



5th WAidid CONGRESS

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Milan 2024
28-30 November 2024

One Health Perspective in Infectious Diseases

Emerging Infectious Diseases in Humans: The INF-ACT Projects

Carlo Giaquinto,
Elisa Barbieri, Cecilia Liberati
University of Padova

New Outbreaks 2022 - 2024



Acute hepatitis



Diphtheria



Measles



Influenza



Enterovirus (Echovirus-11)



Oropouche virus



Polio



MPOX



Cholera



Scarlet Fever



Marburg virus



Pertussis



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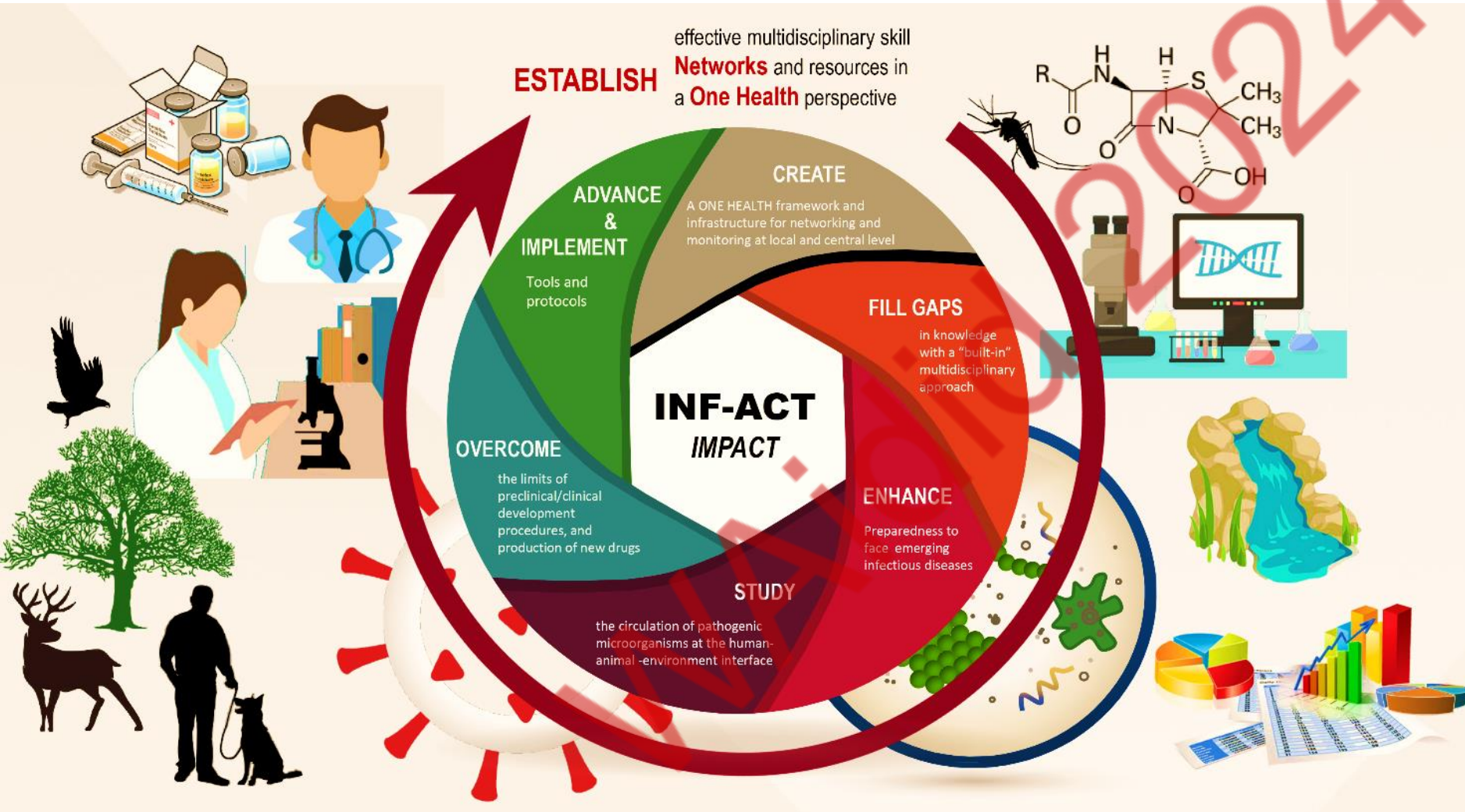
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PNRR PE13- INF-ACT



One Health Basic and Translational Research Actions addressing Unmet Needs on Emerging Infectious Diseases

