

# Pharmacovigilance and vaccine safety monitoring

**Prof Alfredo Vannacci MD PhD**

[alfredo.vannacci@unifi.it](mailto:alfredo.vannacci@unifi.it)

**Dr Niccolò Lombardi, PharmD PhD**

[Niccolo.lombardi@unifi.it](mailto:Niccolo.lombardi@unifi.it)

**PeaRL - Perinatal Research Laboratory**

- University of Florence | Department of Neurosciences, Psychology, Drug Research and Child Health
- CiaoLapo Foundation for Perinatal Health

## AEFI general definition

Any untoward medical occurrence which follows administration of an active immunizing agent and which does not necessarily have a causal relationship with the use of a vaccine. The adverse event may be any unfavourable or unintended sign, abnormal laboratory finding, symptom or disease.

## Serious AEFI

An AEFI that meets one or more of the following criteria: fatal or life-threatening, results in hospitalization, prolongation of an existing hospitalization, persistent or significant disability/incapacity, congenital anomaly/birth defect.

## What is an adverse event following immunization (AEFI)?



## WHO cause specific definition of AEFIs

**1**

Vaccine product-related reaction

An AEFI that is caused or precipitated by a vaccine due to one or more of the inherent properties of the vaccine product.

**2**

Vaccine quality defect-related reaction

An AEFI that is caused or precipitated by a vaccine that is due to one or more quality defects of the vaccine product including its administration device as provided by the manufacturer.

**3**

Immunization error-related reaction

An AEFI that is caused by inappropriate vaccine handling, prescribing or administration.

**4**

Immunization anxiety-related reaction

An AEFI arising from anxiety about the immunization.

**5**

Coincidental event

An AEFI that is caused by something other than the vaccine product, immunization error or immunization anxiety

# Non-COVID vaccines

AEFI rate

**78** x 100,000

Rapporto Vaccini  
2021

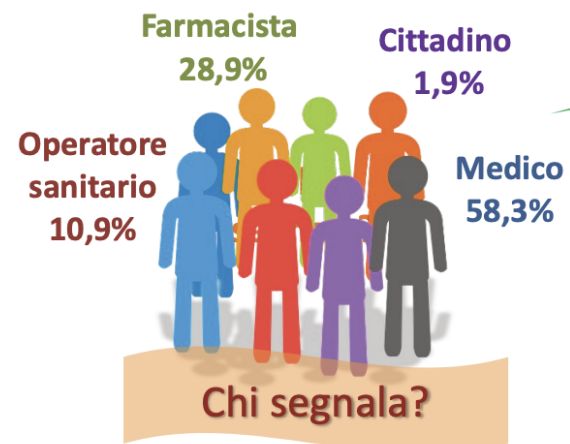
la sorveglianza postmarketing in Italia dei vaccini non-COVID-19

Circa 20,5 milioni di dosi somministrate



18.060 segnalazioni inserite  
segnalazioni spontanee e farmacovigilanza attiva

15.978 casi relativi al 2021



78 segnalazioni ogni 100.000 dosi somministrate\*

0 2000 4000 6000 8000 10000 12000 14000

FEBBRE

IRRITABILITA'

REAZIONE LOCALE

DIARREA

PIANTO

REAZIONE CUTANEA

3,6 segnalazioni gravi ogni 100.000 dosi\* sono correlabili a una vaccinazione

# Vaccines Safety in Children and in General Population: A Pharmacovigilance Study on Adverse Events Following Anti-Infective Vaccination in Italy

Niccolò Lombardi<sup>1†</sup>, Giada Crescioli<sup>1†</sup>, Alessandra Bettiol<sup>1</sup>, Marco Tuccori<sup>2,3</sup>, Marco Rossi<sup>2,4</sup>, Roberto Bonaiuti<sup>1</sup>, Claudia Ravaldi<sup>5,6</sup>, Miriam Levi<sup>7</sup>, Alessandro Mugelli<sup>1</sup>, Silvia Ricci<sup>8,9</sup>, Francesca Lippi<sup>8,9</sup>, Chiara Azzari<sup>6,8,9</sup>, Paolo Bonanni<sup>6</sup> and Alfredo Vannacci<sup>1,2,5\*</sup>

AEFI were **very rare**; the vast majority of them was **non-serious** and, despite the claims of anti-vaccination movements, the **simultaneous administration** of vaccines was safe and did not influence the risk of reporting a serious AEFI, particularly in children.

