Vaccine effectiveness monitoring in Portugal: Current status and upcoming changes

Ausenda Machado
on behalf of the Vaccine Effectiveness and Impact studies in Portugal

Departamento de Epidemiologia, Instituto Nacional de Saúde Doutor Ricardo Jorge, Lisboa

Adult Immunization Board (AIB)
Country meeting:

Adult immunization in Portugal: successes, lessons learned and the way forward

25 – 26 November 2025
Jupiter Lisboa, Lisbon, Portugal

REPÚBLICA PORTUGUESA
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Instituto_Nacional de Saúde
Doutor Ricardo Jorge

Context

Public health relevance

- Vaccines are one of the main public health interventions, responsible for reducing the incidence of several infectious diseases and their related morbidity and mortality

- Monitoring vaccine effectiveness and vaccination impact allows the knowledge of the disease reduction due to immunization

Extreme importance for accessing the benefits of the vaccine uptake and evaluation of vaccination strategies

- Changes in vaccination strategies
- Yearly/seasonal vaccination programmes (influenza, COVID-19)

Monitoring Vaccine Effectiveness in Portugal

Since 2005: **Influenza vaccine**

- Against symptomatic influenza (2005-2008)
- Against medically attended influenza at primary care (2008- ongoing)
- Against hospitalised influenza (2015- ongoing)

Since 2020: **COVID-19 vaccine**

- Against assymptomatic and symptomatic infection
- Against medically attended SARS-CoV-2 at primary care
- Against severe COVID-19 (hospitalisation and death)
- In Health Care Workers

2015-2019: **Pneumoccocal vaccine**

- Effectiveness of comunity acquired pneumonia (feasibility)
- Impact of PCV7 and PCV13 on pneumonia hospitalizations in ≥65 years

Monitoring Vaccine Effectiveness in Portugal

Studies with primary data collection

- Based in surveillance system
  - GP sentinel network
  - Hospital sentinel network

Studies with eletronic health registries

  - COVID-19 vaccine effectiveness

Within European multicentric studies

- Use of a common protocol
- Part of stable networks
  - I-MOVE (Influenza – Monitoring Vaccine Effectiveness in Europe)
  - I-MOVE+ (Investigating vaccine effectiveness and impact in 65+ adults)
  - I-MOVE COVID (strengthen COVID-19 surveillance and VE)
  - VEBIS (Vaccine Effectiveness, Burden and Impact Studies)
- Co- Financed by European Center for Disease Prevention and Control, European Comission

European multicentric studies

Primary data collection

Common protocol implemented in participating sites on yearly basis, two settings (Primary care and Hospital)

I-MOVE network to measure VE against influenza or COVID-19

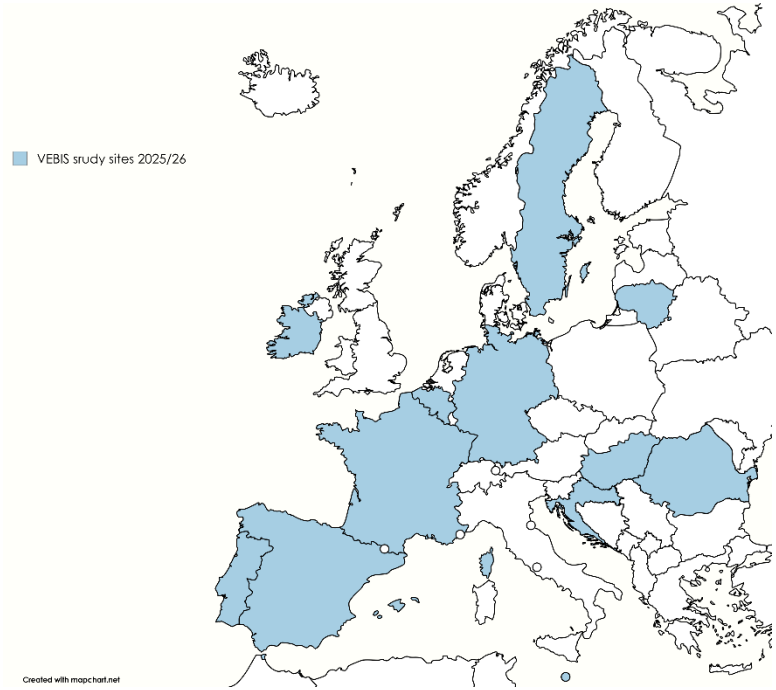


Fig. 1: *Sites/countries participating I-MOVE multicentre study*

Monitoring vaccine effectiveness

- Influenza and COVID-19
- Overall (≥14d post-vaccination) and risk groups
- By time since vaccination
- By VOC/clade

Research questions:

- Effect of repeated vaccination
- Effect of statin uptake
- Chronic conditions
- Case definition

