



## SHORT ARTICLE

# Paediatric activities and adherence to vaccinations during the COVID-19 epidemic period in Tuscany, Italy: a survey of paediatricians

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## Keywords

Paediatric vaccination coverage • Adherence • COVID-19 pandemic • Paediatricians • Survey • Italy

## Summary

**Introduction.** The global COVID-19 pandemic is placing a heavy burden on health services. One result could be a general reduction in routine vaccination activities. In Tuscany (Central Italy), paediatricians (in agreement with the regional health service) administer and register paediatric vaccinations of their patients. The aim of the present study was to evaluate the impact of the COVID-19 epidemic on paediatric vaccinations administered by Tuscan paediatricians, as a proxy of adherence to vaccinations during this epidemic period.

**Methods.** Four hundred members of the Tuscany section of the Italian Federation of Paediatricians (FIMP) were invited to participate in a semi-structured online survey.

**Results.** During the COVID-19 pandemic, almost all (98.2%) of the 223 respondents reported a general decline in outpatient paediatric visits; 65.8% reported a more than 60% reduction (144 answers) in comparison with the situation before the COVID-19 pandemic. A total of 208 paediatricians (93.3%) continued to vaccinate in the period considered: 66/208 (31.7%) reported a reduc-

tion in parents' compliance with mandatory vaccination (hexavalent and MMRV vaccines), and 88/208 (42.3%) reported a reduction in compliance with non-mandatory vaccinations. Almost all paediatricians declared having taken preventive actions to counter the spread of SARS-CoV-2.

**Discussion and conclusions.** Although the majority of Tuscan paediatricians continued to vaccinate during the lock-down, some parents decided to postpone their children's scheduled vaccinations, mainly owing to fears concerning the safety of access to health services. When Italian immunization coverage data on the first months of 2020 become available, it will be possible to assess the real impact of the COVID-19 pandemic on paediatric vaccinations. It is crucial to continue vaccinating against preventable infectious diseases in order to avoid other possible epidemic outbreaks. The pandemic must not be seen as an obstacle to compliance with the vaccination schedule, but rather as an excellent opportunity to underline the importance of all recommended vaccinations.

## Introduction

Coronavirus disease (COVID-19) is an acute respiratory disease caused by a newly discovered coronavirus called SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). On March 11, the WHO Director-General declared COVID-19 a pandemic, since over 118,000 cases had been reported globally in 114 countries and 4,291 people had died [1]. The first outbreak occurred in Wuhan (China), where several cases of pneumonia of unknown origin had alarmed the local authorities [2, 3]. Within a few months, the high communicability of SARS-CoV-2 had determined a state of emergency in numerous countries.

In Italy, after confirmation of the first two cases of infection in a couple of Chinese tourists from Wuhan (31 January 2020), the outbreak began in the northern regions, the first indigenous case being discovered in the province of Lodi, in Lombardy (21 February 2020) [4]. Initially, the epidemic mainly affected Lombardy, Veneto and Emilia Romagna, and then spread nationwide. In Tuscany, the epidemic spread more slowly than in the most seriously affected regions of Italy, and recent

estimates indicate 10,121 total cases and 1,055 deaths (data updated to 3 June 2020) [5]. To curb the spread of SARS-CoV-2, an initial nationwide lock-down phase started on 11 March 2020, with the suspension of production, commercial activities and non-essential services; whenever possible, so-called "smart working" was encouraged in both the public and private sectors [6]. Given the downward epidemiological trend following the adoption of these measures, a 'phase 2' started on 4 May with the gradual re-opening of some production facilities and work activities [7].

The COVID-19 pandemic has severely affected global health services, placing an enormous burden on health-care systems [8]. In this context, it is important not to overlook the value of some public health preventive interventions which cannot be postponed, such as vaccinations. In Italy, public health services provide vaccinations free of charge, in accordance with the 2017-2019 National Immunization Plan (NIP) [9]. In Tuscany, central Italy, paediatricians administer and register paediatric vaccinations of their patients, in agreement with the regional health service.

The aim of the present study was to evaluate the impact of the COVID-19 epidemic on paediatric vaccinations administered by paediatricians in Tuscany, as a proxy of adherence to vaccinations during this epidemic period.

## Methods

Four hundred members of the Tuscany section of the Italian Federation of Paediatricians (FIMP), corresponding to almost 90% of the paediatricians affiliated to the regional health service, were invited to fill out a semi-structured online questionnaire (accessible via an embedded URL link or by scanning a QR code). Data regarding the period 11 March-4 May 2020 (first phase of Italian lockdown) were collected. The deadline for returning completed questionnaires was 31 May.