Lombardi et al., Front Pharm, 10, 948, 2019

**TABLE 3** | Association between serious AEFI risk and different factors expressed as reporting odds ratio (ROR) with classes of the National Vaccination Plan 2017–2019.

	0–15 months		16 months–12 years	
	Adjusted ROR (95% CI)	p-Value	Adjusted ROR (95% CI)	p-Value
<b>Sex</b>				
Female	Ref.			
Male	1.26 (0.48–3.27)	0.639	2.29 (1.10–4.76)	0.027
<b>Concomitant drugs (not suspected)</b>				
No	Ref.			
Yes	3.20 (0.96–10.70)	0.059	6.88 (1.42–33.43)	0.017
<b>Tot strains/toxoids</b>				
1–6	Ref.			
6+	0.16 (0.02–1.30)	0.087	2.14 (0.97–4.74)	0.060
<b>Presence of allergens (in traces)</b>				
No	Ref.			
Yes	0.31 (0.04–2.56)	0.280	0.94 (0.45–1.98)	0.873

## COVID vaccines

AEFI rate

97 x 100,000

## Rapporto sulla Sorveglianza dei vaccini anti-COVID-19

27/12/2020 - 26/12/2022



## SOSPETTE REAZIONI AVVERSE

140.595

Comirnaty 66,2%

Spikevax 15,1%

Vaxzevria 17,3%

Jcovden 1,3%

Nuvaxovid 0,1%



**AIFA**

AGENZIA ITALIANA DEL FARMACO

Article

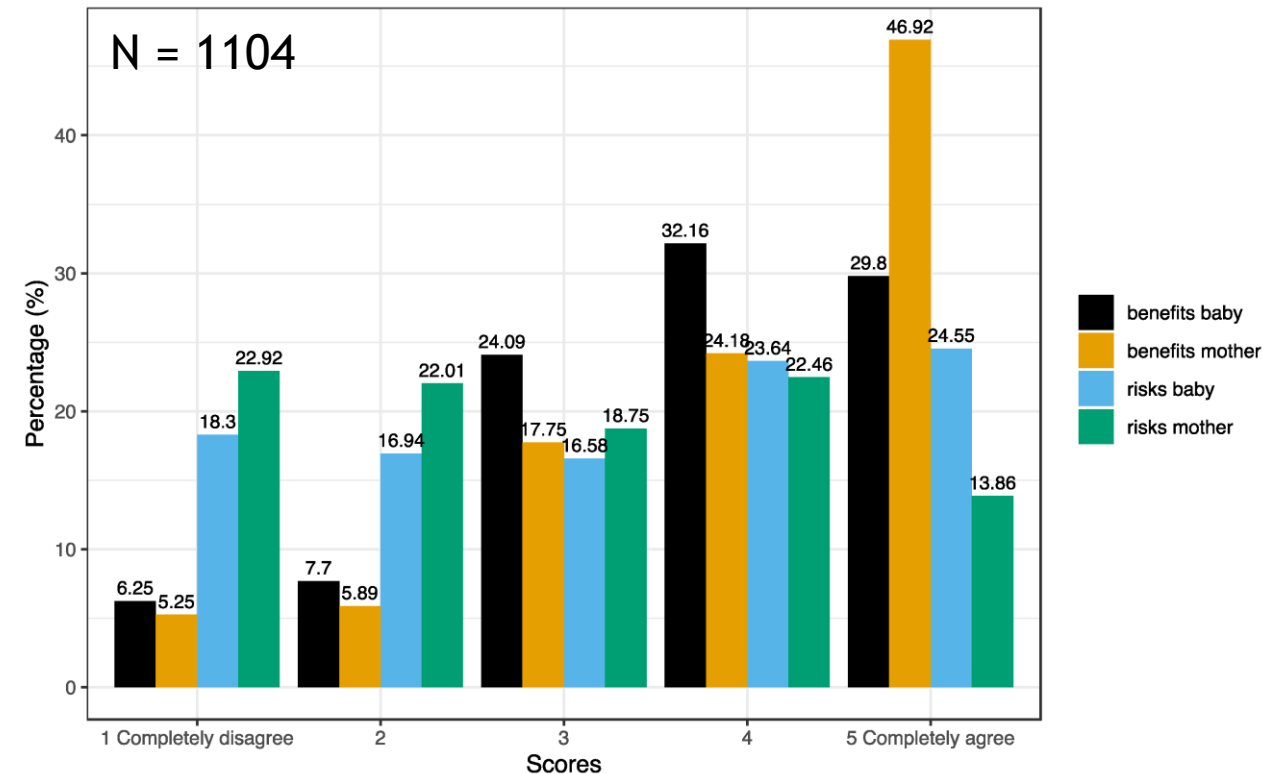
## The Interplay of Perceived Risks and Benefits in Deciding to Become Vaccinated against COVID-19 While Pregnant or Breastfeeding: A Cross-Sectional Study in Italy