European multicentric studies

Electronic Health Records

Electronic health registries to access vaccine effectiveness in specific population subgroup

Vaccine effectiveness, Burden and Impact studies (VEBIS) electronic health record (EHR)

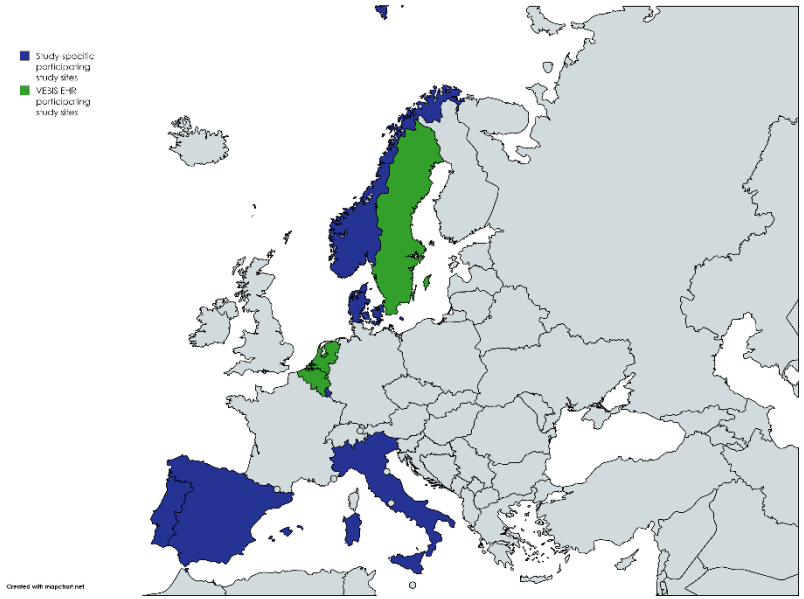


Fig. 2: *Sites/countries participating VEBIS EHR multicentre study*

Monitoring COVID-19 vaccine effectiveness

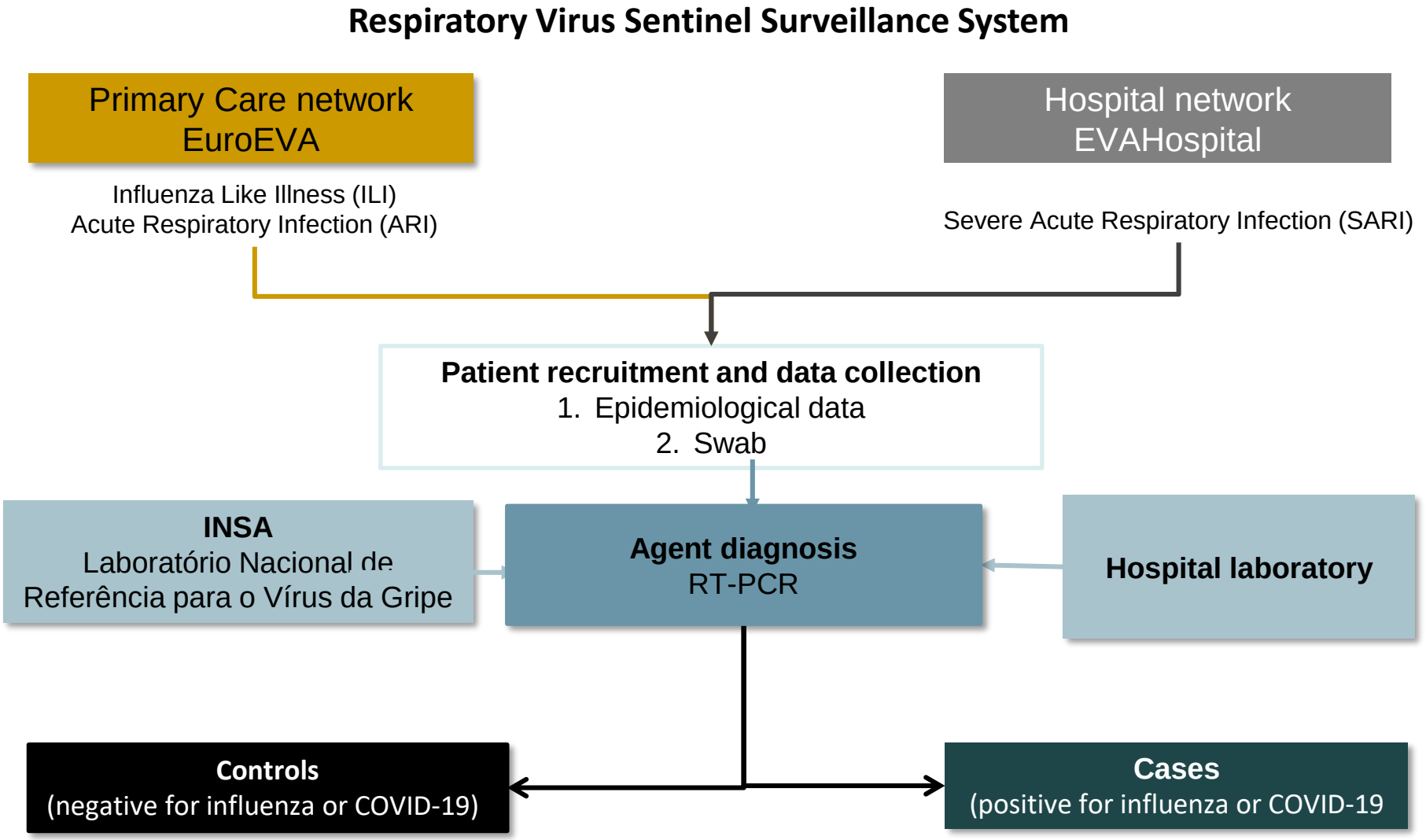
- Severe outcomes
- In ≥65 years (≥14d post-vaccination)
- By time since vaccination
- By VOC
- By vaccine brand

