



EXPERT ADVISORY PANEL REPORT ON COVID-19 TESTING AND QUARANTINE AT CANADA'S BORDERS: COMMENTS ON ANALYSIS AND RECOMMENDATIONS

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June 2021

EXECUTIVE SUMMARY

The implementation of effective border management, including the use of testing and quarantine measures informed by evolving science and best (or at least better) practice, is now critically important at this key stage of Canada's COVID-19 pandemic response. The failure to do so puts at risk the gains being achieved from mass vaccination, increases the potential for a fourth wave, and thus would delay the country's recovery process. We therefore welcome the increased attention drawn by the latest Advisory Panel to the crucial role of testing and quarantine at Canada's borders.² We offer comments on the Report's analysis based on research by the *Pandemics and Borders Project* on the use of cross-border measures worldwide during the pandemic. We draw upon recent developments concerning known and emerging variants of concern (VoCs), their interaction with progress on mass vaccination, and the substantial evidence now available on effective border management during COVID-19. We then set out what recommendations by the Advisory Panel we agree with. We also discuss, based on concerns about causing higher risks of virus importation and onward transmission by travellers into the wider population, what revisions to the recommendations are needed. The increased risk of vaccine-evading variants created by the recommended discontinuation of mandatory hotel quarantine requirements for all air travellers is especially concerning. The lifting of hotel quarantine for fully vaccinated travellers is supported, at this time, but only with continued use of COVID-19 testing at days 5-6 and 12-14 after arrival. Our recommendations aim to maintain the gains now being achieved through vaccination, and to lay the foundations for the safer easing of travel measures in ways that would not reverse those gains.

ESSENTIAL ROLE OF EFFECTIVE BORDER MANAGEMENT: A CRITICAL TIME IN CANADA'S PANDEMIC RESPONSE AND RECOVERY

As mass vaccination continues to progress in Canada, the country is at a critical point in its COVID-19 pandemic response. Around 63% of the Canadian population has received one dose, with 8.5% of Canadians fully vaccinated, as of 8 June 2021.³ It is anticipated that “there will be enough vaccines to immunize everyone for whom vaccines are approved and recommended...by September 2021,” assuming the continued supply of safe and effective vaccines.⁴

While there is promising evidence of how immunisation is bestowing protection against severe illness and death, and now rapidly reducing virus transmission, there remain risks to these gains. Modelling studies show that herd immunity (estimates range from 70-90% vaccination rates) is unlikely to be reached for some time. This is based on adults as a proportion of the Canadian population (80%), predicted rates of adult vaccination (80%), average levels of protection bestowed by existing vaccines (80%), and non-vaccination of younger children (<12 years).⁵ Increased vaccination, lower transmission and plans for the relaxation of public health measures in coming months are expected to lead to reduced physical distancing and increased travel domestically and abroad.

Most concerning is the threat posed by SARS-CoV-2 VoCs (and variants of high consequence).⁶ The vast majority of the world's population will not receive a vaccine dose for many months and even years. This will mean continued high levels of infection and transmission globally. We have seen that, even in countries with high vaccination levels, higher transmission VoCs can rapidly reverse declines in total infections. The emerging situation in the UK, for example, should serve as a cautionary tale as cases are once again rising because of the 40% more transmissible Delta (B.1.617.2) variant. There are now reports that the Delta variant has begun to do the same in Canada, putting additional pressure on the need to accelerate second vaccine doses.^{7,8,9} The worst-case scenario is the potential emergence of immune-evasive¹⁰ variants¹¹ which may require further boosters or even a new whole-of-population vaccine roll out.¹² This rapidly evolving situation is thus highly concerning at this critical juncture in Canada's response to COVID-19.¹³

CANADA'S CURRENT CHALLENGES WITH BORDER MANAGEMENT

Under current border management policies, repeat introductions of SARS-CoV-2 and variants have been ongoing. Available data from the Public Health Agency of Canada (PHAC) reports more than 2000 international arrivals by air testing positive for SARS-CoV-2, including 557 cases involving three VoCs (Alpha, Beta, Gamma) between 22 February-22 April 2021 under current testing and quarantine measures.¹⁴ Given no public information on when these travellers tested positive (i.e. at the border, during the 14-day mandatory quarantine, after 14-days), and whether there was strict compliance with mandatory quarantine requirements, it is not possible to accurately assess the extent of virus introduction by these travellers to the wider population. However, the arrival of multiple VoCs not previously present in Canada strongly implicates the role of travel. A recent preprint based on genomic sequencing indicates “international introductions and interprovincial transmission of SARS-CoV-2 contributed to the Canadian COVID-19 burden throughout 2020...More stringent border controls and quarantine measures may have curtailed introductions and may still be warranted.”¹⁵ Looking forward, the Advisory Panel's finding that many international arrivals by air (14-35%) and land (88-93%) remain exempt from testing and quarantine, a 40% level of monitoring for compliance with

mandatory self-quarantine, and many media reports of non-compliance by non-exempt arrivals strongly suggest VoC importation and spread into the wider population will continue without changes to border management policies.

