST project)	Tiago Correia
	6.2 Health beliefs and attitudes toward Influenza and COVID-19 vaccination in Portugal	Ana João Santos

6.1 Portugal's relationship to vaccinations and factors associated with vaccine hesitancy (VAX-TRUST project)

6.1.1 Correia T, Hilário AP, Guerreiro C, Mendonça J, Morais R, Augusto FR, Beja A. Policy recommendations for healthcare authorities, organizations and professionals on vaccine hesitancy in Europe: From evidence to practice. Health Policy. 2025 Aug;158:105361.

Vaccine hesitancy presents significant challenges to public health, exacerbated by a lack of cohesive policies in Europe. Recognized as a complex social phenomenon influenced by various factors, vaccine hesitancy threatens health systems and public trust. This paper analyses the political background and current gaps in policies addressing vaccine hesitancy, with a specific focus on the role of healthcare authorities, organizations and professionals in shaping effective responses. The VAX-TRUST project, funded by H2020 and conducted in seven European countries, provides a framework for translating social scientific research into actionable strategies within healthcare settings. Using methodologies such as the Delphi method, the project developed the ASTARE model, which encompasses six dimensions: Awareness, Support, Training, Agency, Recognition, and Engagement. These dimensions guide tailored recommendations to strengthen the capacity of healthcare professionals, organizations, and authorities in addressing vaccine hesitancy, enhancing public trust, and vaccine confidence and uptake. The paper highlights the necessity of evidence-based, collaborative, and adaptive policies that raise public awareness, counteract misinformation, and support healthcare professionals. Effective policymaking requires understanding legislative processes, leveraging scientific evidence, and fostering stakeholder participation. By emphasizing context-sensitive interventions and culturally informed strategies, this study provides a comprehensive approach for health systems to address vaccine hesitancy and improve public health outcomes across Europe.

6.1.2 Millat-Martínez P, Mora A, Condeminas PE, Castelló M, Alsina C, Fiestas B, Bason M, Esquerda M, Perera-LLuna A, Nafria B, Bassat Q. Exploring reported causes of vaccine hesitancy among European adolescents and parents: results of a citizen science project. BMC Public Health. 2025 Mar 25;25(1):1136.

Background: Progress in pediatric immunization is threatened by vaccine hesitancy. While recent estimates show 14-35% of European parents exhibit some degree of hesitancy, little is known about adolescents. We assessed vaccine hesitancy and associated factors in European adolescents and parents through the online Science4Pandemics platform. **Methods:** We conducted two cross-sectional surveys. One in individuals aged ≥ 12 and < 18 years, using a non-validated questionnaire adapted from the Parent Attitudes about Childhood

Vaccines (PACV); and another using the PACV questionnaire in parents aged ≥ 18 years, who were not necessarily related to the adolescents. **Results:** 1877 adolescents from Italy, Portugal, Poland and Spain were included. Of these, 45.9% were aged 12-14 years, and 54.1% were 15-17 years. The prevalence of hesitancy (adapted PACV score ≥ 50%) was 20.8% (390 individuals). Hesitancy prevalence varied between countries, from 12.5% in Spain to 31.6% in Poland ($p < 0.001$). Geographic region was the only associated factor for hesitancy [Odds Ratio (OR) for Polish adolescents: 3.20 (95%CI: 2.29, 4.51); OR for Italian adolescents: 2.28 (95%CI: 1.62, 3.24); OR for Portuguese adolescents: 1.13 (95%CI: 0.77, 1.66); all compared to Spanish adolescents]. Country remained the only associated factor in the multivariate logistic regression analysis. In contrast, 1135 parents of children under 18 were included, with hesitancy observed in 20.4% (232 individuals). The main associated factors for hesitancy, both in the univariate and multivariate analyses, were country of residence [OR for Italian parents: 2.34 (95%CI: 1.47, 3.80); OR for Polish parents: 2.69 (95%CI: 1.70, 4.36); OR for Portuguese parents: 2.26 (95%CI: 1.41, 3.68); all compared to Spanish parents], and age, with older parents being less hesitant (OR: 0.97, 95%CI: 0.96, 1.00). In both parents and adolescents, the main reasons for vaccine hesitancy were fear of vaccine side effects (56.1% in adolescents, 51.9% in parents) and lack of trust in government recommendations (21.9% in adolescents, 22.8% in parents). **Conclusions:** Vaccine hesitancy in adolescents and parents in Europe is prevalent, with country of residence as a key influencing factor. Targeted strategies to educate both groups about immunization benefits and its side effects are essential, considering the heterogeneity across countries and reasons for hesitancy.

6.1.3 Antonini M, Genie MG, Attwell K, Attema AE, Ward JK, Melegaro A, Torbica A, Kelly B, Berardi C, Sequeira AR, McGregor N, Kellner A, Brammli-Greenberg S, Hinwood M, Murauskienė L, Behmane D, Balogh ZJ, Hagen TP, Paolucci F. Are we ready for the next pandemic? Public preferences and trade-offs between vaccine characteristics and societal restrictions across 21 countries. Soc Sci Med. 2025 Feb;366:117687.

In vaccination decisions, individuals must weigh the benefits against the risks of remaining unvaccinated and potentially facing social restrictions. Previous studies have focused on individual preferences for vaccine characteristics and societal restrictions separately. This study aims to quantify public preferences and the potential trade-offs between vaccine characteristics and societal restrictions, including lockdowns and vaccine mandates, in the context of a future pandemic. We conducted a discrete choice experiment (DCE) involving 47,114 respondents from 21 countries between July 2022 and June 2023 through an online panel. Participants were presented with choices between two hypothetical vaccination programs and an option to opt-out. A latent class logit model was used to estimate trade-offs among attributes. Despite some level of preference heterogeneity across countries and respondents' profiles, we consistently identified three classes of respondents: vaccine refusers, vaccine-hesitant, and pro-vaccine individuals. Vaccine attributes were generally deemed more important than societal restriction attributes. We detected strong preferences for the highest levels of vaccine effectiveness and for domestically produced vaccines across most countries. Being fully vaccinated against COVID-19 was the strongest predictor of pro-vaccine class preferences. Women and younger people were more likely to be vaccine refusers compared to men and older individuals. In some countries, vaccine hesitancy and refusal were linked to lower socioeconomic status, whereas in others, individuals with higher education and higher income were more likely to exhibit hesitancy. Our findings emphasize the need for tailored vaccination programs that consider local contexts and demographics. Building trust

in national regulatory authorities and international organizations through targeted communication, along with investing in domestic production facilities, can improve vaccine uptake and enhance public health responses in the future.

6.1.4 Correia T, Pereira ADC, Barros H, Davidovitch N, Leighton L, McCallum AK, Meireles P, Mueller JE, Otok R, Odone A, Petrakova A, Prymula R, Ricciardi W, Scintee SG, Signorelli C. Filling the Gap to Address Vaccine Hesitancy in Europe. Public Health Rev. 2025 Jan 24;46:1608208.

6.1.5 Augusto FR, Guerreiro CS, Morais R, Mendonça J, Beja A, Correia T, Hilário AP. Addressing vaccine hesitancy in the training of healthcare professionals: Insights from the VAX-TRUST project. Public Health Pract (Oxf). 2024 Dec 19;9:100569.

Background: Evidence suggests that healthcare professionals often feel uncomfortable discussing vaccination with patients, largely due to a lack of training on the topic. In line with the scientific evidence gathered from the VAX-TRUST project, it is crucial to invest in training healthcare professionals and developing political measures to effectively address vaccine hesitancy. This paper explores the importance of training healthcare professionals to address vaccine hesitancy and provides concrete strategies for its implementation. **Study design:** A quantitative research design was used. **Methods:** The findings are based on a comprehensive Delphi survey conducted with a panel of 112 experts. Additionally, the study involved practical interventions carried out across seven European countries, engaging a total of 694 participants. These participants included general practitioners (GPs), paediatricians, nurses, as well as medical and nursing students. This robust and diverse dataset provides a well-rounded perspective on the subject matter, ensuring that the insights gained are both extensive and representative of various healthcare professionals across Europe. **Results:** Three key themes emerged from the findings: the need for effective strategies to address communication challenges with vaccine-hesitant individuals, the importance of using evidence-based communication practices to improve these interactions, and the necessity of integrating social scientific knowledge on vaccination into the training of healthcare professionals. **Conclusions:** Training healthcare professionals is essential to equip them with skills and knowledge needed to deal with the complexities of vaccine hesitancy. Evidence was gathered on ways to reflect and act to develop this capacity, namely, by increasing the ability to communicate empathetically, responding to patients' concerns with evidence-based information, and to building stronger and more collaborative relationships with them.