Research questions:

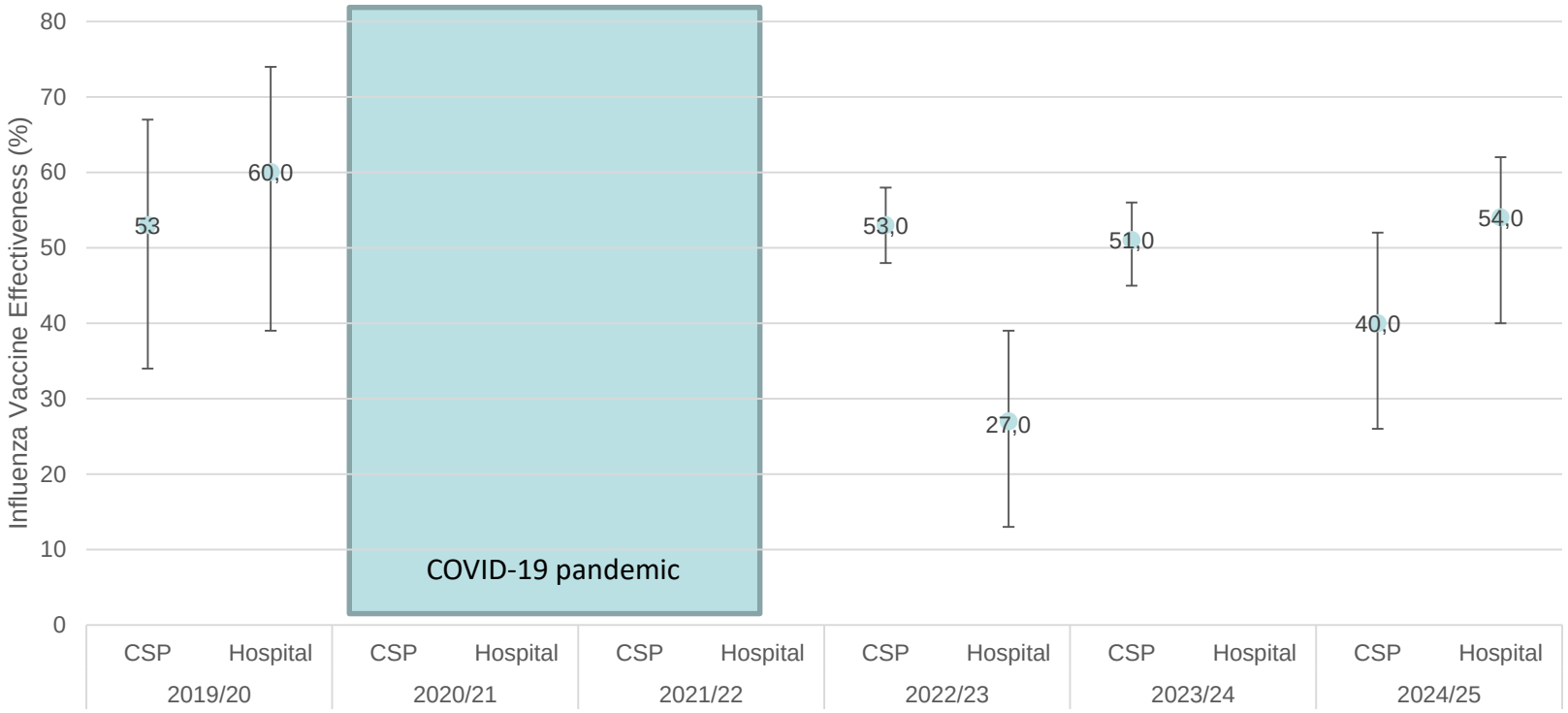
- VE in paediatric population
- VE in immunocompromised persons

