

## Sullivan, Michelle A HLTH:EX

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**From:** Svab, Karen (PHAC/ASPC) <karen.svab@canada.ca> on behalf of CPIP TG SECRETARIAT / GT PCP (PHAC/ASPC) <phac.cpip.tg.secretariat-gt.pcp.aspc@canada.ca>  
**Sent:** March 20, 2020 4:48 AM  
**To:** Henry, Bonnie HLTH:EX; Susy Hota (Susy.Hota@uhn.ca); Ian Gemmill (ianm.gemmill@queensu.ca); Alfieri, Carolina (Ext.); Hatchette, Todd (Ext.); Wolfe-Roberge, Pamela (SAC/ISC); Henry, Erin (PHAC/ASPC); Michelle.Murti@oahpp.ca; nadine.sicard@msss.gouv.qc.ca; XT:HLTH Galanis, Eleni  
**Cc:** Brian Schwartz (brian.schwartz@oahpp.ca); Stirling, Rob (PHAC/ASPC); Williams, Jill (PHAC/ASPC); Smith, Sharon E (PHAC/ASPC); Lalonde, Fanie (PHAC/ASPC); Paddle, Lisa (PHAC/ASPC); Kotowski, Laura (PHAC/ASPC); Gravelle, Natalie (PHAC/ASPC); Daly, Kim (SAC/ISC); Thompson, Laurel HLTH:EX; CPIP TG SECRETARIAT / GT PCP (PHAC/ASPC)  
**Subject:** FW: print (article from Brian)

Good morning TG members,

Please see below from Brian.

Thank you,  
Karen Svab

### CPIP TG Secretariat

Senior Project Officer | Agente de projets principal  
Public Health Agency of Canada | Agence de la santé publique du Canada  
130 Colonnade Rd | 130 rue Colonnade  
[Phac.cpip.tg.secretariat-gt.pcp.aspc@canada.ca](mailto:phac.cpip.tg.secretariat-gt.pcp.aspc@canada.ca) | Tel: (613) 324-3256

---

**From:** Paddle, Lisa (PHAC/ASPC) <lisa.paddle@canada.ca>  
**Sent:** 2020-03-19 10:21 PM  
**To:** Brian Schwartz <Brian.Schwartz@oahpp.ca>  
**Cc:** CPIP TG SECRETARIAT / GT PCP (PHAC/ASPC) <phac.cpip.tg.secretariat-gt.pcp.aspc@canada.ca>  
**Subject:** RE: print

Thx Brian! Shared internally.

Karen – if this wasn't shared with the CPIP TG, please go ahead and do so.

---

**From:** Brian Schwartz <Brian.Schwartz@oahpp.ca>  
**Sent:** 2020-03-18 2:42 PM  
**To:** Paddle, Lisa (PHAC/ASPC) <lisa.paddle@canada.ca>  
**Subject:** FW: print

This is from Neil Ferguson, who has published extensively on pandemic modelling. I don't see that this has been peer-reviewed, but it's interesting. Brian

<https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf>

**Brian Schwartz, MD, MScCH, CCFP(EM), FCFP**

**Vice-President**

**Public Health Ontario | Santé publique Ontario**

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[www.publichealthontario.ca](http://www.publichealthontario.ca)



## Sullivan, Michelle A HLTH:EX

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**From:** XT:HLTH Stanwick, Richard  
**Sent:** April 22, 2020 6:08 PM  
**To:** Henry, Bonnie HLTH:EX  
**Subject:** Re: NZ transparency on Covid-19

Thanks, I will pass on to Kathy. Regards. Richard

Sent from my iPad

> On Apr 22, 2020, at 5:53 PM, Henry, Bonnie HLTH:EX <Bonnie.Henry@gov.bc.ca> wrote:

>

> Yes. In some detail. We are actually following what they are doing fairly closely and vice versa. And if you look at the actual details of Sweden we are also pretty close to them as well.

> Bonnie

>

> Dr Bonnie Henry

> Provincial Health Officer

> Ministry of Health

> Bonnie.henry@gov.bc.ca

> 250 952-1330

>

>> On Apr 22, 2020, at 5:31 PM, Stanwick, Richard (Dr) <Richard.Stanwick@viha.ca> wrote:

>>

>> My CEO was wondering if your team has reviewed the approach used in NZ? Thanks. Richard

>>

>> Sent from my iPad

## Sullivan, Michelle A HLTH:EX

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**From:** Henry, Bonnie HLTH:EX  
**Sent:** April 22, 2020 5:53 PM  
**To:** XT:HLTH Stanwick, Richard  
**Subject:** Re: NZ transparency on Covid-19

Yes. In some detail. We are actually following what they are doing fairly closely and vice versa. And if you look at the actual details of Sweden we are also pretty close to them as well.

Bonnie

Dr Bonnie Henry  
Provincial Health Officer  
Ministry of Health  
Bonnie.henry@gov.bc.ca  
250 952-1330

> On Apr 22, 2020, at 5:31 PM, Stanwick, Richard (Dr) <Richard.Stanwick@viha.ca> wrote:  
>  
> My CEO was wondering if your team has reviewed the approach used in NZ? Thanks. Richard  
>  
> Sent from my iPad

**Sullivan, Michelle A HLTH:EX**

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**From:** Dix, Adrian HLTH:EX  
**Sent:** March 19, 2020 7:47 AM  
**To:** Henry, Bonnie HLTH:EX  
**Cc:** Brown, Stephen R HLTH:EX; van Baarsen, Amanda HLTH:EX  
**Subject:** Re: SARS-CoV-2/COVID-19: Implications of latest scientific research

I will call him this morning  
Sent from my iPad

On Mar 19, 2020, at 7:46 AM, Henry, Bonnie HLTH:EX <Bonnie.Henry@gov.bc.ca> wrote:

Advice?

*Dr Bonnie Henry  
Provincial Health Officer  
Office of the PHO  
Ministry of Health  
British Columbia*

250 952 1330

**From:** Norm Letnick [mailto:[s.22](mailto:s.22)]  
**Sent:** March 19, 2020 7:38 AM  
**To:** Henry, Bonnie HLTH:EX  
**Subject:** SARS-CoV-2/COVID-19: Implications of latest scientific research

Dr. Henry,

Is it time for more forceful action?

I know you are busy and probably considering a range of options but if you could send me a few words or call me so I may inform Andrew that would be appreciated as always.

Norm

----- Forwarded message -----

**From:** Andrew Wilkinson <[andrew\\_wilkinson@telus.net](mailto:andrew_wilkinson@telus.net)>  
**Date:** Wed, Mar 18, 2020 at 10:21 PM  
**Subject:** Fwd: SARS-CoV-2/COVID-19: Implications of latest scientific research  
**To:** Norm Letnick <[s.22](mailto:s.22)>

Norm, you may have seen this already but the point is the growing scientific support for highly aggressive containment measures of the sort being used in Italy and SAN Francisco. Please make inquiries with Bonny Henry as soon as you can. Thanks .

Sent from my iPad

Begin forwarded message:

**From:** Karen Bakker <[karen.bakker@ubc.ca](mailto:karen.bakker@ubc.ca)>

**Date:** March 18, 2020 at 10:04:07 PM PDT

**To:** [andrew\\_wilkinson@telus.net](mailto:andrew_wilkinson@telus.net)

**Subject:** SARS-CoV-2/COVID-19: Implications of latest scientific research

Dear Andrew

Forgive me for cluttering your inbox at such a busy time. I hope you're well.

We're writing to draw your attention to some crucially important, newly published scientific research on SARS-CoV-2/COVID-19. We believe this research has important implications for policy-makers, decision-makers, and for all health care professionals. The research sheds new light on the degree of asymptomatic transmission that has occurred to date. It's a matter of utmost urgency that decision-makers and the general public understand the implications of this new research, which was just released in the past few days.

The statements below have been vetted by some of the world's leading epidemiologists, scientists, and medical health professionals, including Dr. Michael Joyner (Mayo Clinic), Dr. Derya Unatmaz (The Jackson Laboratory), Nathaniel Daw (Princeton), Dr. Carlos del Rio (Professor and Chair, Department of Public Health and Department of Medicine, Emory University), Dr. David Fisman (Professor, University of Toronto), Dr. Lili Barouch (Professor, Johns Hopkins), and Dr. Samira Rahimi (Professor, McGill University).

As will be immediately obvious, the policy implications are urgent. Hence, the scientists mentioned above have also co-signed a petition, released yesterday, regarding the policy implications of the research: in short, maximum mitigation is now urgently required. We feel it's urgent to draw this research to the attention of senior decision-makers, as fast as possible. We directed our petition at scientists and health care professionals; over 1,000 people have signed the petition in less than 24 hours. The main message: asymptomatic transmission changes everything.

Please feel free to share this information with colleagues and contacts that may benefit from reviewing these research findings.



Many thanks and best wishes,

Dr. Karen Bakker (UBC) and Dr. Gary Marcus (Professor Emeritus, NYU, and CEO, Robust.AI)

--

\* \* \* \* \*

Dr. Karen Bakker

Professor and Canada Research Chair

University of British Columbia | Musqueam Territories

217-1984 West Mall, Vancouver BC Canada V6T 1Z2

Phone 604 822 6702 | Fax 604 822 6150

[www.watergovernance.ca](http://www.watergovernance.ca) | [www.karenbakker.org](http://www.karenbakker.org)

### **Briefing Note: Asymptomatic transmission of SARS-CoV-2**

The note below summarizes two research articles.

1. The first article (by some of the world's leading epidemiologists based in China, the US, and the UK) was published in *Science*.
2. The second article was published by a team of 30 researchers: members of the Imperial College COVID19 response team advising the UK government and the World Health Organization.

The research summarized below indicates that asymptomatic (and undocumented) infections were responsible for 80% of documented cases in the recent COVID outbreak in China. The study, published in *Science*, estimates that for every known case of coronavirus, another 5 to 10 cases are likely to be asymptomatic and hence undetected. Community transmission via such undocumented cases is, the researchers demonstrate, a major reason why this pandemic is growing at an exponential rate. The implications are modeled in the second study: maximum mitigation (stricter than what we currently have in place in Canada) is necessary to avoid over-burdening our health care systems.

(1) Li, Ruiyun, Sen Pei, Bin Chen, Yimeng Song, Tao Zhang, Wan Yang, and Jeffrey Shaman. (2020). "Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV2)." *Science* 16 Mar 2020: eabb3221 DOI: [10.1126/science.abb3221](https://doi.org/10.1126/science.abb3221)

1. **Asymptomatic carriers**, not likely to be identified through conventional means, **are now confirmed by leading researchers as a major source of spread.**

2. **Community transmission is much more widespread than previously understood.** New evidence on community transmission was released in a March 16 article published by some of the world's leading epidemiologists in the prestigious peer-reviewed journal *Science* (available [here](#)).

1. According to the epidemiologists' analysis, asymptomatic (and hence undocumented) infections were responsible for 80% of documented cases in the recent COVID outbreak in China.

2. The study estimates that for every known case of coronavirus, another 5 to 10 cases are likely to be asymptomatic and hence undetected. Community transmission via such undocumented cases is a major reason this pandemic is growing at an exponential rate.

3. See this coverage in the New York Times, aptly titled: "Coronavirus, hiding in plain sight."

(ii) Ferguson, N., Laydon, D., et. al. (2020) "Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand." 16 March 2020. Imperial College COVID-19 Response Team; WHO Collaborating Centre for Infectious Disease Modelling; MRC Centre for Global Infectious Disease Analysis. <https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf>

1. **Lockdown will save tens or possibly hundreds of thousands of lives.** New simulation models from Imperial College London, also released March 16, show that significant differences in a full lockdown policy relative to more moderate measures. The Imperial College report, which simulated the effectiveness of public health measures in reducing the spread of COVID19, was authored by 30 scientists, led by Imperial College's coronavirus response team.

a. See this coverage in The Guardian, which explains why this study has significantly changed UK policy.

b. See this article in the New York Times about how these findings have influenced US policy (including spurring the issuing of stricter recommendations from the White House task force).

## Sullivan, Michelle A HLTH:EX

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**From:** Asaph Young Chun <ychun2@gmail.com>  
**Sent:** March 19, 2020 4:02 PM  
**To:** David N. Fisman  
**Cc:** Cheng, Lydia; Taha, Monir; McGeer, Dr. Allison; Herveen Sachdeva; Michael Finkelstein; Dr Zoutman, Dick; Janine McCready; Eileen de Villa; Nelson Lee; Monali Varia; Horgan, Mary (School of Medicine); Wheeler, Kristen; Harvey, Bart; House, Althea (PHAC/ASPC); Killikelly, April (PHAC/ASPC); Gregory Kujbida; Henry, Bonnie HLTH:EX; Jacqueline Willmore; mazzola; Moore, Kieran; Moore, Kieran; Fowler, Rob Dr.; Etches, Vera; Adalsteinn Brown; Dr.Shanker Nesathurai; Kouyoumdjian, Fiona (MOH); Kuster Stefan; Bogoch, Isaac; Powis, Jeff - Toronto East General Hospital; Ferguson, Niall - UHN; Jacob Moran-Gilad, MD; Ashleigh Tuite; Amy Greer  
**Subject:** Re: social distancing: duration

Hello, David and colleagues,

I was in the Korea CDC yesterday, advising strategies to keep C19 under control and preventing the 2nd wave. I've decided to have a national team of epi modelers working together in the next few months, providing nearcasting and sharing lessons and mistakes with others on this planet. We remain vigilant.

Korea CDC keeps updating materials in English in support of many others who may find them useful outside Korea.

Essential to preventing 2nd waves is to do proactive actions in nursing homes and other group dwellings with elderly and disabled who are most susceptible to C19 if they have current medical conditions.

- Visitors and nursing persons in these group dwellings are more likely to be infected and/or infecting others as well, given asymptomatic nature of C19.
- Internationals visiting Korea are found to be another potential source of 2nd wave. All international visitors at airport are currently tested; positives are quarantined for 14 days; App is installed on smart phones of internationals to keep them informed of further developments; and etc.
- Korea CDC keeps containing sparks around country. Putting off sparks are at times more difficult than a national fire. The key is timely response to contain in coordination with local administrators.
- There are other unknowns we try to nail down and deal with. Let us know of your new ideas if any.

