

## SHORT COMMUNICATION

# COVID-19 IN THE CZECH REPUBLIC 2020 AND 2021: COMPARATIVE ANALYSIS OF PROBABLE WORK-RELATED TRANSMISSION OF THE CORONAVIRUS SARS-COV-2

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## SUMMARY

**Objectives:** The aim of the analysis was to determine the probable places of coronavirus transmission in association with the work and compare the situation between 2020 and 2021.

**Methods:** The work analysed data from the Information System of Infectious Diseases managed by the Institute of Health Information and Statistics of the Czech Republic in the period from March 2020 – December 2021.

**Results:** 2,483,219 COVID-19 cases were officially confirmed (732,202 during 2020 and 1,338,790 in 2021), from them 140,368 (6%) represented work-related disease, 520,830 cases (21%) work-related contact, and 1,822,021 (73%) out-of-work contact. There were identified 13 occupations with the highest incidence of COVID-19 in the observed period (458,341 cases), in descending order – clerk, machinist, teacher, craftsman, worker/agency worker, driver, sales worker/cashier, warehouse worker/expediter, nurse, manager, food worker, paramedic, and social worker. Comparing 2020 and 2021, there was a difference in the ranking of occupations by incidence of disease. In 2021, the risk of infection acquiring increased for the occupations clerk, machinist, craftsman, worker/agency worker, manager, and food worker, while it decreased for the health professions (nurse, other paramedic, physician) and for social worker; 5,514 cases of COVID-19 were recognized as an occupational disease in 2020 and 2021, from them 5,483 cases (99.4%) in the health and social care economic activity sector.

**Conclusion:** The available data show probable exposures to an infectious agent (without proof of specific contact with the source of the infection), of which 27% cases of COVID-19 are related to work (cases of work-related disease and work-related contact represented together the closest relationship to work). Different relevant anti-epidemic measures in the workplace have considerable practical importance for epidemic control. The use of personal protection of the mouth and nose with respirators/muffs is essential to reduce the risk of airborne transmission.

**Key words:** COVID-19, SARS-CoV-2 transmission, work-related disease, work-related contact, occupational disease, epidemic control

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## INTRODUCTION

The previous brief communication (1) described the course of the COVID-19 epidemic in the Czech Republic from 1 March 2020 (first case) to the end of the year 2020. Significant restrictive anti-epidemic measures in the spring 2020 and their acceptance by the population led to a favourable course of the epidemic, followed by a worsening in autumn 2020 with an increase in the number of cases until March 2021. In the spring and summer months of the year 2021, a decline in the number of cases followed, with a renewed increase from October 2021 (2). The course of the epidemic was modified by a number of influences, including biological variability of the agents, recommendations and restrictions at different levels of decision-making, vaccination and individual behaviour. These undoubtedly included the somewhat questioned

personal protection of the mouth and nose with masks and respirators, which at the beginning of the epidemic was considered by the majority of the Czech population to be an essential element in the prevention of the coronavirus transmission.

## MATERIALS AND METHODS

The authors analysed data from the Infectious Diseases Information System (Czech acronym ISIN) managed by the Institute of Health Information and Statistics of the Czech Republic (Czech acronym ÚZIS) in the period March 2020 – December 2021. The work-related disease was identified on the basis of the work environment and the probable causality with the occupational exposure, the work-related contact includes cases without

a proven origin of the disease in the workplace. The last entity was a group of COVID-19 cases without work contact. These three entities were defined as such in the ÚZIS database without further specification. The authors added data of COVID-19 cases officially recognized as occupational diseases in 2020 and 2021 from the Registry of Occupational Diseases (National Institute of Public Health, Prague).

## RESULTS

In total, 2,483,219 officially confirmed COVID-19 cases were reported in the period from March 2020 – December 2021 (732,202 during 2020 and 1,338,790 in 2021), from them 140,368 (6%) represented work-related disease, 520,830 cases (21%) work-related contact, and 1,822,021 (73%) out-of-work contact. The incidence of COVID-19 cases in individual months of the observed period is shown in Fig. 1.