6.1.6 Pinto de Carvalho C, Ribeiro M, Godinho Simões D, Pita Ferreira P, Azevedo L, Gonçalves-Sá J, Mesquita S, Gonçalves L, Pinto Leite P, Peralta-Santos A. Spatial Analysis of Determinants of COVID-19 Vaccine Hesitancy in Portugal. Vaccines (Basel). 2024 Jan 24;12(2):119.

Vaccine hesitancy tends to exhibit geographical patterns and is often associated with social deprivation and migrant status. We aimed to estimate COVID-19 vaccination hesitancy in a high-vaccination-acceptance country, Portugal, and determine its association with sociodemographic risk factors. We used the Registry of National Health System Users to determine the eligible population and the Vaccination Registry to determine individuals without COVID-19 vaccine doses. Individuals older than five with no COVID-19 vaccine dose administered by 31 March 2022 were considered hesitant. We calculated hesitancy rates by municipality, gender, and age group for all municipalities in mainland Portugal. We used the

spatial statistical scan method to identify spatial clusters and the Besag, Yorke, and Mollié (BYM) model to estimate the effect of age, gender, social deprivation, and migrant proportion across all mainland municipalities. The eligible population was 9,852,283, with 1,212,565 (12%) COVID-19 vaccine-hesitant individuals. We found high-hesitancy spatial clusters in the Lisbon metropolitan area and the country's southwest. Our model showed that municipalities with higher proportions of migrants are associated with an increased relative risk (RR) of vaccine hesitancy (RR = 8.0; CI 95% 4.6; 14.0). Social deprivation and gender were not associated with vaccine hesitancy rates. We found COVID-19 vaccine hesitancy has a heterogeneous distribution across Portugal and has a strong association with the proportion of migrants per municipality.

6.1.7 Vuolanto P, Almeida AN, Anderson A, Auvinen P, Beja A, Bracke P, Cardano M, Ceuterick M, Correia T, De Vito E, Delaruelle K, Delicado A, Esposito M, Ferrara M, Gariglio L, Guerreiro C, Marhánková JH, Hilário AP, Hobson-West P, Iorio J, Järvinen KM, Koivu A, Kotherová Z, Kuusipalo A, Lermytte E, Mendonça J, Morais R, Numerato D, Polak P, Rudek T, Sbaragli S, Scavarda A, Silva K, da Silva PA, Sivelä J, Moura ES, Świątkiewicz-Mośny M, Tipaldo G, Wagner A. Trust matters: The Addressing Vaccine Hesitancy in Europe Study. Scand J Public Health. 2024 May;52(3):379-390.

This article presents the design of a seven-country study focusing on childhood vaccines, Addressing Vaccine Hesitancy in Europe (VAX-TRUST), developed during the COVID-19 pandemic. The study consists of (a) situation analysis of vaccine hesitancy (examination of individual, socio-demographic and macro-level factors of vaccine hesitancy and analysis of media coverage on vaccines and vaccination and (b) participant observation and in-depth interviews of healthcare professionals and vaccine-hesitant parents. These analyses were used to design interventions aimed at increasing awareness on the complexity of vaccine hesitancy among healthcare professionals involved in discussing childhood vaccines with parents. We present the selection of countries and regions, the conceptual basis of the study, details of the data collection and the process of designing and evaluating the interventions, as well as the potential impact of the study. Laying out our research design serves as an example of how to translate complex public health issues into social scientific study and methods.

6.1.8 Costa IS, Nisa MM, Ferreira LM. Online Search Patterns about Vaccination: A National Study. Port J Public Health. 2022 Nov 24;40(3):134-139.

Introduction: Google Trends is an online metadata platform that measures the relative search volume of every topic in online search engines. In medical settings, this behavior has been associated with active changes in people's perceptions and search for healthcare. This study aimed to evaluate the online search patterns of Portuguese extra-program and risk-based vaccination. **Methods:** Analysis of the relative search volume was performed for extra-program and risk-based vaccines, in every Portuguese district between 2006 and 2021. Relative search volume was represented between 0 and 100 (highest interest in the query). **Results:** Rotavirus vaccine was consistently the most searched, followed by BCG and flu, the last of which, with abnormal peaks of search in November 2009 and October 2020. We registered a significant increase in the search for every vaccine in the last 5 years ($p < 0.01$). Particularly, during the COVID-19 pandemic, a more abrupt increase was registered for the flu vaccine, but most importantly for BCG (3,0[69,9] vs. 9,0[528,0]). Lisboa and Porto are the only Portuguese districts where percentual research is spread across all types of vaccines. On the other hand, in Portalegre, 84% of total searches correspond to BCG. **Discussion and**

conclusion: The recent increase in the interest in vaccination may translate into the investment of health professionals in primary prevention measures. However, the mediatic impact of pandemics is not neglectable. Health professionals must fight misinformation as it may have happened with the increasing interest in BCG, probably due to the protective association proposed with the infection by SARS-CoV-2.

6.2 Health beliefs and attitudes toward Influenza and COVID-19 vaccination in Portugal

6.2.1 Oliveira J, Gonzalez B, Mendes T, Paulino P, Gaspar R, António B, Costa D, Pinto LQ, Costa A, De Arriaga MT. Informing future seasonal influenza and COVID-19 vaccination campaigns based on past experience: a mixed-method approach with eligible populations and healthcare professionals. Front Public Health. 2025 Aug 22;13:1616402.

Background: Seasonal vaccination campaigns against influenza and COVID-19 are critical for protecting vulnerable populations. Scientific evidence on past campaigns is essential for the effectiveness of future campaigns. This study aims to: (1) assess predictors of influenza and COVID-19 vaccination intentions (2) explore perceived barriers and facilitators of 2023-2024 seasonal vaccination campaign. Methods: A cross-sectional study employing both quantitative and qualitative methods was conducted. The quantitative study involved a sample of 231 respondents from Portugal, including healthcare professionals and vaccination eligible population: individuals over 60 years of age, and individuals with chronic diseases. Quantitative data were collected via an online survey to assess vaccination literacy, attitudes, and future vaccination intention. The qualitative study consisted of four focus groups with a total of 17. Participants: Vaccinated/unvaccinated individuals and healthcare professionals. Thematic analysis was used to explore perceptions of eligible populations about this vaccination campaign. Results: Quantitative analysis revealed that attitudes toward vaccination and factors related to personal/family health predicted future vaccination intentions for influenza and COVID-19. Thematic analysis identified key facilitators, such as positive perceptions of pharmacies as vaccination sites and an early start of the campaign specifically for vaccinated groups. Barriers were related to campaign communication, fear of side effects, vaccination fatigue, and the co-occurrence of high temperatures during the campaign start. Unvaccinated individuals expressed lower perceived susceptibility and severity. Conclusion: The study highlights the importance of clear communication, addressing vaccination fatigue, and considering environmental factors. Improving proximity between health professionals as trusted information sources and the population, alongside customized communication, may also enhance vaccination uptake among the eligible population. The potential influence of weather conditions on the acceptance of vaccination campaigns is a topic that deserves further consideration in the future, within the scope of climate changes.

6.2.2 Santos AJ, Kislaya I, Matias-Dias C, Machado A. Health beliefs and attitudes toward Influenza and COVID-19 vaccination in Portugal: a study using a mixed-method approach. Front Public Health. 2024 Jan 19;11:1331136.