You may find key developments in Korea in the Korea CDC home page. More are available in English.

<http://ncov.mohw.go.kr/en/>

I add this C19 virus is good at having humans to distrust each other, creating ungrounded fear and anxiety, and having us lose the precious elderly, the source of the human wisdom. It attacks everyone yet discriminates those weak and old by hitting them hard. s.16

s.16

Very best,  
Young

-----  
Asaph Young Chun, Ph.D.  
Director-General, [Statistics Research Institute](#) | [Statistics Korea](#)  
Republic of Korea

Associate Editor, [Journal of Official Statistics](#) - [Statistics Sweden](#)

On Wed, Mar 18, 2020 at 8:19 AM David N. Fisman <[david.fisman@utoronto.ca](mailto:david.fisman@utoronto.ca)> wrote:

Dear friends and colleagues;

Please find attached some more current modeling work on duration of social distancing required. This seems to be a good news-bad news story, inasmuch as SD pushes the peak forward but relaxing SD means the whole thing starts up again.

Summer may help too, and that's not in our model. It does seem that this virus may be sensitive to UVB and temperature.

The TLDR is that social distancing can push the peak off into the future and buy us time, but of course the question will be how and when to walk this tightrope and scale things back so that economic damage is minimized. Those of you in decision-maker roles are, I hope, in touch with people in HK, Korea, Taiwan, Singapore and Israel, who seem to be innovators in this space.

Best and as always the intention is that you share this as appropriate with your networks.

d

(Thanks again to Ashleigh and Amy: how lucky we are to work with them).



## Sullivan, Michelle A HLTH:EX

---

**From:** David N. Fisman <david.fisman@utoronto.ca>  
**Sent:** March 18, 2020 5:19 AM  
**To:** Cheng, Lydia; Taha, Monir; McGeer, Dr. Allison; Herveen Sachdeva; Michael Finkelstein; Dr Zoutman, Dick; Janine McCready; Eileen de Villa; Nelson Lee; Monali Varia; Horgan, Mary (School of Medicine); Wheeler, Kristen; Harvey, Bart; House, Althea (PHAC/ASPC); Killikelly, April (PHAC/ASPC); Gregory Kujbida; Henry, Bonnie HLTH:EX; Jacqueline Willmore; mazzola; Moore, Kieran; Moore, Kieran; Fowler, Rob Dr.; Etches, Vera; Adalsteinn Brown; Dr.Shanker Nesathurai; Kouyoumdjian, Fiona (MOH); Kuster Stefan; Asaph Young Chun; Bogoch, Isaac; Powis, Jeff - Toronto East General Hospital; Ferguson, Niall - UHN; Jacob Moran-Gilad, MD  
**Cc:** Ashleigh Tuite; Amy Greer  
**Subject:** social distancing: duration  
**Attachments:** social\_distancing\_outputs March 18.pdf

Dear friends and colleagues;

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Best and as always the intention is that you share this as appropriate with your networks.

d

(Thanks again to Ashleigh and Amy: how lucky we are to work with them).

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Withheld pursuant to/removed as

s.17

## Sullivan, Michelle A HLTH:EX

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**From:** Tim Takaro <ttakaro@sfu.ca>  
**Sent:** June 13, 2020 8:43 AM  
**To:** XT:HLTH Gilbert, Mark; XT:HLTH Galanis, Eleni; XT:Kim, Jong HLTH:IN; Singal, Mayank [BCCDC]; Corneil, Trevor HLTH:EX; XT:HLTH Kosatsky, Tom; Hoang, Linda [BCCDC]; Gustafson, Reka [BCCDC]; XT:Mema, Dr. Silvina HLTH:IN; XT:Palmer, Becky HLTH:IN; XT:Krajden, Mel HLTH:IN; Gilks, Blake [PHSA]; Mooder, Karen [PHSA]; Gray, Andrew Dr. HLTH:IN; XT:Golmohammadi, Dr. Kamran HLTH:IN; XT:McDonald, Shannon HLTH:IN; Nicol, Anne-Marie; 'Allan Holmes'; XT:Henderson, Sarah ENV:IN; Work Camps; Wong, Katrina; XT:Fumerton, Raina HLTH:IN; Melissa Aalhus  
**Cc:** Henry, Bonnie HLTH:EX  
**Subject:** Am. Coll. Occ. Env. Med. webinar on protecting construction workers from COVID-19  
**Attachments:** ACOEM-COVID-June-12-2020.pdf

Greetings colleagues!

Here's an upcoming webinar from California may be of interest to your networks. The updated (12Jun20) reference doc attached is also excellent.

This ACOEM event is co-sponsored by the California El Camino Real Association of Occupational Health Nurses (CECRAOHN) and Workplace Health Without Borders (WHWB).

*Moderator:*

**David Rempel, MD, MPH**, Division of Occupational and Environmental Medicine, University of California, San Francisco

*Speakers:*

*Resources and Recommendations for Putting Together a Protection Program*

**Chris Trahan Cain, CIH**, Executive Director, The Center for Construction Research and Training (CPWR), Silver Springs, MD

*Cal/OSHA Guidance: COVID-19 Infection Prevention in Construction*

**Gary R. McIver, Jr., CSP**, Senior Safety Engineer, Cal/OSHA Consultation, Sacramento, CA

*Practical Issues on Preventing Infection Spread on Construction Sites*

**David F. Barragan**, President/CEO, Barragan Corp International, Riverside, CA

-Tim

## Sullivan, Michelle A HLTH:EX

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**From:** Corneil, Trevor HLTH:EX  
**Sent:** June 15, 2020 12:23 PM  
**To:** Berglund, Jessica WCB:EX; Brocklehurst, Thomas WCB:EX  
**Subject:** FW: Am. Coll. Occ. Env. Med. webinar on protecting construction workers from COVID-19  
**Attachments:** ACOEM-COVID-June-12-2020.pdf

Thought you'd find this interesting. Trevor

Best,  
Trevor

Trevor Corneil MD FRCPC  
COVID-19 | MOH BC Gov  
604 218 5718

---

**From:** Tim Takaro  
**Sent:** June 13, 2020 8:43 AM  
**Subject:** Am. Coll. Occ. Env. Med. webinar on protecting construction workers from COVID-19

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*Cal/OSHA Guidance: COVID-19 Infection Prevention in Construction*

**Gary R. McIver, Jr., CSP**, Senior Safety Engineer, Cal/OSHA Consultation, Sacramento, CA

*Practical Issues on Preventing Infection Spread on Construction Sites*

**David F. Barragan**, President/CEO, Barragan Corp International, Riverside, CA

## Sullivan, Michelle A HLTH:EX

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**From:** Corneil, Trevor HLTH:EX  
**Sent:** June 2, 2020 10:45 AM  
**To:** Henry, Bonnie HLTH:EX  
**Subject:** FW: Lancet articles  
**Attachments:** COVID Masks Lancet June 2020.pdf; COVIDSurg Lancet May 2020.pdf

FYI below and attached Bonnie. More for your awareness.

Best,  
Trevor

Trevor Corneil MD FRCPC  
604 218 5718

Thanks Patty, I've taken a quick read. Both are reviews and have some interesting findings, but shouldn't be generalized beyond the contexts in which the studies were done. All that to say I don't think they would change our policy direction. I'd be interested in others thoughts.

Best,  
Trevor

Trevor Corneil MD FRCPC  
604 218 5718

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**From:** Daly, Patty [VCH]  
**Sent:** June 2, 2020 8:43 AM  
**To:** Corneil, Trevor HLTH:EX ; Gustafson, Reka [BCCDC]  
**Cc:** XT:HLTH Boraston, Dr. Suni ; Salzman, Jim [VCH] ; Chittock, Dean [VCH] ; Schaeffer, David [VCH] ; Wong, Titus [VCH] ; Carsley, John [VCH] ; XT:HLTH Dawar, Meena ; Gustafson, Reka [VCH] ; XT:Harding, John HLTH:IN ; XT:Hayden, Althea HLTH:IN ; XT:HLTH Lu, James ; XT:Lysyshyn, Mark Dr. HLTH:IN ; XT:Mckee, Geoff HLTH:IN ; Schwandt, Michael [VCH]  
**Subject:** Lancet articles  
**Importance:** High

Hi Reka and Trevor – our EOC Policy group briefly discussed the two new Lancet articles (attached):

1. Systemic review of factors preventing COVID transmission, now being widely reported as demonstrating the superiority of N95 respirators in preventing transmission compared to surgical masks
2. Surgical mortality amongst those with perioperative COVID infection, including a small group who were asymptomatic – may increase pre-surgical screening of all patients (already sent to me by our regional head of anaesthesia)

We felt it was important to get in front of these articles with common provincial messaging, if we get a group to review today. I haven't reviewed them myself yet but copying our MHOs to see if others can assist in reviewing these today.

Patty



Patricia Daly MD, FRCPC  
Vice-President, Public Health and Chief Medical Health Officer  
Vancouver Coastal Health  
#800-601 West Broadway  
Vancouver, BC V5Z 4C2  
Phone: 604-675-3924  
Fax: 604-731-2756  
E-mail: [Patricia.Daly@vch.ca](mailto:Patricia.Daly@vch.ca)

**Assistant:** Erika Bell  
Phone: 604-675-3918  
E-mail: [Erika.Bell@vch.ca](mailto:Erika.Bell@vch.ca)

# Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis

Derek K Chu, Elie A Akl, Stephanie Duda, Karla Solo, Sally Yaacoub, Holger J Schünemann, on behalf of the COVID-19 Systematic Urgent Review Group Effort (SURGE) study authors\*



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# Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study



COVIDSurg Collaborative\*



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## Sullivan, Michelle A HLTH:EX

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**From:** Patrick, David [BCCDC] <David.Patrick@bccdc.ca>  
**Sent:** March 20, 2020 4:47 PM  
**To:** \_BCCDC\_Mho  
**Cc:** Burgess, Heather [BCCDC]; Becu, Annelies [BCCDC]; Smolina, Kate [BCCDC]; Crabtree, Alexis [BCCDC]; HECC Planning HLTH:EX; Skowronski, Danuta [BCCDC]; XT:HLTH Gustafson, Reka; XT:HLTH Galanis, Eleni; XT:Flatt, Alexandra HLTH:IN; XT:ODonnell, Maureen HLTH:IN; Henry, Bonnie HLTH:EX; 'trevor.corneil2@interiorhealth.ca'; Otterstatter, Michael [BCCDC]; Janjua, Naveed [BCCDC]; XT:Krajden, Mel HLTH:IN; Hoang, Linda [BCCDC]; Sekirov, Inna [BCCDC]; Prystajec, Natalie [BCCDC]; XT:Patrick, David HLTH:IN  
**Subject:** Fw: Today's epi briefing  
**Attachments:** COVID Epi Briefing 20Mar2020.pdf

Good Afternoon, Everyone:

Kindly find today's Epi Briefing from our Epidemiology and Modeling Team.

In addition to comparing our own experience with global epidemic trajectories, this issue focuses on observations and estimates around public health measures and border closures.

We are looking to answer key questions to help with PH decision making. For that reason, your specific questions are welcome and can be passed up through your CMHOs who are meeting daily with Reka.

Heather - please share with full BCCDC EOC.

These remain internal briefings but we do want to work to defining web-sharable elements to sate the curiosity of the public and of our clinical colleagues.

Look after yourselves and take a few moments to take in some sunlight.

My best.

David

David M. Patrick, MD, FRCPC, MHSc  
Director of Research and Medical Epidemiology Lead for Antimicrobial Resistance, BCCDC  
Professor, UBC School of Population and Public Health

I respectfully acknowledge that I live and work on the unceded territory of the x<sup>w</sup>məθkwəy̓əm, Skwxwú7mesh, Stó:lō and Səlílwəta?/Selilwitulh Nations.

# COVID-19 Surveillance, Epidemiology and Modelling Teams Update

## Epidemiological Briefing: International situation

20 March 2020



BC Centre for Disease Control  
Provincial Health Services Authority

# Globally, March 19<sup>th</sup> - Deaths

Coronavirus deaths in Italy and Spain are increasing much more rapidly than they did in China

Cumulative number of deaths, by number of days since 10th death



FT graphic: John Burn-Murdoch / @johnburnmurdoch  
Source: FT analysis of Johns Hopkins University, CSSE, Worldometers. Data updated March 19, 15:00 GMT  
© FT

3/20/2020

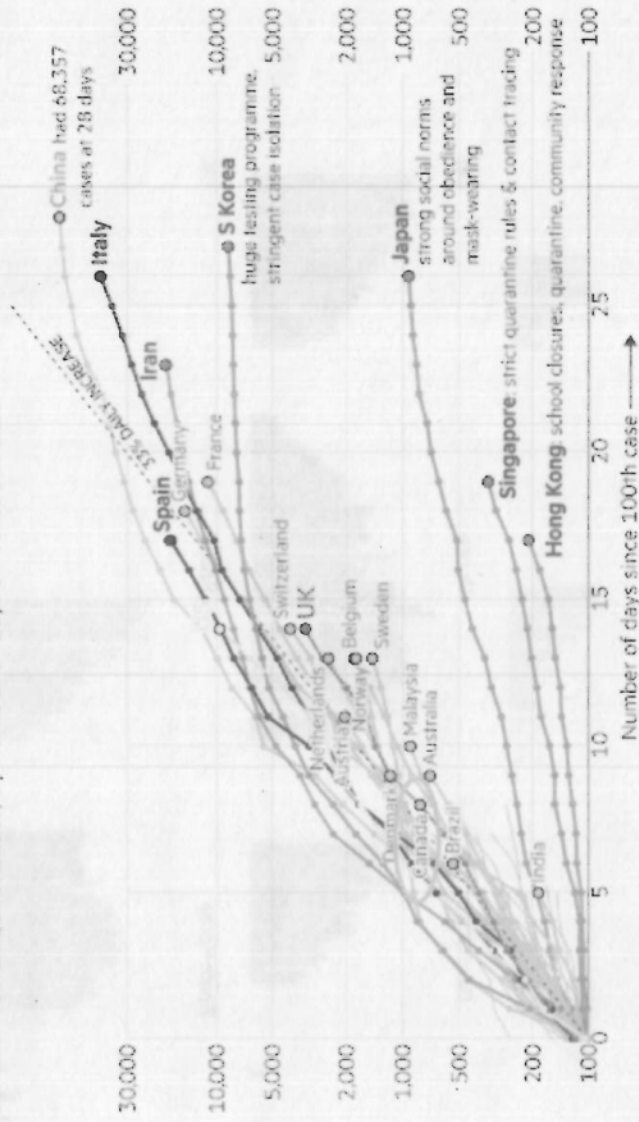
DRAFT - NOT FOR FURTHER DISTRIBUTION

<https://www.ft.com/content/a26fbf7e-48f8-11ea-aeb3-955839e06441>

# Globally, March 19<sup>th</sup> – Diagnosed cases

## Country by country: how coronavirus case trajectories compare

Cumulative number of cases, by number of days since 100th case



FT graphic: John Burn-Murdoch / @johnburnmurdoch  
Source: FT analysis of Johns Hopkins University, CSSE, Worldometers. Data updated March 19, 19:00 GMT  
© FT

For the first time since epidemic start, there were no newly confirmed, locally acquired cases in China in the past 24hrs. Risk is now from returning Chinese nationals who may bring it back from other countries.