Measuring Vaccine Effectiveness

Study Design Test Negative Design

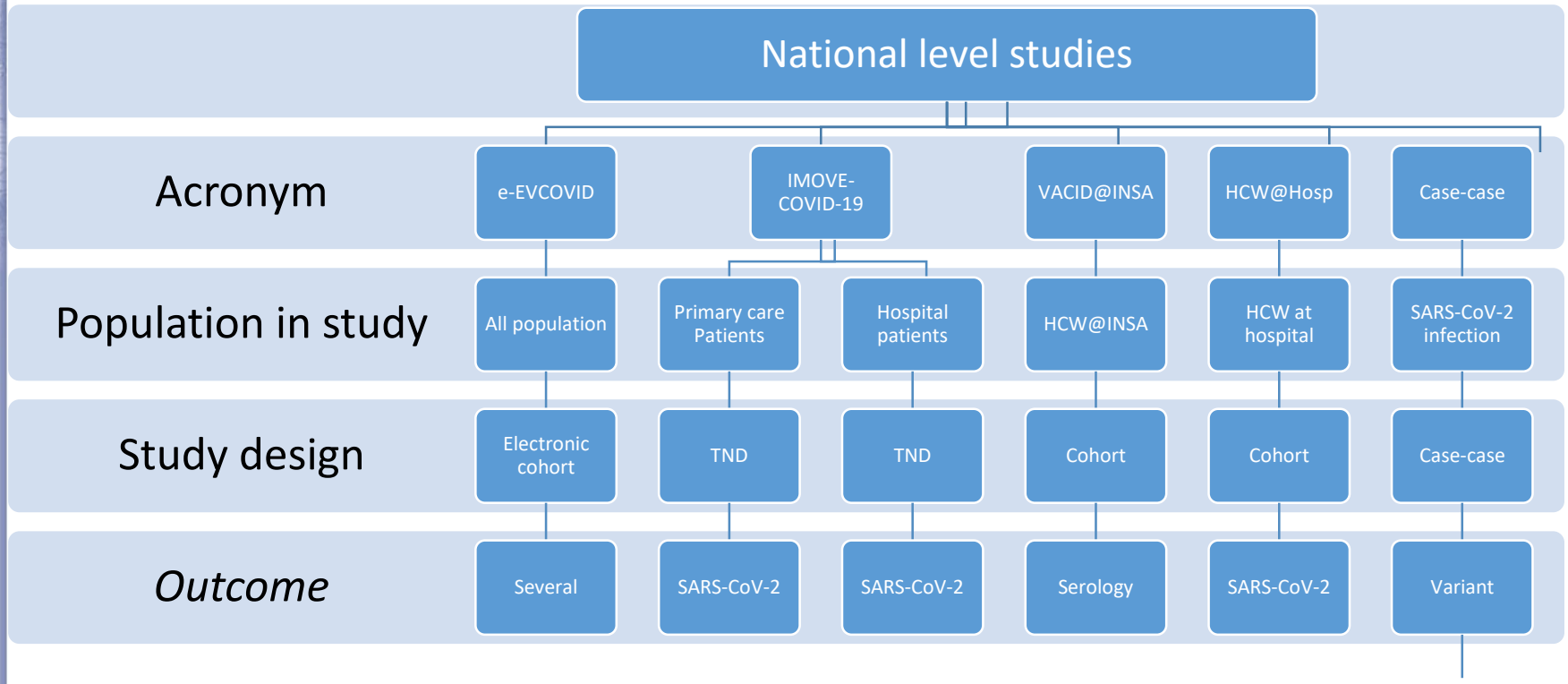


Monitoring Influenza Vaccine Effectiveness



VE Adjusted for sex (male or female), age group (18-44, 45-64, and ≥65 years), presence of comorbidities (yes or no), and month of symptom onset

