

Travel restrictions and lockdown during the COVID-19 pandemic — impact on notified infectious diseases in Switzerland

Running title: Impact of travel restrictions and lockdown on infectious diseases

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HIGHLIGHT/ TEASER

Based on notification data the impact of the COVID-19 lockdown in Switzerland was assessed. While the incidence of tick-borne encephalitis almost doubled as compared to 2016-2019, a reduction in all other infectious diseases was recorded. The lowest reduction rates (<25%) were noted for legionellosis, hepatitis A, chlamydia infection and gonorrhoea.

The COVID-19 pandemic declared by the World Health Organization on 11 March 2020 resulted in unprecedented travel restrictions. Among 217 destinations (countries and territories) accounted for by the World Tourism Organization 123 (57%) had introduced travel restrictions by 16 March and 100% by 20 April (<https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2020-04/TravelRestrictions%20-%2028%20April.pdf>).

Based upon epidemic legislation Switzerland on 16 March declared the highest level of pandemic concern and ordered that all non-essential institutions including restaurants, ski-resorts, etc. must close the following day. Also meetings exceeding 5 persons were prohibited, but there was no curfew. The authorities recommended to renounce international travel and that those abroad should promptly return. An entry ban for anybody except citizens, residents, cross-border permit holders and essential goods was issued, which has been lifted for travel e.g. to neighbouring countries on 15 June. Taking into account that most Swiss residents returned or were evacuated until the end of March, Switzerland was practically isolated from week 14 (30 March) to 24 (14 June). Within the country the lockdown meant that most non-essential businesses were closed until 11 May, when restaurants opened for parties initially restricted to 4 persons.

To assess whether a reduction of imported diseases had occurred in Switzerland during the 11-week isolation period to which we added the initial week after the lockdown we analysed data based on the mandatory reporting to the Federal Office of Public Health. These data are published in weekly Bulletins (<https://www.bag.admin.ch/bag/de/home/das-bag/publikationen/periodika/bag-bulletin.html>). Additionally we wanted to assess implications of physical distancing within the country. The incidence for the 2020 period was compared to the mean and minimal incidence in the same period in the preceding years 2016 to 2019. As shown in the table we assumed a ‘usual incubation period’, which could be as long as 4 weeks for hepatitis A and accordingly used the data collected later.

Overall, there has been a substantial reduction in almost all recorded infectious diseases (ID) in the 2020 period as compared to earlier years. Typical imported infections and such with respiratory transmission not only had a lower incidence as compared to the average but also to the annual minimum in the previous four years. In contrast, legionella infections, hepatitis A, gonorrhoea in 2020 did not fall below the incidence in every single year in the control period.

Among ID with respiratory transmission, the incidence of meningococcal and pneumococcal diseases markedly decreased. In contrast legionella infections diagnosed were reduced by only 22.2% despite the fact that most hotels were closed in the survey period; therefore by far not all these infections are imported. To what extent such cases have been detected due to an intensified search for respiratory pathogens in potential COVID-19 patients or nosocomial transmission is unknown¹. Due to a lack of thorough investigations some legionella pneumonias may have been missed in previous years. The decrease in influenza (data not shown) was considered to be a usual seasonal effect. Physical distancing not only reduces the risk of SARS-CoV-2, but also influenza activity^{2,3}.

The incidence of campylobacter and of salmonellosis decreased by 59.8 and 41.0%, respectively, but both showed a marked trend to increasing incidence rates in the weeks after the re-opening of restaurants. There were very few records of typhoid, paratyphoid and shigella infections, these usually imported IDs⁴ almost disappeared. Surprisingly hepatitis A infections were diagnosed throughout the study period with no significant decrease as compared to previous years. In 2017 among a total of 110 hepatitis A cases recorded in Switzerland the proportion of imported vs. locally acquired cases was 3 to 2, with men who had sex with men (MSM) being a prominent risk group in the autochthonous cases⁵. It is unknown what proportion of hepatitis A recorded during the lockdown may have been associated with MSM.

Also some sexually transmitted infections (STI) continued to occur despite the lockdown, gonorrhoea and chlamydia transmissions were reduced by less than 20%. With respect to gonorrhoea (2,581 cases in 2018) MSM transmission accounted for 54.4% of cases as compared to heterosexual cases in males (30.2%) and females (15.5%)⁶. In view of the broadly variable incubation period hepatitis B incidence was not assessed.