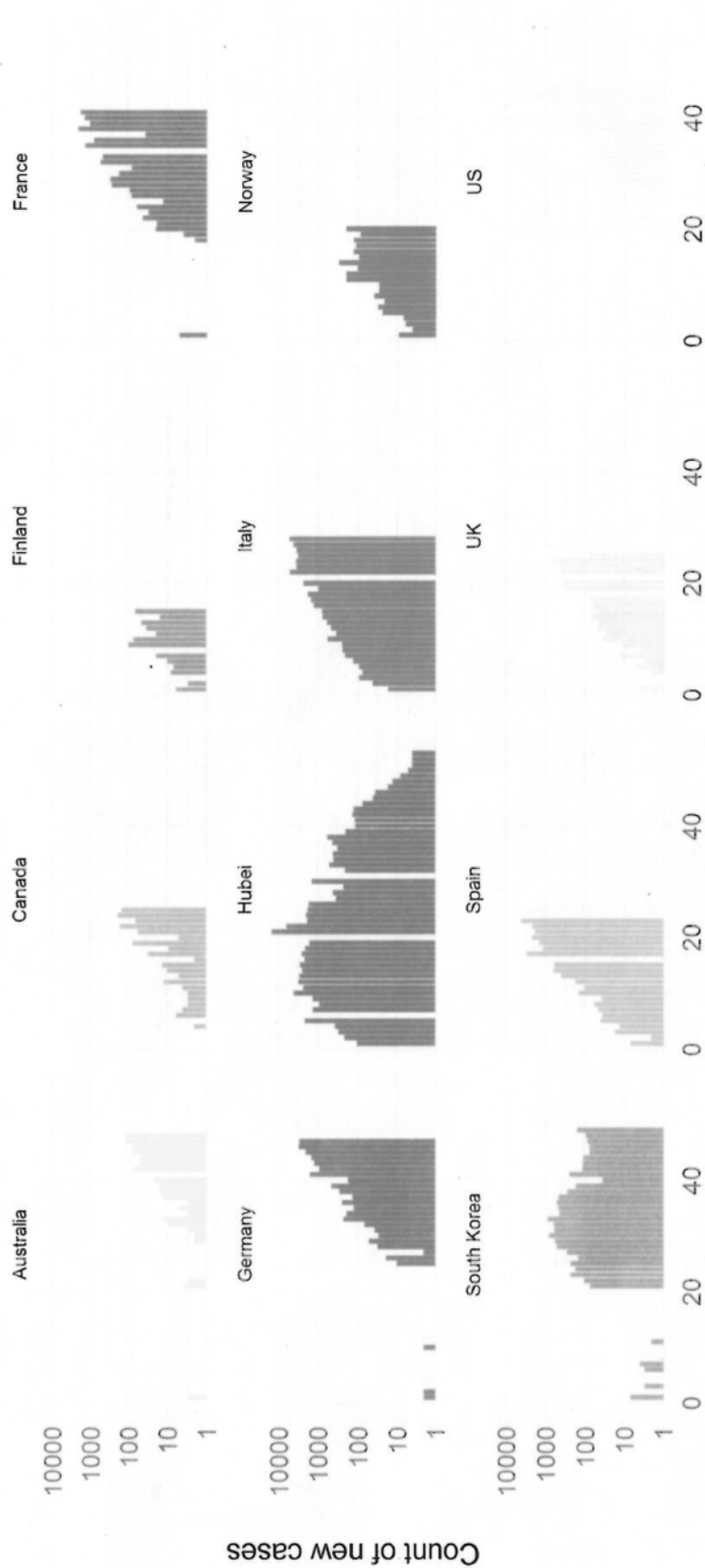
Germany is planning to build a new 1000 bed hospital in Berlin at a trade fair exhibition site

3/20/2020

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<https://www.ft.com/content/a26fbf7e-48f8-11ea-aeb3-955839e06441>

# New Covid-19 Cases per day by Country



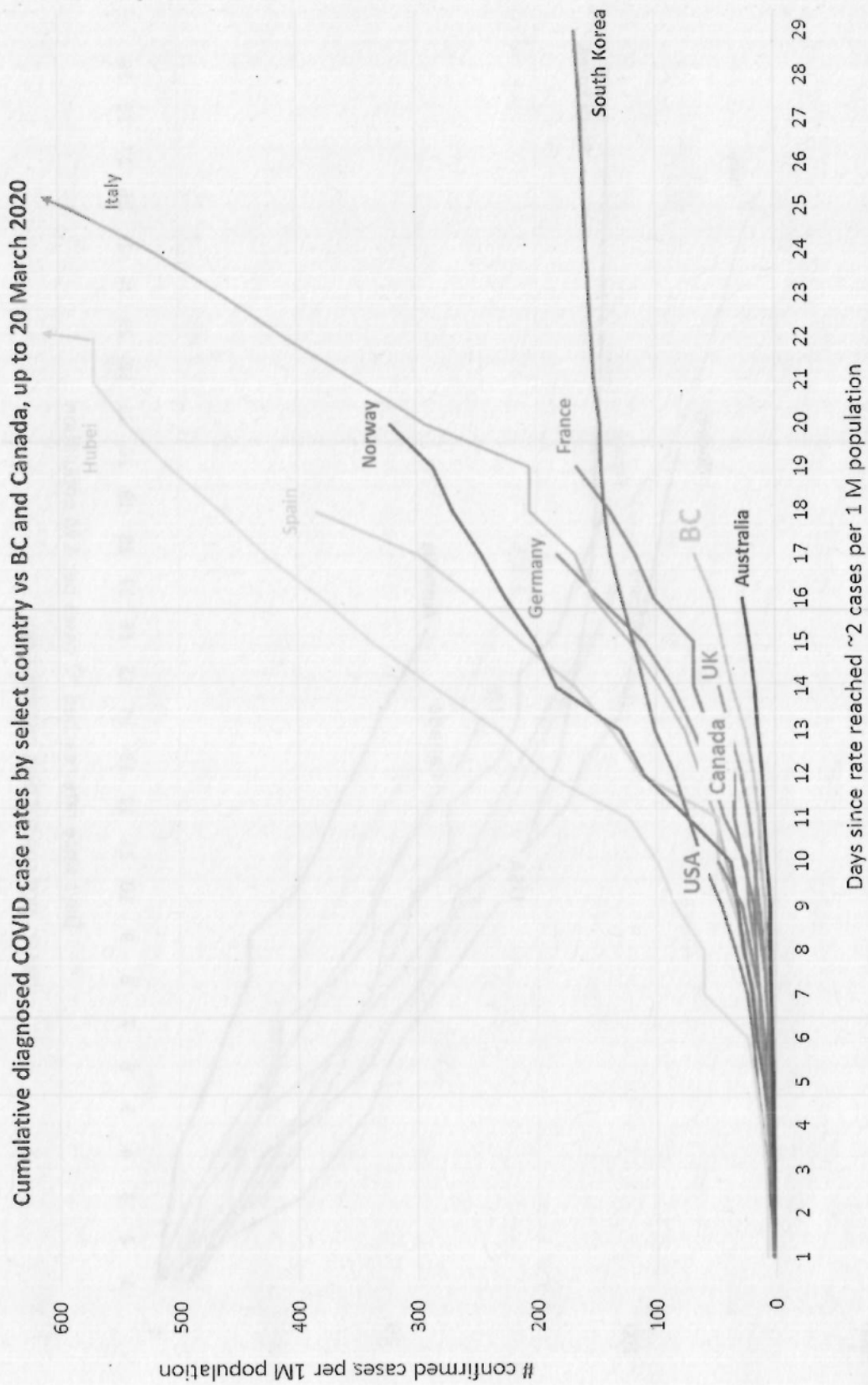
Days Since 10th Case

Data extracted from JHU CSSE Github repository on 2020-03-20

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Days since rate reached ~2 cases per 1 M population

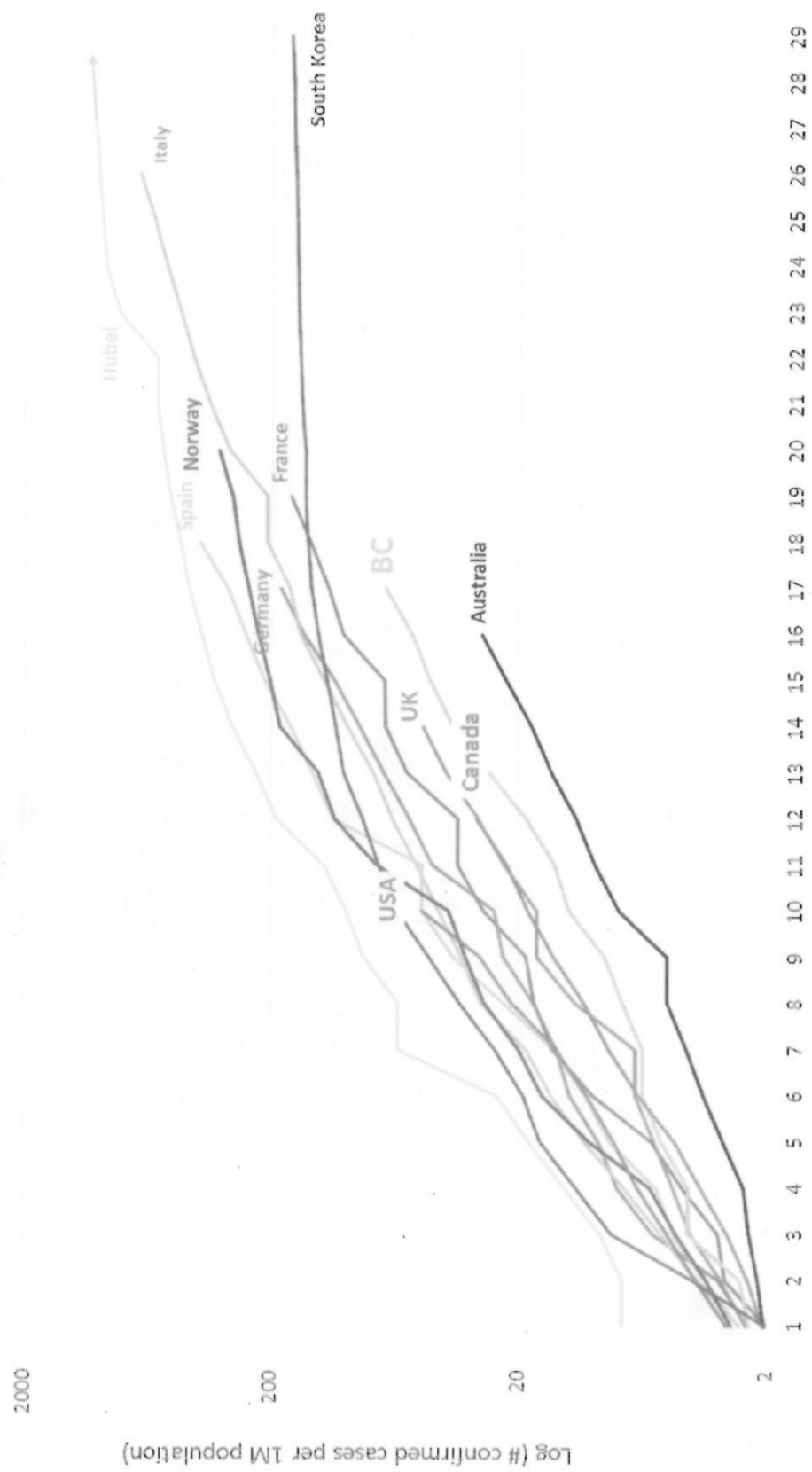
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case rates per  
1M pop ↑

3/20/2020



Cumulative diagnosed COVID case rates by select EU country vs BC and Canada, up to 20 March 2020