There were identified 13 occupations with the highest incidence of COVID-19 in the observed period (458,341 cases), in descending order – clerk, machinist, teacher, craftsman, worker/agency worker, driver, sales worker/cashier, warehouse worker/expediter, nurse, manager, food worker, paramedic, and social worker (Fig. 2). Comparing 2020 and 2021, there was a difference in the ranking of occupations by incidence of disease (Fig. 3). In 2021, the risk of infection acquiring increased for the occupations clerk, machinist, craftsman, worker/agency worker, manager and food worker, while it decreased for the health professions (nurse, other paramedic, physician) and for social worker (Fig. 4). In 2021, driver, sales worker/cashier and warehouse worker/expediter were newly included in the most risky occupations, while physician, miner and policeman dropped from the ranking of the most risky occupations compared to 2020 (Fig. 2).

One hundred and fifty cases of COVID-19 were recognized as an occupational disease in 2020, from them 148 cases in the health and social care economic activity sector, 5,364 cases of COVID-19

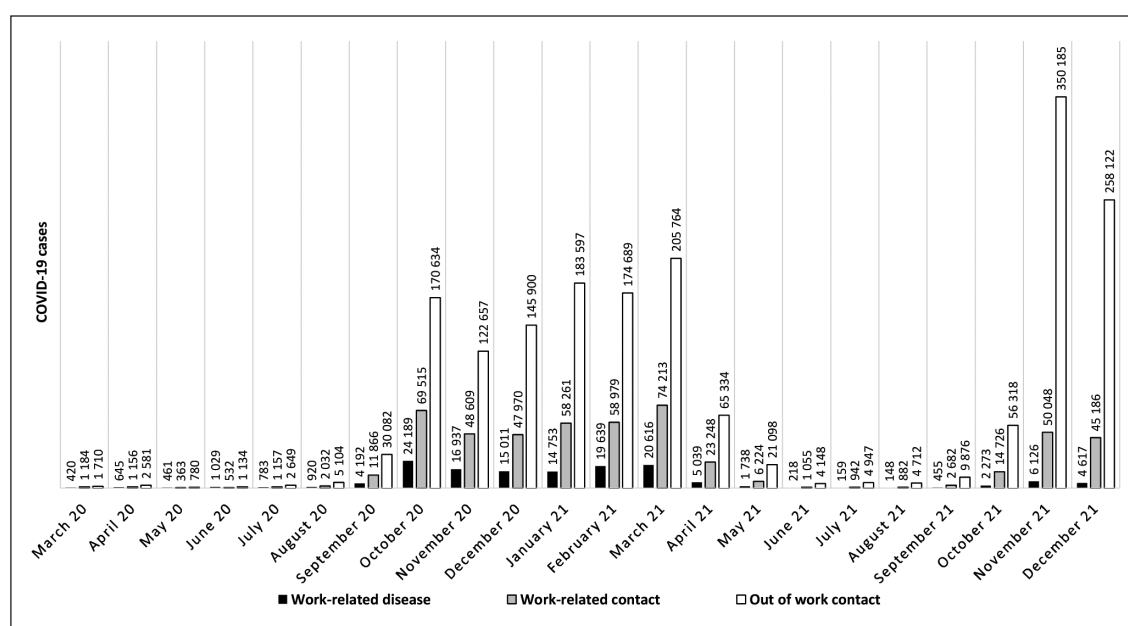
were recognized as an occupational disease in 2021, from them 5,335 cases (99.5%) in health and social care economic activity sector (3, 4); together in 2020 and 2021 5,514 cases of COVID-19 were recognized as an occupational disease (5,483 cases, 99.4% in the health and social care economic activity sector).

