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## Review Paper

# Smallpox vaccination and vaccine hesitancy in the Kingdom of the Two Sicilies (1801) and the great modernity of Ferdinand IV of Bourbon: a glimpse of the past in the era of the SARS-COV-2 (COVID-19) pandemic

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## ABSTRACT

**Objective:** The current health emergency caused by COVID-19 disease shows several correspondences with well-known epidemics of the past. The knowledge of their management and overcoming could give us useful tools to face the present COVID-19 pandemic and future epidemics.

**Study design:** On 1 March 1801, the first smallpox vaccinations were carried out in Palermo, and a few weeks later, the vaccine was also administered in Naples and the various provinces of the Kingdom. We aim to study the mass vaccination programme initiated by the Bourbon king Ferdinand IV that was the first large-scale campaign to be conducted in Italy and one of the first in Europe.

**Methods:** The authors searched and examined historical testimony and different aspects linked to the public health issues on vaccination. It is a topical topic in the current period with the COVID pandemic.

**Results:** Albeit with the due differences determined by the passage of time and by the scientific and cultural advances of modern society, this testimony from the past can provide us with food for thought regarding how to face the present COVID-19 pandemic and to prepare for the future. Indeed, it shows us how the terrible smallpox epidemic was handled and finally overcome, thanks to vaccination.

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## Introduction

Exactly 220 years have passed since the history of vaccination in the dominions of Southern Italy began, when Ferdinand IV, King of Naples and Sicily (Fig. 1), initiated the fight against smallpox.

Today, despite the differences determined by the passage of time and by scientific advances, this history still has lessons to teach us as we face the current coronavirus pandemic. Indeed, it can show us how and by what means the tremendous smallpox epidemic was handled and finally overcome.

In those days, epidemic diseases were the leading causes of death. In the early years of the 21st century, by contrast, infectious diseases steadily and markedly declined as a cause of death – at least until the appearance of COVID-19. This is due to the fact that, over the years, fundamental public health measures have been

implemented, such as mass vaccination campaigns, which have proved highly successful.

In this regard, David Salisbury, Associate Fellow of Global Health Security at Chatham House, the *Royal Institute of International Affairs in London*, asserted that 'Thanks to vaccinations, about 9 million deaths were avoided between 2000 and 2016'.<sup>1</sup>

Indeed, over the years, vaccination has proved to be the safest, and sometimes the only, means of protecting against possible epidemics and pandemics. Admittedly, adverse events and side-effects may occur, although these affect only a very small number of those who are vaccinated.

In the light of the history of vaccination and the impressive results achieved, the current antivaccination arguments appear not easy to understand. Interestingly, however, such arguments had already been levelled against the first smallpox vaccination campaigns at the beginning of the 19th century.<sup>2</sup>

In 1801, the whole of Sicily, and especially the city of Palermo – where the King had taken refuge after abandoning Naples at the

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Fig. 1. Portrait of Ferdinando IV di Borbone (Napoli 1751–1825).

end of 1798, following the very brief experience of the French republic – were in the throes of a terrible smallpox epidemic, which killed over 8000 people and caused a veritable slaughter among children.<sup>3,4</sup>

Smallpox (*'variola'* in late Latin, derived from *varius*, meaning *'varied, variable, mottled'*) is an acute, infectious, contagious and epidemic viral disease characterised by a typical vesiculo-pustular rash.<sup>5</sup>

Reported since ancient times,<sup>6</sup> smallpox constantly reappeared in Europe after the middle of the 16th century, becoming the leading endemic disease in the following century.<sup>7</sup> It had a severe effect on society, striking younger age groups in particular and impacting negatively on the reproduction of the population. In the 18th and 19th centuries, smallpox was rife throughout Europe, being responsible for numerous epidemics, which broke out at intervals of 5–10 years, as soon as a sufficiently large population of non-immunised residents had been reconstituted.<sup>8,9</sup>

Ferdinand IV, whose brother don Filippo had died of smallpox in 1777, determined to seek some means of saving his people from this terrible disease. In 1778, he therefore ordered the court physician Angelo Maria Gatti to inoculate smallpox into him and his three children.<sup>10,11</sup>

In this case, it was inoculation of smallpox or variolation, an obsolete method of immunising patients against smallpox by infecting them with substance from the pustules of patients with a mild form of the disease (*variola minor*); it was basically a deliberate inoculation of an uninfected person with the smallpox virus (as by contact with pustular matter) that was widely practiced before the era of vaccination as prophylaxis against the severe form of smallpox, it was the method used before Jenner.