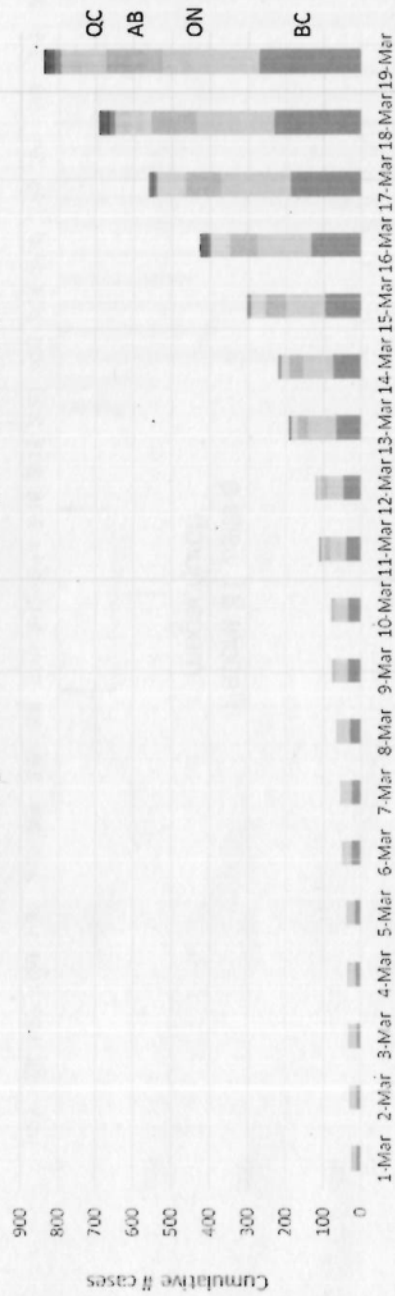
Same graph on a log scale

Note log scale & case rates per 1M pop →

Days since rate reached ~2 cases per 1 M population  
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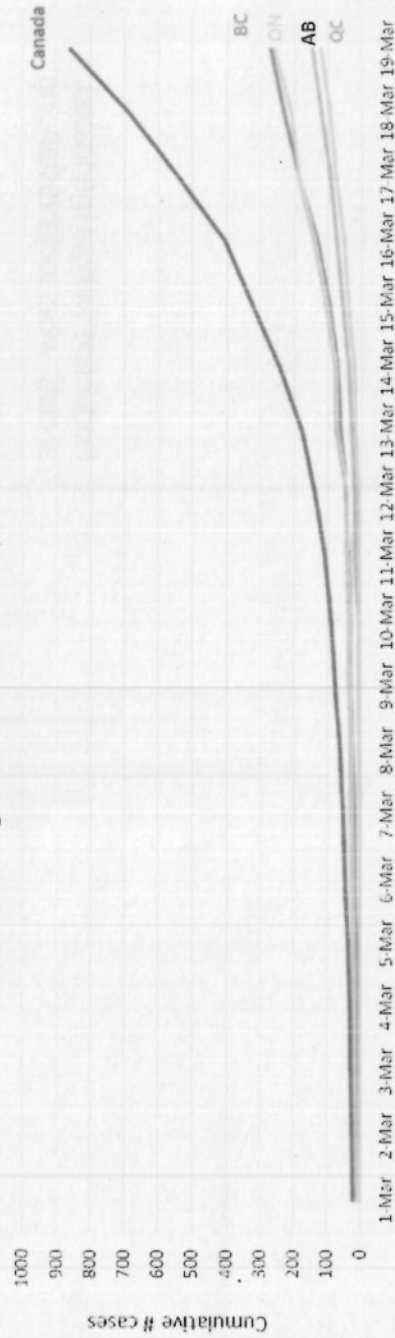
3/20/2020

Canada: diagnosed COVID-19 cases, 19 March 2020



Sources: official provincial websites + internal BCCDC communication for BC numbers; Canadian numbers reflect BC's latest numbers

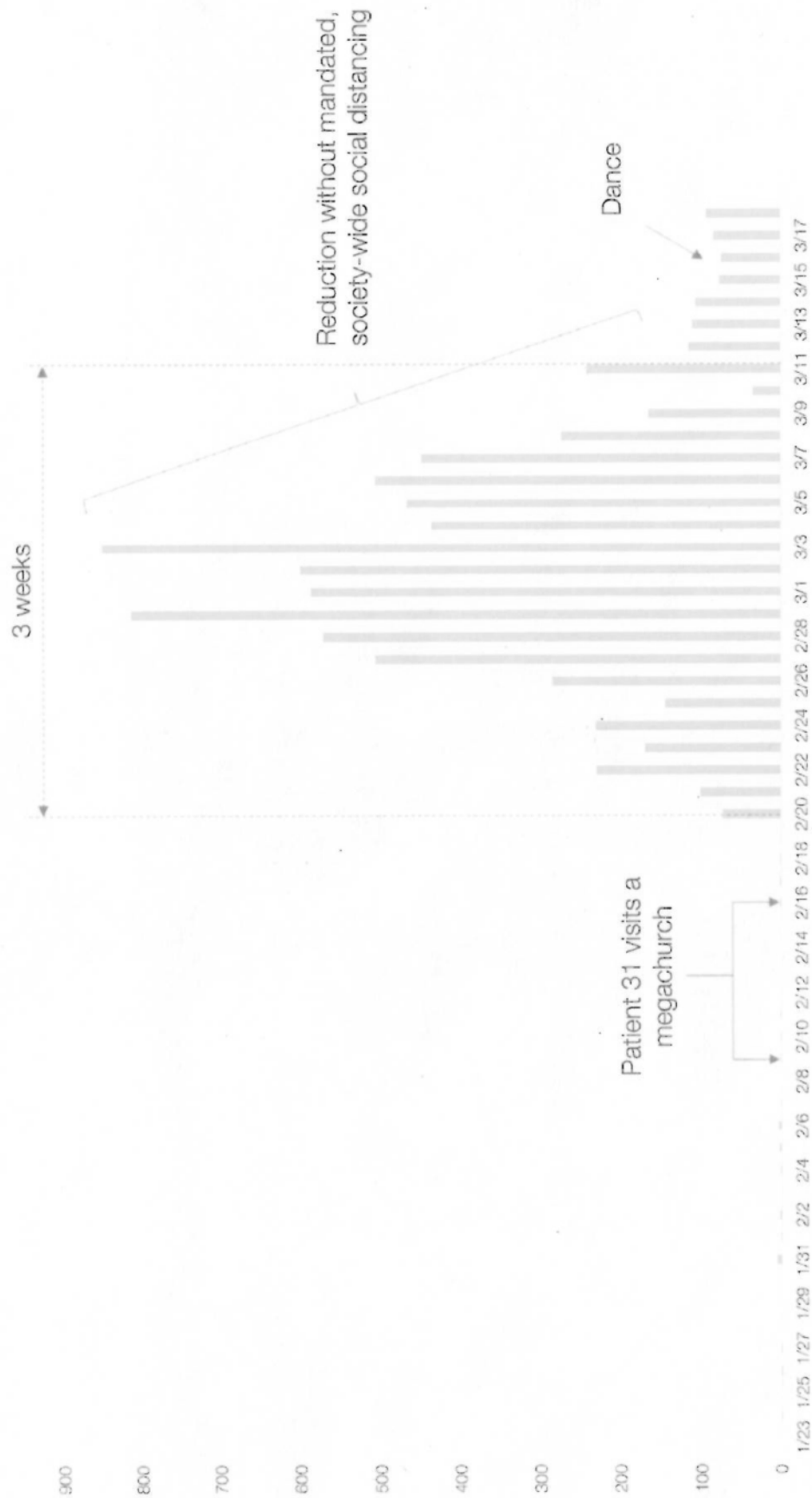
Canada: diagnosed COVID-19 cases, 19 March 2020



3/20/2020

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# Chart 12.b: New Daily Cases in South Korea



Source: Tomas Pueyo analysis from primary data from Johns Hopkins uploaded to Github by Ryan Lau:  
[https://github.com/CSSEGISandData/COVID-19/blob/master/csse\\_covid\\_19\\_data/csse\\_time\\_series\\_19\\_covid-Confirmed.csv](https://github.com/CSSEGISandData/COVID-19/blob/master/csse_covid_19_data/csse_time_series_19_covid-Confirmed.csv)

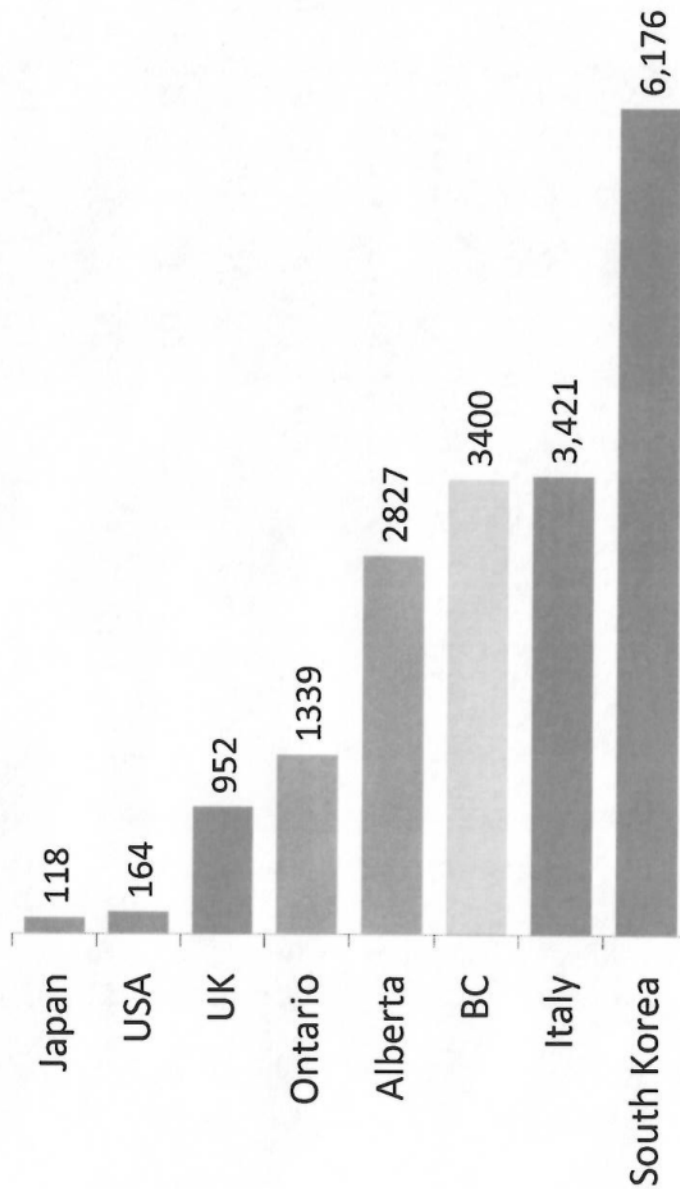
## South Korea: Importance of early events and interventions

- **Proactive** – testing started mid-January; enhanced surveillance for pneumonia in health care facilities from late January; travellers from Hubei banned early Feb; government advises restricted travel mid Feb
- **Outlier “super-spreader” event early in epidemic** (linked to one church in which >3,900 people were infected). This led to a rapid initial rise in cases; control of this outbreak may have been associated with a decline in the rate of increase
- Note: there was no country-wide, Italy-style “lockdown” – instead, the focus was on efficient testing, contact tracing, travel bans, isolation and quarantines
- Singapore – another example of success – largely adopted a similar strategy, supplemented with economic help to those in quarantine

[https://www.ijidonline.com/article/S1201-9712\(20\)30150-8/fulltext](https://www.ijidonline.com/article/S1201-9712(20)30150-8/fulltext)

## South Korea: extensive early testing

**Tests per Million People**



- Testing in South Korea is extensive compared to other countries
- It was also instituted early in order to facilitate contact tracing and management

<https://www.worldometers.info/coronavirus/covid-19-testing/>

# Contact tracing and management

- Comprehensive contact tracing
  - Done by interview, cell phone GPS, credit card purchases, and CCTV
  - Frequent public announcement for contact notification
- Active and enforced contact management
  - Twice daily monitoring
  - Fines for violators
- Use of technology
  - Incoming travellers required to answer twice daily symptom monitoring
  - Incoming travellers on a voluntary basis use an app that alerts if they leave their quarantine zone
- Cohorting of moderate cases
  - High-risk cases prioritized for hospitals
  - Moderate risk isolated and observed in repurposed buildings

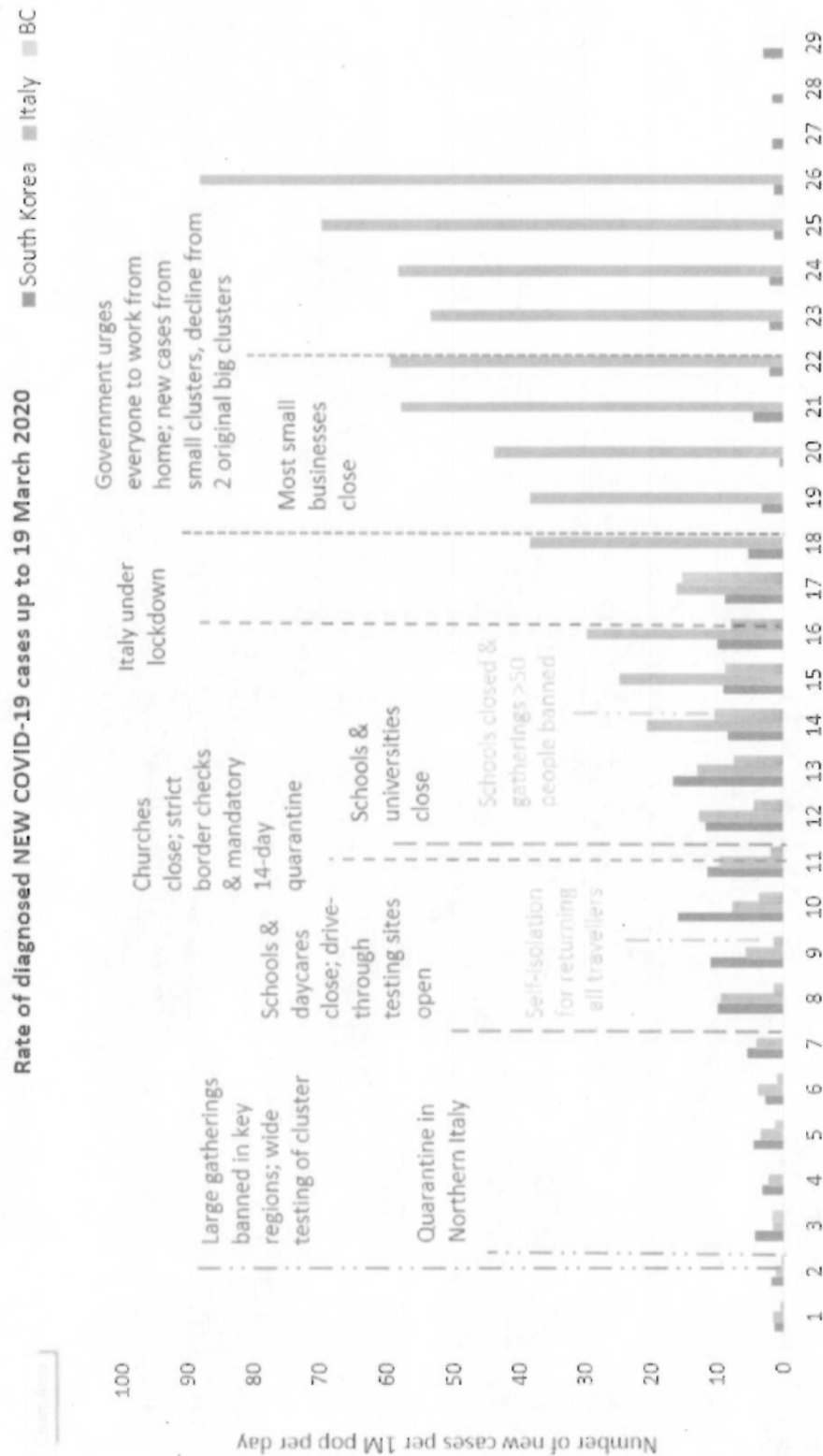
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7045882/>