- 25 Institutions
- 350 Researchers
- Cascade open calls



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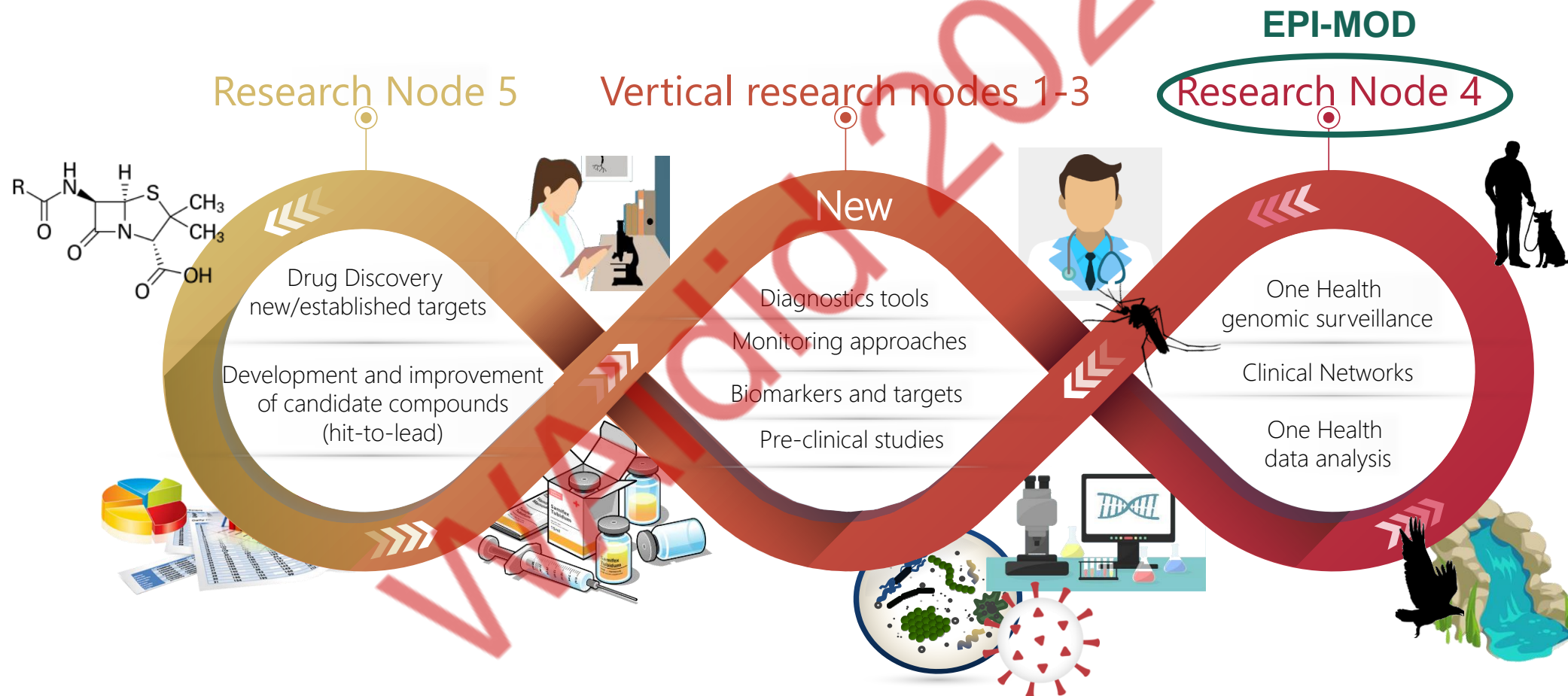
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Data production

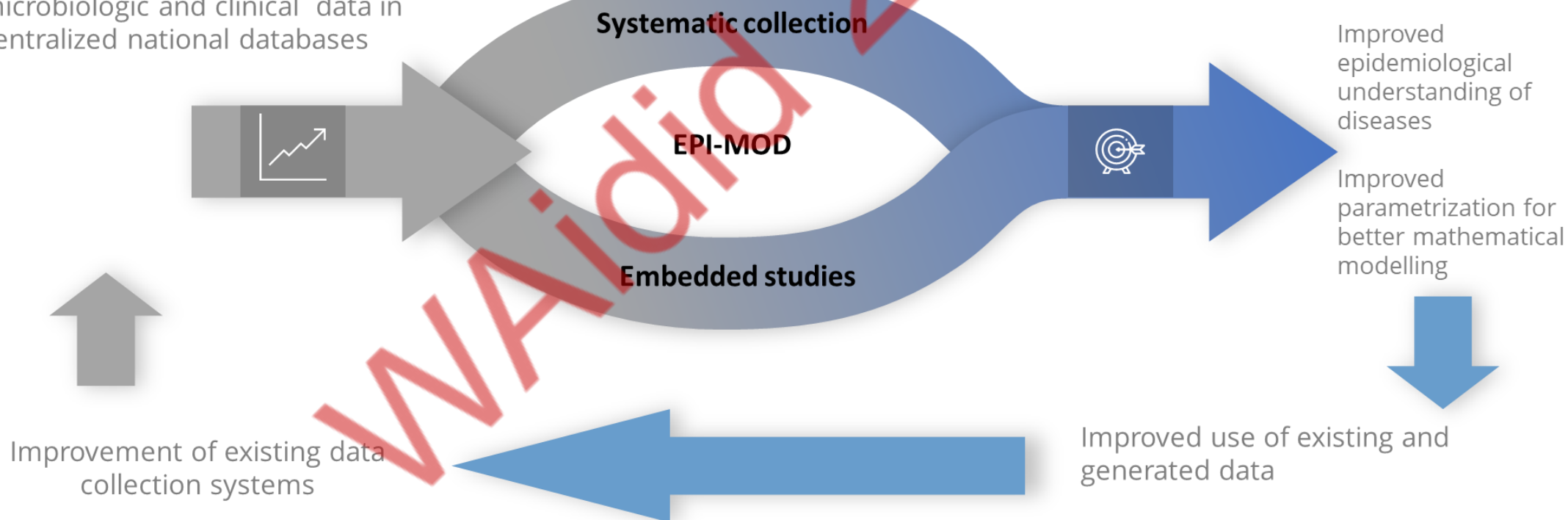
Tools and models for innovative systematic data collection.