Monitoring COVID-19 Vaccine Effectiveness



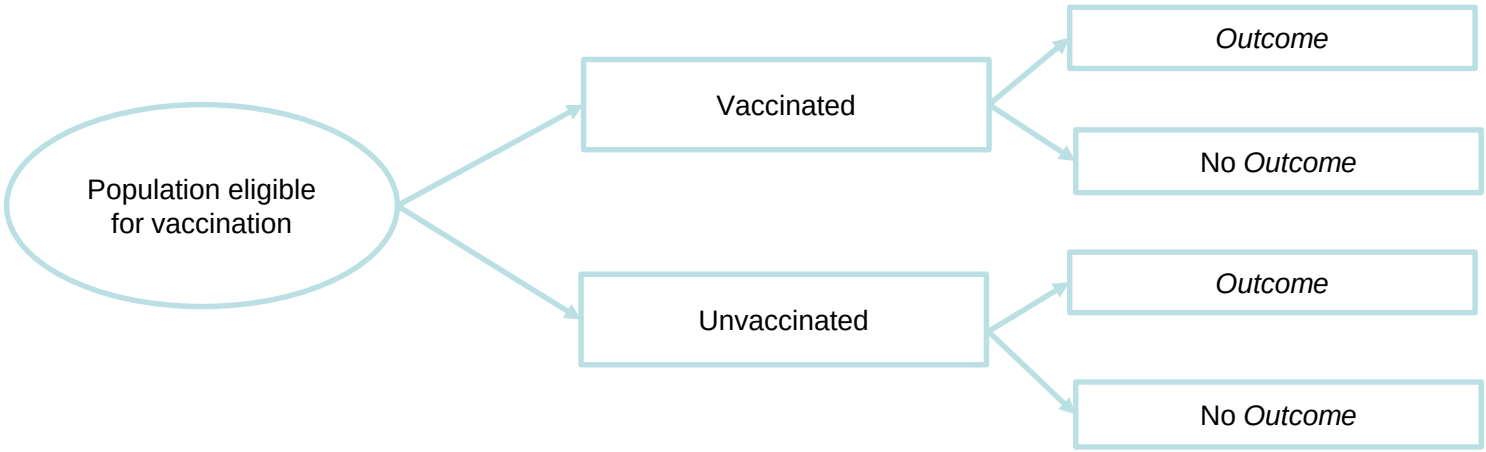
COVID-19 VE studies

- Scope of disease severity
- Age groups
- Specific populations (Health Care Workers in different settings, navy militars)
- Different VOC

Monitoring COVID-19 Vaccine Effectiveness

Study Design

Cohort, deterministic data linkage of six nationwide electronic health registries