Teresa Gavaruzzi <sup>1,2,\*</sup>, Marta Caserotti <sup>2,†</sup>, Roberto Bonaiuti <sup>3</sup>, Paolo Bonanni <sup>4</sup>, Giada Crescioli <sup>3</sup>, Mariarosaria Di Tommaso <sup>4</sup>, Niccolò Lombardi <sup>3</sup>, Lorella Lotto <sup>2</sup>, Claudia Ravaldi <sup>3</sup>, Enrico Rubaltelli <sup>2</sup>, Alessandra Tasso <sup>5</sup>, Alfredo Vannacci <sup>3,†</sup> and Paolo Girardi <sup>6,†</sup>

- The **overall risks/benefits tradeoff** of COVID-19 vaccination was highly predictive of both vaccination behavior and intention.

- An increase in the **perceived risk to the baby** had a more substantial negative impact on vaccination decisions than a similar increase in perceived risk to the mother.

- Pregnant women** were less likely or willing to be vaccinated compared to breastfeeding women.



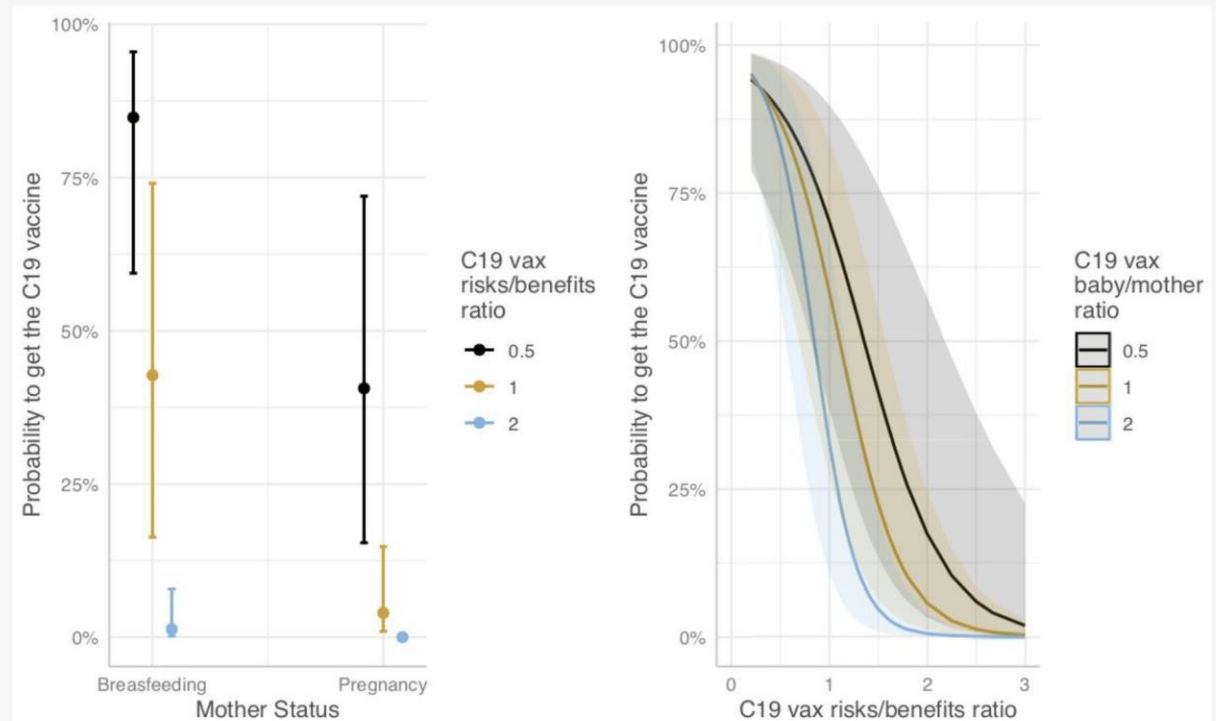
•**Link Between Perceived Risk and Vaccine Hesitancy:** The study highlights a significant connection between the perceived risk of COVID-19 and vaccine hesitancy in pregnant and breastfeeding women.

