

1 A pandemic in times of global tourism: superspreading and exportation of COVID-19
2 cases from a ski area in Austria

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13 Running title: COVID-19 exportation from Austria

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24 On January 7, 2020, the World Health Organization (WHO) announced a novel
25 coronavirus to be the cause of unclear pneumonia cases in China. The infection
26 came to be known as coronavirus disease (COVID-19), caused by the severe acute
27 respiratory syndrome coronavirus 2 (SARS-CoV-2). After spreading to 114 countries,
28 a COVID-19 pandemic was declared by WHO on March 11
29 (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>).

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31 Between March 9-16, increasingly more COVID-19 cases were detected at the
32 University Hospital Münster (UKM), a tertiary care center in northwestern Germany.
33 Out of 90 cases, 36 had recently visited Ischgl (39.6%, Figure 1), a popular ski town
34 in the Austrian Alps. With 22,626 beds for visitors, 492,798 tourists arrived in the
35 2018/2019 season, including guests from over 20 different countries. American
36 tourists represented the most relevant group of non-European guests, with 6,886
37 overnight stays (<https://www.tirol.gv.at/statistik-budget/statistik/publikationen/>).

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39 Several of our patients had visited après-ski bars in Ischgl and some recalled having
40 contact to subsequently confirmed cases. Patients were predominantly male (61.1%)
41 and aged 20 to 71 years (mean 43.3). All displayed symptoms, including cough
42 (69.4%), fever (55.6%) and dysphagia (33.3%) (Figure 2).

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44 Quantitative realtime PCR of nasopharyngeal swabs was performed (1), yielding
45 positive SARS-CoV-2 results in 36 Ischgl-cases. Another nine Ischgl-tourists had
46 equivocal test results, implying a potentially higher proportion of Ischgl-related
47 COVID-19 cases. Thus, we included Ischgl as a risk region in our internal COVID-19

48 case definition, which was officially recommended by the German authorities two
49 days later.

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51 Iceland declared Ischgl a risk region as early as March 5 after travelers returning
52 from a ski trip tested positive upon arrival ([https://www.landlaeknir.is/um-
53 embaettid/frettir/frett/item39457/Skidasvavid-Ischgl-i-Austurriki-i-hop-skilgreindra-
54 ahattusvada](https://www.landlaeknir.is/um-
53 embaettid/frettir/frett/item39457/Skidasvavid-Ischgl-i-Austurriki-i-hop-skilgreindra-
54 ahattusvada)). Norway reported 161 cases imported from Austria, 57.1% of all
55 imported cases ([https://www.fhi.no/en/id/infectious-diseases/coronavirus/daily-
56 reports/daily-reports-COVID19/](https://www.fhi.no/en/id/infectious-diseases/coronavirus/daily-
56 reports/daily-reports-COVID19/)). In Denmark, this proportion also reached 50%
57 (<https://files.ssi.dk/COVID19-overvaagningsrapport-18032020>). On March 8, an
58 employee of a popular après-ski bar in Ischgl tested positive for COVID-19.
59 However, local authorities estimated the transmission to visitors to be very unlikely
60 ([https://www.tirol.gv.at/meldungen/meldung/artikel/erhebungen-zu-am-coronavirus-
61 erkrankten-norweger-im-bezirk-landeck-weiter-im-gange/](https://www.tirol.gv.at/meldungen/meldung/artikel/erhebungen-zu-am-coronavirus-
61 erkrankten-norweger-im-bezirk-landeck-weiter-im-gange/)). As cases continued to
62 increase, a quarantine was declared in Ischgl on March 13
63 ([https://www.bundeskanzleramt.gv.at/bundeskanzleramt/nachrichten-der-
64 bundesregierung/2020.html](https://www.bundeskanzleramt.gv.at/bundeskanzleramt/nachrichten-der-
64 bundesregierung/2020.html)) and the ski season was finally terminated on March 14
65 (<https://www.ischgl.com/news-de>). The local public prosecutor's office has now
66 initiated an investigation on allegations of unreported COVID-19 cases diagnosed in
67 late February in Ischgl (<https://www.apa.at/Site/News.de.html?id=6353870430>).

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69 Our findings support European data indicating the exportation of COVID-19 cases
70 from a cluster in Ischgl. The après-ski bar where the first patient diagnosed with
71 COVID-19 in Ischgl worked as a barkeeper was reportedly the source of many of the
72 cases later detected in Iceland, Norway and Denmark

73 ([https://www.spiegel.de/politik/ausland/coronavirus-ausbruch-in-ischgl-die-](https://www.spiegel.de/politik/ausland/coronavirus-ausbruch-in-ischgl-die-brutstaette-a-8f56e5a2-635f-473a-96e9-300b6cbf4180)
74 [brutstaette-a-8f56e5a2-635f-473a-96e9-300b6cbf4180](https://www.spiegel.de/politik/ausland/coronavirus-ausbruch-in-ischgl-die-brutstaette-a-8f56e5a2-635f-473a-96e9-300b6cbf4180),
75 <https://www.bbc.com/news/world-europe-52007104>). Several of our patients also
76 reported having visited the bar. This supports the theory of a superspreading event
77 taking place in Ischgl, a phenomenon already observed in past SARS and MERS
78 outbreaks (2-4). Considering the delayed epidemiological response, we believe that
79 Ischgl-related cases continue to circulate undetected within and outside of Europe.
80 European travelers were banned from entering the United States on March 14
81 (https://www.whitehouse.gov/presidential-actions/?issue_filter=healthcare), nine
82 days after Iceland issued its epidemiological warning. An unknown number of
83 infected travelers from Ischgl could thus have entered American territory in this time
84 span, as observed in Germany and other European countries.