Introduction: Vaccination is one of the most effective population strategies to prevent infectious diseases and mitigate pandemics, and it is important to understand vaccine uptake determinants since vaccine hesitancy has been increasing for the past few decades. The Health Belief Model (HBM) has been widely used for understanding vaccination behavior. The current study aimed to assess influenza vaccine (IV) non-uptake and attitudes toward COVID-

19 vaccination, two important respiratory diseases with similar symptoms, and routes of transmission in the Portuguese population. **Methods:** We conducted a cross-sectional study using a panel sample of randomly chosen Portuguese households. A total of 1,050 individuals aged 18 years and over responded to a telephone or online questionnaire. Through a mixed-method approach, we employed thematic content analysis to describe reasons for not taking the IV, considering the HBM dimensions, and quantitative statistical analysis to estimate IV and COVID-19 vaccine coverage. **Results:** The IV uptake for the overall population was 30.7% (CI 95%: 26.5, 35.2). Susceptibility was found to be a main factor for IV non-uptake, followed by barriers, such as stock availability and fear of adverse effects. The uptake of the COVID-19 vaccine was very high in the study population (83.1%, CI 95%: 13.6%-20.9%). There was a high perception of COVID-19-associated severity and fear of the consequences. Individuals who reported IV uptake seemed to perceive a higher severity of COVID-19 and a higher benefit of taking the COVID-19 vaccine for severe complications. **Discussion:** Thus, the population does not seem to consider influenza to be a health risk, as opposed to COVID-19, which is considered to be a possibly severe disease. The association between IV uptake and COVID-19 perceptions highlights that an overall attitude toward vaccination in general may be an important individual determinant.

6.2.3 Welch VL, Metcalf T, Macey R, Markus K, Sears AJ, Enstone A, Langer J, Srivastava A, Cane A, Wiemken TL. Understanding the Barriers and Attitudes toward Influenza Vaccine Uptake in the Adult General Population: A Rapid Review. Vaccines (Basel). 2023 Jan 13;11(1):180.

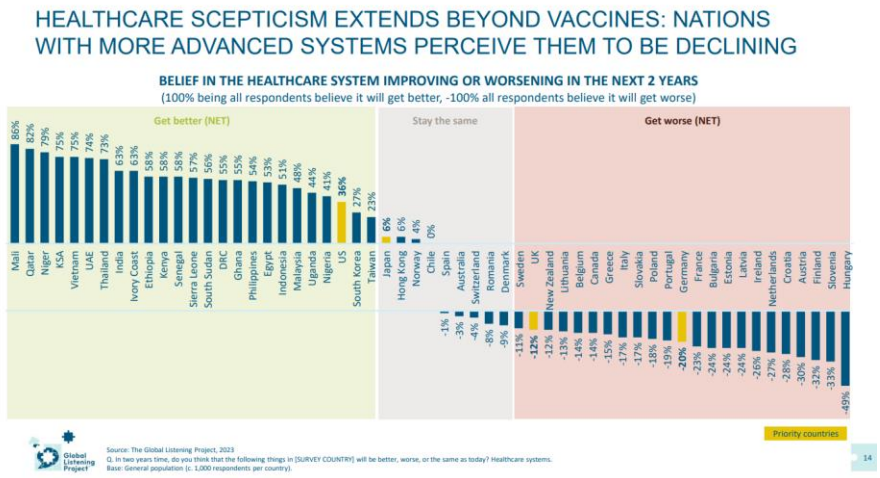
Influenza is a common respiratory infection associated with a substantial clinical, humanistic, and economic burden globally. Vaccines are essential to prevent and control influenza and are recommended by public-health agencies, such as the WHO and US CDC; however, vaccination rates vary considerably across the globe. This review aimed to investigate the perceived barriers and attitudes to influenza vaccination in the global population, in order to identify strategies that may improve influenza vaccination coverage. A structured literature search was undertaken to identify studies that reported on patient-reported attitudes towards influenza vaccination, focused on the adult general population in 16 prespecified countries. Eighty studies were included in this review. Negative attitude towards healthcare were found to be the most agreed upon barrier to vaccine uptake (31.1% agreement). The most agreed promoter of influenza vaccination was trust in healthcare services (62.0% agreement). Approximately 50% of participants intended to receive the influenza vaccine in the following season. To improve influenza vaccination coverage, healthcare workers must strengthen the foundation of substantial trust in healthcare services and provide educational materials that improve influenza vaccination knowledge among the adult general population.

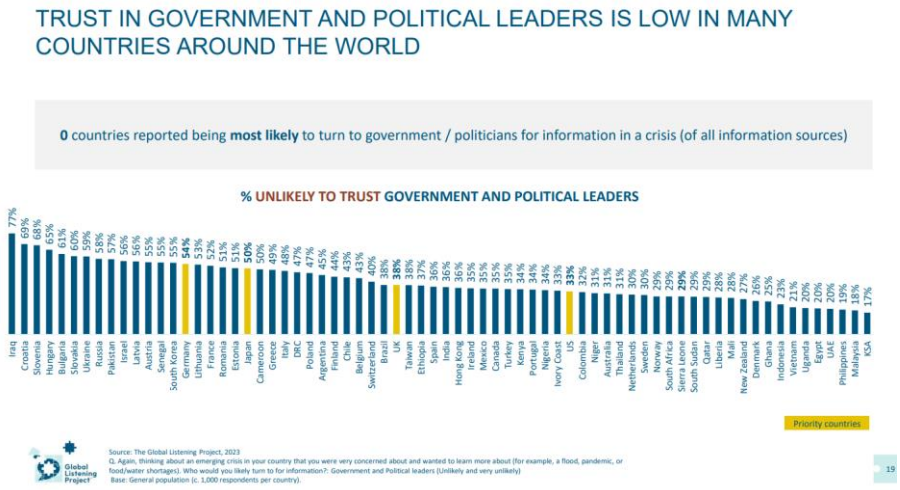
6.2.4 Welch VL, Metcalf T, Macey R, Markus K, Sears AJ, Enstone A, Langer J, Srivastava A, Cane A, Wiemken TL. Understanding the Barriers and Attitudes toward Influenza Vaccine Uptake in the Adult General Population: A Rapid Review. Vaccines (Basel). 2023 Jan 13;11(1):180.

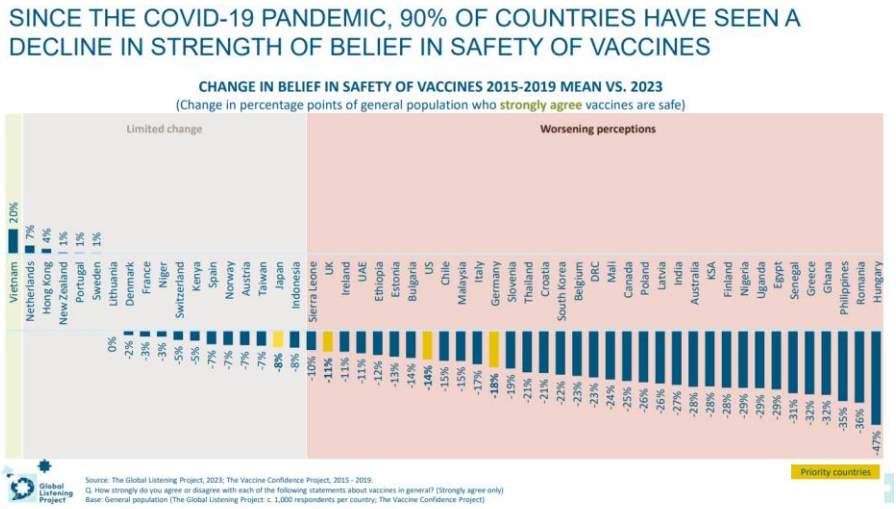
Influenza is a common respiratory infection associated with a substantial clinical, humanistic, and economic burden globally. Vaccines are essential to prevent and control influenza and are recommended by public-health agencies, such as the WHO and US CDC; however, vaccination rates vary considerably across the globe. This review aimed to investigate the perceived barriers and attitudes to influenza vaccination in the global population, in order to identify strategies that may improve influenza vaccination coverage. A structured literature search

was undertaken to identify studies that reported on patient-reported attitudes towards influenza vaccination, focused on the adult general population in 16 prespecified countries. Eighty studies were included in this review. Negative attitude towards healthcare were found to be the most agreed upon barrier to vaccine uptake (31.1% agreement). The most agreed promoter of influenza vaccination was trust in healthcare services (62.0% agreement). Approximately 50% of participants intended to receive the influenza vaccine in the following season. To improve influenza vaccination coverage, healthcare workers must strengthen the foundation of substantial trust in healthcare services and provide educational materials that improve influenza vaccination knowledge among the adult general population.