•**Concerns About Safety and Adverse Events:** These women's vaccination decisions are greatly influenced by their concerns about the safety of vaccines and the fear of potential adverse events.

•**Need for Clear, Evidence-Based Information:** Providing clear, factual information about the safety and efficacy of vaccines is crucial in addressing these fears.

•**Targeted Communication Strategies:** Developing communication strategies that specifically address safety concerns and the low risk of adverse events can enhance vaccine confidence and uptake in these groups.

**Figure 2.** Predicted probability and 95%CI to be vaccinated, considering the interaction between mother status and COVID-19 vaccination risks/benefits ratio (**left**) and COVID-19 vaccination risks/benefits ratio and COVID-19 vax baby/mother ratio (**right**).




N = 1104





## COVID-19 Vaccination in Pregnancy, Paediatrics, Immunocompromised Patients, and Persons with History of Allergy or Prior SARS-CoV-2 Infection: Overview of Current Recommendations and Pre- and Post-Marketing Evidence for Vaccine Efficacy and Safety

Nicoletta Luxi<sup>1</sup> · Alexia Giovanazzi<sup>1</sup> · Annalisa Capuano<sup>2</sup> · Salvatore Crisafulli<sup>3</sup> · Paola Maria Cutroneo<sup>4</sup> · Maria Pia Fantini<sup>5</sup> · Carmen Ferrajolo<sup>2</sup> · Ugo Moretti<sup>1</sup> · Elisabetta Poluzzi<sup>6</sup> · Emanuel Raschi<sup>6</sup> · Claudia Ravaldi<sup>7</sup> · Chiara Reno<sup>5</sup> · Marco Tuccori<sup>8</sup> · Alfredo Vannacci<sup>7</sup> · Giovanna Zanoni<sup>9</sup> · Gianluca Trifirò<sup>1</sup>  · Ilmiovaccino COVID19 collaborating group

### Key Points

Evidence on the benefit–risk profile of COVID-19 vaccines in special cohorts, such as pregnant and breastfeeding women, children/adolescents, immunocompromised people, and persons with a history of allergy or previous SARS-CoV-2 infection, is still limited.

Due to the higher risk of SARS-CoV-2 infection and severe COVID-19, vaccination is currently recommended in these special cohorts. COVID-19 vaccination for children and adolescents is still debated.

Ongoing large-scale studies will provide clinically relevant data in the frailest populations to better inform the worldwide COVID-19 vaccination campaign.

• **Benefit-Risk Profile of Vaccines:** The evidence indicates a generally favorable benefit-risk profile for COVID-19 vaccines in the general population, suggesting their overall safety and effectiveness.

• **Limited Evidence in Special Groups:** There is limited evidence on the efficacy and safety of COVID-19 vaccines in special cohorts, such as pregnant and breastfeeding women, children, immunocompromised individuals, and those with a history of allergies or prior SARS-CoV-2 infection, highlighting the need for further research in these groups.

• **Importance of Post-Marketing Surveillance:** The critical overview of pre- and post-marketing evidence underscores the significance of ongoing vaccine surveillance post-approval, to monitor safety and efficacy across different populations.

• **Personalized Vaccination Approach:** Analysis of special groups indicates the potential need for a more personalized approach to vaccination, ensuring safety and efficacy for all demographic groups.