Design of the cohort

- Population eligible for COVID-19 vaccination

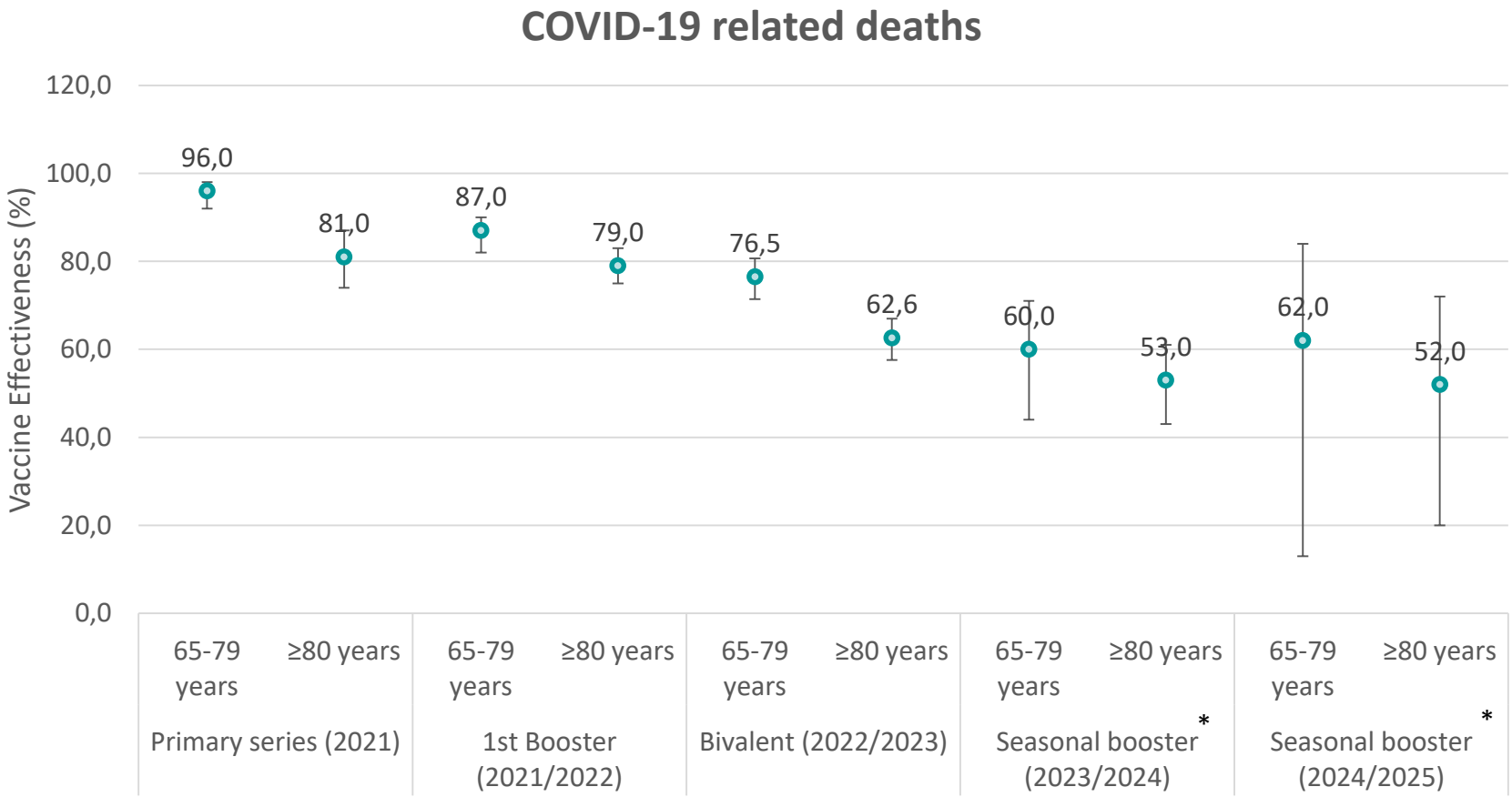
Baseline characterization

- COVID-19 surveillance system
  - Vaccine status (date of inoculations, number of doses, brand)
  - Demographic, chronic conditions
  - Previous SARS-CoV-2 infection

Follow-up

- COVID-19 surveillance system
  - Hospitalizations and death

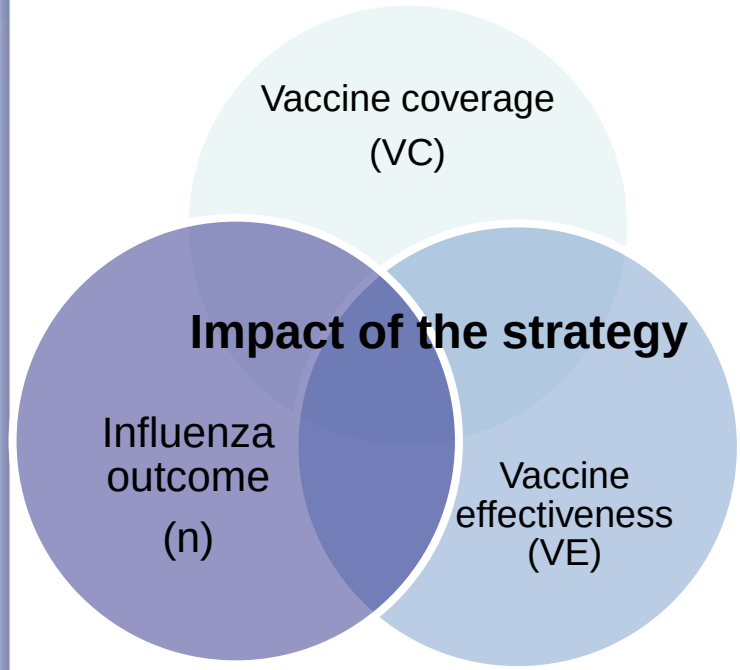
Monitoring COVID-19 Vaccine Effectiveness