For these reasons, alongside mass vaccination, using testing and quarantine to maximize the identification of SARS-CoV-2 (including variants) infections in travellers, and minimize their onward transmission in the wider population, is arguably the most important priorities in Canada's COVID-19 response over the coming year. Our comments on the Advisory Panel's analysis and recommendations are intended to prevent a fourth wave in Canada, and lay the foundations for the safer easing of travel measures in due course.

COMMENTS ON ADVISORY PANEL REPORT'S ANALYSIS

Border management is a highly complex policy domain made even more challenging during COVID-19. The need for large-scale implementation of effective travel measures, evolving scientific evidence on SARS-CoV-2, and dynamic nature of the pandemic pose unprecedented demands on decision makers. The Advisory Panel's recognition that any advice on border management "may require revision both due to rapidly evolving evidence and the continued evolution of the pandemic" acknowledges these challenges. The following comments are intended to enhance the Report's analysis by taking account of methodological developments, updated evidence and best practices.

Need for clearer objectives and targets

The starting point for the Advisory Panel's deliberations is that the "objectives of border measures" are "to reduce risk but not eliminate it through measures, including testing and quarantine."¹⁶ The report also states, at various points, that the objective is to "minimize risk", "reduce risk" and "mitigate risk". We advise the need for clearer objectives and specific targets to measure progress. For example, a goal of appropriately testing an increasing proportion of all international arrivals (or selected groups of travellers) could be agreed. Or a goal of monitoring an increasing proportion of non-exempt travellers for compliance with mandatory quarantine requirements might be agreed. In this way, the government can evaluate the extent to which risk is reduced or mitigated through the achievement of defined objectives and specific targets.

Need to stop describing travel as low risk given shortcomings in data

Our research finds that the late introduction of mandatory testing requirements for non-exempt travellers (from 7 January 2021), the non-compliance by some non-exempt travellers with travel measures, the partial or delayed reporting of cases linked to international travel by provinces/territories to PHAC, and the exemptions from testing and quarantine requirements for many categories of travels all undermine accurate risk assessment. The cited results of two pilot studies (Pearson International Airport and Alberta) were conducted prior to the risk posed by VoCs and are limited by sampling bias (i.e. testing of small number of volunteer non-exempt international arrivals over a limited period).¹⁷ Overall, the frequent claim that international travel accounts for a small (<2%) proportion of total cases in Canada does not reflect any recognized methodology for risk-based analysis associated with travel.¹⁸ Canada mirrors recent concerns expressed in Ireland where Mallon et al. used genomic sequencing to identify "multiple introductions of wave 2 variants from outside Ireland" notably the Gamma variant.¹⁹ Throughout this period of repeated introductions, as described in the *Irish Times*,

This madness was encouraged by an insistence that international travel was a very small factor in infections in Ireland.... As recently as January 29th, [Leo Varadkar] was warning that restricting international travel was not “a silver bullet” as “less than one per cent of cases could be attributed to international travel.” This was wilfully to miss the point. It may be true that only a small number of cases could be directly traced back to a particular person who had travelled from abroad. (Though in fact the tracing is not detailed enough to show this.) The real issue was and is that, having once eliminated the virus, Ireland was reseeding it over and over by importing new – and in many cases more dangerous – variants.²⁰

We thus strongly caution against the continued citation of this figure in Canada as the basis of recommended travel measures. It is inaccurate, misleading and undermines efforts to address proven risks from travel. The claim does not align with a growing number of studies that find that travel is deeply implicated in the initial and repeated introduction of SARS-CoV-2 and its variants into Canada and other countries. For instance, Han et al (2020), note:

Although the future of COVID-19 is unknown at present, countries should plan and prepare for the worst-case scenario. It is not too late for the following lessons to be learnt and applied now. First, as described here, countries can move forward mainly on the basis of the epidemiology or on the epidemiology in combination with other considerations; however, a clear and transparent plan that describes which factors are being taken into account is essential. Ideally, these plans should explicitly state the levels or phases of easing restrictions, the criteria for moving to the next level or phase, and the containment measures that each level or phase entails. Second, countries should not ease restrictions until they have robust systems in place to closely monitor the infection situation.²¹

Need to move towards risk-based approach

There is an urgent need to move Canada towards a recognized methodology supporting a more risk-based approach to border management. This requires improvements to systematic collection and analysis of appropriate data on all travellers upon which to base appropriate risk assessment, mitigation and communication.²²

We are encouraged that governments have increasingly applied modelling to support domestic COVID decision-making. Simulations and risk modelling should be more broadly used to support critical decisions on border management. To illustrate the potential power of such an approach, we developed a scoping model to assess the relative ability of the present approach, panel proposals, and alternate proposals (described below) to prevent or detect 100 cases of immune-evasive variants being carried by different categories of travellers (see Table 1). Prevented means the cases are blocked or detected before entering into community contact. Detected means that cases are identified through testing after they are in community contact. Undetected means the cases are circulating in the community without being identified. Assumptions and methodology are available upon request.