## CovidVaccineMonitor.eu

- **Project Overview:** Funded by the European Medicines Agency (EMA) and conducted in collaboration with the Italian Medicines Agency (AIFA), the project aims to estimate the incidence of short and long-term adverse reactions following the administration of COVID-19 vaccines.
- **Objective:** The main goal is to monitor adverse reactions through a web-app-based prospective monitoring system, targeting both the general population and special cohorts.
- **Duration:** The project spans from May 2021 to May 2023.
- **Participating Countries:** It involves 16 European countries, with 12 actively participating in the prospective monitoring.
- **Special Cohorts Monitoring:** The University of Verona (UNIVR) coordinates the monitoring of vaccine safety in special cohorts, including pregnant and breastfeeding women, children and adolescents, immunocompromised individuals, and people with a history of allergies or previous COVID-19 infection

## Il tuo contributo rende i vaccini più sicuri

Partecipa al monitoraggio degli effetti collaterali dei vaccini anti COVID-19 registrandoti al sito web **fino a 48 ore dopo aver ricevuto la prima dose del vaccino.**

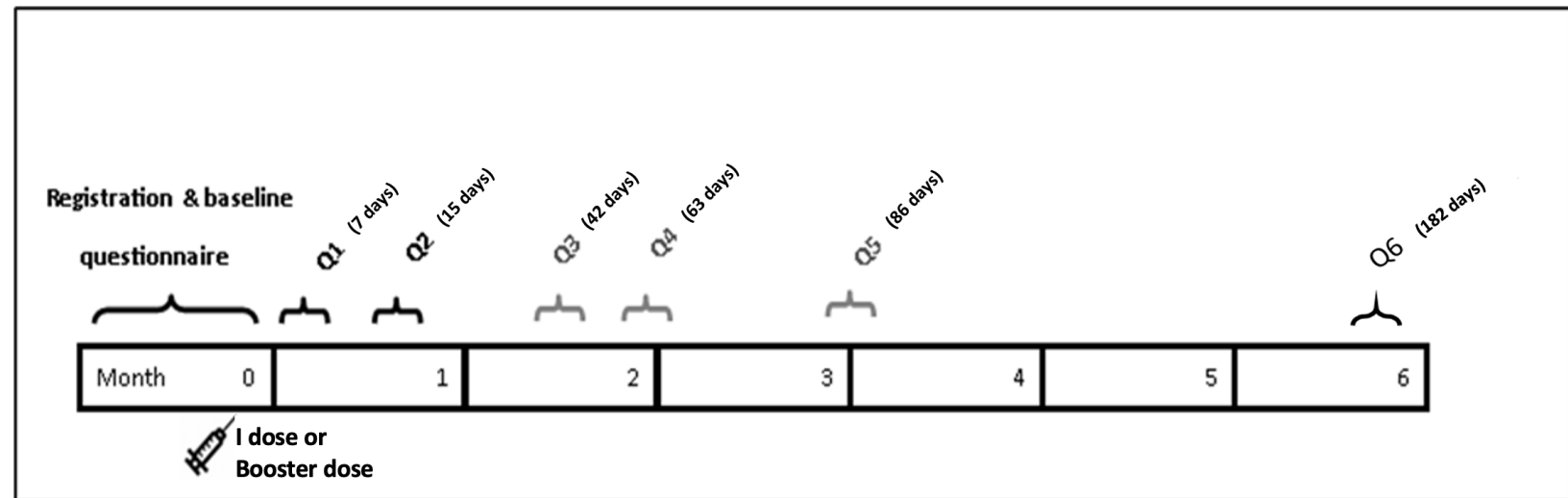


**COVID**  
vaccine  
monitor.eu/it



## CovidVaccineMonitor.eu

- Active surveillance via webapp
- Solicited AEFIs registration
- Unsolicited AEFIs registration




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ilmiovaccino **COVID19.it**

UNIVERSITÀ di VERONA  
Dipartimento di DIAGNOSTICA E SANITÀ PUBBLICA

## CovidVaccineMonitor.eu

Cohort	1st Dose	Booster Dose	Total Doses
Immunocompromised	20	89	109
People with History of Allergy	186	235	421
Prior SARS-CoV-2 Infection	141	226	367
Children and Adolescents	251	75	326
Pregnant Women	37	59	96
Lactating Women	17	47	64
None of the Cohorts	364	1235	1599
<b>Total</b>	<b>1016</b>	<b>1966</b>	<b>2982</b>