The vaccine with the 'Jenner method' was introduced in 1796, and it was the inoculation of exudate taken from vaccine smallpox pustules, which gave immunity both to this disease and to the more terrible human smallpox.

Indeed, the subject of inoculation was constantly present in Bourbon politics, so much so that the 1789 Code regulating the community of San Leucio contained an entire section devoted to inoculation against smallpox by means of the use of 'material' drawn from pustules of human smallpox.<sup>13</sup>

At the beginning of the 19th century, the King's wish was therefore to use the method designed in 1796 by the English physician Edward Jenner (1749–1823), whose book *The Origin of the Vaccine Inoculation* was published in 1801.<sup>14</sup>

Having observed that people who had recovered from 'cowpox' did not contract 'smallpox', Jenner deduced that the former disease could confer protection against the latter.<sup>15,16</sup> Indeed, as cattle farmers of the time used to say, 'I cannot take smallpox for I have had cowpox.'<sup>17</sup> (See Fig. 2).

Jenner therefore put forward the hypothesis – which subsequently proved correct – that artificially infecting a healthy individual with material from a cowpox pustule would immunise that individual against smallpox. As was subsequently demonstrated, this phenomenon was due to the resemblance of the antigens of the two viruses. In other words, the antibodies active against cowpox were also active against smallpox. Thus, Jenner laid down the principles of vaccination (from the Latin word *vaccinus*, derived from *vacca*: cow), a preventive therapy against smallpox that proved more efficacious than inoculation and which had fewer complications.<sup>12</sup>

His discovery spread with surprising speed in Europe that, at the time, was at the beginning of the long years of the Napoleonic Wars. In the following years, it spread also to the Americas.<sup>18</sup> (See Fig. 3).

### Smallpox vaccination in the kingdoms of southern Italy

Although Ferdinand IV did not have the possibility to produce Jenner's anti-smallpox vaccine in industrial quantities, he



Fig. 2. Portrait of Edward Jenner (1749–1823).

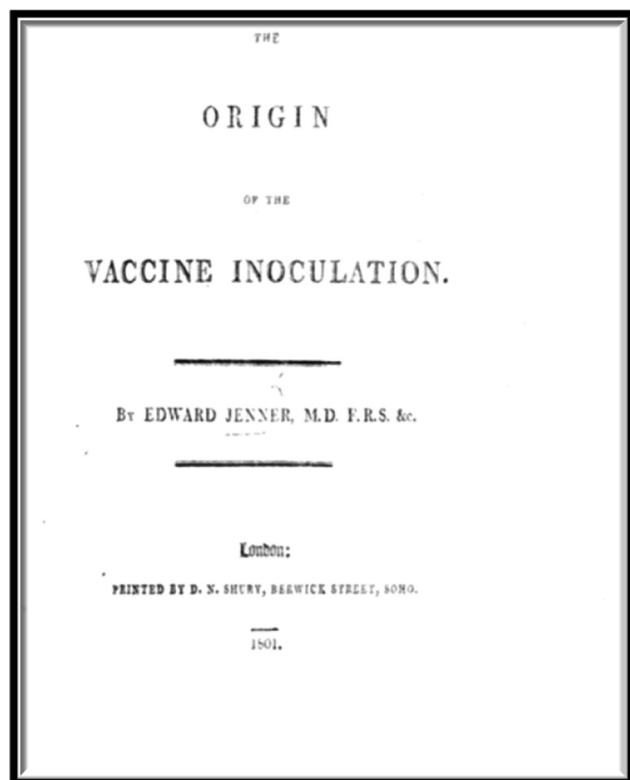


Fig. 3. The origin of the vaccine and inoculation (1801).

nevertheless managed to stipulate an agreement with two physicians, Joseph Andrew Marshall and John Walker.

