Czech Republic and low COVID-19 mortality in the heart of Europe: possible explanations

Three months after the onset of the explosive spread of COVID-19 disease in Europe, the Czech Republic is among the few European countries with only a very limited burden of this serious infection and low case fatality rates (Figures 1 and 2). The country is very active in PCR testing, including all suspicious contacts for SARS-CoV-2 virus, and hospitals test most incoming patients. There is an ongoing discussion, about how to explain the difference compared with most the other European countries.4

We attempted to assess several possible reasons for the mild course of COVID-19 in our country that could be helpful for epidemic control in other countries or for the future. The possible explanations are listed in Tables 1 and 2.

Lockdown timing

We believe that the single most important factor was the early decision to close schools, public events, and even state borders. The Third Faculty of Medicine was the first institution in the country that cancelled a public event. Facing the onset of COVID-19 hospital admissions in Prague (after the return of thousands of Prague families from skiing in Northern Italy), we decided to cancel our annual medical students’ ball (1200 expected attendees) on 5 March. This was followed 5 days later by the decision of the Czech government to close schools and public events with >50 attendees.

This lockdown was ordered 13 days before the first COVID-19 death in the country, and its timing was most probably (along with the border closure) crucial for the subsequent low rates of COVID-19 in the country. The importance of lockdown timing is supported by data from other countries that closed schools (along with other ‘lockdown measures’) before the first COVID-19 death in the given country: Hungary, Norway, Finland, Slovakia, Denmark, and Portugal. Also, Greece closed schools just the day after the first death. In contrast, lockdown in countries suffering most from COVID-19 was done much later—more than 6 weeks after the first proven case (Italy, Spain, the UK, Belgium, and France); see Table 3.
Furthermore, Czech citizens were extremely disciplined not only in using facemasks but even in producing textile facemasks at home in large numbers during the initial phase, when publicly available supplies were close to zero. From almost the first day of the lockdown the majority of the population was wearing facemasks. During the course of the pandemic, textile facemasks even became a fashion item (colours matching clothes). The importance of this simple protective measure is supported by a metaanalysis showing a 47% reduction of...
infection spreading with facemask use and a 38% reduction with regular hand hygiene.

**Public health and epidemiology system**

The country has a long tradition of regional stations for public health (hygiene) and epidemiology. Every county (with 0.5–1 million inhabitants) is served by one such station led by a professional with board certification in public health and epidemiology. These professionals organized many activities from the very beginning, especially tracing and systematic quarantine of all contacts.

**Thousands of medical students: volunteers**

The first day (!) after the lockdown of schools, the medical students of the Third Faculty of Medicine (Charles University) organized jointly with students from all the seven other medical schools in the country several thousands of volunteers to help in all healthcare facilities (hospitals, hygiene stations, emergency medical services, etc.). This greatly facilitated the extremely fast transformation of the healthcare services to be ready for COVID-19.

**Hospital admissions for COVID-19**

The experience of all Czech hospitals during this period is very similar: in early March (after the first COVID-19 hospital admissions occurred in the country) every large hospital transformed at least one of its departments into a COVID clinic. This transformation took place very quickly (within 7–10 days) including dedicated staff assigned from other departments to these new clinics. Simultaneously, most elective procedures (especially those requiring intubation and mechanical ventilation) were immediately postponed. Thus, the healthcare services were well prepared for a COVID-19 tsunami, which however did not occur. Most of the capacity of these improvised COVID clinics remained empty. By early May, these clinics are returning to their original function, and hospitals are resuming all elective procedures. The peak number of COVID-19 patients treated in Czech hospitals was 446 (42 per million on 9 April 2020); currently it has decreased to 239, i.e. currently (May 9) only 23 patients per million population are in Czech hospitals with COVID-19.

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**Table 2** Hospital beds per 1000 inhabitants

| Country      | Hospital beds per 1000 people |
|--------------|-------------------------------|
| Germany      | 8                             |
| Austria      | 7.4                           |
| Hungary      | 7                             |
| Czech Republic | 6.6                         |
| Poland       | 6.6                           |
| France       | 6                             |
| Belgium      | 5.6                           |
| Switzerland  | 4.5                           |
| Greece       | 4.2                           |
| Portugal     | 3.4                           |
| The Netherlands | 3.3                       |
| Italy        | 3.2                           |
| Spain        | 3                             |
| UK           | 2.5                           |
| Sweden       | 2.2                           |

Source: [https://ourworldindata.org/coronavirus](https://ourworldindata.org/coronavirus).

**Table 3** Relationship between lockdown timing and COVID-19 mortality

| Country        | No. of COVID-19 deaths per million at 6 weeks after the first COVID-19 death in the country | No. of days between the first COVID-19 case in the country and closure of schools | No. of days between the first COVID-19 death in the country and closure of schools |
|----------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Greece         | 11.61                                                                                     | 15                                                                         | 1                                                                             |
| Czech Republic | 22.88                                                                                     | 8                                                                          | -13                                                                          |
| Hungary        | 28.98                                                                                     | 6                                                                          | -5                                                                           |
| Norway         | 33.20                                                                                     | 15                                                                         | 0                                                                            |
| Finland        | 42.00                                                                                     | 42                                                                         | -10                                                                          |
| Denmark        | 73.72                                                                                     | 15                                                                         | -4                                                                           |
| Portugal       | 92.97                                                                                     | 13                                                                         | -2                                                                           |
| France         | 166.51                                                                                    | 51                                                                         | 30                                                                           |
| UK             | 234.86                                                                                    | 49                                                                         | 14                                                                           |
| Italy          | 254.08                                                                                    | 38                                                                         | 15                                                                           |
| Spain          | 404.09                                                                                    | 45                                                                         | 11                                                                           |
| Belgium        | 540.31                                                                                    | 39                                                                         | 2                                                                            |

Source: [https://ourworldindata.org/coronavirus](https://ourworldindata.org/coronavirus).
BCG vaccine

Another possible explanation was suggested by Berg et al.\textsuperscript{3} and Miller et al.\textsuperscript{4} According to these two analyses, the countries with a long history of compulsory BCG vaccination (as in the Czech Republic) have a lower burden of COVID-19 disease, including milder cases with lower mortality.

Conclusions

Based on the alarming information from Italy, the Czech Republic was very quick and effective in implementing the above-described measures. All parties (healthcare professionals, politicians, and the population in general) acted swiftly and responsibly, thus the country was fortunate during the first 3 months of this pandemic due to the combination of all the described facts.

The future may provide some additional explanations. At the time of writing, the country is returning back to normal in a stepwise manner.

References

References are available as Supplementary material at European Heart Journal online.