National expert networks collecting critical genomic, microbiologic and clinical data in centralized national databases

EPI-MOD AIMS

Data analysis and interpretation

Tools and models for innovative data analysis and interpretation, use of multi-sourced data for early warning and risk assessment



INVALIDO 2024



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Definition and validation of standardized methodologies to monitor innate and acquired immunity parameters of host response to monitor severity of infection or response to vaccination:

Two commercially available assays were validated on biological samples:

- To monitor multiparametric gene expression of immune markers (22 analytes) triggered in whole blood by inactivated viral particles
- To measure multiparametric serum concentrations of inflammatory mediators.

Validation of biomarkers of :

microbial translocation [MT: LBP, lipopolysaccharide binding protein, EndoCab IgM],
intestinal damage [ID: intestinal fatty acid binding protein (I-FABP) and zonulin]
inflammation (IN: IL-6)

- The clinical and diagnostic network will be potentiated with the network selected through the Cascade Open Call
- Novel data from research in Node 1 (IFN signature and CNS involvement in respiratory infections) will be evaluated

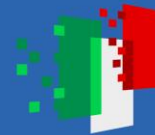
Advancing knowledge on the detection of severity biomarkers through clinical networks



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Innovative tools for screening infections from a OH perspective:

- Development of a new **vesicular stomatitis (VSV)-based platform** for producing pseudoviral particles with Spike glycoproteins. Production and characterization of recombinant SARS-CoV-2 RBDs and soluble ACE2 receptor for the use in ELISA-based virus neutralization assays.
- Use of Lentiviral Vectors pseudotyped with SARS-CoV-2 Spike from omicron BA.1, BA.2 and BA.4/5 for the evaluation of nAbs on sera of SARS-CoV-2 infected individuals.
- Sensitivity tests for SARS-CoV-2 virions detection were carried out in physiological solution, PBS, Urea, MEM, artificial saliva and biological matrices.
- Implementation of sensitivity for virion detection in biological matrices and wastewaters.
- Development of a machine learning approach for predicting humoral responses to primary and booster SARS-CoV-2 mRNA vaccination in people living with HIV.

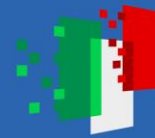
Advancing knowledge on innovative tools for screening



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Infection, Genetics and Evolution 122 (2024) 105601



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Contents lists available at ScienceDirect

Infection, Genetics and Evolution

journal homepage: www.elsevier.com/locate/meegid



Fifty years after the first identification of Toscana virus in Italy: Genomic characterization of viral isolates within lineage A and aminoacidic markers of evolution

Giulia Marsili^a, Carlo Pallotto^{b,c}, Claudia Fortuna^a, Antonello Amendola^a, Cristiano Fiorentini^a, Sara Esperti^{b,d}, Pierluigi Blanc^{b,c}, DOMENICO ROBERTO GUARDI^{b,e}, Venturi Giulietta^a, Claudio Argentini^{a,*}

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ARTICLE INFO

Keywords:
Toscana virus
Evolution
Host change
Mutations

ABSTRACT

Toscana Virus (TosV) was firstly isolated from phlebotomine in our Institute about fifty years ago. Later, in 1984–1985, TosV infection, although asymptomatic in most cases, was shown to cause disease in humans, mainly fever and meningitis. By means of genetic analysis of part of M segment, we describe 3 new viral isolates obtained directly from cerebrospinal fluid or sera samples of patients diagnosed with TosV infection in July 2020 in Tuscany region. Phylogenesis was used to propose the clustering of TosV lineage A strains in 3 main groups, whereas deep mutational analysis based on 12 amino acid positions, allowed the identification of 9 putative strains. We discuss deep mutational analysis as a method to identify molecular signature of host adaptation and/or pathogenesis.

