



## ORIGINAL ARTICLE

# Drive-through vaccinations prove successful in immunizing mountain communities against tick-borne encephalitis during the COVID-19 pandemic

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## Keywords

TBE vaccine • Drive-through • COVID-19

## Summary

*In March 2020, the COVID-19 pandemic disrupted most of the routine outpatient activities in Italian hospitals and Prevention Departments, including those vaccinations which were not urgent and/or scheduled for children aged 0-6 years. Since June 2020, when the pandemic entered a milder phase, in the alpine Province of Bel-*

*luno (Veneto, North-Eastern Italy), 12,152 doses of vaccine against tick-borne encephalitis have been administered by means of the innovative “drive-through” modality. No significant adverse events have occurred and popular demand has steadily grown, proving the “drive-through” approach to be safe, efficient and successful.*

## Introduction

In March 2020, in all Italian Regions, the COVID-19 emergency prompted suspension of all outpatient services in the Prevention Departments of the Local Health Units, with the sole exception of urgent or non-deferrable activities. Most vaccinations were therefore suspended (unless urgent or scheduled for children aged 0-6 years) [1].

In this context, new strategies were required, in order to deal with the backlog of postponed appointments as soon as the COVID-19 epidemiological scenario would allow at least partial resumption of routine healthcare services. For this purpose, the World Health Organization (WHO) provided some guiding principles for routine immunization activities during the pandemic [2, 3]. On the basis of these, the Veneto Region (in North-Eastern Italy) also provided its Local Health Units with guidelines for the management of the activities of Prevention Departments during the so-called “phase 2” of the pandemic [4]. These guidelines included recommendations to: ensure hygiene, ventilation, and social distancing among healthcare workers and children in waiting rooms and in the rooms devoted to vaccination; minimize the number of rooms visited by combining medical examinations and vaccination during the same visit; specifically train the dedicated healthcare personnel; allocate separate areas for immunization services in hospitals, if possible; and temporarily avoid mass vaccination campaigns.

In this scenario, drive-through vaccination has emerged as a rapid and safe means of immunizing large numbers of young people and adults whose vaccinations were due in the full pandemic period (March-May 2020) and

whose appointments had to be rescheduled. This innovative modality had previously been experimented internationally for vaccinations [5, 6], and has recently been widely adopted for the administration of swab tests for COVID-19 [7-9].

Here, we describe the experience of the Province of Belluno (Veneto Region), a vast alpine territory where over 12,000 people have been vaccinated against tick-borne encephalitis (TBE) since the beginning of summer by means of the drive-through modality.

## Methods

### CONTEXT

The Province of Belluno, in the Veneto Region, is a mountainous territory in the Alps, in North-eastern Italy, with a population of 201,972. In the period 2006-2018, 153 cases of TBE were notified in this territory, with a mean incidence rate (IR) of 5.89 cases/100,000 inhabitants during the decade 2007-2017; the area is therefore defined as “high endemic” (IR > 5/100,000). Most cases are notified between April and October, and males between 50 and 70 years old are most frequently involved. However, it must be pointed out that milder cases, which constitute the vast majority, are largely under-diagnosed [10] and that the cases of TBE reported in the Province of Belluno account for approximately 40% of all Italian cases.

Therefore, since 2019, the Local Health Unit (AULSS 1 “Dolomiti”) has offered anti-TBE vaccination free of charge to all residents who request it [11].

Furthermore, from the end of February to the first week

of September 2020, 1,281 cases of COVID-19 were detected in the Province of Belluno [12], with an IR of 634 positive cases/100,000 inhabitants.

### LOGISTICS AND ORGANIZATION

Subjects were invited to attend for anti-TBE vaccination according to priorities defined on the basis of the preexisting waiting list. Priority was given to:

- subjects who should have received the 1<sup>st</sup> dose of vaccine during the lock-down;
- categories exposed to occupational risks who were waiting for the 2<sup>nd</sup> or 3<sup>rd</sup> dose of vaccine;
- individuals who were already on the waiting list, but not yet scheduled to receive the 1<sup>st</sup> dose of vaccine;
- new requests for appointments for the 1<sup>st</sup> dose of vaccine;
- people waiting for their 2<sup>nd</sup> dose appointment to be scheduled;
- those waiting for their 3<sup>rd</sup> dose appointment to be scheduled.