<https://www.sciencemag.org/news/2020/03/coronavirus-cases-have-dropped-sharply-south-korea-whats-secret-its-success>

<https://www.euractiv.com/section/coronavirus/news/commitment-transparency-pav-off-as-south-korea-limits-covid-19-spread/>



# Comparison of mitigation strategies in Italy, South Korea and BC so far

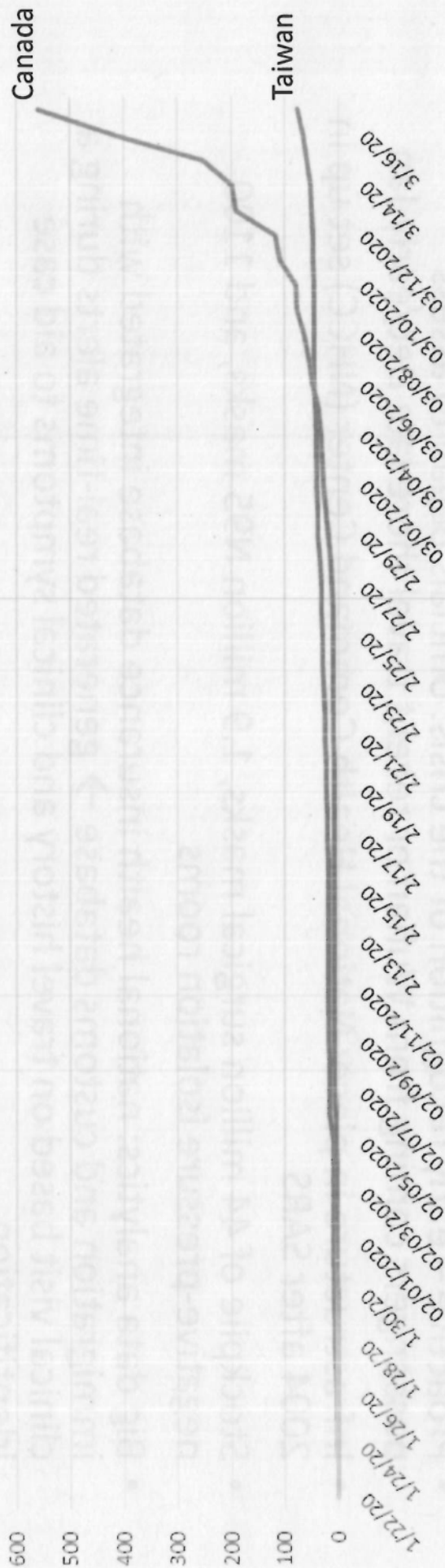


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# Taiwan: 23M citizens, still <100 cases over two months

COVID-19 cases in Taiwan and Canada, 22 Jan - 16 Mar 2020





## Taiwan experience

- Proactive – early recognition of the crisis: officials began to assess passengers coming from Wuhan or recent travel there late Dec/early Jan
- Infrastructure in place: National Health Command Center (NHCC) set up in 2004 after SARS
- Stockpile of 44 million surgical masks, 1.9 million N95 masks, and 1100 negative-pressure isolation rooms
- Big data analytics: national health insurance database integrated with immigration and customs database → generated real-time alerts during a clinical visit based on travel history and clinical symptoms to aid case identification.
  - Travellers with higher risk were quarantined at home and tracked through their mobile phone to ensure that they remained at home during the incubation period
- Regular communication to the public: simple health messaging coupled with timely, accurate and transparent information on the epidemic

[https://jamanetwork.com/journals/jama/fullarticle/2762689?fbclid=IwAR0L3sZ7l2aQFEnpDsA9\\_LG6KxYUepp1qJMhIV8BU7rcNlpc2X0Hi8BfXA](https://jamanetwork.com/journals/jama/fullarticle/2762689?fbclid=IwAR0L3sZ7l2aQFEnpDsA9_LG6KxYUepp1qJMhIV8BU7rcNlpc2X0Hi8BfXA)

## Interesting studies

- Vo, small town in Italy, where first COVID death occurred, tested all of its 3,300 inhabitants to study the natural history of the virus
  - 3% were infected
  - 50% of infected did not have any symptoms
- The town hasn't seen new infections for days now since this was done.
- A recent study based on Chinese data used a model to estimate epidemiological characteristics of COVID-19:
  - **86%** of infections were undocumented prior to travel restrictions
  - Transmission rate of undocumented infections was 55% of documented, but due to greater numbers, undocumented infections were the source for 79% of documented cases in China
- NB: may not be directly applicable to other countries based on differences in control, surveillance, and reporting practices

<https://www.trialsitenews.com/university-of-padua-vo-study-one-possible-hypothesis-of-how-to-contain-covid-19/>

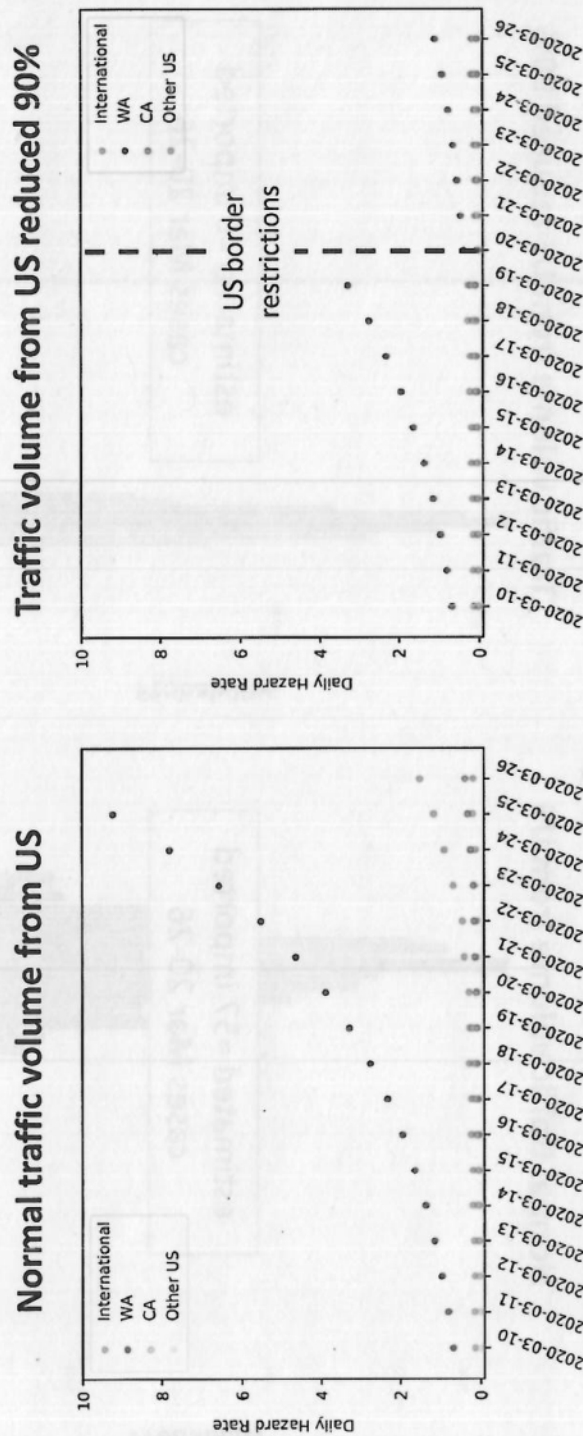
<https://science.sciencemag.org/content/early/2020/03/13/science.abb3221>

Some previous slides, updated

3/20/2020

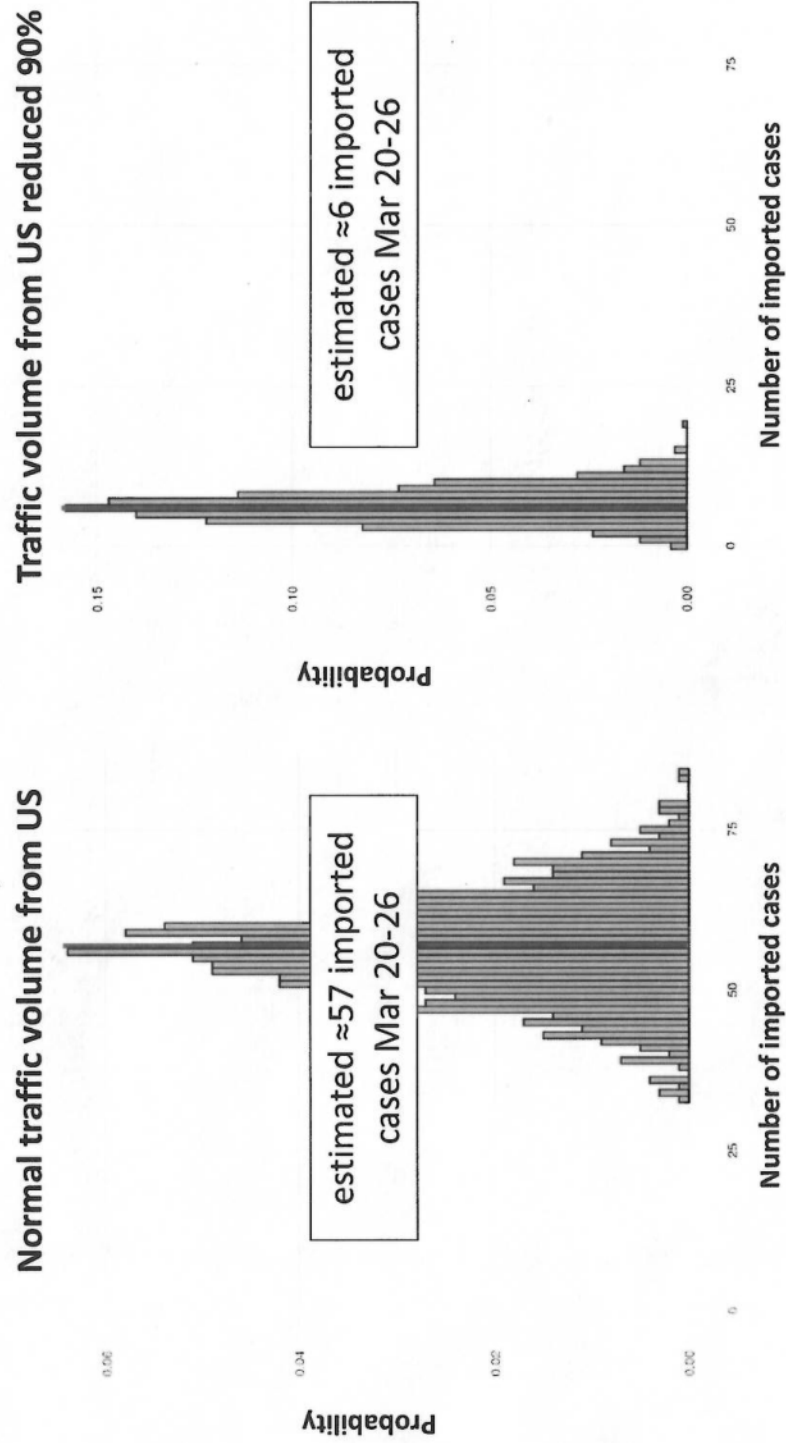
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# Daily risk of imported cases to BC, by origin (March 20 – 26)



Forecasts may be underestimated due to under-reporting of COVID-19 prevalence

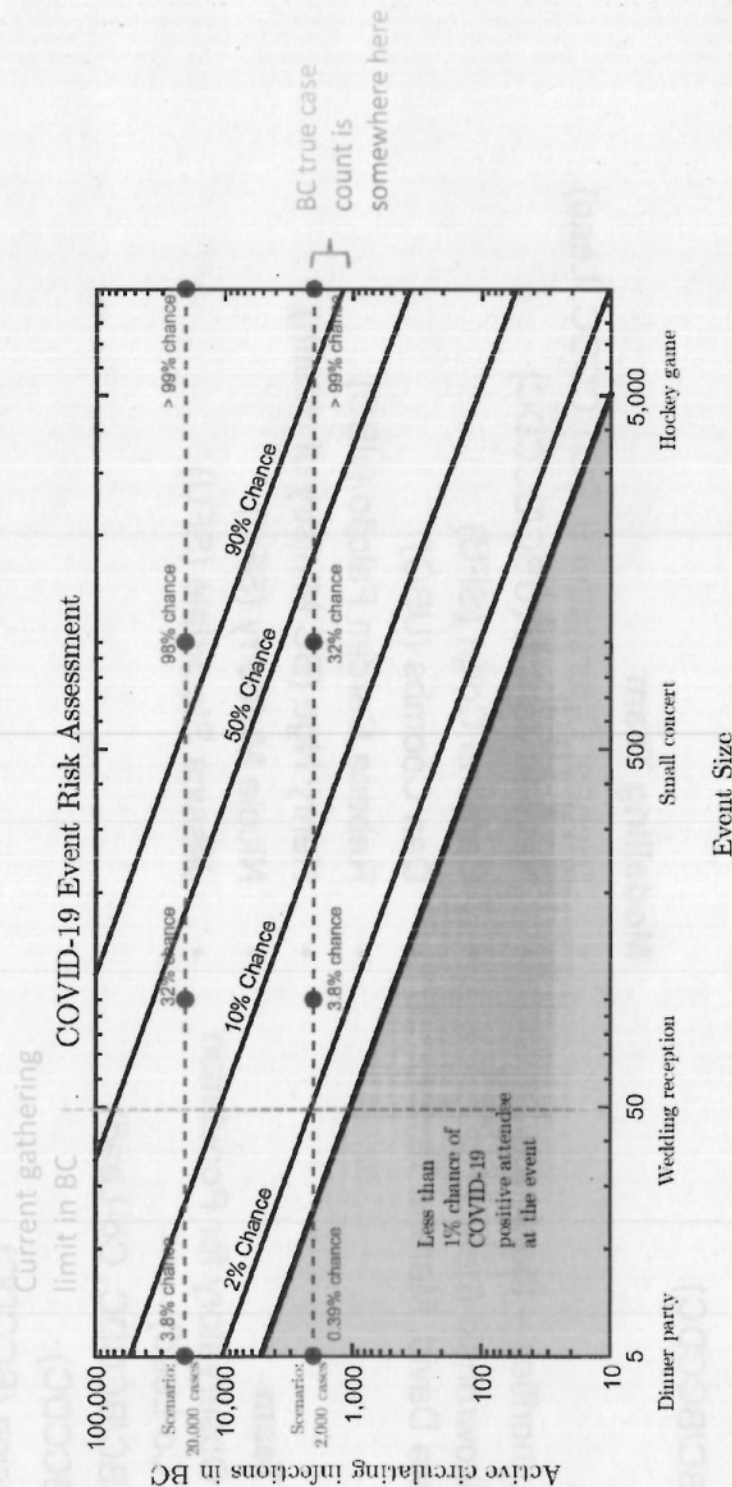
# Predicted numbers of cases imported to BC (March 20 – 26)



Forecasts may be underestimated due to under-reporting of COVID-19 prevalence

# BC-specific gathering size risk assessment tool – 20 March

The diagonal lines illustrate different % likelihoods that someone in attendance at a gathering of a given size has COVID-19. At the current BC limit of 50 people per gathering, the likelihood of someone having COVID-19 at a given gathering is up to 2%.