Science of the Total Environment 933 (2024) 173217



ELSEVIER

Contents lists available at ScienceDirect

Science of the Total Environment

journal homepage: www.elsevier.com/locate/scitotenv



Characterisation of microbial communities and quantification of antibiotic resistance genes in Italian wastewater treatment plants using 16S rRNA sequencing and digital PCR

Giusy Bonanno Ferraro^{a,b}, Carmelo Bonomo^b, David Brandtner^c, Pamela Mancini^a, Carolina Veneri^a, Rossella Briancesco^a, Anna Maria Coccia^a, Luca Lucentini^a, Elisabetta Suffredini^d, Dafne Bongiorno^b, Nicolò Musso^b, Stefania Stefani^b, Giuseppina La Rosa^{a,*}

^a National Center for Water Safety (CeNSia), Istituto Superiore di Sanità, Rome, Italy

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^c Departments of Infectious Disease, Istituto Superiore di Sanità, Rome, Italy

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AMR

Vector-borne pathogens

Innovation in genomic OH surveillance



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HUMAN VACCINES & IMMUNOTHERAPEUTICS
2024, VOL. 20, NO. 1, 2386739
<https://doi.org/10.1080/21645515.2024.2386739>



OPEN ACCESS [Check for updates](#)

ARTICLE COMMENTARY

Who is (not) vaccinated? A proposal for a comprehensive immunization information system

Giacomo Pietro Vigezzi^a, Elena Maggioni^a, Fabrizio Bert^b, Corrado de Vito^c, Roberta Siliquini^b, and Anna Odone^{b,a,d}

^aDepartment of Public Health, Experimental and Forensic Medicine, University of Pavia, Pavia, Italy; ^bDepartment of Public Health and Pediatrics Sciences, University of Torino, Torino, Italy; ^cDepartment of Public Health and Infectious Diseases, Sapienza University of Rome, Rome, Italy; ^dMedical Direction, IRCCS Fondazione Policlinico San Matteo, Pavia, Italy

ABSTRACT

The role of immunization in public health is crucial, offering widespread protection against infectious diseases and underpinning societal well-being. However, achieving optimal vaccination coverage is impeded by vaccine hesitancy, a significant challenge that necessitates comprehensive strategies to understand and mitigate its effects. We propose the integration of Population Health Management principles with Immunization Information Systems (IISs) to address vaccine hesitancy more effectively. Our approach leverages systematic health determinants analysis to identify at-risk populations and tailor interventions, thereby promoting vaccination coverage and public health responses. We call for the development of an enhanced version of the Italian National Vaccination Registry, which aims to facilitate real-time tracking of individuals' vaccination status while improving data accuracy and interoperability among healthcare systems. This registry is designed to overcome current barriers by ensuring robust data protection, addressing cultural and organizational challenges, and integrating behavioral insights to foster informed public health campaigns. Our proposal aligns with the Italian National Vaccination Prevention Plan 2023–2025 and emphasizes proactive, evidence-based strategies to increase vaccination uptake and contrast the spread of vaccine-preventable diseases. The ultimate goal is to establish a data-driven, ethically sound framework that enhances public health outcomes and addresses the complexities of vaccine hesitancy within the Italian context and beyond.

ARTICLE HISTORY

Received 28 June 2024
Accepted 27 July 2024

KEYWORDS

Immunization information system; proactive medicine; immunization programs; vaccination hesitancy; ethical issues

- Innovative human behaviour monitoring strategy **A Dynamic Space-Time Diffusion Simulator in a GIS Environment is being created**. The first static GIS maps were made based on geolocation data of emergency room accesses of a hospital in the province of Rome. The dynamic system will be created based on the date of diagnosis information.
- Analysis of vaccine hesitancy level and identification of determinants of infection and National Health Service access

The network will be potentiated with the network selected through the Cascade open Call

Systematic revision completed and elaboration of the scientific paper. Submission and publication on scientific journal of the field.

Unveiling human responses to epidemics



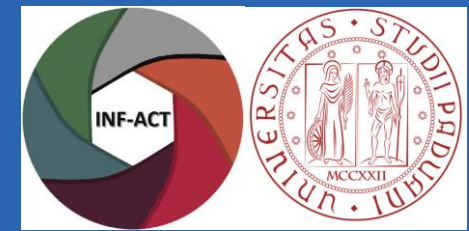
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Challenges and opportunities of a surveillance system – the *M.pneumoniae* case



↑ outpatient consultations and hospital admissions of **children** due to *Mycoplasma pneumoniae* pneumonia since **May 2023**, and RSV, adenovirus and influenza virus since **October 2023**



↑ outpatient consultations and hospital admissions of **children** due to pneumonia compared to previous seasons

Disease Outbreak News

Upsurge of respiratory illnesses among children- Northern China

23 November 2023

Description of the Situation

China Provides Data to WHO on Wave of Pneumonia Cases Among Children

Release of information comes after unusual public request by U.N. agency

By [Chun Han Wong](#) [Follow](#) in Singapore and [Yoko Kubota](#) [Follow](#) in Beijing
Updated Nov. 23, 2023 11:44 pm ET

Disease figures per week - current: what is happening in the Netherlands now?