Respondents were asked to answer 14 questions plus an open-ended question. The research instrument, which was specifically designed to gather information from paediatricians, was divided into some sections: participants' characteristics, access to outpatient paediatric clinics, behaviour of paediatricians and adherence of parents to paediatric vaccinations, the last section measured the preventive actions put in place to counter the spread of SARS-CoV-2. Participants were informed that the questionnaire was anonymous and would take around 10 minutes to complete.

## Results

### PARTICIPANT CHARACTERISTICS

A total of 400 paediatricians from the Tuscany-FIMP were invited to fill out the online questionnaire: 223 did so, yielding an overall response rate of 55.7%. The

answers received came from all ten provinces of Tuscany: 46.2% from the Local Health Unit (LHU) of Central Tuscany (Florence, Pistoia and Prato), 24.2% from the LHU of South-East Tuscany (Arezzo, Grosseto and Siena) and 29.6% from the LHU of North-West Tuscany (Livorno, Lucca, Massa-Carrara, Pisa). The greatest number of questionnaires filled in came from Florence (31.4%), followed by Pisa (9.9%) and Siena (9.9%).

### ACCESS TO OUTPATIENT PAEDIATRIC CLINICS

Almost all the paediatricians surveyed (98.2%) reported a general decline in outpatient paediatric visits during the COVID-19 epidemic period. Figure 1 shows their perception of access to their clinics; 65.8% reported a more than 60% reduction (144 answers) in comparison with the situation before the COVID-19 pandemic.

### ACTIVITIES AND BEHAVIOUR OF PAEDIATRICIANS AND UPTAKE OF VACCINATIONS

A total of 208 respondents (93.3%) continued to vaccinate in the period considered, while 15 (7%) answered that they had suspended vaccinations. Of the 208 who continued to vaccinate, 66 (31.7%) reported a reduction in the compliance of parents with mandatory vaccination (hexavalent and MMRV vaccines), and 88 (42.3%) reported a reduction in adherence to non-mandatory vaccinations, in comparison with the pre-epidemic period. Most of the 66 paediatricians who had noticed a reduced uptake of mandatory vaccination reported relatively low percentages of reduction (under 30%) in comparison with the pre-epidemic period. Concerning the uptake of non-mandatory vaccinations, a more homogeneous distribution was observed among the 10 percentage ranges considered, as shown in Figure 2.

Of the 208 paediatricians who continued to vaccinate, 37 (17.8% of the sample analysed) stated that they had administered only the first scheduled doses of the vac-

Fig. 1. Paediatricians' perception of the reduction in access to their outpatient clinics.

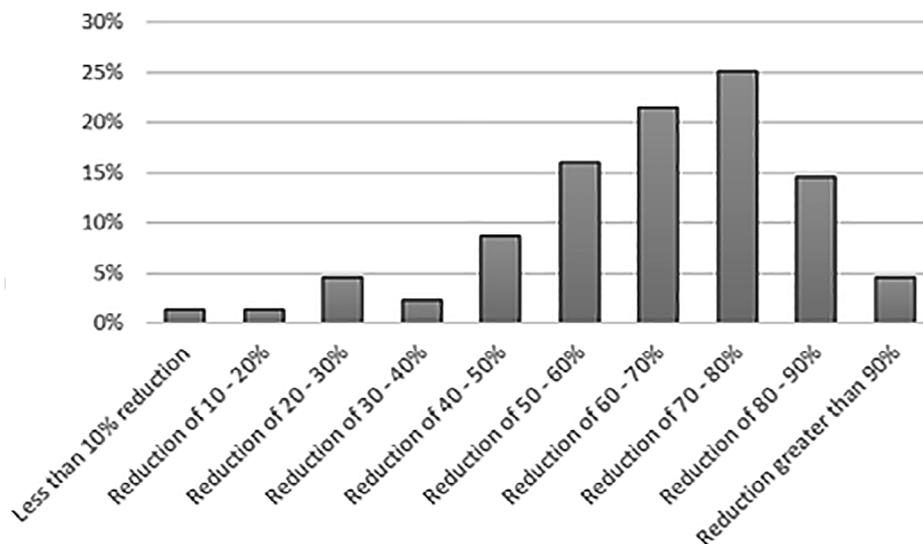
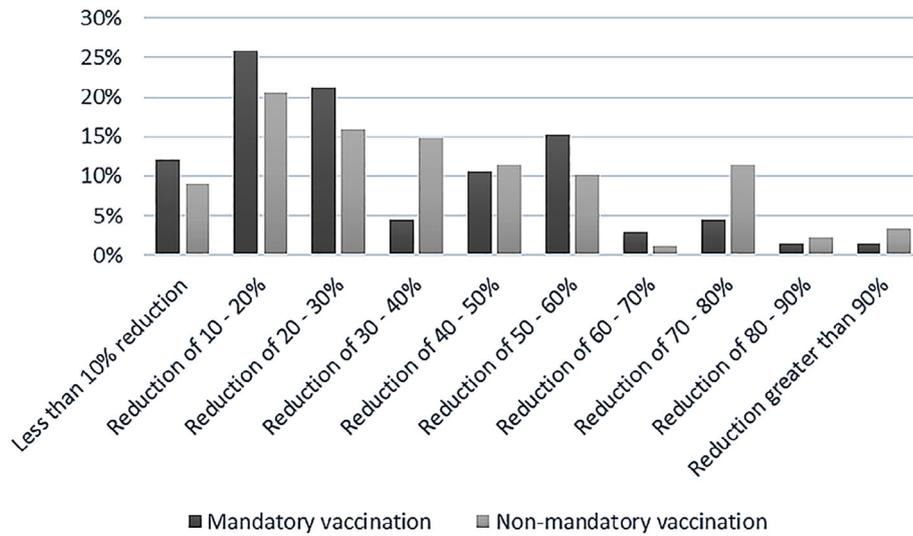