Table 1: Predicted prevented or detected cases of immune-evasive variants

Category of Traveller	Present Regulations (All	Panel Recommendations	Alternative Recommendations
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(Assuming 100 infections per category)	categories except exempt are treated the same)		
Unvaccinated	Prevented: 88 Detected: 10 Undetected: 2	Prevented: 73 Detected: 20 Undetected: 6 (3x)	Prevented: 88 Detected: 11 Undetected: 1 (0.5x)
Partially vaccinated	Prevented: 88 Detected: 10 Undetected: 2	Prevented: 58 Detected: 27 Undetected: 15 (7x)	Prevented: 88 Detected: 11 Undetected: 1 (0.5x)
Fully vaccinated	Prevented: 88 Detected: 10 Undetected: 2	Prevented: 0 Detected: 85 Undetected: 15 (7x)	Prevented: 49 Detected: 48 Undetected: 3 (1.5x)
Exempt	Prevented: 0 Detected: 60 Undetected: 40	Prevented: 0 Detected: 65 Undetected: 35	Prevented: 44 Detected: 47 Undetected: 9 (0.1x)

Source: Robert Greenhill, 8 June 2021

Analysis of recommendations also needs to consider the consequences of increased border volumes as a result of policy changes. The Canadian government is constitutionally constrained by Article 6 of the Canadian Charter of Rights and Freedoms²³ from preventing Canadians departing or leaving Canada. However, policy makers should refrain from encouraging or subsidizing non-essential travel during a pandemic. For example, the proposed elimination of virtually all constraints and costs on fully vaccinated travellers will likely lead to increases in non-essential travel. The scoping analysis (above) estimates that, with the Panel recommendations, for infections carried by fully vaccinated travellers, 7x more infected cases per 100 would enter the community undetected. If volumes were to simultaneously increase by 3-5 times, the compound effect would be a 21-35 x potential increase in the number of vaccine-evading variants entering the wider population via fully vaccinated travellers compared to present policies. This type of modelling should be done, and shared publicly, to inform and justify any future changes in border management policy.

Need to minimize exemptions from testing and quarantine

The Advisory Panel reports that, under current border management policies, 14-35% of international air arrivals and 88-93% of land arrivals into Canada are exempt from testing and quarantine.²⁴ It is not possible using publicly available data from Statistics Canada to calculate the precise numbers of travellers this represents but, even with conservative approximations of around 500,000 international arrivals each month²⁵, this represents a substantial number of travellers. Without testing or quarantine requirements, it is not possible to assess the resulting public health risks. However, given that SARS-CoV-2 infections do not distinguish by purpose of travel (exempt versus non-exempt), we can assume some degree of virus importation and onward transmission into the wider population.

The Report describes the current exemption of travellers as necessary “to maintain essential supply chains and services.” This includes recommendations to only subject exempt travellers to “voluntary testing” when easing travel measures based on immunity status. While we recognize that a small proportion of exempt travellers should remain exempt, we argue that current categories include an overly broad range of travellers. Many, such as cross-border students, are not involved in “essential supply chains and services.” As mass vaccination progresses, and Canada moves towards easing travel measures, we suggest vaccinating genuinely exempt travellers (e.g., cross-border transport workers) and integrating the remainder into protocols based on immunity status.

Need to recognize shortcomings in current border management policies

The Advisory Panel sets out three “objectives of border measures”, namely to 1) “reduce mortality and morbidity from COVID-19 by limiting the introduction of SARS-CoV-2 and its VoCs into Canada”, 2) “maintain essential supply chains and services and ensure that travel restrictions are not excessive, while continuing to protect the public”, and 3) “use surveillance testing of SARS-CoV-2 and VoCs at the borders for travellers, including voluntary testing of exempt travellers, to inform ongoing measures”. We stress the need to clearly assess the effectiveness of current policies in achieving these objectives before putting forth its recommendations. We argue that border management to date has:

1. *failed to significantly reduce mortality and morbidity from COVID-19 by limiting the introduction of SARS-CoV-2 and its VOCs into Canada* - The Alpha (B.1.17), Beta (B.1.351), Gamma (P.1) variants have all been imported into Canada. The Delta (B.1.617.2) variant has also established itself in Canada in recent months since the implementation of additional travel measures. It could be argued that the measures did successfully “reduce” and “limit” introductions (compared to no measures at all) although no data is provided of the degree to which risk has been reduced or limited. It is also fair to assume that, under current border measures, the introduction of SARS-CoV-2 and its VOCs will continue to be introduced into Canada with potentially severe effects.
2. *succeeded in maintaining essential supply chains and services* - The varied categories of international arrivals exempt from current mandatory testing and quarantine requirements include what are described as “essential supply chains and services”. However, what is deemed “essential” varies across countries and over time. In Canada, it is important to recognize that the categories have changed over time based on specific economic and political choices. The panel does not conduct or report on any critical assessment of the rationales for the government’s categories of “essential supply chains and services”.
3. *succeeded in travel restrictions not being excessive but failed in continuing to protect the public* - A comparison of Canada’s travel restrictions with countries considered to be modelling “best practice” suggests current measures are not excessive. On the contrary, the 3-day mandatory hotel quarantine for non-exempt travellers is somewhat more lenient than the 14-21 day requirement of New Zealand, Thailand, Australia and many other “best practice” countries.^{26,27}
4. *failed in effectively using surveillance of SARS-CoV-2 and VoCs at the borders for travellers* - While there has been improved testing for international arrivals by air and land to improve surveillance, the large proportion of exempt travellers means that there is no systematic