The greatest reduction was recorded in vector borne diseases, which are not endemic in Switzerland. The few cases of malaria reported throughout the period can be explained by potentially long incubation periods and repatriations. In contrast to all above-mentioned infections there has been an increase of reported tick-borne encephalitis even above the 2018 record year⁷ as similar to neighbouring countries (Dobler G., TBE-ISW 10 September 2020) many more people during the lockdown went outdoors hiking or performing sports.

There are multiple limitations to this assessment of crude ID data submitted first by the diagnostic laboratory and thereafter confirmed by the physician in charge as a rule within 7 days. It may be that particularly ID physicians in these hectic times performed less tests and delayed final diagnosis and reporting. We had no access to the detailed reports often including the date of onset of symptoms and a travel history. Lastly, we cannot demonstrate that the reported changes in incidence are causally associated with the COVID-19 pandemic and the respective preventive measures. Further research needs to be conducted verifying the not only the reliability of the data but also taking into account details after obtaining the necessary clearance. The focus should be on human-to-human transmission and the period of observation should be extended.

But already now the conclusion can be drawn that — as expected — the incidence of (sub)tropical diseases is markedly reduced if the population is prevented of traveling there. Physical distancing had a great impact reducing the risk of respiratory disease transmission. Casual sex continued to be practiced in private circles as documented by the small reduction

in gonorrhoea and chlamydia infections. This stands in contrast to a small study conducted in China⁸, but illustrates the need for continued testing and treatment for STI even during a pandemic lockdown⁹. The marked reduction of syphilis and HIV illustrates that these pathogens are transmitted in different higher risk networks¹⁰.

UNCORRECTED MANUSCRIPT

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Conflicts of interest

RS is or in the past three years has been a paid advisor or lecturer to Bavarian Nordic, Emergent Biosolutions, GlaxoSmithKline, Pfizer, Takeda and Valneva. The Department JF is heading received grants from Gilead Sciences, MSD, VIIV-Healthcare. JF is a member of the Federal Commission for Questions around Sexually Transmitted Infections. SL declares no conflict of interest. the co-authors declare no conflict of interest.

Contributions

RS collected and analysed the data published weekly by the Federal Office of Public Health, all authors equally contributed to the text until finalization.

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Legend to Table

Infectious diseases notified to the Swiss Federal Office of Public Health during the 2020 COVID-19 lockdown period; comparison to 2016-2019.

TRANSMISSION / PATHOGEN									
NOTIFICATIONS	Usual incubation period (UIP)	Assessment 12 weeks + UIP	2019	2018	2017	2016	Mean 2016-19	2020	Reduction 2020 to mean (%)
Respiratory									
Legionella	≤ 1 week	weeks 14-25	101	141	79	76	99	77	-22.2
Meningococcal	≤ 1 week	weeks 14-25	9	6	9	10	8	2	-75.0
Pneumococcal	< 1 week	weeks 14-25	190	203	206	178	194	50	-74.2
Faeco-oral									
Campylobacter	< 1 week	weeks 14-25	1414	1521	1429	1504	1467	590	-59.8
Hepatitis A	4 weeks	weeks 18-29	21	20	32	5	20	19	- 5.0
S. typhi / paratyphi	2 weeks	weeks 16-27	8	6	6	5	6	3	-50.0
Salmonella, other	< 1 week	weeks 14-25	285	264	264	261	268	158	-41.0
Shigella	< 1 week	weeks 14-25	26	50	33	25	34	6	-82.4
Body fluids									
Chlamydia infection	2 weeks	weeks 16-27	2465	2607	2596	2523	2548	2247	- 11.8
Gonorrhoea	< 1 week	weeks 14-25	836	653	520	582	648	541	-16.5
HIV infection	3 weeks	weeks 17-28	107	106	107	122	110	47	-57.3
Syphilis, early	3 weeks	weeks 17-28	144	186	N/A	N/A	165	25	-84.8
Vector borne									
Chikungunya	1 week	weeks 15-26	10	1	8	7	6	0	-∞
Dengue	1 week	weeks 15-26	51	38	36	29	38	4	-89.5
Malaria	2 weeks	weeks 16-27	54	65	81	88	72	10	-86.1
Tick-borne encephalitis	2 weeks	weeks 16-27	92	183	93	79	112	210	Increase 87.5