Fig. 2. Paediatricians reporting a reduction in adherence to mandatory and non-mandatory vaccinations.



cines, while the majority (82.2%) reported administering all the scheduled vaccine doses. Moreover, 99% and 93.3% of the vaccinating paediatricians did not recommend postponing mandatory and non-mandatory vaccinations, respectively.

**PREVENTIVE ACTIONS TAKEN TO COUNTER THE SPREAD OF SARS-CoV-2**

To limit the spread of SARS-CoV-2, 223 paediatricians declared that they had taken several preventive actions; specifically, they reported providing hand-sanitizing gels in waiting rooms and common areas (98.2%), scheduling visits to limit crowding in waiting rooms (98.2%), carrying out environmental sanitation (92.4%), implementing physical distancing measures in waiting rooms (87.4%) and other measures, as reported in Table I.

**Discussion**

Updated data on vaccination coverage in all the Italian Regions during the pandemic COVID-19 are not yet available; therefore, we cannot assess the impact of the COVID-19 pandemic on the uptake of vaccination among Italian infants.

In the USA, preliminary vaccination coverage data have been analysed by Bramer et al. [10], who used Michigan Care Improvement Registry (MCIR) data in order

to evaluate the status of vaccinations of multiple cohorts of children (between 1 and 24 months) and to compare the period May 2016-May 2019 and the period January-April 2020. According to their study, vaccination coverage decreased in all age-cohorts, except for birth-dose hepatitis B coverage, which is typically administered in the hospital setting. For example, in the cohort of children aged 5 months, coverage by all recommended vaccines (doses: 2 HepB, 2 Rota, 2 DTaP, 2 Hib, 2 PCV, 2 IPV) declined from approximately two thirds during 2016-2019 (66.6%, 67.4%, 67.3%, 67.9%, respectively) to less than half (49.7%) in May 2020.

In addition, the Centers for Disease Control and Prevention (CDC) published data showing that from mid-March to mid-April 2020, doctors in the Vaccines for Children program (VFC) ordered 2.5 million fewer doses of vaccines and 250,000 fewer doses of measles-containing vaccines, compared with the same period in 2019 [11]. The decline in routine paediatric vaccine ordering and in the doses administered might indicate that US children and their communities will face an increased risk of outbreaks of vaccine-preventable diseases (VPDs) in the future. With national data showing immunization rates for all ages dipping to dangerously low levels, the American Academy of Pediatrics (AAP) has launched a campaign to urge parents to schedule visits to their paediatricians for vaccinations and health check-ups.

As reported by WHO guidelines, the disruption of immunization services, even for brief periods, will result in increased numbers of susceptible individuals, raising the risks of an upsurge in outbreak-prone VPDs [12]. The reduction of vaccination coverage could cause an increase in morbidity and mortality, especially in the age-groups most at risk, such as young children or the elderly. Consequently, in the future, a greater burden could be placed on health systems already sorely afflicted by the COVID-19 pandemic.