During each session, appointments were initially scheduled at a rate of one every five minutes. Subsequently, the high volume of requests made it necessary to schedule one appointment every two minutes, in order to vaccinate approximately 30 people per hour, and finally one every minute. The appointments were communicated by telephone or letter, together with the following information:

- date and time of the scheduled convocation;
- specification that it was compulsory to come by car and to wear a face mask;
- recommendation to wear clothing, preferably a t-shirt, that would facilitate injection of the vaccine;
- description of the exact route to the vaccination site and of the subsequent way out;
- obligation to wait for 15 minutes in a dedicated car park after administration of the vaccine, without wearing a face mask, in order to enable the supervising operator to recognize pallor or other signs of adverse events.

The drive-through vaccination site was a tent, generally provided by local volunteers, equipped with all the standard equipment of an in-hospital ambulatory setting:

- refrigerator (2-8°C) for the correct storage of the vaccine for the entire duration of the daily activity, equipped with separate compartments for pediatric doses and adult doses;
- desk and chairs;
- photocopies of a sufficient number of pre-vaccination anamnestic questionnaires;
- two computers endowed with the Region's official software (*SiaVr*) for vaccinations, correctly installed and functioning;
- two trolleys carrying the vaccine administration material;
- emergency trolley;
- wheelchair and stretcher in case a patient needed to be transferred from his/her car into the drive-through tent;
- containers for special waste and for other waste, according to the various disposal needs;

- rigid needle containers;
- at least one kidney-shaped basin for each trolley;
- sanitizing gel;
- gauze and disinfectant.

Before each vaccination session, the personnel were responsible for checking that the above-listed material was present in an adequate quantity. During each session, a medical doctor had to be available - either physically present at the drive-through site (if this was far from the local hospital) or able to reach the site rapidly in the event necessity (if the site was within the perimeter of the local hospital). The remaining personnel consisted of two healthcare assistants or nurses, one of whom administered the pre-vaccination questionnaire and registered each vaccination on the regional software, while the other administered the vaccine. An auxiliary operator patrolled the post-vaccination parking area to check for the possible occurrence of adverse reactions.

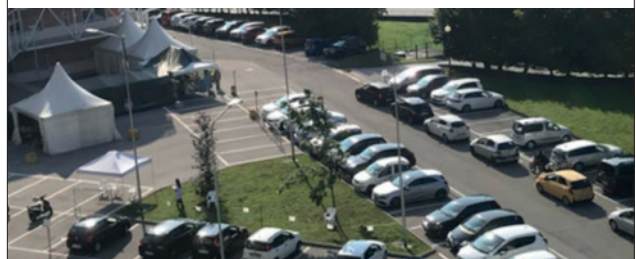
In the event of any adverse reaction, the three operators were trained to transfer the patient immediately from his/her car to the wheelchair or stretcher, and then to convey him/her promptly to the tent or to the emergency room, according to the severity of the clinical symptoms. The personnel responsible for the procurement of vaccines had to request the vaccine doses from the hospital pharmacy, possibly well in advance, in accordance with the schedule of vaccination sessions, in order to avoid any shortage.

Three sites were designated for the drive-through vaccinations:

1. one in the car park (Fig. 1) outside San Martino local hospital in Belluno (the Province's largest town);
2. one in the market square of the small town of Pieve di Cadore (less than 5 minutes from the local hospital), by agreement with the local municipal administration;
3. one in the car park outside the offices of the Prevention Department in the town of Feltre (the second-largest town in the Province).

A fourth site, in the small town of Caprile, was being opened at the time when this article was written. Each of the four locations had previously been inspected by technicians and IT specialists from the Local Health Unit and by the Hygiene and Public Health Service, in order to evaluate the spaces available, check the electricity supply and Internet connection, and determine the pathways through and the positioning of the vaccination sites.

Fig. 1. Drive-through site outside San Martino Hospital in Belluno; right: a line of cars queuing before vaccination; left: the tent; center: cars parked after vaccination.