testing of all travellers. This means that there are substantial gaps upon which surveillance can be conducted at the border. The late detection of VoCs, through community testing and genomic sequencing (e.g. Delta [B.1.617.2] variant) also means that prevention of onward transmission into the wider Canadian population is not being achieved.

Need to learn from best practices on border management amid mass vaccination

We argue the need for Canada to closely observe the border management policies of other countries that are achieving comparably high rates of vaccination. One relevant example is Israel which continues to be among the leading countries in COVID-19 vaccination rates (59% of population fully vaccinated as of 7 June 2021).²⁸ This has enabled the government to progressively relax virtually all domestic restrictions. Importantly, to protect these gains, the government has recognized the need to maintain strict testing and quarantine requirements at its borders (Box 1) that are more stringent than those recommended by the Advisory Panel.²⁹ By contrast, the UK's easing of travel measures may need to be halted as the Delta (B.1.617.2) variant causes a surge in infections despite high vaccination rates.³⁰

Box 1: Border management policies of Israel during COVID-19

Israel has maintained relatively strict travel measures that control who is permitted to enter the country and under what conditions:

- very few exceptions for non-citizens and residents especially if not vaccinated, and an overall cap at 3,000 arrivals per day since March 2021 - fewer prior to that, with many nationals stranded abroad
- hotel quarantine required for travellers who have been in “high-risk” countries in the past 14 days
- other international arrivals can isolate at home under strict conditions (since March 2021)
- use of monitoring bracelet for home quarantine recently piloted although relevant legislation has yet to be passed
- costs of hotel quarantine covered by the government
- vaccinated Israeli residents and citizens returning home are tested and, if negative, can be exempt from quarantine (unless they have been in a high-risk country within 14 days)

COMMENTS ON REPORT RECOMMENDATIONS

The Report sets out recommendations under three broad principles. We comment on each set of recommendations below and, where appropriate, provide revised recommendations. Our comments are based on findings from research conducted by the Pandemics and Borders Project, the comments on the Report's analysis provided above, and the three goals of protecting the gains currently being achieved by mass vaccination; preventing a further wave caused by importation of an immune-evasive SARS-CoV-2 variant; and, in achieving the first two goals, laying the foundation for the safer easing of travel measures.

1. Border measures must evolve to reflect the experience gained and the global situation regarding VoCs and vaccination

Recommendation 1.1 *The Panel recommends that the Government of Canada continue screening positive cases in international travellers for VoCs. Additional short-term measures may be necessary as and when new emerging VoCs are identified in Canada and globally.*

We agree that, given the continuing and evolving risks posed by VoCs, Canada should continue to screen international arrivals. This should be achieved through appropriate testing protocols and genomic sequencing. However, we advise that screening be extended to most categories of travellers who are currently exempt to improve disease surveillance at the border. Current systems for administering testing are now well established and should not be a hindrance to extending screening to these travellers. In some cases, rapid testing or a valid sampling may be applied for very limited categories of exempt travellers by land (e.g. truck drivers).

Revised recommendation 1.1

We recommend that the Government of Canada continue screening positive cases in all international arrivals by air, land and sea for VoCs. This should now be extended to most categories of currently exempt travellers. Rapid testing of a random sample of exempt travellers for limited categories may be used as exceptions. Additional short-term measures may be necessary as and when new emerging VoCs are identified in Canada and globally.

Recommendation 1.2 *The Panel recommends that the Government of Canada have procedures in place to ensure that all travellers submit required tests and that all positive results are immediately communicated to the appropriate local public health authority.*

We agree on the critical importance of timely submission of tests by travellers, and reporting of positive test results by laboratories to local public health authorities. We add that PHAC should also receive this data in a timely manner. Rapid generation, collation and sharing of this data remains essential to effective disease surveillance, monitoring and reporting. Improved timeliness is particularly important presently given the potential risk from more transmissible VoCs. Delays in reporting undermine critical action (e.g., contact tracing) to prevent onward transmission.

2. Border measures must be simple, easy to understand, equitable and consider both benefits and harms

Recommendation 2.1 *The Panel recommends that land and air border measures should be consistent as much as possible.*

We agree with this recommendation. Our comparative analysis of border management worldwide finds that consistency across all points of entry and categories of travellers distinguish countries that have been more effective at reducing importation and onward spread of SARS-CoV-2 and its variants. The inconsistencies in Canadian policies, notably in quarantine practices for international air and land arrivals, creates opportunities for diversion of travellers to avoid measures intended to reduce travel-related risks. These inconsistencies also undermine public confidence.