6.2.5 A The Global listening project - NEW ERA OF EXPECTATION - UNDERSTANDING THE RISE OF HEALTHCARE SCEPTICISM, MISINFORMATION, AND TRUST DYNAMICS TO ENHANCE BELIEF IN ADULT IMMUNISATION







Session 7: Adult Vaccination in Portugal in specific situations and population groups; the way forward

Session 7: Adult Vaccination in Portugal in specific situations and population groups; the way forward	7.1 Vaccinations of healthcare providers	Ana Isabel Correia
	7.2 Vaccinations of pregnant women	Carolina Sequeira
	7.3 Vaccination of older adults	Sofia Duque
	7.4 Vaccination of immunocompromised	Luis Graca
	7.5 From children to adults: applying Portugal's Pediatric vaccine success to adult immunization	Fernanda Rodrigues

7.1 Vaccinations of healthcare providers

7.1.1 Drobniewski F, Ashmi M, Kusuma D, Ahmad R, Naumovas D, Juozapaitė D, Toscano C, Perea E, Abecasis AB, Viveiros M, Pereira JPV, Jensen BO, Bardeck N, de Morais Caporali JF, Pinto JA, Incardona F, Parczewski M, Serwin K. Determinants of vaccine hesitancy among healthcare workers in an international multicenter study within the EuCARE project. Sci Rep. 2025 Aug 28;15(1):31703.

A total of 2079 healthcare workers (HCWs) responded to an anonymous survey on vaccine hesitancy conducted between December 2022 and October 2023 at centers in Lithuania, Portugal, Poland, Germany, and Brazil. Only 55.7% were confident about the long-term safety of the COVID-19 vaccine; 10% believed the risk of having COVID-19 vaccines was greater than the risk of COVID-19 itself. 54.2% believed that COVID-19 vaccination should be compulsory for all staff working in healthcare settings (unless medically exempt), for all patient-facing HCW (59.0%), and for all medical, nursing, and midwifery students (56.7%); fewer supported compulsory influenza vaccination, i.e., 38.0%, 41.5% and 39.7% for equivalent groups. Under half had been vaccinated for influenza in recent years. Respondents were supportive of childhood vaccinations. Level of education, specific HCW occupation and geography were associated with the degree of vaccination hesitancy. The majority trusted advice from health professionals or scientists/doctors and distrusted statements from politicians. **Key factors that HCWs thought would encourage vaccination included: vaccine availability at their workplace, vaccination of professional colleagues, sufficient opportunity to ask about vaccine safety and efficacy, supportive information from international bodies, and HCW plans to visit vulnerable family/friends**. Generic vaccine promotion activities, whilst valuable, require nuanced modification for different HCW subgroups, vaccines, education levels, and geography.

7.1.2 Pérez-Rivas FJ, Esteban-Gonzalo L, García-García D, Ajejas Bazán MJ, Roquette-Viana MC, Tholl AD, Marques-Vieira CMA. Attitudes and behaviors toward vaccination among nursing students from Spain and Portugal: a cross-sectional study. BMC Nurs. 2025 Aug 4;24(1):1012.

Background/objectives: Since nursing students will be future promoters of immunization, it is essential to compare the attitudes and behaviors toward vaccination among nursing students in Portugal and Spain, to provide a comparative and contextualised view of the perceptions and practices of future health professionals in two countries with similar health systems and training structures, but influenced by different socio-cultural frameworks. Therefore, allows for the identification of similarities and divergences in the disposition towards vaccination, which is key for the design of more effective and culturally sensitive educational and public health strategies. Methods: **This cross-sectional study assessed and compared attitudes and behaviors toward vaccination among nursing students from the Portuguese Catholic University (Lisbon, Portugal) and the Complutense University of Madrid (Spain).** The study included 928 students from all four years of the nursing degree program, who completed the Questionnaire on Attitudes and Behaviors toward Vaccination in Health Sciences Students (ACVECS). Results: The results showed significant differences between both countries. Spanish students presented more favorable attitudes and behaviors toward vaccination compared to Portuguese students ($p < 0.001$). Women and native students obtained higher scores. Differences were observed according to academic year: in Spain, students in higher years showed better attitudes, while in Portugal it was first-year students who obtained higher scores. These differences could be influenced by cultural, educational, and pandemic-related factors. Conclusions: Spanish students showed significantly more favorable attitudes and behaviors toward vaccination than Portuguese students. Native

students had a better attitude toward vaccination in both countries, this difference being especially notable in behaviors oriented toward vaccination among Portuguese students.

7.1.3 Teófilo V, Amaro J, Matos P, Pinho P, Moreira S, Ribeiro R, Miller M, Pinelas S, Silva F, Azevedo C, Norton P. Hesitação e Recusa da Vacina Contra a COVID-19 entre Profissionais de Saúde: Estudo Transversal num Hospital Português [Hesitancy and Refusal of the COVID-19 Vaccine Among Healthcare Professionals: A Cross-Sectional Study in a Portuguese Hospital]. Acta Med Port. 2025 Apr 1;38(4):217-227. Portuguese.

Introduction: Vaccine hesitancy is recognized by the World Health Organization as a major global health threat. In the context of the COVID-19 pandemic, this issue has taken on unique dimensions. Healthcare professionals are considered one of the most reliable sources of information regarding vaccination. Their stance on immunization is a determining factor in their likelihood to recommend it to others, with potential repercussions for vaccination uptake rates in the general population. This study aimed to characterize the sociodemographic profile of healthcare professionals at a Portuguese tertiary hospital who declined COVID-19 vaccination and to analyze the reasons for hesitancy/refusal and future vaccination intentions. Methods: A cross-sectional study was conducted in 2021, targeting healthcare professionals eligible for the completion of the primary COVID-19 vaccination schedule. Those who refused vaccination were asked to complete the "COVID-19 Non-Vaccination Questionnaire", which included a multiple choice question and an open response field regarding reasons for hesitancy/refusal and future vaccination intentions. Variables analyzed included gender, age, and professional category. Results: Among the 6648 healthcare professionals in the sample, 2.3% (n = 153) declined to complete the vaccination schedule. The average age was 46 years (SD = 11), with the proportion in each age group being 1.2% aged ≤ 35 years, 2.5% aged 36 - 45 years, and 3.1% aged > 45 years. The vaccine refusal rate among all professionals of each gender was 2.3% for females and 2.4% for males. A higher proportion of refusals was observed among healthcare assistants (n = 53, 4.0%) and technical assistants (n = 13, 3.0%). Sixteen reasons for vaccine hesitancy/refusal were identified, with the most frequently reported being fear of adverse reactions (n = 31), insufficient research on vaccines (n = 22), and distrust in vaccine efficacy (n = 25). Only 28.1% (n = 43) expressed an intention to be vaccinated in the future. Conclusion: A high acceptance rate for the primary COVID-19 vaccination schedule was observed. The likelihood of vaccine refusal was similar between genders but higher among individuals over 45 years and operational support staff. The reasons for vaccine refusal that implied concerns about the vaccine's safety stood out. Further studies are needed to better understand the dynamics underlying vaccine hesitancy/refusal.

7.1.4 Silva Paulo M, Modenese A. Editorial: Knowledge, attitudes and perceptions of healthcare professionals and health professions students towards vaccinations and non-pharmaceutical interventions. Front Med (Lausanne). 2024 Oct 28;11:1443129.

7.1.5 Savulescu C, Prats-Uribe A, Brolin K, Uusküla A, Bergin C, Fleming C, Murri R, Zvirbulis V, Zavadska D, Gaio V, Popescu CP, Hrisca R, Cisneros M, Latorre-Millán M, Lohur L, McGrath J, Ferguson L, …, Pohrib SM, Muñoz-Almagro C, Milagro A, Bacci S, Nardone A; VEBIS HCW VE study group; Collaborators in VEBIS HCW study group. Effectiveness of the autumn 2023 COVID-19 vaccine dose in hospital-based healthcare workers: results of the VEBIS healthcare worker vaccine effectiveness cohort study, seven European countries, season 2023/24. Euro Surveill. 2024 Oct;29(44):2400680.

COVID-19 vaccination recommendations include healthcare workers (HCWs). We measured COVID-19 vaccine effectiveness (CVE) of the autumn 2023 dose against laboratory-confirmed SARS-CoV-2 infection in a prospective cohort study of 1,305 HCWs from 13 European hospitals. Overall CVE was 22% (95% CI: -17 to 48), 49% (95% CI: -8 to 76) before and -11% (95% CI: -84 to 34) after the start of BA.2.86/JN.1 predominant circulation. Autumn 2023 COVID-19 vaccination led to a moderate-to-low reduction in SARS-CoV-2 infection incidence in HCWs. Monitoring of CVE is crucial for COVID-19 prevention.