Both endorsed Jenner's method and had been commissioned by the Royal Navy to take part in a naval expedition to Egypt to inoculate the members of the crew and, at the same time, to spread the new method of prevention among the British troops stationed in the Mediterranean. After reaching Gibraltar, Minorca and Malta, the two physicians separated; Walker continued on the route towards Egypt, whereas Marshall headed for Palermo.<sup>19</sup>

With great ability, the King succeeded in getting vaccination extended to the populations of Palermo and Naples and provided funds and transport. On 14 March 1801, Joseph Andrew Marshall, on the invitation of Queen Maria Carolina of Austria, carried out the first vaccinations in Palermo; these were repeated publicly and free of charge on Mondays and Thursdays. Thus, Marshall was able to teach the new method to his colleagues Giovanni Vivenzio and Michele Troja, who were the Court Physician and the Surgeon of the King's Chamber, respectively.<sup>20</sup>

These two men would certainly have enjoyed considerable prestige in the local community and undoubtedly held great sway over the population; this was especially true of the Court Physician, who headed the entire health care organisation of the country.<sup>21</sup>

Moreover, to further spread knowledge of the new system of prophylaxis in the medical environment, Marshall published the treatise *Osservazioni sopra il vajuolo vaccino* in Palermo and opportunely dedicated it to King Ferdinand IV.<sup>22</sup>

To spread the word more effectively, public posters were distributed. Through Dispatch N° 228 of 23 June 1801, which was sent by the Minister for Ecclesiastical Affairs to the director of the General Police, 100 posters announcing Marshall's public inoculations at a centre in Monteoliveto were affixed in the city streets.<sup>23</sup>

The main targets of vaccination were children, who were the most severely affected by the disease. Indeed, they rarely survived, and when they did, they risked being left blind or deformed. From the report presented by Dr Marshall to the House of Commons in London in 1802, it emerged that, in collaboration with the Bourbon health system, he had managed to vaccinate over 10,000 children in less than 1 year. Moreover, according to the dates reported in the health care registers at the time, Ferdinand IV's vaccination programme was the first large-scale campaign to be conducted in Italy and among the first in Europe.<sup>24</sup>

Obviously, this vaccination programme was not exempt from criticism; heated arguments raged between supporters and opponents, often detractors, giving rise to an intense scientific and cultural debate. This is not surprising if we consider that even today, more than two centuries later, while the fate of our immediate future depends on a vaccine that was created in a very short time, there are still many people who oppose vaccination or remain hesitant. And this despite the far greater scientific knowledge available today, and the enormous success of mass vaccination campaigns that have led to the eradication of smallpox and have drastically reduced the incidence of many other epidemic diseases.<sup>25,26</sup>

Scepticism towards vaccinations is a phenomenon that has existed ever since this first vaccine became available and also during the 18th century towards inoculation. Today, however, it is certainly fuelled by the ease with which anyone at all can glean contradictory information from the Internet and also by many other bogus explanations that have nothing to do with vaccines.<sup>27</sup>

In English, this phenomenon is known as 'Vaccine Hesitancy'; in Italian, it is called 'esitazione vaccinale' (a term that combines the concepts of indecision, uncertainty, reluctance and procrastination).

It is a complex phenomenon that is strictly linked to different contexts with different determinants: historical period, geographical area, political situation. The vaccine hesitancy refers to delay in acceptance or refusal of vaccination despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence.<sup>28</sup>

Thus, vaccine hesitancy constitutes only the latest chapter in a story that began in Italy in the middle of the 18th century, concomitantly with the first methods of smallpox prevention.<sup>29</sup> Indeed, back in the second half of the 18th century, the inoculation of smallpox (or 'variolation') elicited contrasting opinions in the various cities where this practice had been adopted.

After undergoing variolation, Ferdinand IV himself clashed with his father, King Charles III of Spain, who, being very religious, claimed that the practice conflicted with the will of God.

This idea was one of the most common reasons for opposition to the practice of inoculation, and later of vaccination; many people disapproved of the practice, in that they believed that their own death or the death of their children due to smallpox was merely the manifestation of God's will.