Tab. I. Preventive actions taken to counter the spread of Sars-Cov-2 during paediatric outpatients visits.

Preventive actions	n (%)
Scheduling visits	219 (98.2)
Hand sanitizing gel	219 (98.2)
Environmental sanitation	206 (92.4)
Physical distancing measures	195 (87.4)
Limitation of the daily number of visits	135 (60.5)
Distribution of gloves and masks	85 (38.1)

Examples from previous large epidemics (e.g. diphtheria in the former Soviet Union in 1990-1996 and in Venezuela in 2017-2018) show that, when vaccination coverage falls or vaccinations are disrupted, cases of infectious diseases that have apparently disappeared can quickly re-emerge [13-14].

In order to avoid shrinkage of the vaccine offer and to limit the risk of SARS-CoV-2 transmission during vaccination activities, the WHO has drafted a detailed guideline indicating the correct hygiene rules to respect and the importance of primary courses of vaccinations (such as measles, rubella, pertussis, poliomyelitis).

As reported in our study, many families have preferred to postpone the mandatory and non-mandatory vaccination sessions scheduled for their children, which has resulted in a general decline in outpatient paediatric visits in comparison with the situation before the COVID-19 pandemic. Moreover, the few paediatricians (7%) who decided to temporarily suspend vaccination undermined vaccination uptake. The main reasons for lower adherence to vaccination lie not only in the social restrictions imposed, but also in the fear of contagion. Indeed, parents' concerns about potentially exposing their healthy children to COVID-19 during clinic visits might have greatly contributed to the observed decrease.

As shown by the above data, it is crucial to convince parents of the importance of protecting their children against serious VPDs by means of public health interventions, even during a pandemic period. One of the most useful ways to do this is to provide them with correct and effective information on the importance and safety of vaccinations. Given the current relaxation of the social distancing measures and quarantine policies adopted in Italy, children who are not protected by vaccines could be more vulnerable to VPDs, such as measles, as social contacts are resumed.

With regard to the possible risk of contagion during paediatric outpatient visits, the strategies for administering vaccinations need to be modified in order to ensure safety. Some such modifications are: reducing the number of people in waiting rooms, asking patients to stay outside the facility until they are called, scheduling visits, using personal protective equipment, marking out personal spaces, and adopting specific hygiene measures and physical distancing procedures.

It will be crucial to organize programs for the recovery of vaccinations missed during the COVID-19 pandemic as soon as possible. This will necessitate verifying the current vaccination coverage status of target groups, tracking unvaccinated children by means of active calls, and planning the supply of an adequate number of doses. Additional vaccination sessions should also be organised in order to reach susceptible children.

A possible bias of our results may lie in the selection of the sample. Indeed, in Tuscany, unlike other Italian Regions, almost all paediatricians are personally and directly involved in immunization activities and are particularly sensitive to this issue, as is revealed by the fact that the majority of them continued to vaccinate during the lock-down. However, paediatricians in Tuscany also

reported a general reduction in parents' compliance with vaccinations. Although our data cannot be immediately generalized to the entire country, our survey is, to our knowledge, the only preliminary available indicator of a possible falling trend in immunization coverage during the COVID-19 epidemic period in Italy. When the Italian vaccination coverage data for the first months of 2020 become available, it will be interesting to compare our regional data with those recorded in other Regions, and to assess the real impact of the COVID-19 pandemic on the uptake of paediatric vaccinations.

## Conclusions

In conclusion, despite the difficulties of the health services in managing the current COVID-19 emergency, we hope that adequate communication strategies will soon be put in place in order to reduce concerns about vaccinations and to redress the decline in vaccination coverage that occurred during the months of lock-down. In addition, new evidence is emerging on the possible positive effects of some vaccinations on the COVID-19 pandemic: cross-protective antibodies against measles could provide indirect protection against SARS-CoV-2 [15]. The pandemic must not be seen as an obstacle to compliance with the vaccination schedule, but rather as an opportunity to further stress the importance of all recommended vaccinations.

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## Conflicts of interest statement

The authors declare no conflict of interest.

## Authors' contributions

Conceptualization and design, SB, AB. and PB; methodology, SB, AB, GG, and BG; acquisition of data, GG, BG and VF; formal analysis and interpretation of data, SB, AB, GG, BG; writing - Original Draft, SB, AB, GG, BG. and BZ; writing - Review & Editing, SB, AB and PB; supervision and Project Administration, S.B. and A.B. All authors have read and agreed to the submitted version of the manuscript.

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