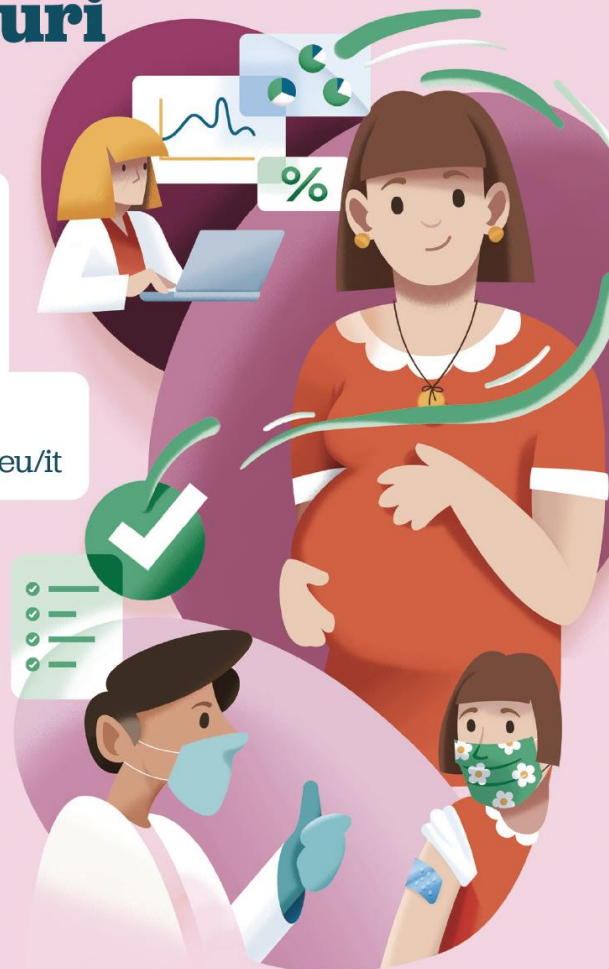
Unpublished data

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**COVID**  
vaccine  
monitor.eu/it



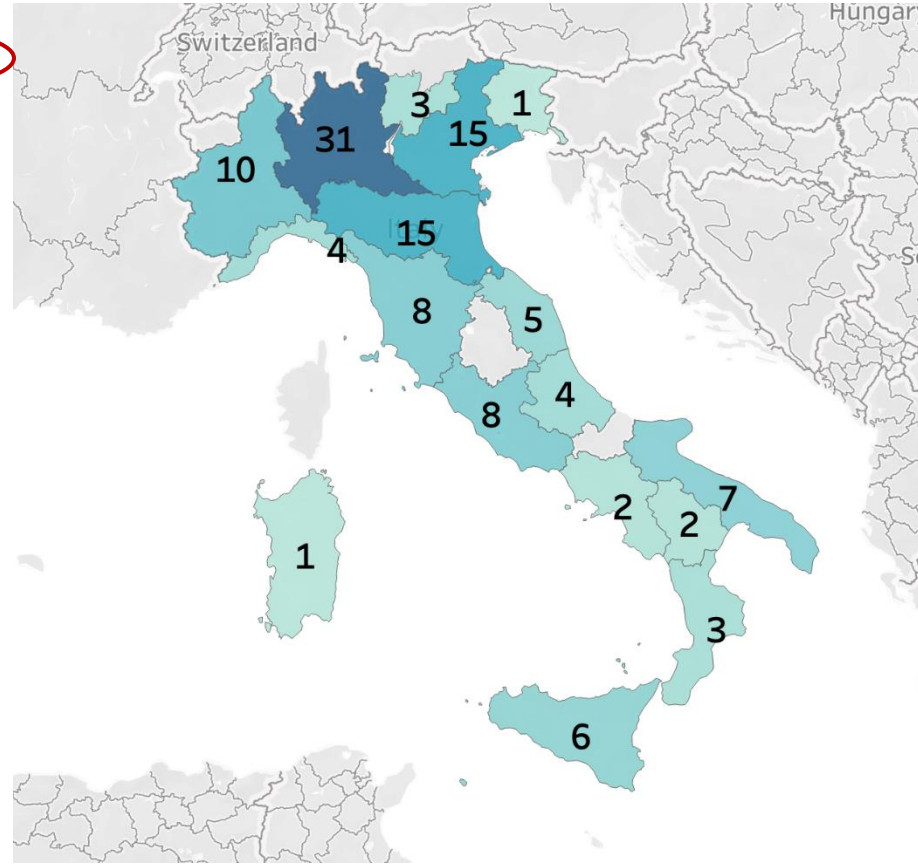


## A Multilayer frAmework to enhance pharmacoloGical kNowledge among wOmEn in reproductive age, pregnancy and post-partum using a serious game appLIcAtion