Recommendation 2.2 *The Panel recommends that the requirement for all air travellers to quarantine in government-authorized accommodations be discontinued. However, travellers subject to quarantine must provide a suitable quarantine plan for approval and adhere to this plan. The Panel recommends that the government continue to ensure that those who do not have a suitable quarantine plan be required to adhere to an alternative one (for example, in designated quarantine facilities).*

We share the Panel's concern about the problems in effective implementation of government-authorized accommodations (known as mandatory hotel quarantine). However, we strongly disagree that the way to address these problems is across the board discontinuation as this would significantly increase, rather than decrease, risks of onward transmission of SARS-CoV-2 and variants at a critical time in the pandemic response. Instead, we advise that efforts be made to improve implementation of the policy. When introduced in February 2021 for international air arrivals, the current policy was intended to achieve two purposes. First, it was adopted to deter non-essential travel outward and into Canada. Whether this has been achieved is unclear given lack of clear data. Available CBSA data suggests that there was a decline in non-exempt international air arrivals, from 127,801 in January 2021 to 53,486 in March 2021 (58% decrease).³¹ However, data suggests subsequent increases in international arrivals by land which suggests some diversion. Available data does not allow a granular analysis of traveller behaviour. The standardization of hotel quarantine for both international air and land arrivals would restore this disincentive.

Second, hotel quarantine was adopted to enhance Canada's capacity to reduce onward transmission of SARS-CoV-2 and its variants into the wider Canadian population by infected travellers. We agree with the Panel's concerns with non-compliance, with some non-exempt travellers opting to pay the \$3000 fine instead.³² As of 4 June 2021, the amount was increased to \$5000. It remains to be seen what impact this will have on traveller behaviour but we support an increased fine amount and enhanced enforcement of the fine to improve compliance. We agree with the Panel's observation that the cost of administering the system for government and travellers is not inconsiderable. However, the cost is intended to be a disincentive to non-essential travel. Importantly, the cost is substantially less than the estimated cost (\$89 billion, excluding long-term effects of school closures and lost educational opportunities³³) of a further lockdown in the event of further waves in the pandemic. We agree with the Panel that the 3-day period is not aligned with the incubation period of the virus (around 5-days³⁴). It is also not aligned with the 14- to 21-day mandatory quarantine administered in many countries administered either at a government-designated facility or reliably monitored self-quarantine location. Finally, as Canada moves towards easing travel measures based on immunity status, government-authorized or reliably monitored accommodation will be needed for non and partially vaccinated travellers. This strongly suggests more detailed guidance on improving the current system.

Overall, we conclude that there is a need to improve implementation of the hotel quarantine system rather than discontinue its use. Standardizing more rather than less effective quarantine practices for both air and land arrivals is needed. Ending hotel quarantine requirements removes a major disincentive for non-essential travel and, alongside relaxation of domestic restrictions, will encourage international travel. Suspending the current system without a clear plan for monitoring compliance with self-quarantine will increase opportunities for non-compliance. At this critical point in the pandemic response, we are highly concerned that this recommendation will increase the likelihood of onward transmission of SARS-CoV-2 and its variants in the wider Canadian population.

Revised recommendation 2.2

We recommend that the requirement for all air travellers to quarantine in government-authorized accommodations (mandatory hotel quarantine) be continued and that current implementation problems be immediately addressed. We recommend the government consider extending mandatory hotel quarantine to at least 5 days and ideally 7 days to align with the currently known incubation period of the virus. We recommend extension of this requirement to land crossings. If the government develops and implements a reliable system of monitoring compliance with self-quarantine requirements, travellers subject to quarantine must provide an approved quarantine plan for approval and adhere to this plan. If and when an immunity-based system of screening is introduced, exemptions to hotel quarantine for fully vaccinated travellers may be permitted with the appropriate testing and self-quarantine protocols put into place.

Recommendation 2.3 *The Panel recommends that the government continue to ensure that those who do not have a suitable quarantine plan be required to adhere to an alternative one (for example, in designated quarantine facilities).*

As described above, we do not agree with the Panel's recommendation that the 3-day mandatory hotel quarantine (followed by 11-day self-quarantine with a negative test) be immediately discontinued in favour of a full 14-day mandatory self-quarantine. It may be possible in time to move towards such a system but this would require a reliable and cost-effective system of ensuring comparable levels of compliance. The appropriate use of digital technology, for example, may be introduced. The Panel also does not specify what a "suitable quarantine plan" would entail. Given that appropriate alternative systems are currently not in place, the discontinuation of hotel quarantine, despite current problems, would increase risk of virus importation and transmission by travellers into the wider population.