## Assumptions

- Given the rapid recent growth in BC, most cases are still active
- Homogenous mixing within the population (all of BC)
  - Therefore underestimate the risk on the Lower Mainland and overestimate it elsewhere
- Individual gatherings will have a higher or lower risk based on whether they are gatherings of a group with a higher burden of cases
- Shows the likelihood that someone with COVID-19 is present, but not the risk of transmission – which depends on distancing, type of contact at the event, and protective measures taken

Original image and code to adapt it for BC shared by Dr. Joshua Weitz (Georgia Tech) under Creative Commons. Original resource is [here](#).



## BCCDC COVID-19 Surveillance, Epidemiology and Modelling (SEM) Teams

Lead: David Patrick (UBC/BCCDC)

### Surveillance Teams

- Regional Health Authorities – thank you
- BCCDC: Danuta Skowronski (Lead),  
May Ahmed, Samara David, Marsha Taylor,  
David Roth

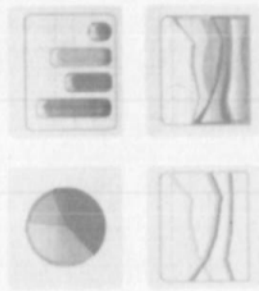
### Global Epidemiology Team

- Kate Smolina (BC Observatory for Population  
and Public Health, Co-Lead)
- Alexis Crabtree (UBC/BCCDC, Co-Lead)
- Chris Mill (PHAC/BCCDC)
- Theodora Consolacion (BCCDC)
- Kamila Romanowski (UBC/BCCDC)

### Modelling Team

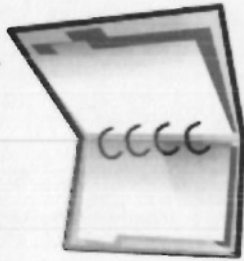
- Michael Otterstatter (UBC/BCCDC, Lead)
- Naveed Janjua (UBC/BCCDC)
- Caroline Colijn (SFU)
- Dan Coombs (UBC)
- Rebeca Cardim Falcão (UBC)
- Henry Ngo (BC Ministry of Health)
- Nicola Mulberry (SFU)
- Jessica Stockdale (SFU)

COVID-19 Epi Briefings



March 19, 2020

Reference / Reports



BCCDC Surveillance Reports

This document – and previous versions of it – is also available on SharePoint at

[http://our.healthbc.org/sites/BC\\_Observatory/COVID-19\\_Epi\\_Briefings/COVID19%20Epi%20Briefings/Forms/AllItems.aspx](http://our.healthbc.org/sites/BC_Observatory/COVID-19_Epi_Briefings/COVID19%20Epi%20Briefings/Forms/AllItems.aspx)



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## Sullivan, Michelle A HLTH:EX

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**From:** Corneil, Trevor HLTH:EX  
**Sent:** April 8, 2020 9:46 AM  
**To:** Sauve, Laura [CWBC]  
**Subject:** Re: new article - effect of school closures  
**Attachments:** school closure systematic review (Lancet Child Adol 2020).pdf; ATT00001.htm

Nice!!

Best,  
Trevor  
604 218 5718

On Apr 8, 2020, at 09:35, Sauve, Laura [CWBC] wrote:

hi - you might be interested in this article - systematic review looking at effects of school closures.

Laura

Dr. Laura Sauve  
Pediatric Infectious Diseases Specialist  
K4-221 - 4480 Oak Street  
BC Children's Hospital  
Vancouver, BC, V6H 3V4  
Phone: 604-875-3049

# School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review



Russell M Viner, Simon J Russell, Helen Croker, Jessica Packer, Joseph Ward, Claire Stansfield, Oliver Mytton, Chris Bonell, Robert Booy

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Page 071 of 153 to/à Page 077 of 153

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## Sullivan, Michelle A HLTH:EX

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**From:** Gustafson, Reka [BCCDC] <reka.gustafson@phsa.ca>  
**Sent:** March 31, 2020 10:43 PM  
**To:** XT:Naus, Monika HLTH:IN; XT:Larder, Andrew Fraser Health Authority EAO:IN; XT:Adams, Evan HLTH:IN; King, Arlene; Behn Smith, Daniele HLTH:EX; Henry, Bonnie HLTH:EX; XT:Hanley, Brendan HLTH:IN; Elliott, Catherine [EXT]; Crabtree, Alexis [BCCDC]; Emerson, Brian P HLTH:EX; Kancir, Jesse M HLTH:EX; XT:Lysyshyn, Mark Dr. HLTH:IN; Lavoie, Martin Dr. HLTH:IN; XT:McDonald, Shannon HLTH:IN; XT:Mema, Dr. Silvina HLTH:IN; Daly, Patty [VCH]; Kendall, Perry [EXT]; XT:Fumerton, Raina HLTH:IN; XT:HLTH Stanwick, Richard; XT:HLTH Pollock, Sue; Corneil, Trevor HLTH:EX; Brown, Stephen R HLTH:EX  
**Subject:** Re: record of COVID CMHO call March 31  
**Attachments:** PublicHealthSectionMeeting.pptx; SBAR - Successful measures by other countries to flatten COVID-19 curves - Mar 30, 2020 (1).docx

Hello Everyone,

Please find attached some slides that summarize background information about the questions we identified for discussion tomorrow. Also attached is a review produced by Martin's team that shows how public health interventions (testing, contact tracing, social marketing) were used to limit the intensity of public health measures in some countries.

Thank you and talk to you tomorrow,

Reka



# CMHO Discussion Questions

Apr 1, 2020



BC Centre for Disease Control  
Provincial Health Services Authority

# Testing

# WHO guidance on testing

| Epidemic stage  | Testing recommendations   |
|---|---|
| <b>Sporadic cases</b><br>(one or more cases, imported or locally acquired)                      | Test all individuals meeting the case definition  |
| <b>Clusters of cases</b><br>(most cases of local transmission linked to chains of transmission) | Test all individuals meeting the case definition  |
| <b>Community transmission</b><br>(inability to link to chains of transmission for most cases)   | <p>If diagnostic capacity is insufficient, implement prioritized testing and measures that can reduce spread (e.g. isolation), including priority testing of:</p> <ul style="list-style-type: none"> <li>• people who are at risk of developing severe disease and vulnerable populations, who will require hospitalization and advanced care for COVID-19</li> <li>• symptomatic health workers (including emergency services and non-clinical staff) regardless of whether they are a contact of a confirmed case</li> <li>• the first symptomatic individuals in a closed setting (e.g. schools, long term living facilities, prisons, hospitals)</li> </ul> |

<https://www.who.int/publications-detail/critical-preparedness-readiness-and-response-actions-for-covid-19>

**Group 1:** Member of, or high degree of interaction with, high risk or vulnerable populations.

AND

Individuals that need testing to direct immediate operational action.

### **Sypmtomatic**

- HCW or people who work in health care settings
- Residents of LTCF
- Hospitalized patients with no alternate diagnosis
- Remote, isolated or indigenous communities
- Travellers entering Canada

### **Why?**

- Prevent introduction into, transmission within LTCF/health care
- Prevent transmission to other staff to maintain healthy workforce
- Limit transmission in settings with vulnerable populations
- Limit transmission in settings with limited access to care
- Prevent further introduction to Canada

**Group 2:** Individuals with higher risk of exposure to the virus and in whom early detection will inform the need for, and effectiveness of, control measures aimed at preventing spread and protecting critical infrastructure

**Symptomatic**

- close contacts of confirmed cases
  - individuals living with health care workers, staff who work in health care facilities (including Long Term care facilities) and prison staff.
  - Critical infrastructure workers\* who have travelled or had close contact with a case or who have been working in a setting known to have cases.
  - Returning international travellers who develop symptoms and become ill enough to require medical attention while on self-isolation.
- Identify local spread/clusters and implement control measures as needed.
  - To determine the need for more stringent requirements on the health care workers and staff working in health care facilities (including Long Term care facilities) or prisons in order to decrease the likelihood of transmission to the worker and onward transmission from the worker which could result in introduction of the virus into a closed high-risk setting.
  - To prevent transmission to other critical infrastructure workers (i.e., maintain workforce – prevent disruption)
  - To detect imported cases and implement measures to prevent spread (e.g. may need to extend self-isolation period for those who travelled with this individual – based on last close contact rather than date of arrival in Canada, also need to put others into self-isolation i.e., who do not have a travel history but are now contacts of a case).

### **Group 3: Individuals that if positive may signal that community transmission is occurring or who may become sources of community transmission.**

- Symptomatic Critical infrastructure workers\* who did not travel, and has no known exposure history.
- Returning international travellers who develop symptoms\* (not requiring medical attention) while on self-isolation.
- Members of the population with influenza-like illness who are already being tested for respiratory viruses.
- Has the potential to identify community transmission while also signalling that measures to prevent transmission to other critical infrastructure workers are needed for a specific worksite. (i.e., objective to maintain workforce – prevent disruption)
- To detect imported cases and implement measures to prevent spread in the community if symptoms extend past the end of the self-isolation period - warranting home isolation and self-isolation of close contacts.
- May detect community spread and does not require additional supplies since already being tested.



Ministry of Health

## COVID-19 Quick Reference Public Health Guidance on Testing and Clearance

This information can be used to help guide decision making on testing and clearance of individuals suspected or confirmed to have COVID-19. This information is current as of March 27, 2020 and may be updated as the situation on COVID-19 continues to evolve.

### Who should be tested for COVID-19?

Testing for COVID-19 should be based on clinical assessment, and not based on the case definition.

At this time, there are no criteria for testing and all specimens will be tested if submitted. However, where there are shortages of testing supplies, the following groups should be **prioritized** for testing to inform public health and clinical management for these individuals:

- Symptomatic health care workers (regardless of care delivery setting) and staff who work in health care facilities
- Symptomatic residents and staff in Long Term Care facilities and retirement homes and other institutional settings eg. Homeless shelter (as per outbreak guidance)
- Hospitalized patients admitted with respiratory symptoms (new or exacerbated)
- Symptomatic members of remote, isolated, rural and/or indigenous communities
- Symptomatic travellers identified at a point of entry to Canada

### Management of individuals who have not been tested

- If individual is asymptomatic and has no exposure risk
  - Provide reassurance and information for [Ontario COVID-19 website](#)
- If individual is asymptomatic, but has exposure risk
  - Provide information on [self-monitoring](#) and [self-isolation](#) for **14 days from exposure risk**

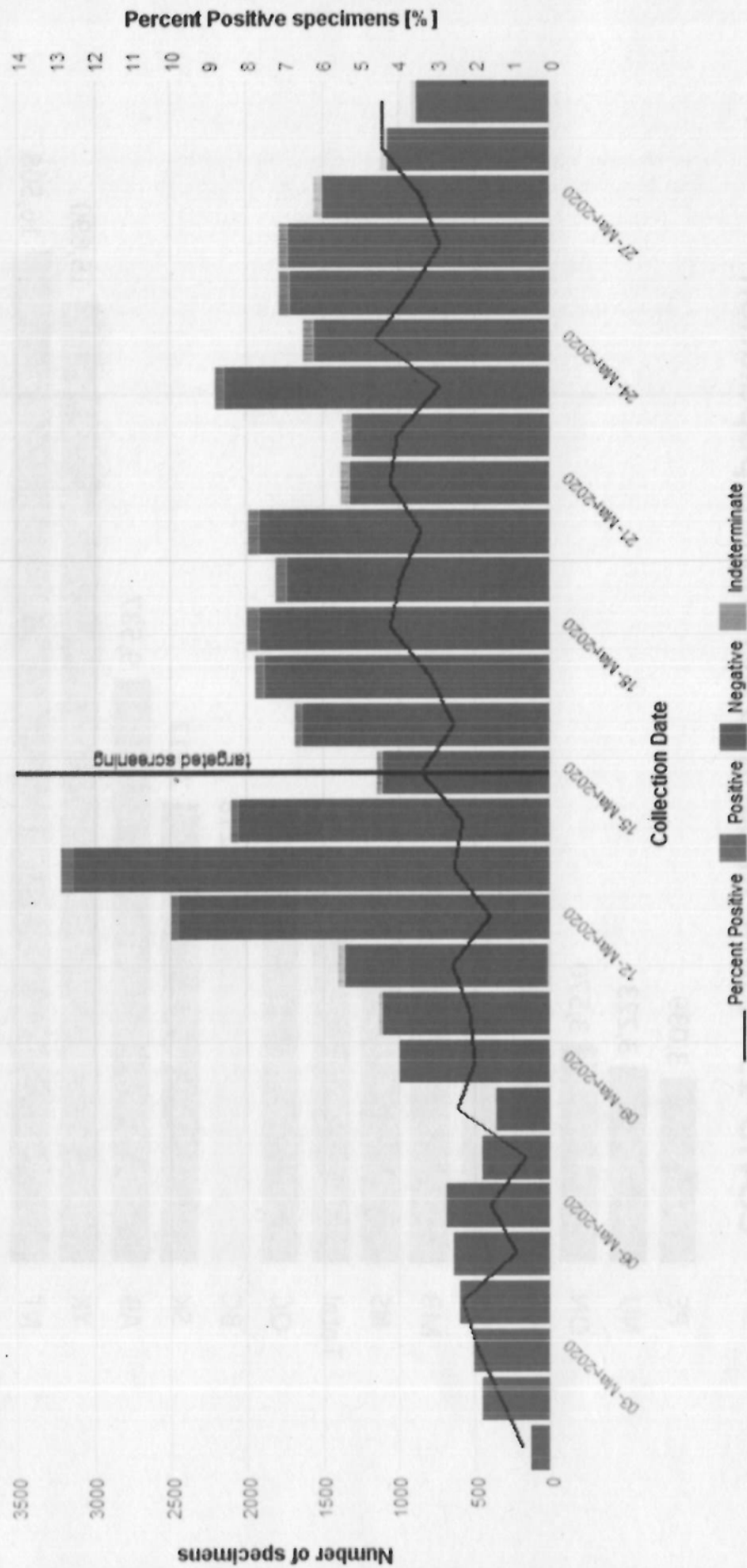
Version 3.0  
March 27, 2020

## BC Guidance

Testing is available for all patients who need it, but not everyone requires a test. B.C. is currently testing those with respiratory symptoms who are:

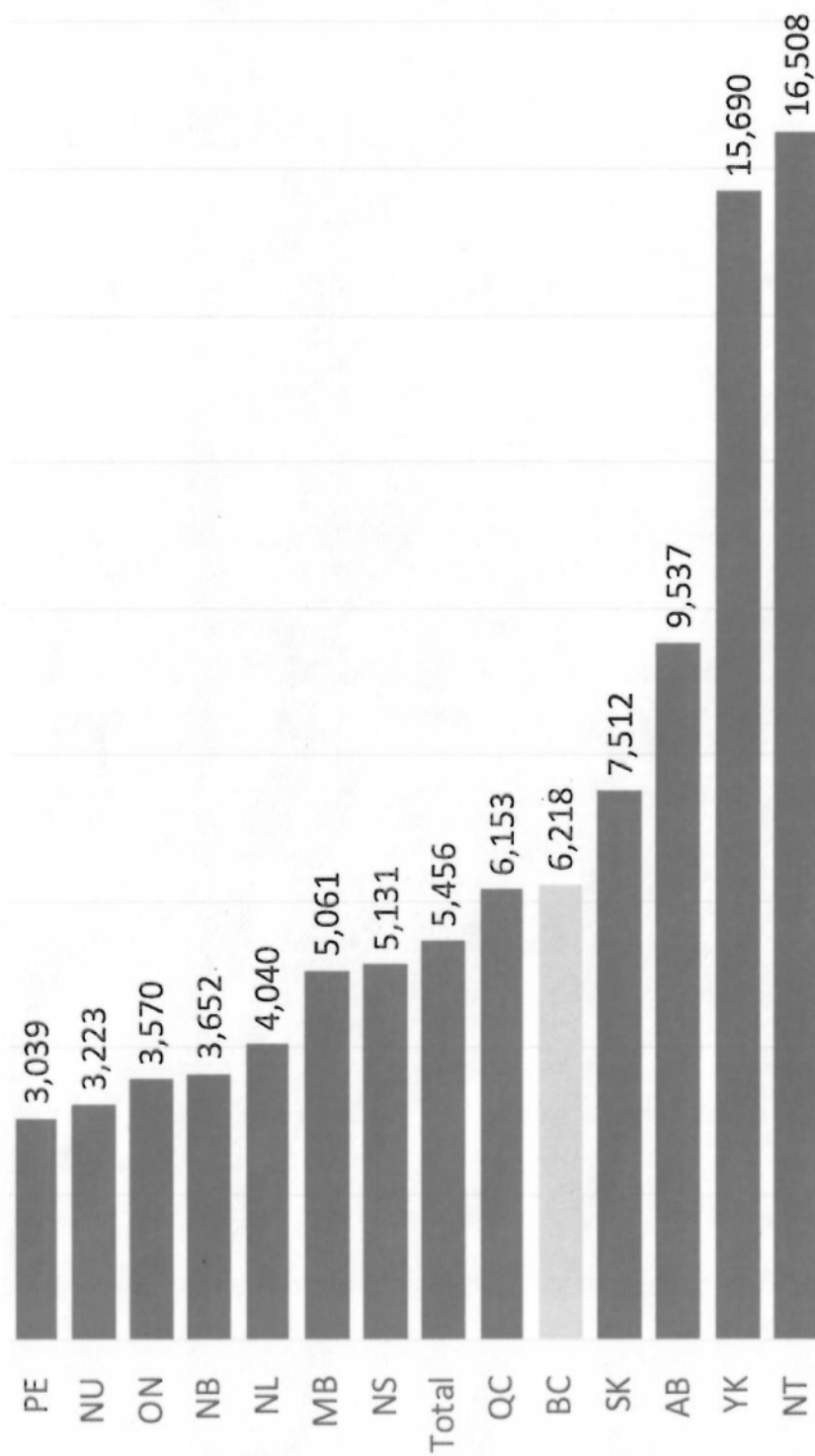
1. Hospitalized, or likely to be hospitalized
2. Health care workers
3. Residents of long term care facilities
4. Part of an investigation of a cluster or outbreak.

Proportion of respiratory specimens testing SARS-CoV-2 positive\* in BC, Mar 1-Mar 29, 2020 (N = 39,491)



Data source: PLOVER 31-Mar-2020  
 \* Non-resulted specimens are excluded.

## COVID-19 Testing in Canada per million population



Data current as of Mar 29, from the national surveillance report.

# Testing questions

s.13

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# Support public health measures

s.13

# Testing question #1

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## Testing question #2

# Public Health Measures

# What is the goal?

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# FHA Review of South Korea, Hong Kong, Taiwan and Germany

## RECOMMENDATIONS

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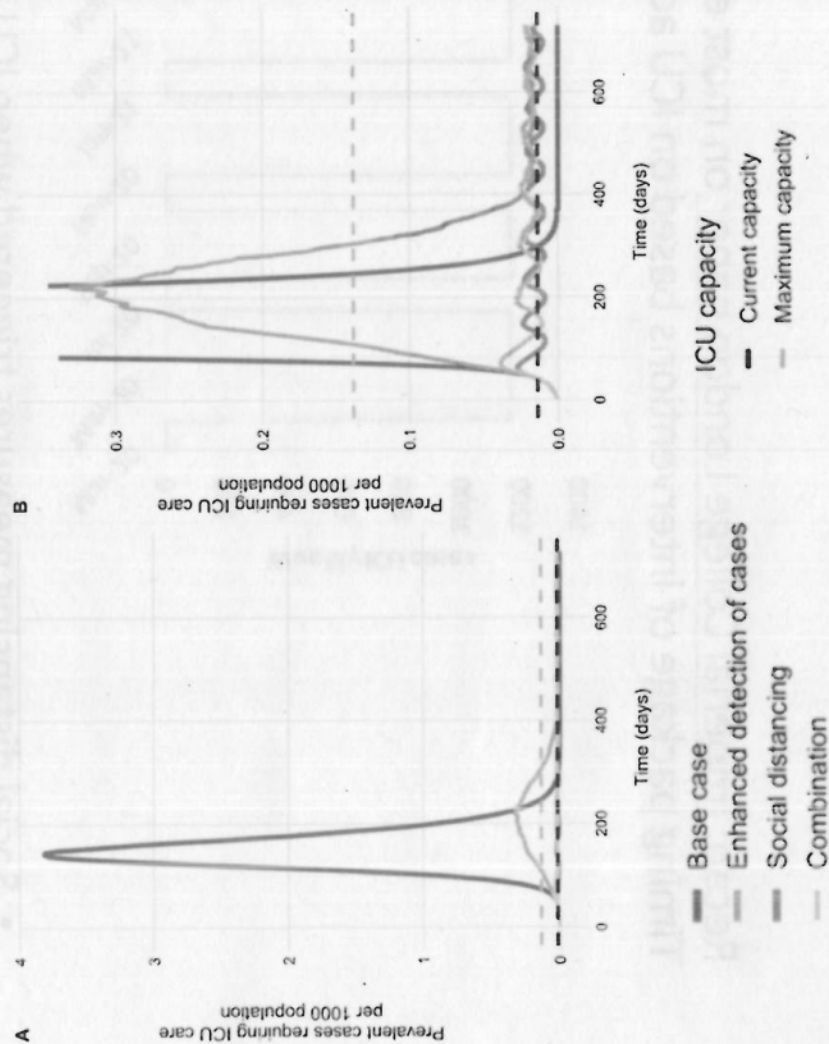


# Recommendations cont'd

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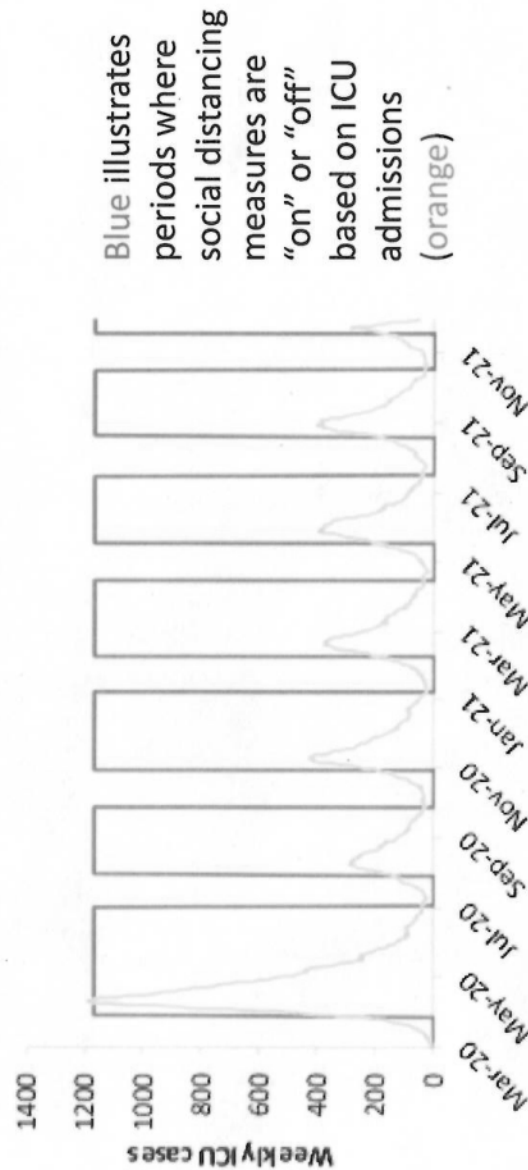
## ON model of prevalent cases requiring intensive care: base case vs 3 intervention scenarios

Zoomed in and stretched to see better



- New model from Ontario (Tuite, Fisman, and Greer) available as [preprint](#)
- Uses ICU census triggers for interventions (similar to Imperial College London [paper](#) – recap on next slide)
- Unlike ICL paper, **contact tracing** is an intervention
- Two strategies keep ICU below capacity:
  1. Strict social distancing alone
  2. Less strict social distancing in combination with long-term widespread testing and contact tracing → this highlights the importance of
    - creating systems for **timely assessment of ICU data** to guide public health action and
    - long-term intensive testing and contact tracing could keep critical care cases within capacity while allowing less strict social distancing

Recap: Imperial College London paper on most effective suppression strategy -  
Timing package of interventions based on ICU admission data triggers



- Social distancing measures triggered when ICU cases rise above set level
  - Case isolation, social distancing of the entire population and either household quarantine or school and university closure are required
  - Declines start 3 weeks after interventions implemented
- In BC, PHSA ICU dashboard (in development) could provide a data stream for this

It is extraordinarily difficult to compare measures across countries due to variability, but there is an attempt to compare countries in a standardized way by creating a Stringency Index

Oxford's Government Response Tracker classifies countries based on their use and timing of:

- School closing
- Workplace closing
- Cancellation of public events
- Closing public transit
- Public information campaigns
- Restrictions on internal travel
- International travel controls
- Monetary/financial measures