* data not published

Impact of Vaccination strategy

Study Design Ecologic study



Impact of the strategy

NAE: Number of averted events

$$NAE = n * \left(\frac{VC * VE}{1 - VC * VE} \right)$$

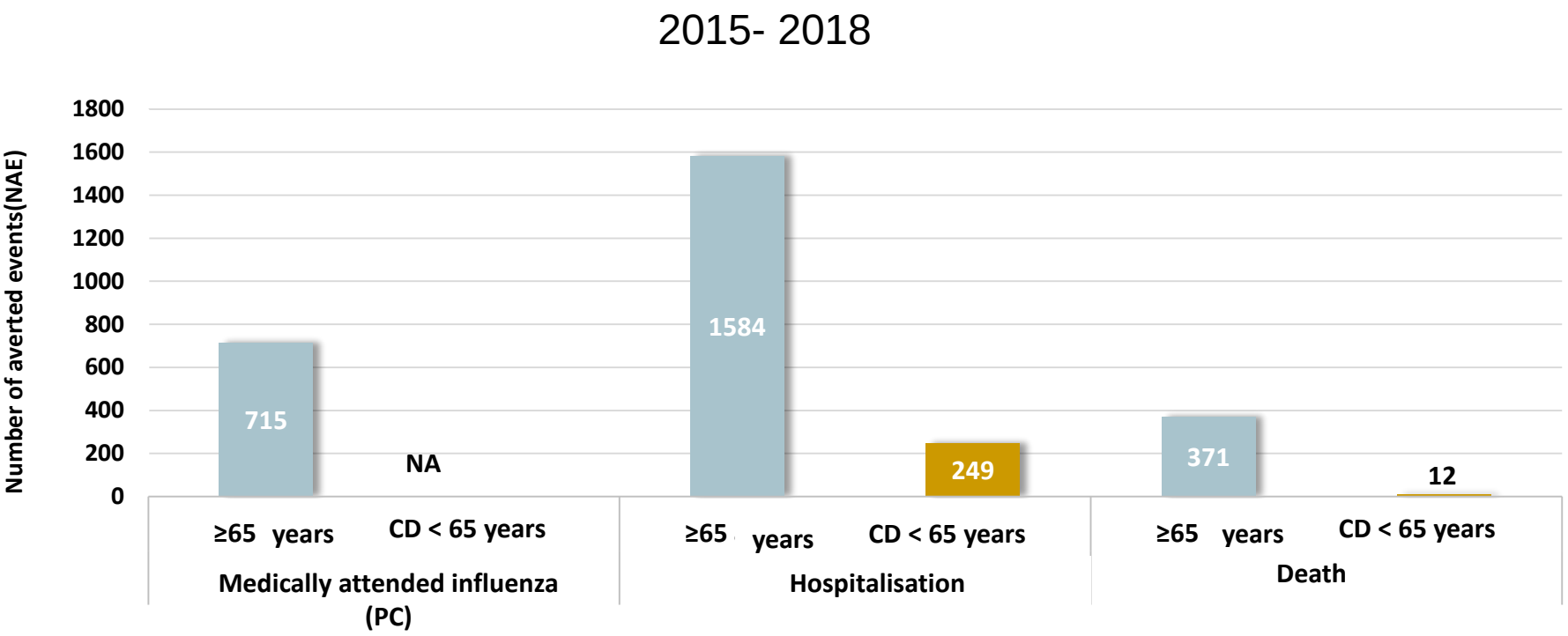
PF: Prevented fraction

$$PF = NAE/(NAE + n)$$

NNV: Number of vaccinations needed to avoid one influenza outcome

$$NNV = Pop/(VE^* (NAE + n))$$

Impact of Influenza Vaccination Strategy



The applied method identified and quantified the overall benefits of the influenza vaccination program, even in seasons with limited vaccine effectiveness;

It captured the impact of several outcomes with different levels of severity;

The knowledge on the impact of the national vaccination strategies could strengthening public health communication with the general public and policymakers