In those days, unlike today, doubts and rejection of vaccination were based on abstract beliefs. Another widely held belief was that vaccination was dangerous because smallpox disease needed an 'escape valve'. Indeed, according to a conviction that was rooted in the humeral tradition of Hippocrates, and later taken up by Galen, the manifestation of disease reflected a need for purification.

A further source of opposition to vaccination was the fear that inserting animal material into the human body could transmit animal diseases to people. Moreover, it was feared that the 'arm-to-arm' technique used in vaccination might spread diseases such as syphilis, as sometimes happened.

In 1821, vaccination was made obligatory in the Kingdom of the Two Sicilies (the first of the Italian states in which the obligation was introduced), whereas in the unified nation, this obligation was brought in by the Crispi-Pagliani law in 1888. Clearly, this step necessitated the implementation of specific strategies of health education to train doctors in the practice of vaccination, to inform the population, to answer the most frequent questions that arose and to reply to those who opposed vaccination.

### The protagonists of the vaccination programme according to the 'Jenner method'

To better understand the measures implemented, it is useful to know something of the protagonists of the vaccination campaign that was initiated in southern Italy in 1801. These pioneers of vaccination operated at the same time as Luigi Sacco, who had been engaged since 1799 in spreading the practice of vaccination in the Cisalpine Republic, where smallpox deaths were drastically reduced, and Giacomo Barzellotti in Siena and in the Dipartimento (Department) dell'Ombone (in Tuscany).

In the vaccination campaign conducted Southern Italy the name of Michele Troja (1747–1828) stands out. The king's personal surgeon, Troja had already been in charge of the 'Direzione Vaccinica' (Vaccination Directorate) created by Ferdinand IV in 1802 to coordinate vaccinations in the capital and in the provinces.

From the outset, Troja was flanked by his closest collaborator, the Salento physician Antonio Miglietta (1767–1826), who was the true architect of the project; the 'apostle of vaccination for the Kingdom of Naples', as he defined himself.<sup>30,22</sup> (See Fig. 4).

When the Direzione Vaccinica was transformed into the *Comitato Centrale di Vaccinazione* (Central Vaccination Committee) in 1807, its presidency was conferred upon Domenico Cotugno (1736–1822), the most famous southern Italian physician of the day, and Miglietta became the Secretary. Between the two, there

was a perfect harmony with regard to the social objective that medicine should have to save the lives of as many people as possible.<sup>31</sup>

This objective fitted well with the illuminist vision, and with that of the Bourbon king, of the physical and moral well-being of all citizens, regardless of their social class.

This same view underlay the king's decision to promote free health care and to offer money prizes to those vaccinees whose names were picked out at random.<sup>32</sup>

Finally, another particularly prominent figure was Gennaro Galbiati (1766–1844), who promoted retrovaccination; that is to say, vaccination with a virus obtained from an animal previously inoculated with a human virus. Indeed, in agreement with Domenico Cotugno's idea that 'one who inoculates everything',<sup>33</sup> Galbiati strenuously opposed the 'arm-to-arm' method to avoid the possible transmission of venereal diseases during vaccination.

The important status of these two doctors testifies to the fact that smallpox was deemed to be a major issue that needed to be tackled directly by the State, and above all, that vaccination should be offered free of charge to all social classes.

On the basis of the indications provided by these physicians, the governors took some extremely effective decisions. To train future doctors in the practice of vaccination, they decreed that no student could graduate from the universities of the Kingdom without having demonstrated perfect knowledge of the mechanism of vaccination and of how to vaccinate.

Similarly, midwives were also obliged to undergo training in vaccination and to spread knowledge of the practice. Indeed, midwives were regarded as veritable 'social mediators', able to explain to mothers in simple language what vaccination was and how it would benefit their children. In addition, parish priests were requested to inform and convince their parishioners, especially those of the lower social classes, of the benefits of vaccination.