Recommendation 2.4 *The Panel does not recommend implementation of country-specific testing or quarantine requirements at this time, except under unique circumstances. Increased monitoring of quarantine compliance should be considered for travellers arriving from countries with new variants of concern.*

We agree that country-specific testing or quarantine, targeted at so-called "hot spot" countries, is not recommended as a strategy for the detection and control of VoCs. This is because, by the time VoCs are identified, they are highly unlikely to be limited to specific countries given the continued high levels of travel globally. The effectiveness of targeted flight bans is doubtful for the same reason. On this basis, we recommend increased monitoring of quarantine compliance for all travellers and not just travellers arriving from countries with VoCs. For example, the flight bans for India and Pakistan to reduce the importation of the Delta (B.1.617.2) variant do not address the potential risk from international arrivals from the UK where the variant is currently causing a new surge in infections despite high rates of vaccination.³⁵ This is now the time to increase vigilance across the board.

Recommendation 2.5 *The Panel does not currently see substantial incremental value in testing onward travellers at airports considering the other testing points throughout the traveller's journey.*

If international arrivals undergo pre-departure and upon arrival testing, and then mandatory 3-day hotel quarantine upon testing negative, other testing points during the traveller's journey is unnecessary. If international arrivals undergo pre-departure and upon arrival testing, do not undergo mandatory 3-day hotel quarantine, any traveller undertaking an onward journey whose upon arrival test result is positive poses a transmission risk to the wider population. We recommend that this group of traveller be limited to fully vaccinated travellers who must also follow careful public health protocols (e.g. mask wearing) while proceeding to their place of quarantine.

3. Changes to border measures should be implemented in a phased approach

Recommendation 3.1 *The Panel recommends phased implementation of new border measures and consideration for the implementation process, including enforcement, which for some new measures, may take more time to implement.*

We agree with the Panel's recommendation that any changes to current border management should be phased. We envision this process like the slow opening of a tap rather than the swing opening of a door. This process must be guided by a risk-based approach, as described above, enabled by improved surveillance of all travellers regardless of purpose of journey and point of entry. Rapid reporting and sharing of test data should be implemented to allow accurate risk assessment over time. The capacity to administer gradually increasing numbers of travellers should be put into place beforehand.

Revised Recommendation 3.1

We recommend phased implementation of new border measures and consideration for the implementation process, including enforcement, which for some new measures, may take more time to implement. Any changes in border management should be informed by the adoption of a risk-based approach enabled by improved systems of disease surveillance at borders.

Recommendation 3.2 *The Panel recommends the Government of Canada continue to use the ArriveCAN app to manage traveller information reporting.*

We agree that the ArriveCan app should continue to be used. However, there will need to be enhancements to enable administration of any future agreed system of screening travellers based on immunity status.

Recommendation 3.3 *The Panel also recommends that quarantine plans be reviewed and approved for travellers arriving at both land and air borders, including symptom screening for all travellers.*

We agree with this recommendation but strongly encourage clear criteria for defining an "approved" quarantine plan.

Recommendation 3.4 *The Panel also acknowledges that there will be a number of considerations regarding vaccine "certification." A system to validate proof of vaccination for arriving travellers should be made available as soon as possible.*

We agree that, given increasing rates of vaccination in Canada and a limited number of other countries, notably the US, it is appropriate to begin considering potential changes in border management that ease current restrictions in ways that do not increase the risk of importing SARS-CoV-2 and variants. We agree that this would be centred on a secure system of validating immunity certification for international arrivals. We also agree with the five categories of “persons entering Canada” used to set out proposed measures to achieve this goal.

Based on our review of currently available evidence, understanding of best practices in border management, and recent developments in the spread and surge of cases caused by VoCs, we offer the following comments on the proposed measures for the five categories of traveller set out in Table 2.

Table 2: Comments on key air and land border measure recommendations for persons entering Canada

Group	Proposed measures (Panel)	Our comments
Unvaccinated non-exempt traveller	<p>Pre-departure PCR or RAT test</p> <p>On arrival PCR test</p> <p>Quarantine at approved place of quarantine or designated quarantine facility</p> <p>Day 7 PCR test and then leave quarantine upon receipt of a negative test</p>	<p>HIGHER RISK</p> <p>Discontinuing hotel quarantine without the introduction of appropriate new measures to ensure equivalent compliance means an increased risk of onward transmission of SARS-CoV-2 into the wider Canadian population. Around 1.5% of non-exempt international air arrivals test positive upon arrival (or an estimated 802 based on 53,486 non-exempt international air arrivals in March 2021).</p> <p>Study informing this recommendation was conducted 9/20-10/20 on “wild” SARS-CoV-2 and not on VoCs which can be more difficult to detect through testing.¹⁷</p> <p>If 94% of infections detected by Day 7 PCR testing is correct, allowing people to leave quarantine after a negative Day 7 test allows 6% of people testing positive after Day 7 to circulate in the wider population. The pattern of a few cases of higher transmission VoCs seeding and then causing a new wave of the pandemic brings into question the risk assessment methodology supporting this recommendation.</p>
Partially vaccinated non-exempt (received a single dose of a 2-dose vaccine within the maximum recommended 2-dose interval period)	<p>Provide acceptable evidence/proof of partial vaccination</p> <p>Pre-departure PCR or RAT test</p> <p>On arrival PCR test</p>	<p>MUCH HIGHER RISK</p> <p>Current evidence suggests a single dose of the COVID-19 Pfizer or AstraZeneca vaccine results in “a 17% absolute reduction in vaccine effectiveness against symptomatic</p>