## DISCUSSION

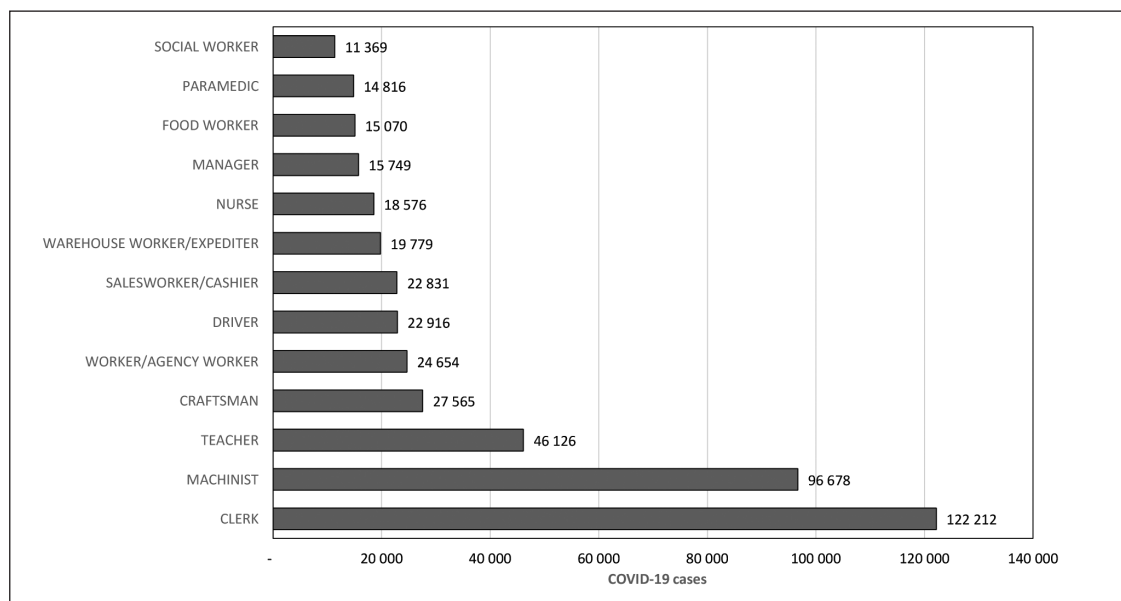
The described differences in the ranking of occupations according to the incidence of diseases between 2020 and 2021 can be partly explained by the gradual vaccination, especially of health and social care professionals exposed to a significant risk of transmission of infectious agents, the use of effective personal protective equipment, especially with regard to airborne transmission of infectious agents, and the overall caution in the examination and treatment of patients/clients. The reduction in the incidence of disease among health and social service professionals in 2021 may also have been due to acquired immunity after the disease. Conversely, the clerical, managerial (white-collar) and blue-collar professions also seemed to have a greater underestimation of the risk of infection (Fig. 4).

The probability of transmission of infectious agents is modified by its dose, climatic conditions, indoor stay, ventilation, introduction or release of restrictions, presence at work or outside, use of a means of transport, and other factors that are difficult to predict. The spread of infection between persons is by respiratory droplets, which are produced when an infected person coughs, sneezes or speaks, and the virus can be carried as an aerosol over a considerable distance by the air current (5). Therefore, the use of personal protection of the mouth and nose with respirators/muffs is essential to reduce the risk of airborne transmission, especially when there is a large concentration of people in enclosed, unventilated areas or even when using air conditioning (6).

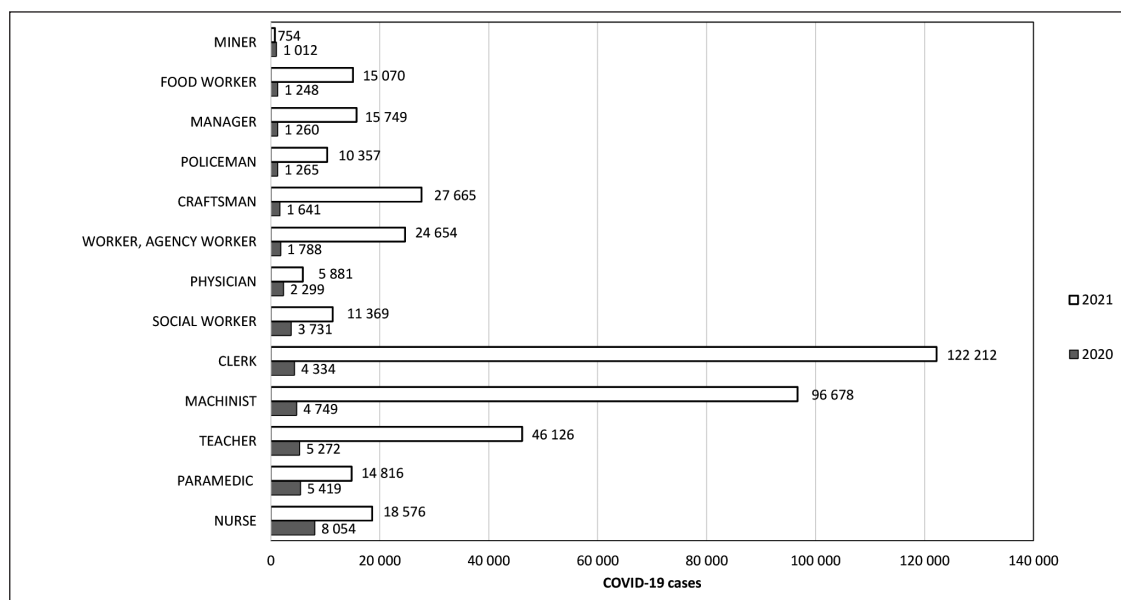
While the entities “work-related disease” and “work-related contact” are not clearly defined in the analysed statistical data,