With a view to persuasion, Antonio Miglietta, director of the public Vaccination Establishments, responded to a precise request by the King (dispatch of 6 August 1806) by implementing a detailed project to overcome all resistance to vaccination; to this end, he produced three strategic documents, printed on 9 August 1806 at the expense of the Royal Treasury: *Istruzione sull'origine e il merito dell'inoculazione vaccina*, an informative brochure; *Ricordi salutari*, distributed to parents and godparents after a child's baptism; and *Omelia del vescovo di Goldstat*, addressed to parish priests.<sup>24</sup>

In the same period, similar interventions were undertaken by Luigi Sacco (1769–1836) in the Cisalpine Republic. Sacco recounted that: "priests could easily instruct and convince the faithful, from the pulpit or in their catechisms, of the need for this operation".<sup>34</sup>

This constituted an efficacious means of overcoming the diffidence of the many people, especially those of the lower classes, who superstitiously resigned themselves to the disease, convinced that there was no remedy for it, thereby hindering vaccination'. For this reason, in the territories where he planned to carry out vaccination, he distributed circulars and, above all, a copy of the 'Omelia' written by the zealous bishop of Goldstat explaining the valuable discovery of the inoculation of the anti-smallpox vaccine. '*The Omelia fits perfectly into Luigi Sacco's complex program, given that he himself is the author*'.<sup>35</sup>

Indeed, the Bishop of Goldstat, with his sound medical-scientific, as well as religious, knowledge did not really exist; he was invented by Sacco purely for the purpose of communication.

Through this fictitious character, Sacco was able to call on an incontestable and highly persuasive authority, while, at the same time, exploiting his own medical competence. Thus, he was able to persuade people to accept the vaccine as a remedy offered by divine Providence to save them, and especially their children, from the disease.



Fig. 4. Antonio Miglietta (1767–1826).

However, despite the many interventions undertaken within the framework of a sort of *ante litteram* information campaign, considerable prejudice against vaccination remained. To convince the most sceptical, in 1803, in the Santissima Annunziata Hospital in Naples, the Direzione Vaccinica organised a public demonstration, just as Jenner had been obliged to do in England.<sup>36</sup>

In front of a large audience, highly reputable surgeons who did not belong to the *Corpo de' pubblici Vaccinatori* (Body of Public Vaccinators) were invited to inoculate human smallpox into 18 orphan children who had already been vaccinated: six from the *Ruota degli Esposti dell'Annunziata*, six from the Real Albergo dei Poveri and six from the general population.

None of the children contracted the disease. As a result of this success, in Naples and the surrounding provinces between 1808 and 1819, almost 400,000 vaccinations were performed in over 17% of all live newborns in the Kingdom.

### The organisation of the vaccination programme

Such a programme of mass vaccination necessarily involved many organisational problems, such as the production, conservation and distribution of the vaccine. To tackle these problems, the *Direzione Vaccinica*, on the advice of Miglietta, adopted the technique of 'arm-to-arm' vaccination, which involved taking material from the pustules of a recently vaccinated subject and injecting it directly into the subject to be vaccinated. In this way, those who had been vaccinated, particularly abandoned children and those housed in institutes, became veritable 'reservoirs'<sup>37</sup> of the vaccine.

However, in the setting of a normal, fruitful debate among men of science, doubt was cast on this technique by another Neapolitan scholar, Gennaro Galbiati, who was firmly convinced of the superiority of the practice of 'animal vaccine' (retrovaccination).

This involved taking exudate from vaccinated children and inoculating it into young cows, then drawing off material for further vaccinations from the pustules that formed on the cows.

Galbiati, who was fully conversant with the technique of vaccination, which he amply described in an 1803 publication, developed and regulated cow-based vaccine production, setting up in Naples a facility for the production of smallpox vaccine from heifers. In this way, he claimed, the vaccine had a greater immunising capacity and, above all, did not act as a vehicle for other human diseases, such as syphilis.

Aside from the vehement clash between Miglietta, the advocate of arm-to-arm vaccination, and Galbiati, the advocate of animal vaccine, the capital of the Kingdom of the Two Sicilies, found itself in the peculiar, and somewhat fortunate, situation of being able to use two vaccination services:

- one public and free of charge, run by Miglietta;
- the other, directed by Galbiati, reserved for the wealthier social classes who could afford an innovative vaccine, which was safer but certainly more costly.