	<p>Quarantine at home* until receiving a negative arrival test</p>	<p>disease with B.1.617.2 [Delta] compared to B.1.1.7 [Alpha].”³⁶</p> <p>A non-exempt traveller whose infection gestates after arrival will, upon receiving a negative test, be permitted to enter wider Canadian society. This creates a higher risk of transmitting SARS-CoV-2 and variants into the wider population at a time when many provinces are lifting public health controls.</p>
Fully vaccinated non-exempt travellers	<p>Provide acceptable evidence/proof of authorized vaccination and time passage</p> <p>Eliminate pre-departure and Day 10 test</p> <p>PCR test on arrival</p> <p>Self-monitoring for symptoms</p> <p>No quarantine required unless on-arrival test is positive</p> <p>Different streams for various categories of travellers upon arrival at airport</p>	<p>MUCH HIGHER RISK</p> <p>Questions “remain open” about reinfection due to rapid waning immunity, immune-evasive VoCs and/or higher transmissibility.</p> <p>Uncertainty remains about the effectiveness of COVID-19 vaccines against certain VoCs.</p> <p>No PCR testing prior to and after arrival, combined with no quarantine, creates much higher risk of importation and onward transmission of an immune-evasive SARS-CoV-2 VoC into wider population. This includes asymptomatic carriers (unidentified through self-monitoring). This scenario would make the entire (including vaccinated) population vulnerable to (re)infection.</p>
Travellers [non-exempt] with proof of previous infection in last 14 to 180 days	<p>Provide acceptable evidence/proof of infection >14 days and <180 days before travel</p> <p>On arrival PCR test on site (airport) or off site (land crossing)</p> <p>Quarantine at home until receiving a negative arrival test</p>	<p>HIGHER RISK</p> <p>Questions “remain open” about reinfection due to rapid waning immunity, immune-evasive VoCs and/or higher transmissibility.³⁷</p> <p>No PCR testing prior to or after arrival creates a higher risk of importation and onward transmission of an immune-evasive SARS-CoV-2 VoC into wider population. This includes asymptomatic carriers (unidentified through self-monitoring). This scenario would make the entire (including vaccinated) population vulnerable to (re)infection.</p>
Exempt travellers	<p>Voluntary testing on arrival with lab-based PCR or rapid test</p> <p>Self-monitoring for symptoms</p> <p>No quarantine required unless test is positive</p>	<p>FAILS TO ADDRESS EXISTING HIGH RISK</p> <p>Given no previous testing or quarantine of varied categories of exempt travellers (up to 35% of international air and 93% of land arrivals), no data to conduct risk assessment for large numbers of international arrivals.</p> <p>No mandatory PCR testing upon arrival or after arrival, combined with no quarantine, likely to pose ongoing high risk of importation</p>

		<p>and onward transmission of SARS-CoV-2 and variants into wider population. This includes asymptomatic carriers (unidentified through self-monitoring). Recommendation of shift from no testing to voluntary testing is a small improvement but many/most will remain untested.</p> <p>Exempt travellers include categories deemed to be at higher risk of infection (e.g. transport workers).³⁸</p>
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REVISED RECOMMENDATIONS ON EASING OF TRAVEL MEASURES

Based on the above comments, we set out our revised recommendations based on the following objectives:

1. Enhancing risk-based approaches to border management through surveillance of all groups of travellers - Fully leveraging provincial and federal public health capacities for the continued and systematic testing of all travellers entering Canada will significantly increase the ability to prevent most and detect all imported variants.
2. Aligning travel measures with rapidly evolving scientific evidence - Enhanced surveillance and improved data will underpin the capacity of PHAC and Public Safety Canada to increase the use of risk-based approaches to border management. This is especially important as Canada transitions to the safe easing of travel measures.
3. Ensuring measures are proportionate to risk - The revised recommendations move Canada towards a more risk-based approach that aligns travel measures with risks posed by different groups of travellers. Enhanced surveillance and ongoing reviews of the emerging science should inform adjustments to risk assessments.
4. Applying travel measures in an equitable way - There is a need to minimise inequities which unfairly privilege or disadvantage certain travellers. Lack of fairness undermines public trust and support for border management. This includes the transparent categorisation of groups of travellers as exempt or non-exempt, and the removal of inconsistencies in policy that cannot be justified by risk assessment.
5. Easing of travel measures in time from a position of effective border management - There is a need to maintain essential supply chains and service and the alternative options proposed recognize the need to maintain (and even increase) cross-border travel as vaccination coverage increases across Canada. To approach reopening and the easing of certain travel restrictions effectively, adequate protections are needed to prevent backsliding in Canada's COVID-19 recovery, through the preventable introduction of the virus via travel.