## Results

By the end of August 2020, a total of 12,152 doses of vaccine against TBE (first, second, third and booster doses) had been administered to 12,083 people at the various sites in the Province of Belluno (Tab. I):

- a total of 8,284 doses administered to 8,193 people (91 people received the first and the second doses within the period) in Belluno since the 24th June 2020, in 43 sessions (average of 193 vaccinations per day);
- a total of 2,193 doses administered in Pieve di Cadore since the 20th July in 12 sessions (average of 183 vaccinations per day);
- a total of 1,697 doses administered in Feltre on three Sundays during all-day (8 am – 7 pm) sessions.

Overall, in 2020, 18,846 doses of vaccine against TBE have been administered, including 6,694 doses administered in outpatient departments at the beginning of the year, before the lock-down, and 12,152 doses administered up to the end of August in the drive-through modality.

These figures compare favorably with those recorded in the previous year: indeed, after May 2019, when the free-of-charge TBE vaccination was introduced, 8960 inhabitants of the province received at least one dose of vaccine and 13,494 doses were administered overall in 2019, according to the regional database.

### ADVERSE EVENTS

No major adverse events occurred. As for minor events, two cases of pre-syncope and two of syncope were registered; these were probably due to the high summer temperatures combined with emotional factors (especially in the case of an adolescent). Following the first minor events, all vaccinees were strongly recommended to leave their car windows open.

In 2019, too, no major adverse events were reported, whereas 20 minor events occurred: headache, paresthesia, pre-syncope and syncope.

## Conclusions

To our knowledge, this is the first case-report on anti-TBE vaccination carried out by means of the drive-through modality during a worldwide pandemic.

The experience of the Local Health Unit “AULSS 1 Dolomiti” in the Province of Belluno indicates that this innovative modality is a safe and efficient means of vaccinating large numbers of people while still maintaining social distancing.

According to the literature, drive-through vaccination has been implemented in some other countries, though almost exclusively for mass immunization against seasonal influenza. Specifically, in the USA, drive-through vaccinations were first carried out more than 20 years ago in Kentucky [6, 13-14], and have been repeated yearly ever since. In North Carolina [15] and New Mexico [16, 17] flu vaccines have also been occasionally administered in the drive-through modality in the last

**Tab. I.** Number of doses of anti-TBE vaccine administered at each of the three sites from 24th June to 31st August 2020, and number of people who were vaccinated; 91 people in Belluno received both the first and the second doses.

	Doses	Subjects vaccinated
Belluno	8,193	8,284
Pieve di Cadore	2,193	2,193
Feltre	1,697	1,697
Total	12,152	12,083

two decades. In these and other [18] American contexts, drive-through vaccination proved successful in immunizing local communities against seasonal influenza.

During the current COVID-19 pandemic, drive-through vaccination has become more common and is now being adopted in several contexts. In New South Wales, Australia, for instance, local health authorities have drawn up guidelines for general practitioners who choose the drive-through option for seasonal influenza vaccination [19]. In terms of logistics, pre-vaccination arrangements (appointments, anamnestic assessment), safety precautions and emergency equipment, these guidelines are comparable to those issued by the Local Health Unit “AULSS 1 Dolomiti” in Belluno.

In Europe, the British National Health Service provided drive-through vaccination against measles-mumps-rubella and papillomavirus for adolescents during the summer [20].

Moreover, analysis of the trend in anti-TBE vaccinations in the Province of Belluno reveals that the number of people requesting vaccination has steadily increased since this free-of-charge service was introduced in May 2019 [11]. This indicates that the drive-through modality has not only proved to be a safe means of ensuring continuity of the service during a milder phase of the COVID pandemic, but also meets with users’ approval, despite the relatively few drive-through sites available (in comparison with the more numerous ambulatory facilities) and the traveling distances involved.

Finally, in the Province of Belluno, the drive-through modality enabled more than 100 people per session (3/3.5-hours) to be vaccinated through the use of only three healthcare workers and one medical doctor. By contrast, in a traditional indoor clinic, the current regulations on social distancing and sanitization of the clinic after each vaccination would have allowed only one person to be vaccinated approximately every 15 minutes. The drive-through modality therefore proved able to maintain the efficiency of the service and also to save doctors, nurses and healthcare assistants precious hours of work in these challenging times of the pandemic.

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## Conflict of interest statement

The authors declare no conflict of interest.

## Authors' contributions

All authors contributed equally to this work.

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