Over the years, after the death of the two great physicians involved in this dispute, the superiority of the animal-based vaccine in terms of efficacy and safety was acknowledged.

### Conclusions

In this article, the authors describe the first steps in the fight against smallpox, an extremely contagious infectious disease of viral origin that proved fatal in 30% of cases and for which no

specific treatment existed, apart from prevention by means of vaccination.

For at least 3000 years, smallpox caused disastrous epidemics, killing over 300 million people in the 20th century alone.

To date, smallpox is still the only infectious disease to have been officially eradicated worldwide. This result was achieved through the efficacious implementation of mass vaccination throughout the world, which was rigorously carried out between 1958 and 1977, and particularly through a decisive worldwide vaccination campaign conducted by the World Health Organization between 1967 and 1979.

Vaccination was the main preventive measure for long years; it is an example in the collective imagination of modern times of the value of medicine and scientific research; it represents an effective strategy against the diseases that have afflicted humankind throughout history such as plague.

It is an excellent skill of prevention for individuals with at the same time a real effect for the entire community; compulsory vaccination was indeed an important aspect.

Today, we can observe a clear transformation of the cultural approach towards vaccination: individual choice prevails over collective one, and the idea of the concept of mandatory vaccination is deeply reduced. The subjective assessment of risks and benefits based on self-managed information becomes increasingly crucial and important.<sup>38</sup>

Certainly, this kind of topic cannot be treated lightly; in any framework, vaccine hesitancy and the refusal of vaccines belong to different reasons of a material, social, cultural, religious nature etc.

One of the fundamental issues is the possibility of having exactly data and the competence to read and interpret them. Today, several information is not checked by specialists in those scientific subjects, and moreover, it can spread very quickly, thanks to the advanced modern technologies.

Recently, the use of social networks such as Facebook, Twitter, and Sina Weibo has become an inseparable part of our daily lives. It is considered as a convenient platform for users to share personal messages, pictures, and videos. However, while people enjoy social networks, many deceptive activities such as fake news or rumors can mislead users into believing misinformation.<sup>39,40</sup>

Laurence Monnais, professor of history and Director of the Center for Asian Studies (CETASE) at Université de Montréal, Canada, in his book *Vaccinations Le mythe du refus*<sup>41</sup> focus on three statements used by different authors and often by media when dealing with the topic of vaccines and vaccination:

- a) First of all 'the act of vaccine administration' (in particular, the process of immunisation); the vaccine induces active immunisation against infectious diseases, and it protect the population;
- b) A second postulate often tend to confuse 'non-vaccination' (the fact of not being vaccinated) and 'refusal of vaccination' (when a subject does not want to be vaccinated);
- c) focuses on the re-emergence of an infectious disease as certainly the direct result of vaccine refusal.<sup>41</sup> The question is therefore extremely complex.

Laurence Monnais states that the use of these postulates highlights 'a more or less shared ignorance of epidemiology, infectious diseases, immunological sciences, vaccinology and their common evolution; [...] They are often based on data [...] poorly contextualized and interpretable at will'.<sup>41</sup>

If, on the other hand, we approach the question with severe and careful scientific attention, we can affirm that: 'Vaccine hesitancy is complex and context specific, varying across time, place and vaccines.

It is influenced by factors such as complacency, convenience and confidence'.<sup>28</sup>

Common concerns underlying hesitancy include uncertainty about the need for vaccination and questions about vaccine safety and efficacy. Sociodemographic factors associated with parental vaccine hesitancy vary across locations and contexts.<sup>42</sup>

It's evident that "there is heterogeneity in vaccine hesitant individuals and a diversity of situations in which vaccine hesitancy can arise, thus requiring that interventions to address vaccine hesitancy be context-specific and problem-specific".<sup>43</sup>

Albeit this, all mankind since the discovery of Edward Jenner, has taken advantage from vaccines to fight and sometimes downfall serious infectious diseases, even if the pathway towards successful vaccines has not been absolutely simple and without problems, e.g. "the Cutter incident" regarding the polio vaccine.<sup>44</sup> In particular, in this case, it is essential that governments and vaccine pharmaceutical companies make correct, clear and immediate communication and announcement in order to explain the problem that has occurred, the possible effects and can therefore ensure fast results and solution of the causes.