**Fig. 1.** Dg. COVID-19 (2,483,219 cases) according to the probable exposure in the period March 2020 – December 2021 (Source: ÚZIS Prague).



**Fig. 2.** Dg. COVID-19 (458,341 cases) signed as work-related disease in selected occupations/professions in the period March 2020 – December 2021 (Source: ÚZIS Prague).



**Fig. 3.** Dg. COVID-19 (451,979 cases: 42,072 in 2020, 409,907 in 2021) signed as work-related disease in selected occupations/professions in the period March 2020 – December 2021 (Source: ÚZIS Prague).

Occupations selected according to the highest incidence of COVID-19 in 2020.

the definition of occupational disease is different and relatively clear (7).

For recognition of COVID-19 as an occupational disease, the following conditions must be met:

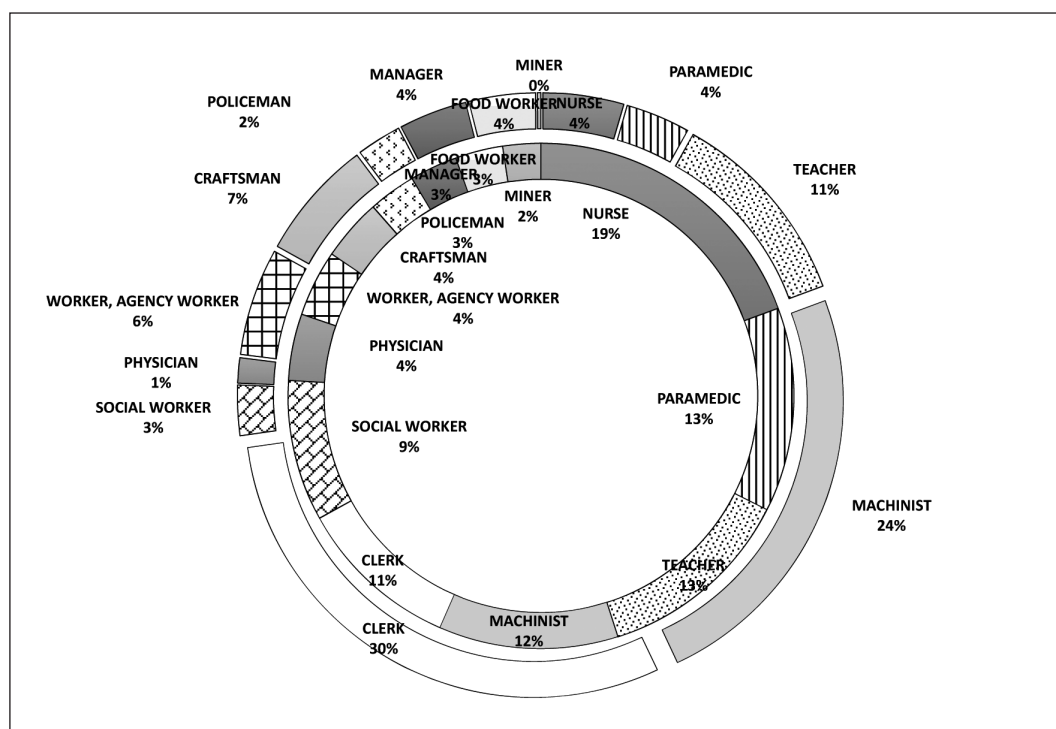
- the disease must be clinically proven and must also be confirmed by laboratory examination;
- it must be verified by a hygiene/epidemiological investigation that the working conditions listed in the list of occupational diseases are met.