Table 3: Revised key air and land border measure recommendations for people entering Canada

Group	Revised Measures (Pandemic and Borders Project)	Advantages
<p>Unvaccinated non-exempt traveller</p>	<ul style="list-style-type: none"> √ Pre-departure PCR or RAT test √ On arrival PCR test + Quarantine at designated government facility for 5-7 days + Quarantine for remainder of 14-day period at approved place if test negative + Isolate at designated government facility if test positive + Remove inconsistency in implementation of mandatory quarantine between international arrivals by air and land + Rationalize land crossings to designate selected points of entry for non-exempt non-vaccinated travellers + Implement government designated quarantine facilities at selected points of entry for non-exempt non-vaccinated land travellers + Increase penalties for failure to adhere to mandatory hotel quarantine to reduce incentive for non-compliance + Day 5/6 and Day 14 tests self-administered with at-home test kits 	<p>Identifies almost all infected travellers in this group including more difficult to detect VoCs</p> <p>Prevents almost all onward transmission of VoCs into wider population by this group and prevents further waves</p> <p>Removes incentives by this group of travellers to divert from air to land borders to circumvent hotel quarantine</p> <p>Creates a disincentive to undertake non-essential travel without vaccination</p> <p>Maintains and even increases incentive for this group of travellers to become fully vaccinated</p> <p>Increases incentive to comply with mandatory hotel quarantine</p> <p>Enables phased approach with gradual reduction in facilities for testing and quarantine as this group decreases in number</p> <p>Increases public trust in border management</p>
<p>Partially vaccinated non-exempt (received a single dose of a 2-dose vaccine within the maximum recommended 2-dose interval period)</p>	<ul style="list-style-type: none"> √ Provide acceptable evidence/proof of partial vaccination √ Pre-departure PCR or RAT test √ On arrival PCR test + Quarantine for 14-days at approved place if test negative 	<p>Acknowledges emerging science on reduced efficacy of one dose of COVID-19 vaccines for some VoCs</p> <p>Prevents almost all onward transmission of VoCs into wider population by this group and prevents further waves</p>

	<p>+ Isolate at designated government facility if test positive</p> <p>+ Day 5 and Day 14 tests self-administered with at-home test kits</p>	
Fully vaccinated non-exempt traveller	<p>√ Provide acceptable evidence/proof of authorized vaccination and time passage</p> <p>+ Pre-departure PCR or RAT test</p> <p>√ PCR test on arrival</p> <p>√ Self-monitoring for symptoms</p> <p>√ No quarantine required unless on-arrival test is positive</p> <p>+ Day 5 and Day 14 tests at local testing centre</p>	<p>Acknowledges current evidence of lower risk of infection and onward transmission</p> <p>Identifies almost all infected travellers in this group with more difficult to detect VoCs</p> <p>Leverages provincial testing capacity and provides quicker results than home tests</p>
Travellers [non-exempt] with proof of previous infection in last 14 to 180 days	<p>√ Provide acceptable evidence/proof of infection >14 days and <180 days before travel</p> <p>√ On arrival PCR test on site (airport) or off site (land crossing)</p> <p>√ Quarantine at home until receiving a negative arrival test</p> <p>+ Day 5 and Day 14 tests at local testing centre</p>	<p>Identifies almost all infected travellers in this group due to rapid waning immunity, immune-evasive VoCs and/or higher transmissibility</p>
Exempt travellers	<p>√ Self-monitoring for symptoms</p> <p>+ Review and minimize categories of exempt travellers to cross-border transport workers and other limited categories</p> <p>+ Integrate removed categories of exempt travellers into above classification by immunity status</p> <p>+ Remaining limited categories of exempt travellers (except diplomats) to be partially vaccinated by July 1 and fully vaccinated by September 1, or lose their exempt status</p>	<p>Reserves exemptions to genuine categories of essential travellers</p> <p>Minimizes public health risks from remaining exempt travellers</p> <p>Identifies almost all infected travellers in this group with more difficult to detect VoCs</p> <p>Avoids increasing disruption to supply chains</p> <p>Reduces perceived unfairness in border policies</p>

	<p>+ Remaining limited categories of exempt travellers crossing the border less frequently than once a week must test on arrival, Day 5-6 and Day 12-14 (if still in Canada)</p> <p>+ Exempt travellers crossing the border more than once a week (e.g., truckers), must test once every 2 weeks</p> <p>✓ No quarantine required unless test is positive</p>	
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Notes

- ✓ agreement with COVID-19 Expert Advisory Panel recommendations
- + revised recommendation

Pandemics and Borders Project

The *Pandemics and Borders Project*, funded by the New Frontiers in Research Fund for two years, is analysing the effective use of cross-border measures by all countries during the COVID-19 pandemic. Composed of researchers based at Simon Fraser University, University of Hong Kong and University of Maryland, our international and multi-disciplinary team is conducting a diverse range of studies to understand border management during the pandemic. These include analyses of a global public health and social measures dataset; systematic reviews of available evidence of the effectiveness of cross-border measures; analyses of genomic sequencing data to identify potential impacts of travel restrictions; and comparative case studies of decision-making.

For more information about the *Pandemics and Borders Project*, please contact Project Coordinator Julianne Piper (julianne_piper@sfu.ca) or visit our website at: <https://www.pandemics-borders.org/>

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