Impact of COVID-19 Vaccination Strategy

Study Design Interrupted time series

Primary series vaccination

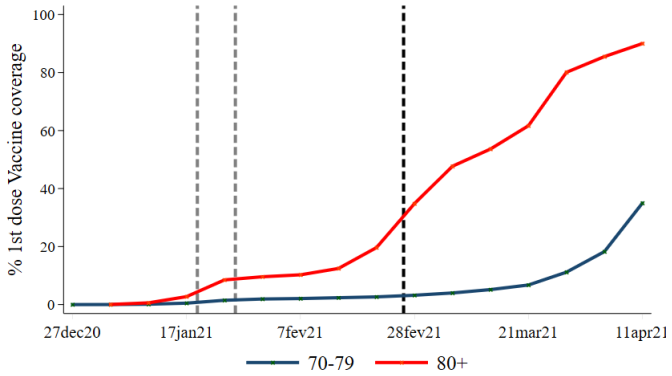


Figure 1. Vaccination coverage in exposed (80+) and control (70-79) groups

Hospitalisation

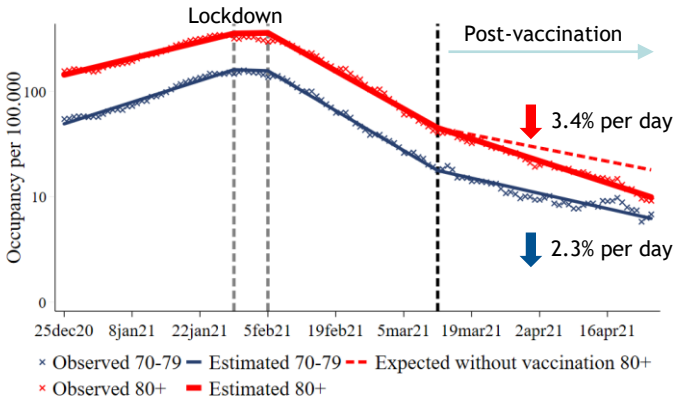
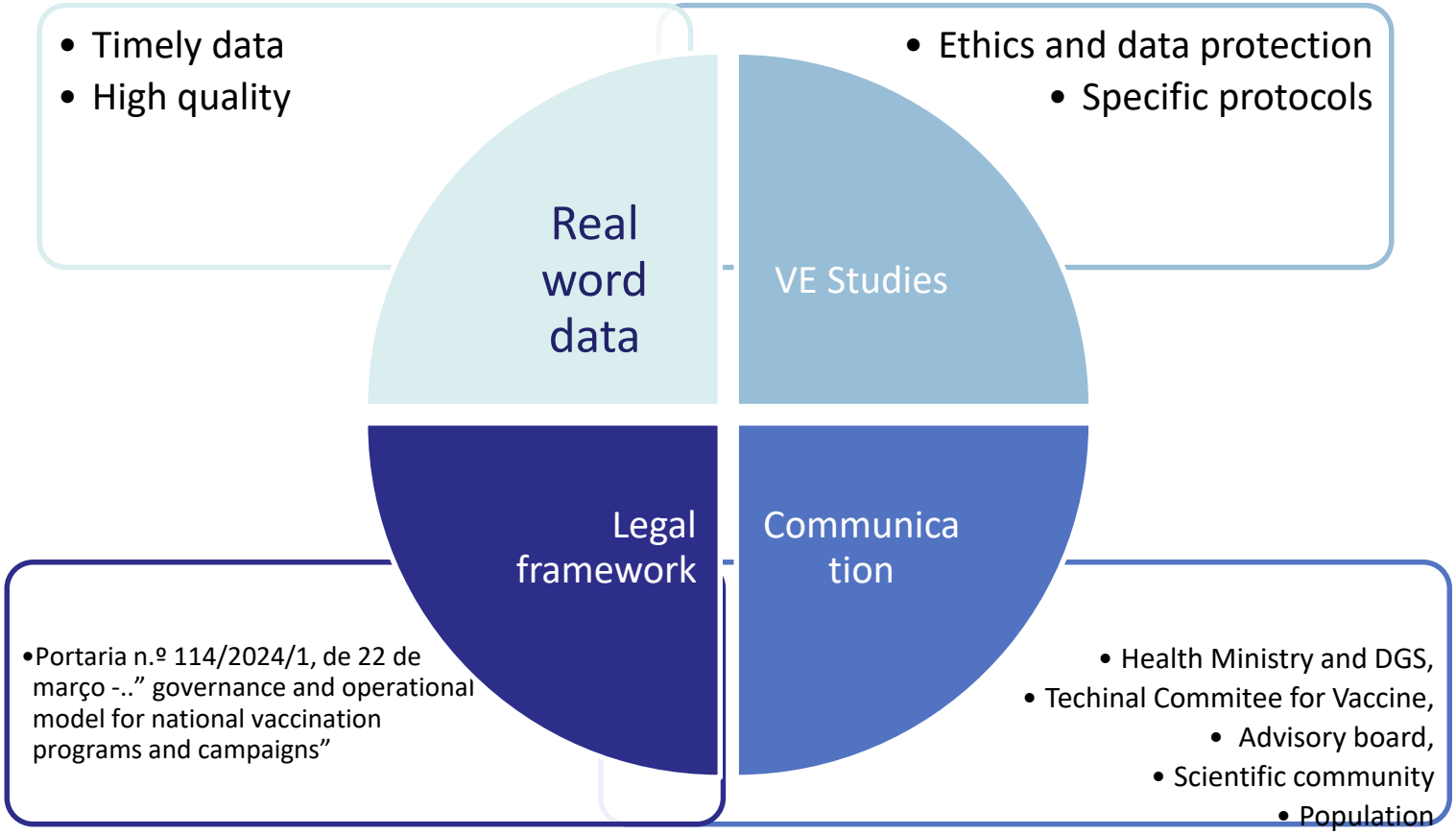


Figure 2. Hospital occupancy in exposed (80+) and control (70-79) groups

Conclusions

- The results indicate reduction of daily COVID-19 hospital occupancy in 80+ population due to vaccination supporting the implementation of COVID-19 vaccination campaign in other population subgroups in Portugal.

Monitoring vaccine effectiveness



Moving forward…

Monitoring seasonal vaccines effectiveness

- Influenza and COVID-19
  - Low circulation of COVID-19
- Data:
  - Primary data: surveillance system, high workload, allocated human resources
  - EHR: data collected for purposes other than research, access to linked data

Monitoring new vaccines (interventions) effectiveness

- Respiratory syncytial virus (RSV)
  - monoclonal antibody in children, disease specific surveillance system (VigRSV)
- Pneumoccocal vaccine
  - Adapt existing surveillance system
- High dose influenza vaccine
  - EHR – specific protocol (approved), data access

Communication

- General population

Team and acknowledgment

INSA (National Health Institute)

- Primary care: Ana Paula Rodrigues, João Almeida Santos
- Hospital: Ausenda Machado, Verónica Gomez
- Health Care Workers: Vânia Gaio, Ausenda Machado
- Eletronic Health Registries: Ausenda Machado, André Brito and Patricia Soares
- RSV: Ana Paula Rodrigues, Vania Gaio

Laboratório Nacional Referência Gripe (INSA)
Hospital network
Health units network
Direção Geral da Saúde
Serviços Partilhados do Ministério da Saúde
Comissão Técnica Vacinação (sazonal)

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Thank you

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