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CORRESPONDENCE

Evaluation of screening international travellers for COVID-19

K. Lönnroth,[1] M. Nordberg,[2] M. Grunér,[3] O. Pazhman,[4] J. Nagamori,[4] A. Westermark[5]

[1]Department of Global Public Health, Karolinska Insitute, Stockholm, Sweden; [2]Infectious Diseases, Åland Central Hospital, Mariehamn, Åland Islands, [3]Medimar Scandinavia Laboratory, Mariehamn, Åland Islands, [4]Primary Care, and [5]Central Administration, Åland Central Hospital, Mariehamn, Åland Islands, Finland

Correspondence to: Knut Lönnroth, Department of Global Public Health, Karolinska Insitute, Tomtebodavägen 18a, Stockholm 171 77, Sweden. email: knut.lonnroth@ki.se

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Dear Editor,

We read with interest Aguiar et al.'s recent paper in the Journal on a roadmap for lifting restrictive measures for COVID-19.[1] It is time to also discuss lifting international travel restrictions and related vaccination and test requirements. We have previously questioned the utility of mass testing of travellers based on an evaluation of compulsory pre-departure COVID-19 screening for travellers from Åland (a self-governed Swedish-speaking island region of Finland with a population of about 30,000) to Sweden.[2] We have now conducted an evaluation of compulsory post-entry screening for people travelling in the opposite direction. Since July 2021, Finland has required international travellers aged ≥16 years from countries with a 14-day COVID-19 incidence of greater than 25/100,000 to certify complete COVID-19 vaccination, previous COVID-19 within the previous 6 months, or a pre-departure negative COVID-19 test result. Those without a valid certificate are required by law to undergo post-arrival testing. We therefore monitored the post-arrival screening of non-symptomatic persons from 12 July to 15 October 2021 to evaluate its implementation and effects on Åland. Travel volumes between Åland and Sweden are normally high, and Sweden was categorised as a high-incidence country throughout this period.

Testing was centralised in a single private clinic laboratory and consisted of real-time reverse transcriptase PCR of nasopharynx samples.[3] Anyone who tested positive was followed up for 14 days to ascertain development of symptoms. Unvaccinated contacts of index cases were tested on Days 1 and 8 of the quarantine period. A definite case of ongoing infectious COVID-19 was defined as a positive test and absence of COVID-19 3 months prior to the test, plus at least one of the following: symptoms developed within 14 days after entry or at least one close contact tested positive. If none of these criteria were fulfilled, a case with a positive test was judged as undetermined. Specificity was calculated using the above case definition for definitive ongoing infectious COVID-19 as reference. The number of inbound international travellers was obtained from the transportation companies. Random spot-checks of certificates at the border crossings revealed that 90% were exempted from testing. Cases identified during the period through regular testing of symptomatic patients and their contacts were recorded separately as part of regular surveillance.

During the study period, 81,478 people travelled to Åland from abroad, including returning local residents. An estimated 8,148 were eligible for post-entry testing, of whom 2,598 individuals were tested (Table). Six tested positive. One developed symptoms the day after the test (Ct value: 28) and was categorised as definitive ongoing infectious COVID-19. One had had COVID-19 recently and was categorised as having non-viable virus remnants (Ct value: 35). None of the other four (Ct values: 36, 33, 30 and 29) developed symptoms within 14 days and none of their 13 contacts tested positive during the quarantine period. These four were categorised as underdetermined cases. The prevalence of definitive ongoing infectious COVID-19 among those screened was 38/100,000. Specificity was 99.8 (95% confidence interval 99.6–99.9). The positive predictive was 17%. In addition, 90 cases were detected during the evaluation period by testing 8,611 people with symptoms and contacts of detected index cases among them. Of these, 68 were assessed as domestic infection on Åland, 12 infected in other regions of Finland, 6 in Sweden (all fully vaccinated and thus not eligible for entry testing) and 4 in other countries (2 fully vaccinated). Thus, only one person fulfilled our criteria for definitive ongoing infectious COVID-19. This person became symptomatic shortly after the test and would have been detected with some delay if the person had been tested when symptoms occurred. The post-entry screening detected 1.1% of all notified cases during the period. The potential positive effect on reduced transmission on Åland of this entry-screening approach therefore appears to be minimal.

Our data suggest that most of the few people who screened positive – and their contacts – were unnecessarily isolated and quarantined. Interpretation of screening-test results in non-symptomatic individuals without any known contact history is challenging.[4] PCR tests generally have high accuracy and are more informative than antigen tests.[5,6] Neither can distinguish viable virus from non-viable virus remnants. When prevalence is low, the positive predictive value is low even for a

highly specific test.[7,8] It is possible that the cases we judged as underdetermined were actually symptom-free infectious carriers of the virus. However, our findings are consistent with what one would expect when screening a population with a moderate COVID-19 prevalence. Theoretically, when screening in a population with a prevalence of less than 100/100,000 cases, at least 1000 persons would need to be tested to detect one true-positive case (depending on test sensitivity), and the positive predictive value would be less than 50% even if specificity were as high as 99.9%. The 14-day notification rate in Sweden varied between 35 and 150/100,000 during the period. Test accuracy can be assessed using different types of reference standards. In this evaluation, we applied a case definition based on post-test symptom development and signs of onward transmission, which is consistent with the screening rationale, which was the early detection of infectious cases of non-symptomatic COVID-19.

Finland, Sweden and many other countries continue to use COVID-19 exit- or entry-screening despite weak evidence on effectiveness, cost-effectiveness and unintended negative effects.[9] Current guidance for COVID-19 quarantine and testing for travellers issued by the European Centre for Disease Prevention and Control are largely based on results from modelling studies.[10] With documented ongoing community transmission of both the Omicron- and the Delta variants in most countries, the value of continued international travel-related measures, including mass screening of travellers, is highly questionable.

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Table Age, sex and departure country among persons screened

	Tested travellers	
	n	%
Age, years*		
16–25	456	19.0
26–34	755	31.4
35–44	658	27.3
45–54	348	14.5
55–64	156	6.5
65–74	80	1.2
≥75	3	0.1
Sex†		
Women	1,177	48.9
Men	1,229	51.1
Origin of travel†		
Sweden	2,163	89.9
Other Nordic countries	41	1.7
Baltic countries	66	2.7
Other countries	136	5.6

*N = 2,456 (missing for 142).

†N = 2,406 (missing for 192).