7.1.6 Prieto-Campo Á, Batista AD, Magalhães Silva T, Herdeiro MT, Roque F, Figueiras A, Zapata-Cachafeiro M. Understanding vaccination hesitation among health professionals: a systematic review of qualitative studies. Public Health. 2024 Jan;226:17-26.

Objectives: In terms of vaccination, people trust healthcare professionals (HCPs) more than any other source of information. They are the cornerstone of vaccination as they can move undecided populations not only towards vaccination but also towards non-vaccination. The aim of this systematic review was to explore the knowledge, beliefs, attitudes, and barriers associated with own vaccination and patient recommendation in HCPs. **Study design:** This study incorporated a systematic review. **Methods:** A systematic review of studies published from January 1, 2000, to June 1, 2020, was conducted by searching PubMed and EMBASE electronic databases. Qualitative studies reporting outcomes related to knowledge, attitudes, or barriers related to vaccination/recommendation by healthcare personnel were included. The guidelines in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses were followed. **Results:** From a total of 2916 studies identified, 36 articles met the inclusion criteria. Some of the factors cited by the HCP that may contribute to vaccine hesitancy were (a) concerns regarding safety or efficacy of vaccines (23 articles); (b) time constraints (21 articles); (c) lack of knowledge about the vaccination/vaccine (19 articles); (d) costs (13 articles); (e) distrust of pharmaceutical industry (8 articles); and (f) considering oneself insusceptible (7 articles), stock shortage (7 articles), lack of personnel (5 articles), and feelings of unnecessary vaccination (5 articles). **Conclusions:** Our review suggests that interventions to combat vaccine hesitancy should increase HCP education on vaccine efficacy and safety, as well as intervene on health system factors such as cost and time per visit. In this way, we could tackle the problem of vaccine hesitancy, which seriously threatens global public health.

7.1.7 Karlsson LC, Garrison A, Holford D, Fasce A, Lewandowsky S, Taubert F, Schmid P, Betsch C, Rodrigues F, Fressard L, Verger P, Soveri A. Healthcare professionals' attitudes to mandatory COVID-19 vaccination: Cross-sectional survey data from four European countries. Hum Vaccin Immunother. 2023 Aug;19(2):2256442.

Mandatory vaccinations are widely debated since they restrict individuals' autonomy in their health decisions. As healthcare professionals (HCPs) are a common target group of vaccine mandates, and also form a link between vaccination policies and the public, understanding their attitudes toward vaccine mandates is important. The present study investigated physicians' attitudes to COVID-19 vaccine mandates in four European countries: Finland, France, Germany, and Portugal. An electronic survey assessing attitudes to COVID-19 vaccine mandates and general vaccination attitudes (e.g. perceived vaccine safety, trust in health authorities, and openness to patients) was sent to physicians in the spring of 2022. A total of 2796 physicians responded. Across all countries, 78% of the physicians were in favor of COVID-19 vaccine mandates for HCPs, 49% favored COVID-19 vaccine mandates for the public, and 67% endorsed COVID-19 health passes. Notable differences were observed

between countries, with attitudes to mandates found to be more positive in countries where the mandate, or similar mandates, were in effect. The associations between attitudes to mandates and general vaccination attitudes were mostly small to neglectable and differed between countries. Nevertheless, physicians with more positive mandate attitudes perceived vaccines as more beneficial (in Finland and France) and had greater trust in medical authorities (in France and Germany). The present study contributes to the body of research within social and behavioral sciences that support evidence-based vaccination policymaking.

7.1.8 Heyerdahl LW, Dielen S, Nguyen T, Van Riet C, Kattumana T, Simas C, Vandaele N, Vandamme AM, Vandermeulen C, Giles-Vernick T, Larson H, Grietens KP, Gryseels C. Doubt at the core: Unspoken vaccine hesitancy among healthcare workers. Lancet Reg Health Eur. 2022 Jan;12:100289.

7.2 Vaccinations of pregnant women

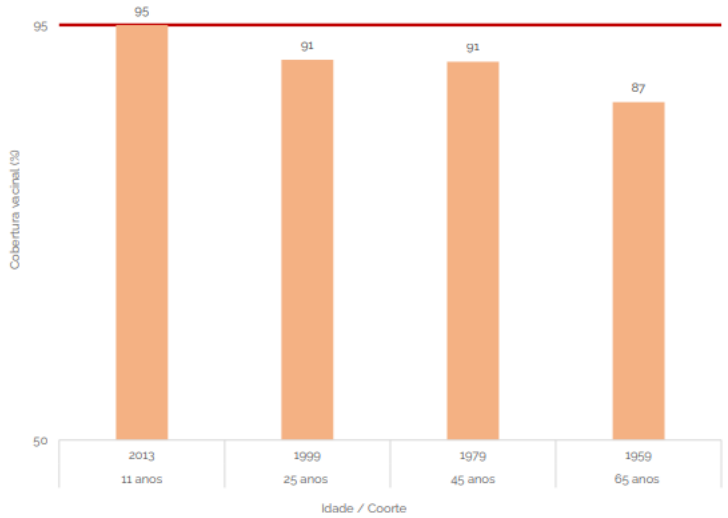


Figura 17. Esquema cumprido. Cobertura vacinal contra tétano e difteria, por idade e coorte. Avaliação 2024, em Portugal Continental. Fonte: VACINAS

https://www.dgs.pt/ficheiros-de-upload-2013/relatorio-pnv-2024-pdf.aspx

It is estimated that, in 2024, approximately 80.4% of eligible pregnant women in Portugal were vaccinated with the Tdap vaccine. The methodology for evaluating this coverage has limitations due to the unavailability of updated data on the number of deliveries performed in 2024 or the actual number of pregnant women during the same year. It is necessary to reinforce this vaccination strategy among pregnant women, regardless of prior disease history or vaccination status.

7.2.1 Borges Charepe N, Queirós A, Alves MJ, Serrano F, Ferreira C, Gamito M, Smet C, Silva V, Féria B, Laranjo M, Martins I, Vieira-Coimbra M, Almeida MDC, Soares C, Castro F, Almeida G, Reis I, Barbosa M, Santos M, Melo M, Bárbara A, Gonçalves D, Oliveira M, Pinheiro P, Faustino MF, Oliveira A, Canhão H, Campos A. One Year of COVID-19 in Pregnancy: A National Wide Collaborative Study. Acta Med Port. 2022 May 2;35(5):357-366.

Introduction: Even though the risk of COVID-19 in pregnancy may be increased, large-scale studies are needed to better understand the impact of the infection in this population. The aim of this study is to describe obstetric complications and the rate of vertical transmission in pregnant women with SARS-CoV-2 infection. **Material and methods:** Detected cases of SARS-CoV-2 infection in pregnancy were registered in Portuguese hospitals by obstetricians. Epidemiological, pregnancy and childbirth data were collected. **Results:** There were 630 positive cases in 23 Portuguese maternity hospitals, most at term (87.9%) and asymptomatic (62.9%). The most frequent maternal comorbidity was obesity. The rates of preterm birth and small-to-gestational-age were 12.1% and 9.9%, respectively. In the third trimester, 2.9% of pregnant women required respiratory support. There were eight cases (1.5%) of fetal death, including two cases of vertical transmission. There were five cases of postpartum respiratory degradation, but no maternal deaths were recorded. The caesarean section rate was higher in the first than in the second wave (68.5% vs 31.5%). RT-PCR SARS-CoV-2 positivity among newborns was 1.3%. **Conclusion:** SARS-Cov-2 infection in pregnancy may carry increased risks for both pregnant women and the fetuses. Individualized surveillance and the prophylaxis of this population with vaccination. is recommended in these cases.

7.3 Vaccinations of older adults

7.3.1 Alfaro T, Froes F, Vicente C, Costa R, Gavina C, Baptista R, Maio A, da Cunha S, Neves JS, Leuschner P, Duque S, Pinto P. Respiratory syncytial virus vaccination in older adults and patients with chronic disorders: A position paper from the Portuguese Society of Pulmonology, the Portuguese Association of General and Family Medicine, the Portuguese Society of Cardiology, the Portuguese Society of Infectious Diseases and Clinical Microbiology, the Portuguese Society of Endocrinology, Diabetes and Metabolism, and the Portuguese Society of Internal Medicine. Pulmonology. 2025 Dec 31;31(1):2451456.