From the Nivel Sentinel Stations and the registrations of Nivel First Line Healthcare Registrations



Denmark reports Mycoplasma pneumoniae epidemic

News brief | November 29, 2023
[Lisa Schnirring](#)
Topics: [Pneumonia](#)

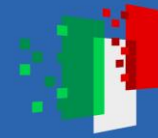
What about Italy?



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DATABASE USED

- In Italy each child aged 0-14 years is enrolled with a FPs working for the NHS. The enrolment is based on the child's house proximity to the FPs ambulatory. FPs are the gatekeepers for secondary care and visits and examinations are free of charge at the point of delivery
- An organised network of > 400 FPs established in 1997 in Italy to collect information to be used for clinical and epidemiological research

↓
All FPs use the same software in their professional practice
(~ 70% of Italian FPs)



Prospective Studies



Studies with routinely collected electronic medical records

3% of the Italian pediatric population

PEDIANET

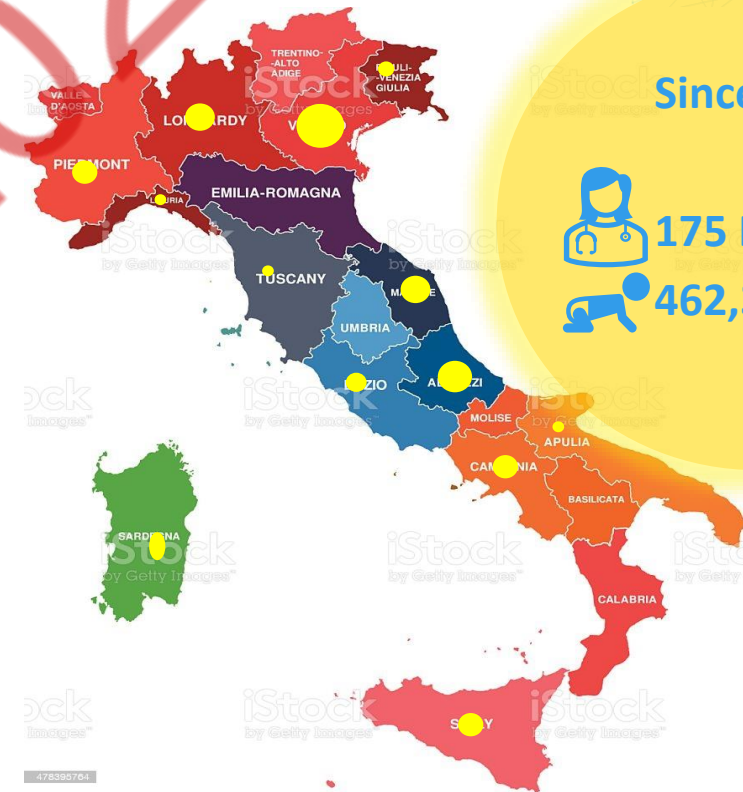
Since 2004



175 FPs



462,324 children

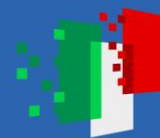




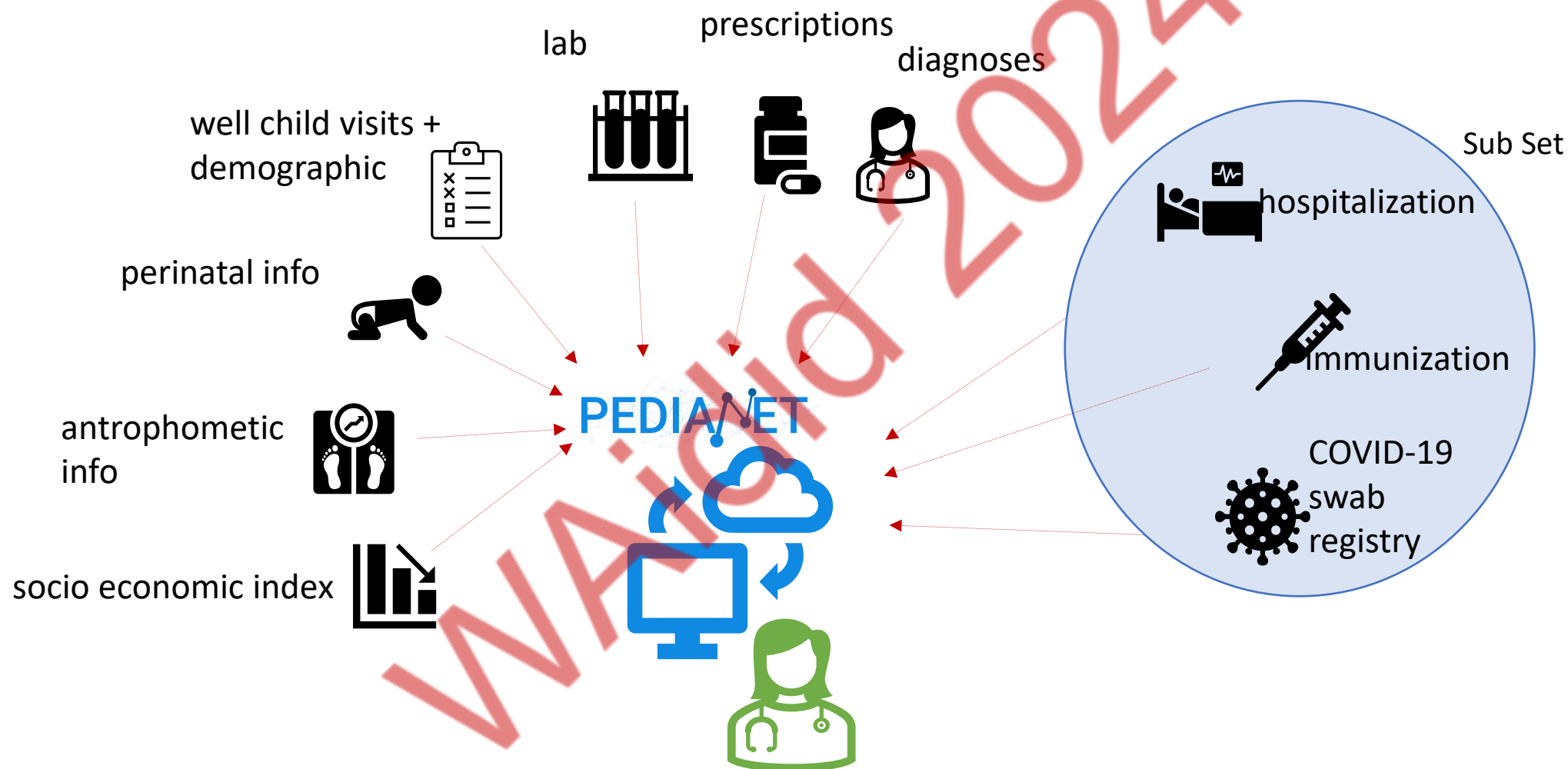
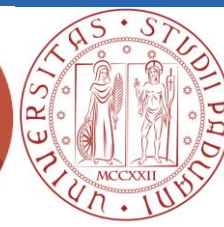
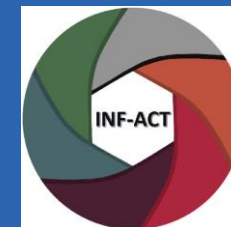
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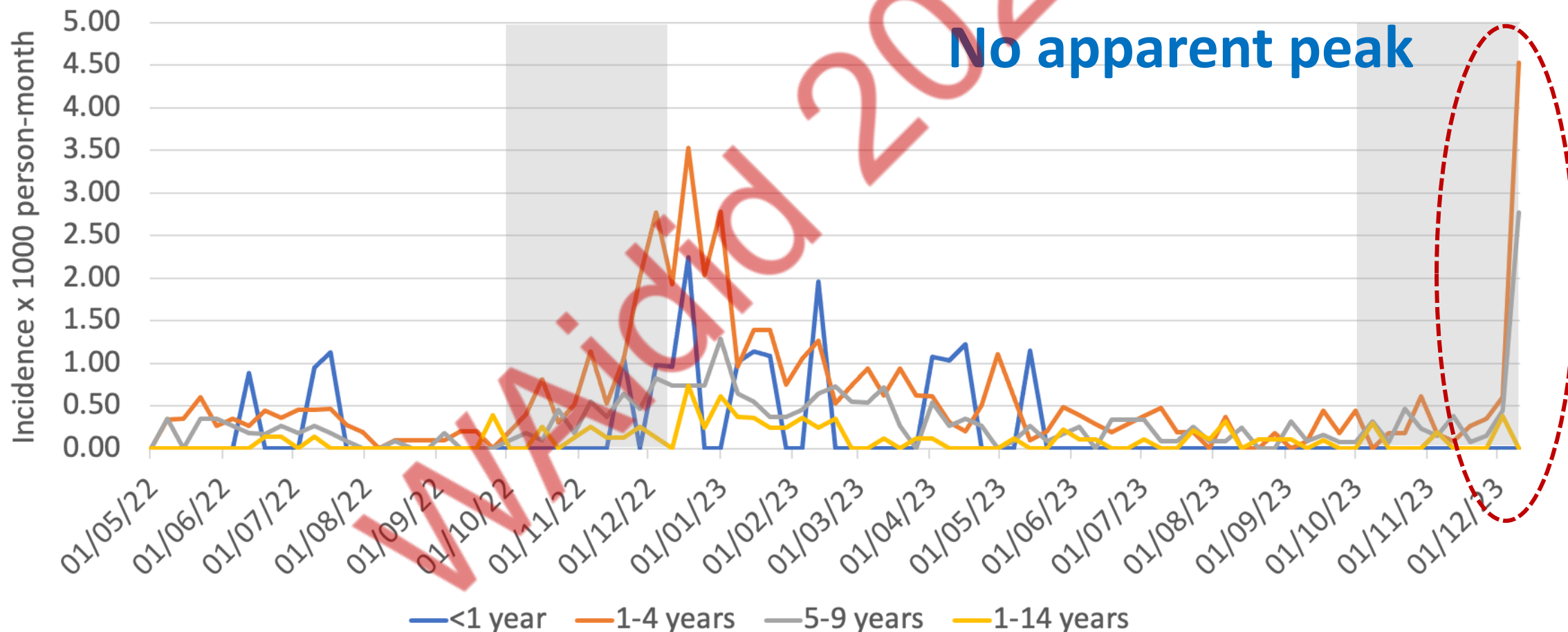
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RESULTS