The two internet based games focused on **vaccinations (Module 1)** and **perinatal depression (Module 2)** were launched through **CiaoLapo's social media channels**

Anonymous data collection and analysis for preliminary validation

	Summary
N	125
<b>First pregnancy</b>	
Yes	30 (24.0%)
No	90 (72.0%)
N.A.	5 (4.0%)
<b>Number of children</b>	
0	18 (20.0%)
1	35 (38.9%)
>1	37 (41.1%)
<b>Previous losses</b>	
No	15 (16.7%)
Yes	75 (83.3%)
<b>Area type</b>	
Metropolitan / major city	36 (28.8%)
Regional / urban / large town / small city	47 (37.6%)
Rural / small town	42 (33.6%)



<b>Job</b>	
Employed full-time	61 (48.8%)
Employed part-time	20 (16.0%)
Employed casually	1 (0.8%)
Working student	2 (1.6%)
Not employed	17 (13.6%)
Parental leave	18 (14.4%)
Other (please specify)	6 (4.8%)
<b>Level of education</b>	
Secondary	5 (4.0%)
Tertiary	34 (27.2%)
Bachelor degree	26 (20.8%)
University degree	32 (25.6%)
Postgraduate University degree	28 (22.4%)
<b>Couple relationship</b>	
Married or living with a partner	124 (99.2%)
Relationship but living separately	1 (0.8%)

## Results of the first minigame on vaccinations

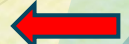
*Has anyone told you about vaccinations? Who?*

	Summary
N	125
<i>Has anyone told you about vaccinations?</i>	
Yes	105 <b>(84.0%)</b>
No	20 (16.0%)
<i>Who?</i>	
Obstetrician	<b>82 (78.1%)</b>
Midwife	<b>40 (38.1%)</b>
General practitioner	7 (6.7%)
Pediatrician	5 (4.8%)
Friends/Other	20 (19.0%)



	Summary
N	125
Cholera	0 (0.0%)
COVID-19	<b>72 (57.6%)</b>
dTpa Diphtheria Tetanus Pertussis	<b>100 (80.0%)</b>
Japanese encephalitis	0 (0.0%)
Hepatitis A	2 (1.6%)
Hepatitis B	5 (4.0%)
Yellow fever	0 (0.0%)
HPV Papilloma virus	4 (3.2%)
Influenza	<b>74 (59.2%)</b>
IPV Poliomyelitis	2 (1.6%)
Meningococcus	7 (5.6%)
MMR Measles Mumps Rubella	<b>17 (13.6%)</b>
Pneumococcus	4 (3.2%)
Anger	0 (0.0%)
TBE tick bite encephalitis	0 (0.0%)
Oral typhoid	0 (0.0%)
Chickenpox	<b>9 (7.2%)</b>
None of these	5 (4.0%)