Background: Respiratory syncytial virus (RSV) is an important cause of lower respiratory tract infection, hospitalisation and death in adults. **Methods:** Based on evidence regarding the impact of RSV on adult populations at risk for severe infection and the efficacy and safety of RSV vaccines, the Portuguese Society of Pulmonology, the Portuguese Association of General and Family Medicine, the Portuguese Society of Cardiology, the Portuguese Society of Infectious Diseases and Clinical Microbiology, the Portuguese Society of Endocrinology, Diabetes and Metabolism, and the Portuguese Society of Internal Medicine endorses this position paper with recommendations to prevent RSV-associated disease and its complications in adults through vaccination. **Conclusion:** The RSV vaccine is recommended for people aged ≥50 years with risk factors (chronic obstructive pulmonary disease, asthma, heart failure, coronary artery disease, diabetes, chronic kidney disease, chronic liver disease, immunocompromise, frailty, dementia, and residence in a nursing home) and all persons aged ≥60 years. If it cannot be made available to this population, then the vaccine should be prioritised for individuals aged ≥75 years and those aged ≥50 years with risk factors. The vaccine should preferably be given between September and November and can be co-administered with the influenza vaccine. Ongoing studies on RSV vaccines may justify extending these recommendations in the future.

7.3.2 Pereira A, Pinho C, Oliveira A, Santos R, Felgueiras M, Martins JP. Vaccination Promotion Strategies in the Elderly: Systematic Review and Meta-Analysis. Vaccines (Basel). 2024 Dec 11;12(12):1395.

Background: The World Health Organization estimates that currently available vaccines prevent 2 to 3 million deaths worldwide each year. Preventing infectious diseases is an important public health priority to ensure healthy ageing and improve quality of life. This study's aim is to identify the best strategies to increase vaccination coverage in the elderly. **Methods**: A systematic review and meta-analysis were carried out, including a bibliographic search in the PubMed and Scopus databases. Studies in older people (60 years or older) on any type of intervention aimed at increasing vaccination coverage were included. The effect of the intervention was measured using the odds ratio (OR). **Results**: After applying the selection criteria, 20 studies were identified: 17 on influenza vaccines and 3 on other vaccines. Educational strategies obtained an OR = 1.63 (95% CI: 1.22-2.19, I2 = 0.59). Medical counselling obtained an OR = 3.13 (95% CI: 0.60-16.37, I2 = 0.95). Writing strategies obtained an OR = 1.14 (95% CI: 0.99-1.32, I2 = 0.93). Few studies reported the effect of free vaccination. **Conclusions**: The educational strategies proved to be more effective than the others in this study. Free vaccination and age may have important roles. Further studies are needed as research in this area remains limited.

7.3.3 MacIntyre CR, de Sousa JC, Heininger U, Kardos P, Konstantopoulos A, Middleton D, Nolan T, Papi A, Rendon A, Rizzo A, Sampson K, Sette A, Sobczyk E, Tan T, Weil-Olivier C, Weinberger B, Wilkinson T, von König CHW. Public health management of pertussis in adults: Practical challenges and future strategies. Hum Vaccin Immunother. 2024 Dec 31;20(1):2377904.

A panel of 24 international experts met in July 2022 to discuss challenges associated with pertussis detection, monitoring, and vaccination in adults; conclusions from this meeting are presented. There has been a shift in the epidemiology of pertussis toward older children and adults. This shift has been attributed to the waning of infection- or vaccine-induced immunity, newer detection techniques causing detection bias, and possibly the replacement of whole-cell pertussis with acellular vaccines in high-income countries, which may lead to immunity waning more quickly. The burden of adult pertussis is still likely under-ascertained due to widespread under-recognition by healthcare professionals (HCPs), under-diagnosis, and under-reporting in this age group. Non-standardized testing guidance and varied case definitions have contributed to under-reporting. Key barriers to HCP engagement with the tetanus, diphtheria, and pertussis (Tdap) vaccine include low awareness, lack of time/funding, and lack of motivation due to low prioritization of Tdap.

7.3.4 Froes F, Timóteo A, Almeida B, Raposo JF, Oliveira J, Carrageta M, Duque S, Morais A. Influenza vaccination in older adults and patients with chronic disorders: A position paper from the Portuguese Society of Pulmonology, the Portuguese Society of Cardiology, the Portuguese Society of Diabetology, the Portuguese Society of Infectious Diseases and Clinical Microbiology, the Portuguese Society of Geriatrics and Gerontology, and the Study Group of Geriatrics of the Portuguese Society of Internal Medicine. Pulmonology. 2024 Sep-Oct;30(5):422-436.

Influenza affects millions of people worldwide each year and can lead to severe complications, hospitalizations, and even death, especially among vulnerable populations such as older adults and those with chronic medical conditions. Annual vaccination is considered the most effective measure for preventing influenza and its complications. Despite the widespread availability of influenza vaccines, however, vaccination coverage rates remain suboptimal in several countries. Based on the latest scientific evidence and expert opinions on influenza vaccination in older people and patients with chronic disease, the Portuguese Society of

Pulmonology (SPP), the Portuguese Society of Diabetology (SPD), the Portuguese Society of Cardiology (SPC), the Portuguese Society of Geriatrics and Gerontology (SPGG), the Study Group of Geriatrics of the Portuguese Society of Internal Medicine (NEGERMI-SPMI), and the Portuguese Society of Infectious Diseases and Clinical Microbiology (SPDIMC) discussed best practices for promoting vaccination uptake and coverage and drew up several recommendations to mitigate the impact of influenza. These recommendations focus on the efficacy and safety of available vaccines; the impact of influenza vaccination on older adults; patients with chronic medical conditions, namely cardiac and respiratory conditions, diabetes, and immunosuppressive diseases; and health care professionals, optimal vaccination timing, and strategies to increase vaccination uptake and coverage. The resulting position paper highlights the critical role that vaccinations play in promoting public health, raising awareness, and encouraging more people to get vaccinated.

7.3.7 Silva TM, Estrela M, Roque V, Gomes ER, Figueiras A, Roque F, Herdeiro MT. Perceptions, knowledge and attitudes about COVID-19 vaccine hesitancy in older Portuguese adults. Age Ageing. 2022 Mar 1;51(3):afac013.

Background: Coronavirus 2019 (COVID-19) has become a public-health emergency of international concern. Most efforts to contain the spread and transmission of the virus rely on campaigns and interventions targeted to reduce Vaccine Hesitancy and Refusal (VHR). **Objective:** this study aims to assess the major factors associated with VHR in the older population in Portugal. **Methods:** a nation-wide cross-sectional study was conducted in the older Portuguese population (≥65 years old) through computer-assisted telephone interviewing. Logistic regression was used to determine the adjusted odds ratio (OR) of the independent variables (perceptions, knowledge and attitudes) and of the outcome (VHR). **Results:** the response rate was 60.1% (602/1,001). Perceptions, knowledge and attitudes were strongly associated with VHR probability. A 1-point Likert scale increase in concerns about the vaccines' efficacy and safety increased the risk of VHR by 1.96 (95% confidence interval [CI]: 1.40-6.28) and 3.13 (95%CI: 2.08-8.22), respectively. A reduction of VHR probability for 'reliability of the information released by social media' (OR = 0.34, 95%CI: 0.16-0.70) and for 'trust in national and international competent authorities' (OR = 0.34, 95%CI: 0.17-0.69) is also observed per 1-point increase. **Conclusions:** as VHR seems to be strongly associated with perceptions, knowledge and attitudes, the design and promotion of vaccination campaigns/educational interventions specifically targeted at changing these potentially modifiable determinants may help to tackle COVID-19 VHR and achieve a wider vaccine coverage.

7.4 Vaccinations of immunocompromised

7.4.1 Cunha AS, Raposo B, V Cordeiro J, Marques MJ, Pedro AR. Desafios Não Atendidos na Prevenção da COVID-19 em Indivíduos Imunocomprometidos: Uma Análise de Consenso em Portugal [Unmet Challenges in COVID-19 Prevention for Immunocompromised Individuals: A Consensus Analysis from Portugal]. Acta Med Port. 2025 Sep 1;38(9):538-547. Portuguese.