If the COVID-19 disease has arisen in work for which there is a hygienic (epidemiologically) proven risk of infection, it shall be recognized and reported as an occupational communicable disease. The phrase “risk of infection” means a higher probability

of transmission in the actual performance of the work than in other usual contact with other persons, even in the event of an epidemic occurrence of the disease.

## CONCLUSIONS

The course of the epidemic COVID-19 was substantially influenced by the repeated alternation of restrictions and releases of anti-epidemic measures, often taken late on the basis of political decisions, and, moreover, illogically at different periods in schools, offices, shops, restaurants, transport, and enterprises. The available data show probable exposures to an infectious



**Fig. 4.** Dg. COVID-19 (451,979 cases expressed in %: 42,072 in 2020 – inner part of the graph, 409,907 in 2021 – outer part of the graph) signed as work-related disease in selected occupations/professions in the period March 2020 – December 2021 (Source: ÚZIS Prague).

Occupations selected according to the highest incidence of COVID-19 in 2020.

agent (without proof of specific contact with the source of the infection), of which 27% of COVID-19 cases are related to work (cases of work-related disease and work-related contact together represent the closest relationship to work). The relative reduction in the incidence of COVID-19 in 2021 compared to 2020 in the health and social care professionals can be partly explained by progressive vaccination, the use of effective personal protective equipment, particularly with regard to airborne transmission of the infectious agent, and overall caution in the examination and treatment of patients/clients. Conversely, there appears to have been a greater underestimation of the risk of infection in the clerical, managerial (white-collar) and blue-collar professions, and no significant improvement could be observed even among teachers.

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#### Conflict of Interests

None declared

#### REFERENCES

1. Tuček M. COVID-19 in the Czech Republic 2020: probable transmission of the coronavirus SARS-CoV-2. *Cent Eur J Public Health*. 2021;29(2):159-61.

2. Ministry of Health of the Czech Republic. COVID-19 epidemic in the Czech Republic [Internet]. Prague: MZ ČR [cited 2022 Sep 22]. Available from: <https://koronavirus.mzcr.cz/en/>.
3. Fenclová Z, Havlová D, Voříšková M, Urban P, Pelclová D, Žofka J. Occupational diseases in the Czech Republic 2020 [Internet]. Prague: NIPH; 2021 [cited 2022 Sep 22]. Available from: [http://www.szu.cz/uploads/NZP/Hlaseni\\_NzP\\_2020.pdf](http://www.szu.cz/uploads/NZP/Hlaseni_NzP_2020.pdf). (In Czech.)
4. Fenclová Z, Havlová D, Voříšková M, Urban P, Pelclová D, Žofka J. Occupational diseases in the Czech Republic 2021 [Internet]. Prague: NIPH; 2022 [cited 2022 Sep 22]. Available from: [http://www.szu.cz/uploads/documents/cpl/nemoci\\_z\\_povolani/Hlaseni\\_NzP\\_2021.pdf](http://www.szu.cz/uploads/documents/cpl/nemoci_z_povolani/Hlaseni_NzP_2021.pdf). (In Czech.)
5. Leung NHL, Chu DKW, Shiu EYC, Chan KH, McDevitt JJ, Hau BJP, et al. Respiratory virus shedding in exhaled breath and efficacy of face masks. *Nat Med*. 2020;26(5):676-80.
6. Chen W, Zhang N, Wei J, Yen HL, Li Y. Short-range airborne route dominates exposure of respiratory infection during close contact. *Build Environ*. 2020;176(2020):106859. doi: 10.1016/j.buildenv.2020.106859.
7. Tuček M. Statement of the Committee of the Society of Occupational Medicine of the Czech Medical Association of J. E. Purkyně on the conditions for recognition of COVID-19 as an occupational disease within the meaning of Government Regulation No. 290/1995 Coll., 2nd updated version as of 23 February 2021 [Internet]. [cited 2022 Sep 22]. Available from: [https://www.pracovni-lekarstvi.cz/files/COVID-19\\_jako\\_NzP\\_25.3.2020\\_rev\\_23.2.2021.pdf](https://www.pracovni-lekarstvi.cz/files/COVID-19_jako_NzP_25.3.2020_rev_23.2.2021.pdf). (In Czech.)

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