About the topic of the present article 'many of the issues salient in Jenner's era-such as the need for secure funding mechanisms, streamlined manufacturing and safety concerns, and deep-seated public fears of inoculating agents-have frequently reappeared and have often dominated vaccine policies'.<sup>45</sup>

In this sense, a narrative based on science could help to clarify the doubts of those who fear vaccines and above all to avoid a treatment, often with sensational effect, not based on evidence-based medicine. The case of the well-known and discussed case of Andrew Wakefield's publication of data on the correlation between the administration of the trivalent MMR vaccine (measles, mumps, rubella) and the onset of diseases such as autism and intestinal diseases is certainly significant: 'In 1998, a Lancet paper described 12 cases of children with autism, and having been vaccinated (MMR) in the United Kingdom; medias presented the information to the lay public, stating that a link was possible. In 2004, The Lancet published letters responding to allegations against the paper. Later, it was established that no link existed between MMR and autism; few years and many publications were necessary to conclude to the absence of evidence. In 2010, the General Medical Council published a report against Dr Wakefield, first author of the 1998 paper, and showing that the children hospital records did not contain the evidence; hospital records differed from the published paper; the Lancet retracted the 1998 paper'.<sup>46</sup> 'Despite the retraction, many autism advocacy groups and parents continue to defend Wakefield. [...] The 'conspiracy theory' that vaccine manufacturers are hiding the truth about MMR and autism is fuelled by parents' need to know what is causing autism, says Margaret Spoelstra, executive director of Autism Ontario, despite the fact that no large study has replicated Wakefield's finding'.<sup>47</sup>

This situation has caused 'vaccine hesitancy' or 'vaccination refusal': in these cases, despite the evidence of the efficacy and safety of vaccinations, an increasing number of people have doubts about vaccination for themselves or their children;<sup>48</sup> this attitude and thinking can result a re-emergence of preventable diseases.<sup>43,41</sup> Non-vaccination can become a serious sociocultural problem and a major obstacle to public health goals.<sup>49</sup>

Moreover, as illustrated by the history of vaccination in southern Italy,<sup>37</sup> success can be achieved only through a concerted effort on the part of each one of us.

Donald A. Henderson, a recognised smallpox expert who served as the first director of the World Health Organization Smallpox Global Eradication Unit, clearly testifies to this.

In his book *Smallpox-the death of a disease*, Henderson [...] provides a personal accounting of the strategies, decisions, and combined global efforts leading to the eradication of smallpox [...].

He discusses the events leading to the World Health Assembly's (WHA's) decision to commit to a major global eradication effort.<sup>50</sup>

Henderson reports on the enormous international effort to achieve the eradication of smallpox.

International health experts from more than 70 countries have joined in the goal of eliminating this disease. Even the United States and the Soviet Union worked together during the darkest days of the Cold War.<sup>51</sup> This should set an example for the politicians of the States, who 'should be informed also about the large health and economic distributional impact that vaccines could have, and they should view vaccination policies as potentially important channels for improving health equity'.<sup>52</sup>

In the latest edition of Henderson's book (2021), there is a new introduction by Phillip K. Peterson, an expert on infectious diseases. He says that 'Dr. Henderson's smallpox campaign' could provide insights into the fight against COVID-19 and future global pandemics.<sup>53</sup>

Thus, while we continue to fight against COVID-19 and other epidemics spread around the world, several governments do not take clear positions on vaccination, and therefore, many people continue to reject this practice. The example cited in this scientific article, and other similar examples in the history of medicine could help clarify many doubts in those who fear or distress vaccines.

We believe that a more balanced reading of the 'history of vaccination' by those who do not recognise its efficacy and value is important and useful. We also believe that the 'history of medicine' and in particular the 'history of vaccines' and the 'history of vaccination' can help provide solutions for the future to current problems.<sup>45</sup>

## Author statements

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Ethical approval is not required for this paper (research study) because it is a historical overview.

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