Introduction: The COVID-19 pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), resulted in significant disease burden and mortality. Despite vaccination successes, new virus variants persist, affecting unvaccinated and immunocompromised individuals (ICI) severely. These high-risk groups face elevated

mortality and hospitalization rates. Vigilance and targeted health measures remain crucial post-pandemic. The aim of this study was to develop consensus on the unmet needs in COVID-19 prevention among ICI. Methods: We performed a Delphi study involving 45 experts, including physicians, health managers, policymakers, public health experts, members of medical societies and patient organizations. Consensus was achieved at 65% for each identified strategy using a scale ranging from "strongly agree" to "strongly disagree." Three Delphi rounds were conducted to address four key questions: identifying unmet needs in COVID-19 prevention for ICI; identifying the characteristics that distinguish ICI as a susceptible group; determining the main outcomes of COVID-19 in ICI; and indicating action plans for protecting ICI. The first round involved voting on pre-identified indicators. The second and third rounds involved analyzing the gathered information and voting on each indicator to achieve consensus. Results: A retention rate of 80% was achieved. Out of 89 valid indicators analyzed, 23 achieved consensus. These included: eight indicators highlighting the importance of raising awareness about COVID-19 and vaccination outcomes, ensuring safety and understanding, and developing targeted immunization strategies for ICI; five indicators identifying susceptible groups within ICI, such as individuals undergoing chemotherapy or radiotherapy, those with primary immunodeficiencies, solid organ transplant recipients, patients with chronic kidney disease, and bone marrow transplant recipients; two indicators showing improvements in clinical outcomes and reduced hospitalizations; and eight indicators recommending the development of effective therapies, more immunogenic vaccines, and treatments for viral infections in ICI. Conclusion: The study **emphasized the importance of targeted immunization strategies, monitoring, and tailored education to address diverse needs of ICI. These findings provide a foundation for future policies to effectively manage and protect ICI during and beyond the COVID-19 pandemic.**

7.4.2 Teles C, Borges A, Magalhães A, Barra C, Silva I, Tomé P, Crespo J, Paiva A, Santos L. Effectiveness and immunogenicity of SARS-CoV-2 booster vaccine in immunosuppressed systemic autoimmune disease patients: A prospective study. Med Clin (Barc). 2025 Jun 27;164(12):106920. English, Spanish.

Introduction and objectives: Patients with systemic autoimmune rheumatic disease (SARD) are a vulnerable population for severe COVID-19 and worse response to vaccination, prompting the need of a booster vaccine. Data regarding its response is limited and inconsistent. The aim of this study was to assess the effectiveness and immunogenicity of the third dose of the SARS-CoV-2 vaccine in immunosuppressed SARD patients. **Materials and methods:** We conducted a prospective study in immunosuppressed SARD Portuguese patients, who received a SARS-CoV-2 booster vaccine, from October 2021 to August 2022. We evaluated COVID-19 incidence in the following 6 months, as well as vaccine immunogenicity through anti-Spike IgG titers and T-cell reactivity to the Spike protein. **Results:** We included 131 patients with a mean age of 54.9±12.2 years. Almost 40% (n=52) developed COVID-19 within 6 months after the booster, but 51 (98.1%) were mild infections. Median post-booster antibody levels and antibody variation were 9540.7 (14,724) and 8937.9 (11,561.3)AU/mL, respectively, and 73.3% (n=96) of the patients showed post-booster T-cell reactivity. Antibody variation was significantly lower in the COVID group (p=0.015). Although post-booster antibody levels and T-cell reactivity were statistically significantly lower in the patients under biologic DMARD, there was not a significant increase in COVID-19 incidence. **Conclusions:** This study shows that a booster vaccine elicits strong immunogenicity and reduces COVID-19 severity, highlighting its importance in immunosuppressed SARD patients.

Larger and more homogeneous cohorts are needed to guide periodic booster administration in this susceptible population.

7.4.3 Ladeira F, Nobrega C, Cerqueira J; on behalf COVACiMS collaborators. Evaluation of the efficacy of the SARS-CoV-2 vaccine additional and booster doses in immunocompromised patients with multiple sclerosis: the COVACiMS study. J Neurol. 2025 Mar 25;272(4):288.

Studies evaluating COVID-19 primary vaccination with two vaccines reported a blunt response in Multiple Sclerosis (MS) patients under anti-CD20 and sphingosine-1-phosphate (S1P) modulators. An extended primary vaccination (EPV) was recommended in immunosuppressed MS patients. Data on the effectiveness of the EPV and subsequent booster dose are limited. A prospective cohort study (n = 270) was conducted to evaluate the humoral and cellular immunogenicity of the EPV scheme in immunocompromised MS patients (i.e., treated with anti-CD20, S1P modulators, natalizumab, teriflunomide, or dimethyl fumarate) vs. regular primary vaccination in non-treated patients - primary course (PC) cohort. The effect of a subsequent booster dose was also assessed - first booster (FB) cohort . The seroconversion rates were 55% and 56% in anti-CD20 and 75% and 67% in S1P modulators group in PC and FB cohort, respectively, and 100% in the remaining groups. A positive SARS-CoV-2 Spike T-spot was observed in 22% of patients under S1P modulators in PC cohort and 67% in FB cohort; the remaining groups had 75% or more. Similar rates of breakthrough infection were observed in both groups vs. controls. Compared to non-treated MS patients, immunosuppressed patients under anti-CD20 and S1P modulators drugs receiving EPV scheme or booster dose still present lower protection rates to SARS-CoV-2.

7.4.4 Cruz P, Lam JM, Abdalla J, Bell S, Bytyci J, Brosh-Nissimov T, Gill J, Haidar G, Hoerger M, Maor Y, Pagliuca A, Raffi F, Samuels F, Segev D, Ying Y, Lee LYW; Global Immunocompromised Health Coalition. Immunobridging Trials: An Important Tool to Protect Vulnerable and Immunocompromised Patients Against Evolving Pathogens. Vaccines (Basel). 2024 Dec 29;13(1):19.

Safeguarding patients from emerging infectious diseases demands strategies that prioritise patient well-being and protection. Immunobridging is an established trial methodology which has been increasingly employed to ensure patient protection and provide clinicians with swift access to vaccines. It uses immunological markers to infer the effectiveness of a new drug through a surrogate measure of efficacy. Recently, this method has also been employed to authorise novel drugs, such as COVID-19 vaccines, and this article explores the concepts behind immunobridging trials, their advantages, issues, and significance in the context of COVID-19 and other infectious diseases. Our goal is to improve awareness among clinicians, patient groups, regulators, and health leaders of the opportunities and issues of immunobridging, so that fewer patients are left without protection from infectious diseases, particularly from major pathogens that may emerge.

7.4.4 Silva-Pinto A, Abreu I, Martins A, Bastos J, Araújo J, Pinto R. Vaccination After Haematopoietic Stem Cell Transplant: A Review of the Literature and Proposed Vaccination Protocol. Vaccines (Basel). 2024 Dec 23;12(12):1449.

Background/Objectives: Haematopoietic stem cell transplantation (HCT) induces profound immunosuppression, significantly increasing susceptibility to severe infections. This review examines vaccinations' necessity, timing, and efficacy post-HCT to reduce infection-related

morbidity and mortality. It aims to provide a structured protocol aligned with international and national recommendations. **Methods:** A systematic review of current guidelines and studies was conducted to assess vaccination strategies in HCT recipients. The analysis included the timing of vaccine administration, factors influencing efficacy, and contraindications. Recommendations for pre- and post-transplant vaccination schedules were synthesised, specifically for graft-versus-host disease (GVHD), immunosuppressive therapy, and hypogammaglobulinemia. **Results:** Vaccination is essential as specific immunity is often lost after HCT. Inactivated vaccines are recommended to commence three months post-transplant, including influenza, COVID-19, and pneumococcal vaccines. Live attenuated vaccines remain contraindicated for at least two years post-transplant and in patients with ongoing GVHD or immunosuppressive therapy. Factors such as GVHD and immunosuppressive treatments significantly impact vaccine timing and efficacy. The review also underscores the importance of pre-transplant vaccinations and ensuring that patients' close contacts are adequately immunised to reduce transmission risks. **Conclusions:** Implementing a structured vaccination protocol post-HCT is critical to improving patient outcomes. Timely and effective vaccination strategies can mitigate infection risks while addressing individual patient factors such as GVHD and immunosuppression. This review highlights the need for tailored vaccination approaches to optimize immune reconstitution in HCT recipients.

7.4.5 Oliveira J, Cruz P, Dias TR, Sousa-Pimenta M, Almeida B, Soares B, Sousa H, Costa R, Ochoa C, Dias F, Medeiros R. Humoral Response to SARS-CoV-2 Vaccine-Boost in Cancer Patients: A Case Series from a Southern European Cancer Center. Vaccines (Basel). 2024 Oct 24;12(11):1207.