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102 research unit 342).

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104 **Conflict of interest**

105 All authors declare no conflict of interest.

106 **References**

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122 **Figure legends**

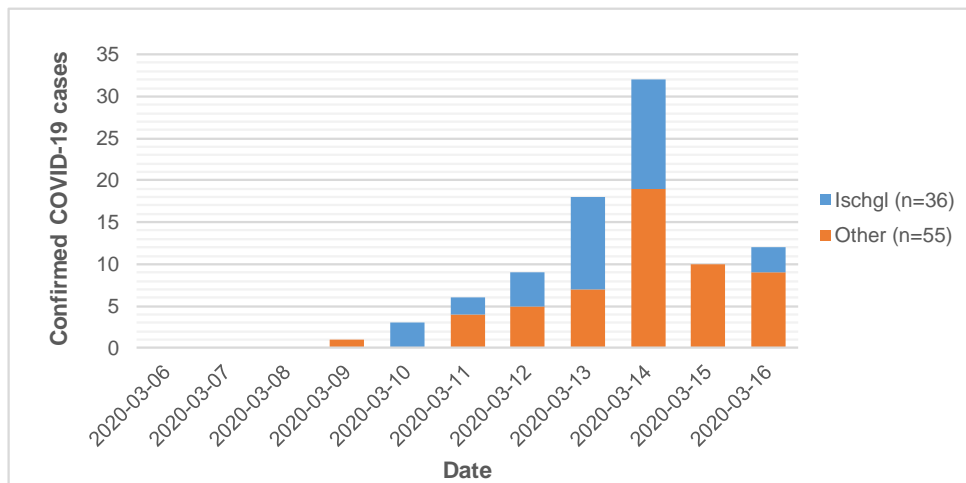
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124 **Figure 1.** Geographical Origin of SARS-CoV-2 diagnosed at UKM between March
125 6th and March 16th, 2020.

126 **Figure 2.** Symptoms displayed by SARS-CoV-2 positive patients consulting at UKM
127 upon return from Ischgl, Austria.

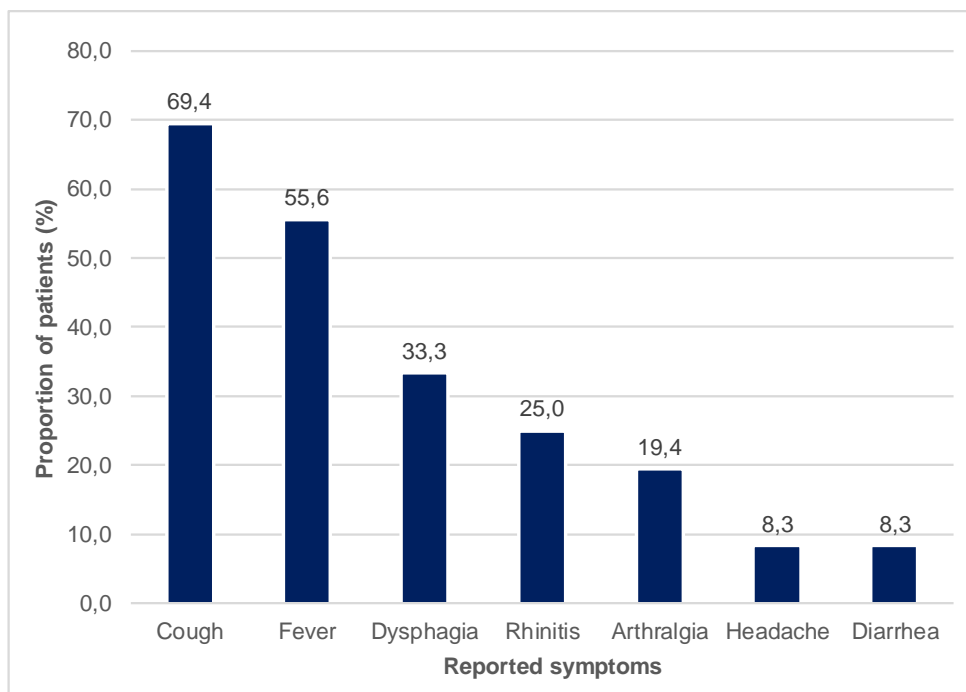
128 **Figures**

129

130 **Figure 1**

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133 **Figure 2**

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