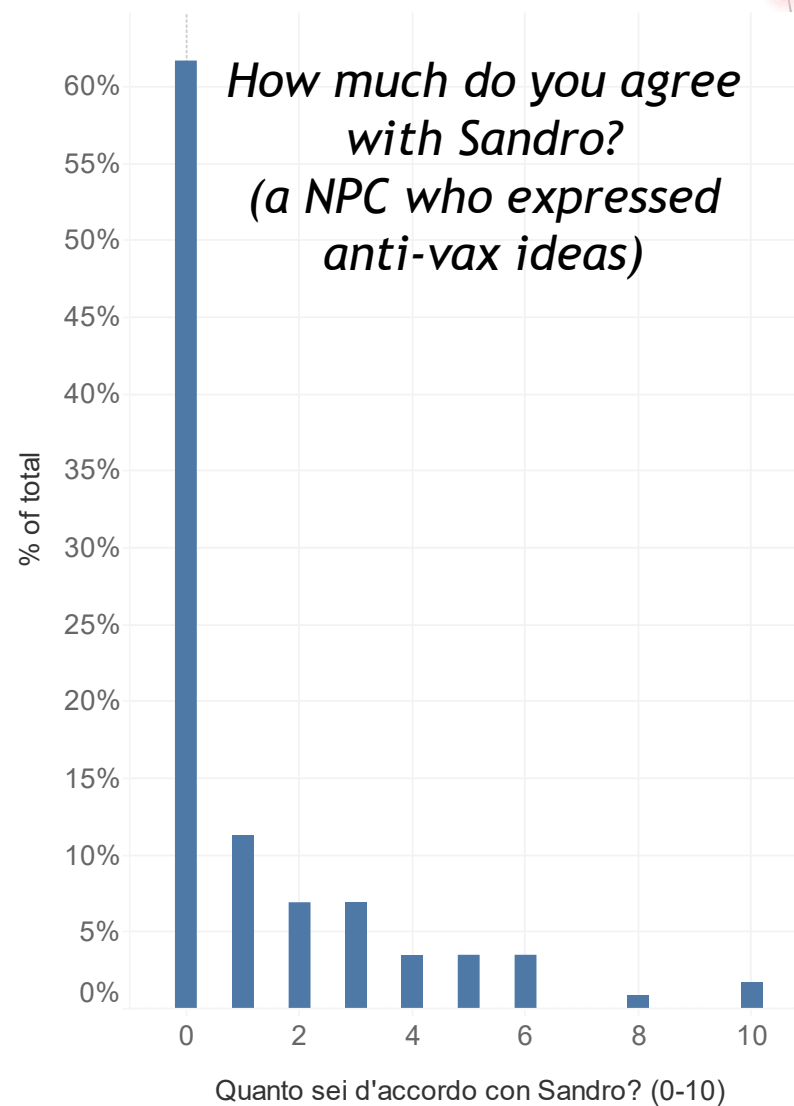
*Please, indicate, in your opinion, which vaccinations are recommended during pregnancy*





*What sources of vaccine information do you listen to?*

	Summary
N	125
Qualified doctors, midwives and healthcare professionals	119 <b>(96.0%)</b>
Posts on social media and personal blogs	5 (4.0%)
Books and articles written by experts in the field of medicine and research	40 (32.3%)
Opinions of friends and relatives who have had similar experiences	5 (4.0%)







## Sentiment Analysis



Women's desire to make **shared choices** with professionals and to be **scientifically informed about vaccines** during pregnancy, even if there may be **underlying anxiety and concern** regarding the possibility of **adverse events** following immunisation or harming the baby.

# Country meeting: Adult Immunization in Italy: successes, lessons learned and the way forward - Florence 6-7/12/23

Did you already know the concept of Serious Gaming?	Freq.	Percent
Yes	4	5.41
No	70	94.59
Total	74	100.00

Do the educational and clinical support purposes of MAGNOLIA seem useful to you?	Freq.	Percent
Yes	70	94.59
No	1	1.35
N.A.	3	4.05
Total	74	100.00

<i>How much you felt involved in the MAGNOLIA stories? (0-10)</i>	<b>6.2 ± 2.0</b>
<i>Did you learn something new?</i>	
Yes	43 (58.1%)
<i>What did you learn?</i>	
How to prevent infectious diseases during pregnancy	9 (20.9%)
Which vaccines are recommended during pregnancy	15 (34.9%)

**New Online** Views **364** | Citations **0** | Altmetric **14**

## Comment & Response

ONLINE FIRST

September 11, 2023

# Machine-Made Empathy? Why Medicine Still Needs Humans

Alfredo Vannacci, MD, PhD<sup>1</sup>; Roberto Bonaiuti, MEng<sup>1</sup>; Claudia Ravaldi, MD, MSc, PhD<sup>1</sup>

» Author Affiliations

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doi:10.1001/jamainternmed.2023.4389

# JAMA Internal Medicine

Large language models such as ChatGPT are impressive, but they merely function as syntactic engines, lacking semantic and pragmatic abilities.

While they can generate coherent and fluent texts on various topics, **they cannot effectively reason** or understand their outputs.

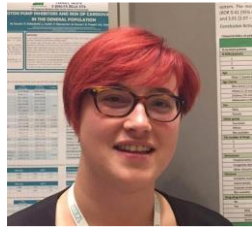
Chatbots may offer significant utility in medicine, but they cannot be considered genuinely "intelligent" or "empathetic".

Chatbots can assist clinicians in crafting responses to patient questions, but **they cannot replace human judgment and compassion.**

# Thank you for your attention



**Niccolò Lombardi**



**Giada Crescioli**



**Roberto Bonaiuti**



**Claudia Ravaldi**



**Laura Mosconi**

## **PeaRL - Perinatal Research Laboratory**

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