Weekly incidence of pneumonia episodes in children < 14 years of age from May 2022 to December 2023. Pedianet, 2022-2023





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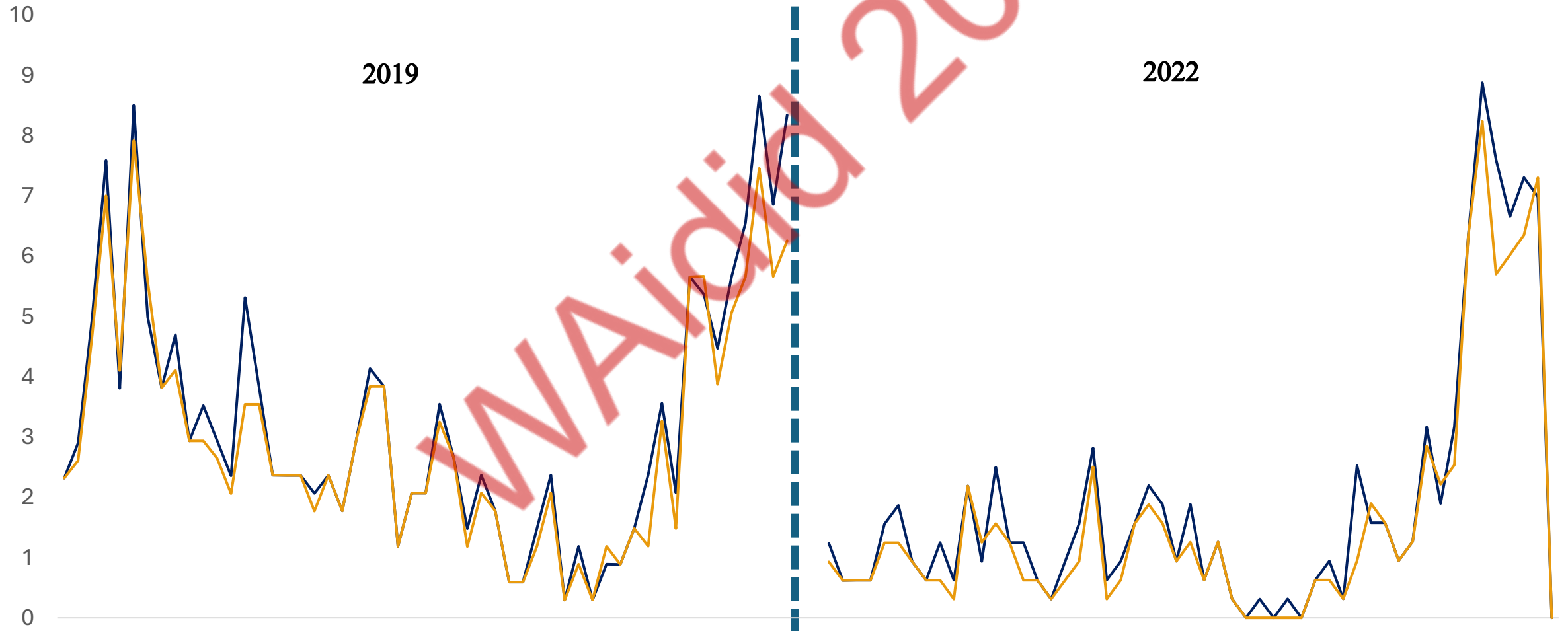