Background: Cancer patients face a greater risk of complications and death after contracting the SARS-CoV-2 virus. Booster doses of the COVID-19 vaccine were suggested to provide additional protection. This study aimed to assess how cancer patients' immune systems respond to the booster shots and categorize their responses. **Methods:** We analyzed 735 samples from 422 individuals, including patients followed at the Portuguese Oncology Institute of Porto (IPO-Porto). Three cohorts were recruited, and blood samples were collected 3- and 6-months post-booster dose: cohort 1 cancer patients (also collected before the booster); cohort 2 cancer patients; and cohort 3 (healthy individuals). Humoral immune response was evaluated by analyzing IgG levels against the SARS-CoV-2 Spike (S) protein. IgG levels against the SARS-CoV-2 Nucleocapsid(N) protein was also analyzed in order to address previous contact with the virus. **Results:** Among Cohort 1 patients with solid tumors, when compared to pre-boost, IgG S levels increased 3 months after the boost and remained high after 6 months. Patients with hematologic tumors demonstrated lower IgG S levels at both timepoints. Comparing the IgG S levels among hematological tumors, solid tumors, and healthy individuals in both timepoints we observed that the healthy individuals had the strongest IgG S response, followed by the solid, and, lastly, the hematologic tumors. Solid tumor patients undergoing chemotherapy had reduced IgG S levels, especially those on high febrile neutropenia risk regimens. **Conclusions:** In conclusion, cancer patients have a weaker immune response to the SARS-CoV-2 vaccine, especially those with hematological cancers. Chemotherapy and febrile neutropenia risk further reduce booster effectiveness. Further research is needed to optimize vaccine timing for cancer patients undergoing chemotherapy.

7.5 From children to adults: applying Portugal's Pediatric vaccine success to adult immunization

7.5.1 Trindade TS, Oliveira CC, Amaral MR, Costa N, Oliveira MA, Monteiro V, Costa M. Beyond Coverage: Policy Lessons From Socioeconomic Gaps in Paediatric Vaccine Access. Acta Paediatr. 2025 Sep 12.

7.5.2 Relatório anual de 2024 do Programa Nacional de Vacinação da Direção-Geral da Saúde https://www.dgs.pt/em-destaque/cobertura-vacinal-ate-aos-7-anos-mantem-se-elevada-pdf.aspx

Portugal remains an international reference in immunization and vaccination, with 98% to 99% of children vaccinated in the first year of life with vaccines from the universal PNV scheme. Coverage remains very high up to 6 years of age, reaching or exceeding, in general, the goal of 95%.

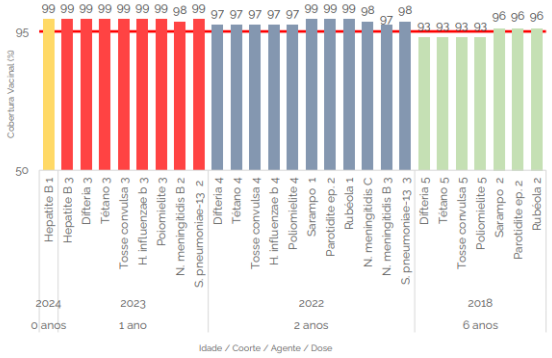


Figura 1. Esquema geral recomendado. Cobertura vacinal por idade/coorte/agente patogénico/dose. Avaliação 2024, em Portugal Continental. Fonte: VACINAS

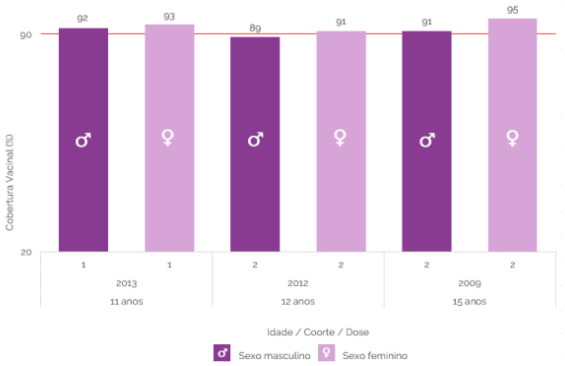


Figura 13. Esquema geral recomendado. Cobertura vacinal contra infeções por HPV, por idade/coorte, dose e sexo. Avaliação 2024, em Portugal Continental. Fonte: VACINAS

7.5.3 GBD 2023 Vaccine Coverage Collaborators. Global, regional, and national trends in routine childhood vaccination coverage from 1980 to 2023 with forecasts to 2030: a systematic analysis for the Global Burden of Disease Study 2023. Lancet. 2025 Jul 19;406(10500):235-260.

Findings: Overall, global coverage for the original EPI vaccines against diphtheria, tetanus, and pertussis (first dose [DTP1] and third dose [DTP3]), measles (MCV1), polio (Pol3), and tuberculosis (BCG) nearly doubled from 1980 to 2023. However, this long-term trend masks recent challenges. **Coverage gains slowed between 2010 and 2019 in many countries and territories, including declines in 21 of 36 high-income countries and territories for at least one of these vaccine doses** (excluding BCG, which has been removed from routine immunisation schedules in some countries and territories). **The COVID-19 pandemic exacerbated these challenges, with global rates for these vaccines declining sharply since 2020, and still not returning to pre-COVID-19 pandemic levels as of 2023**. Coverage for newer vaccines developed and introduced in more recent years, such as immunisations against pneumococcal disease (PCV3) and rotavirus (complete series; RotaC) and a second dose of the measles vaccine (MCV2), saw continued increases globally during the COVID-19 pandemic due to ongoing introductions and scale-ups, but at slower rates than expected in the absence of the pandemic. Forecasts to 2030 for DTP3, PCV3, and MCV2 suggest that only DTP3 would reach the IA2030 target of 90% global coverage, and only under an optimistic scenario. Interpretation: Our estimates of current vaccine

coverage and forecasts to 2030 suggest that achieving IA2030 targets, such as halving zero-dose children compared with 2019 levels and reaching 90% global coverage for life-course vaccines DTP3, PCV3, and MCV2, will require accelerated progress. **These findings underscore the crucial need for targeted, equitable immunisation strategies. Strengthening primary health-care systems, addressing vaccine misinformation and hesitancy, and adapting to local contexts are essential to advancing coverage.** COVID-19 pandemic recovery efforts, such as WHO's Big Catch-Up, as well as efforts to bolster **routine services must prioritise reaching marginalised populations and target subnational geographies to regain lost ground and achieve global immunisation goals.**

7.5.4 Kroneman M, Fermin A, Rechel B, Allin S, Anell A, Behmane D, Bengough T, Blümel M, Bryndová L, Davidovics K, Belvis AG, Charalambous C, Economou C, Fadel S, Fronteira I, Gaál P, Grignon M, Kowalska-Bobko I, Lovrenčić IL, Mantwill S, Murauskienė L, Reinap M, Rohova M, Saunes IS, Theodorou M, Waitzberg R, Jong JD. Initiatives to increase childhood vaccination coverage: an international comparison. Health Policy. 2025 Aug;158:105351.

Background Childhood vaccination rates fluctuate over time and do not always meet the levels recommended by the WHO. Objective This study aims to provide an overview of measures countries have introduced to increase vaccination rates. Methods We developed a structured data collection template that was completed by country experts from Europe, Israel, the USA, and Canada. Experts were identified using the European Observatory on Health Systems and Policies' HSPM (Health Systems and Policy Monitor) network. We approached experts from 32 countries and received responses from 22 countries. In the template we asked for measures introduced between 2014 and 2019. The experts were asked to indicate the type of intervention, the target population, possible positive and negative effects, and evidence on effectiveness. The information was collected between September 2019 and January 2020. Results We identified four main types of interventions: restrictive measures for the unvaccinated, financial incentives, measures supporting the logistics of vaccination, and vaccination promotion campaigns. Restrictive measures often involved expanding existing mandatory vaccination policies or limiting access to pre-school activities for unvaccinated children. Financial incentives for healthcare providers showed some positive effects. Regarding logistical support, several countries used schools as alternative vaccination sites, though this presented organisational challenges. Many countries invested in improving knowledge among both healthcare professionals and parents to encourage vaccine uptake. Conclusions Most initiatives implemented in the countries covered focussed on communication and knowledge enhancement. However, there is limited evidence on the impact of these measures on vaccination coverage.