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RESULTS The identification of a surveillance model for pneumonia in pediatrics

Primary care* vs **Primary care* + FSE** pneumonia incidence rate time series per 1 000 000 person-week



Public health interventions, including maternal immunisation, vaccination of infants ... are critical for reducing the burden of pertussis and preventing further mortality

Pertussis outbreak in neonates and young infants across Italy, January to May 2024: implications for vaccination strategies

Marco Poeta^{1,2*}, Cristina Moracas^{3,3*}, Chiara Albano⁴, Laura Petrarca⁵, Marco Maglione⁶, Luca Pierrì⁷, Maurizio Carta⁸, Paolo Montaldo⁹, Elisabetta Venturini¹⁰, Maia De Luca¹¹, Danilo Buonsenso¹², Ilaria Brambilla¹³, Vania Giacomè¹⁴, Andrea Lo Vecchio^{1,2}, Eugenia Bruzzese^{1,2}, Fabio Midulla⁵, Claudia Colomba^{4,15}, Alfredo Guarino^{1,2}

Euro Surveill. 2024 Jun;29(23):2400301.

FIGURE 1

Distribution of hospitalised pertussis cases aged 0–24 months at 11 participating centres, Italy, 1 January–10 May 2024 (n = 108)



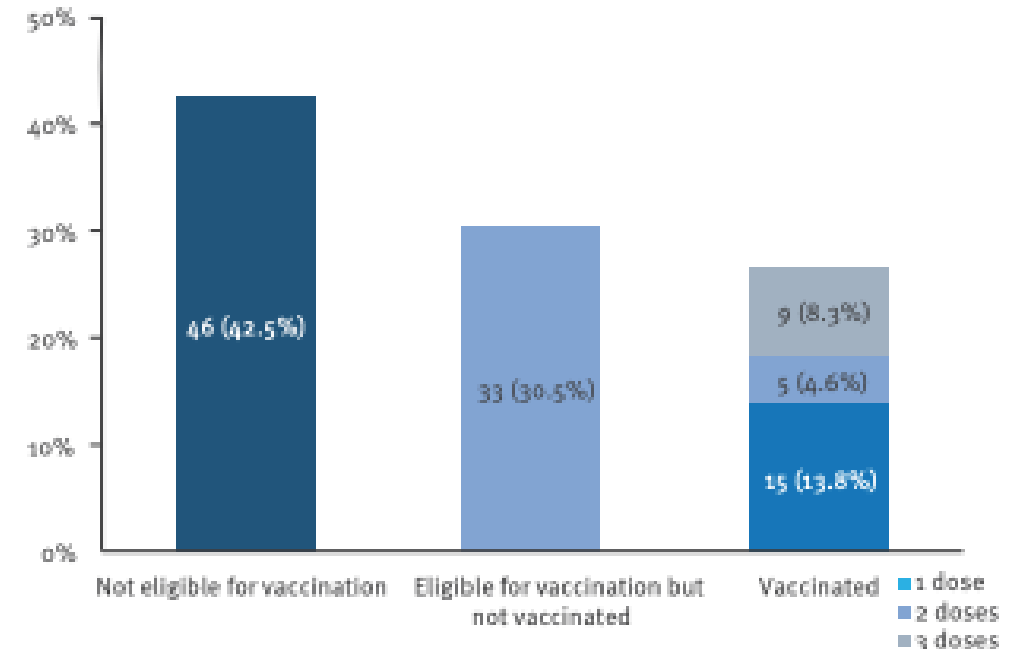
The shading of the left bar indicates an increasing gradient of hospitalised cases from the north to the south of Italy.

- Mothers vaccinated during pregnancy 5.7%
- Mothers informed about pertussis vaccination 20.8%



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

B. Vaccination status





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Existing resources (for both retrospective and prospective studies):

- Database **Pedianet** (Family paediatricians)
- Network **TIPNET** (National Paediatric Intensive Care Network)
- Network of **INF-ACT/SIS-NET** hospital centres

Possible studies:

- RSV epidemiology after introduction Nirsevimab. Comparison between Regions Y/N. Outcomes:
- Aggregated data medically attended LRTI in ER and hospitalized in the Network of **INF-ACT/SIS-NET** centres (**Common Data Model** definition already available UNIPD to be shared)
- Epidemiology and bronchiolitis risk profiles, VAP, necrotizing pneumonia, PICU/NICU infections (**TIPNET** - Retrospective and Prospective)
- Flu vaccination coverage trend et al (**Pedianet** - Retrospective)
- Focus on sepsis in pediatric patients (Network of **INF-ACT/SIS-NET** centres - Retrospective and Prospective)

The clinical and diagnostic network from the Cascade Open Call that will potentiate the existing one

INF-ACT CENTRES



Giaquinto C, Dona' D, Barbieri E