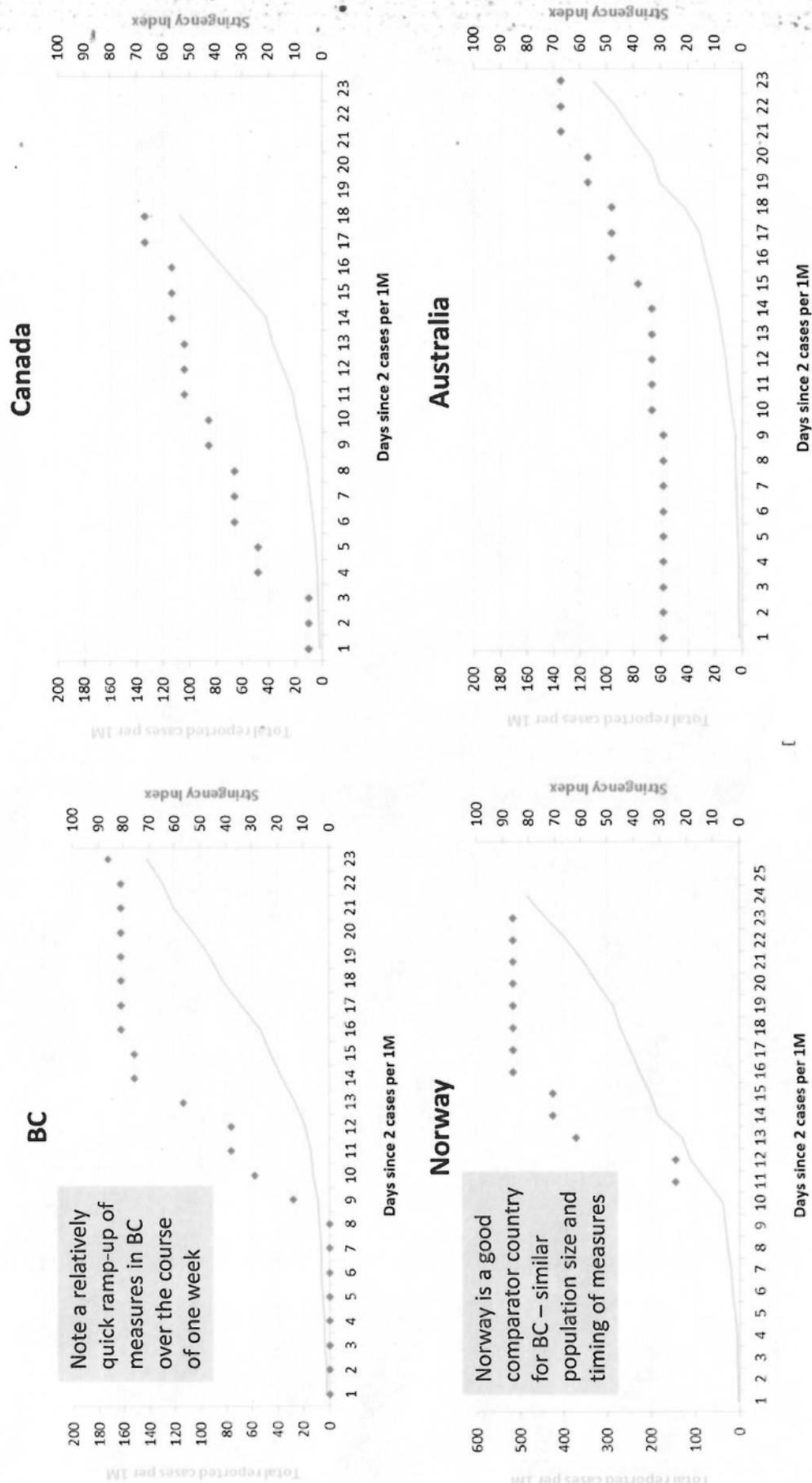
- Score is given for each intervention, and adjusted based on whether or not the measure was recommended or required, and whether it was targeted or general

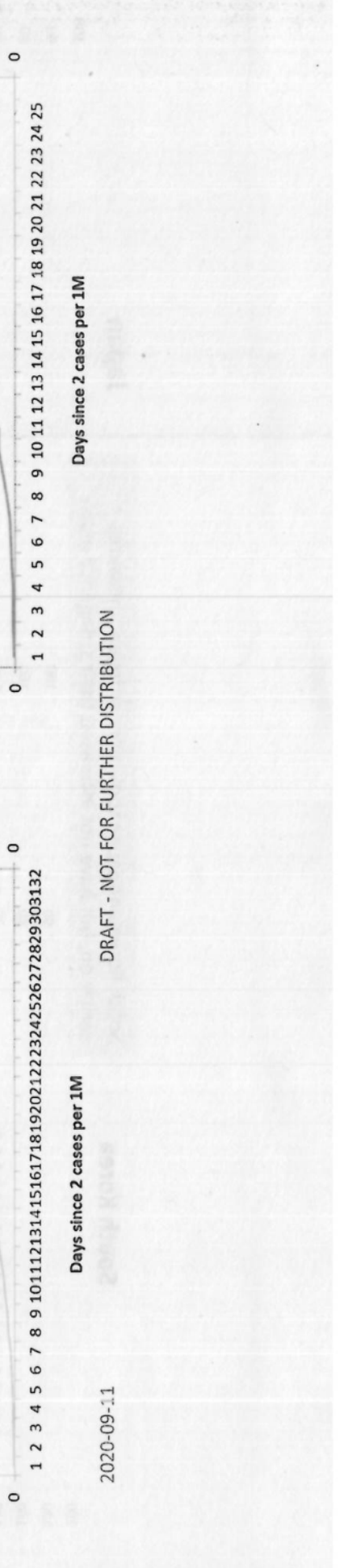
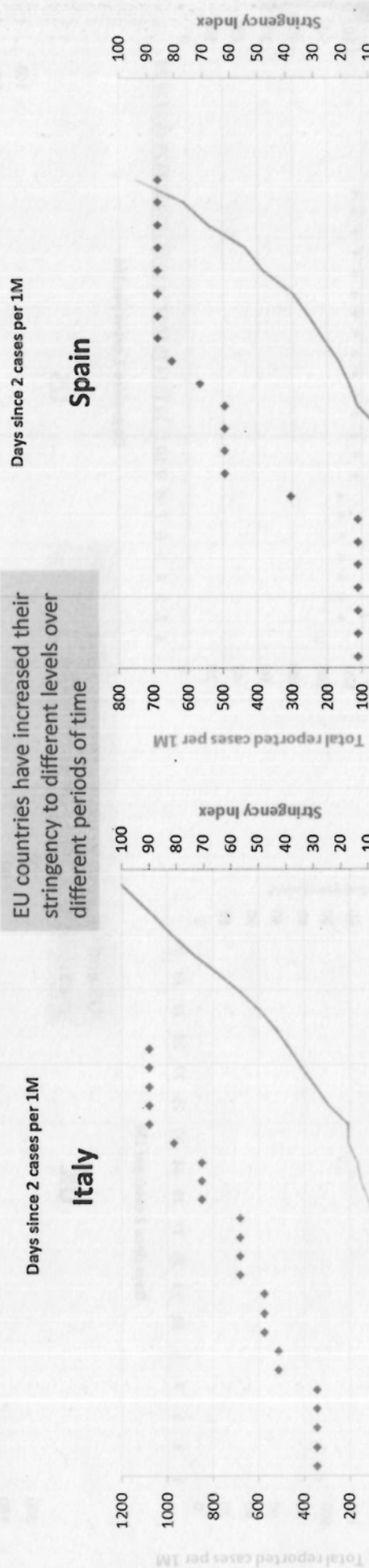
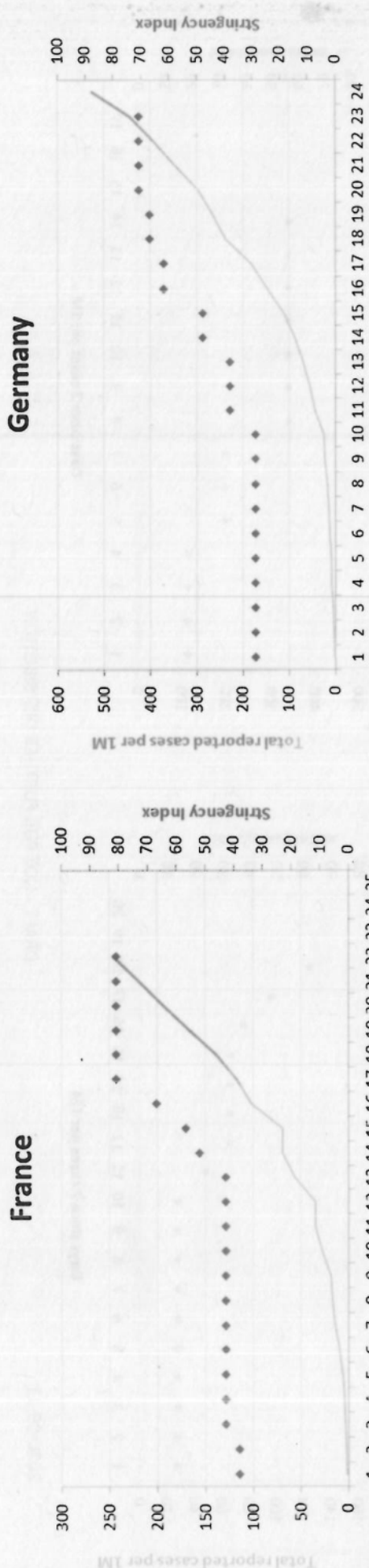
2020-09-11

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Note that scale of  
total cases per  
1M population  
differs to allow  
better  
visualization of  
timing of cases  
relative to  
measures

# Plotting Stringency Index against Total Case Rate in select countries

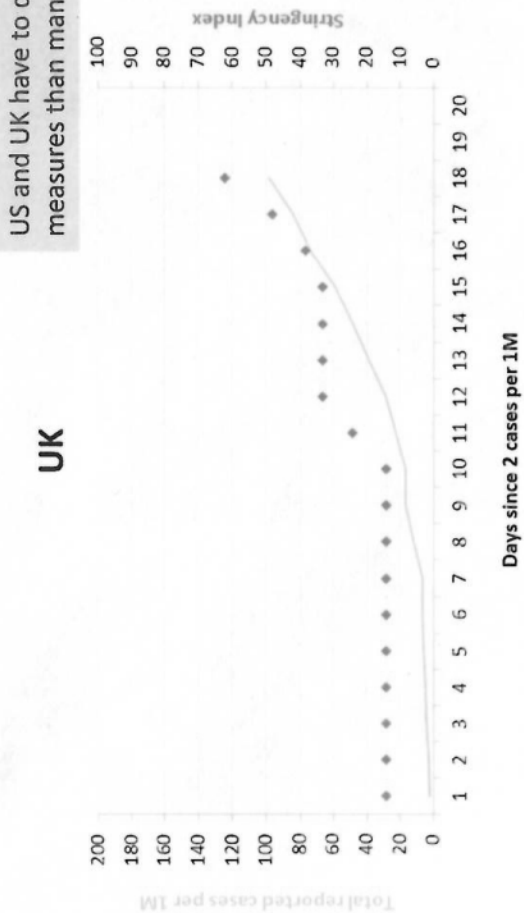
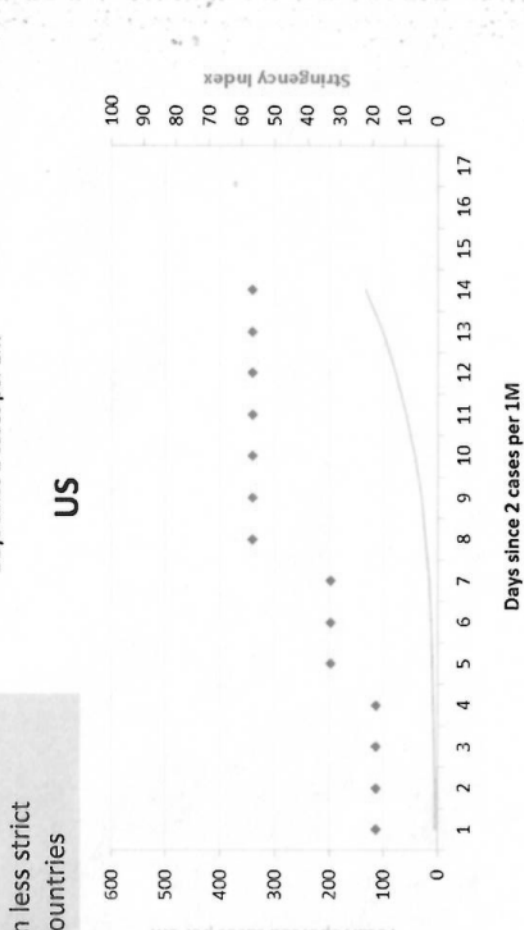
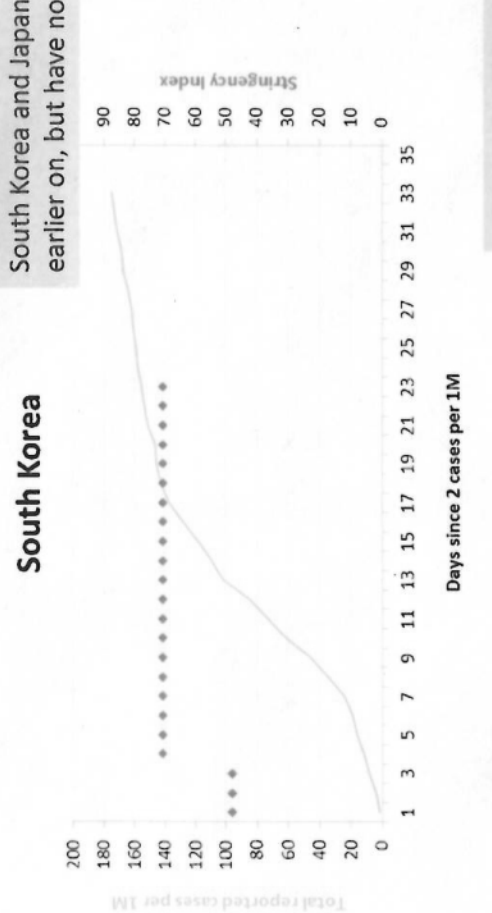
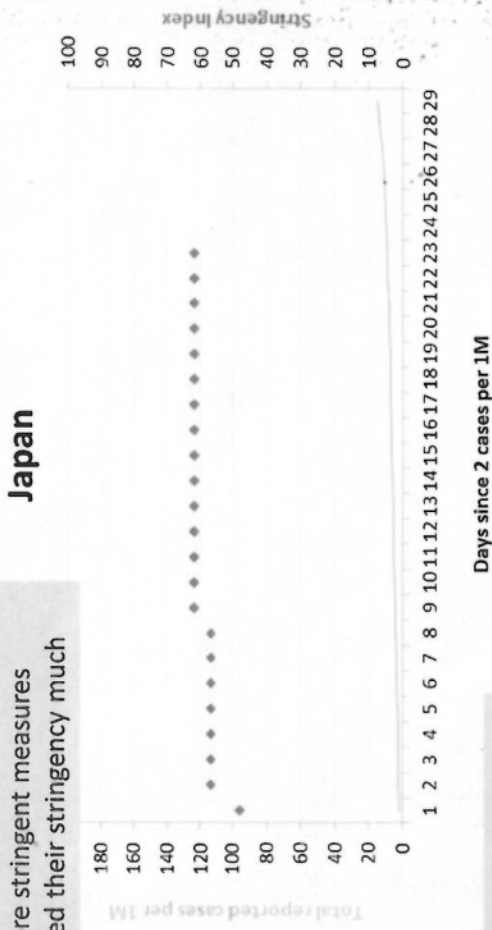




EU countries have increased their stringency to different levels over different periods of time

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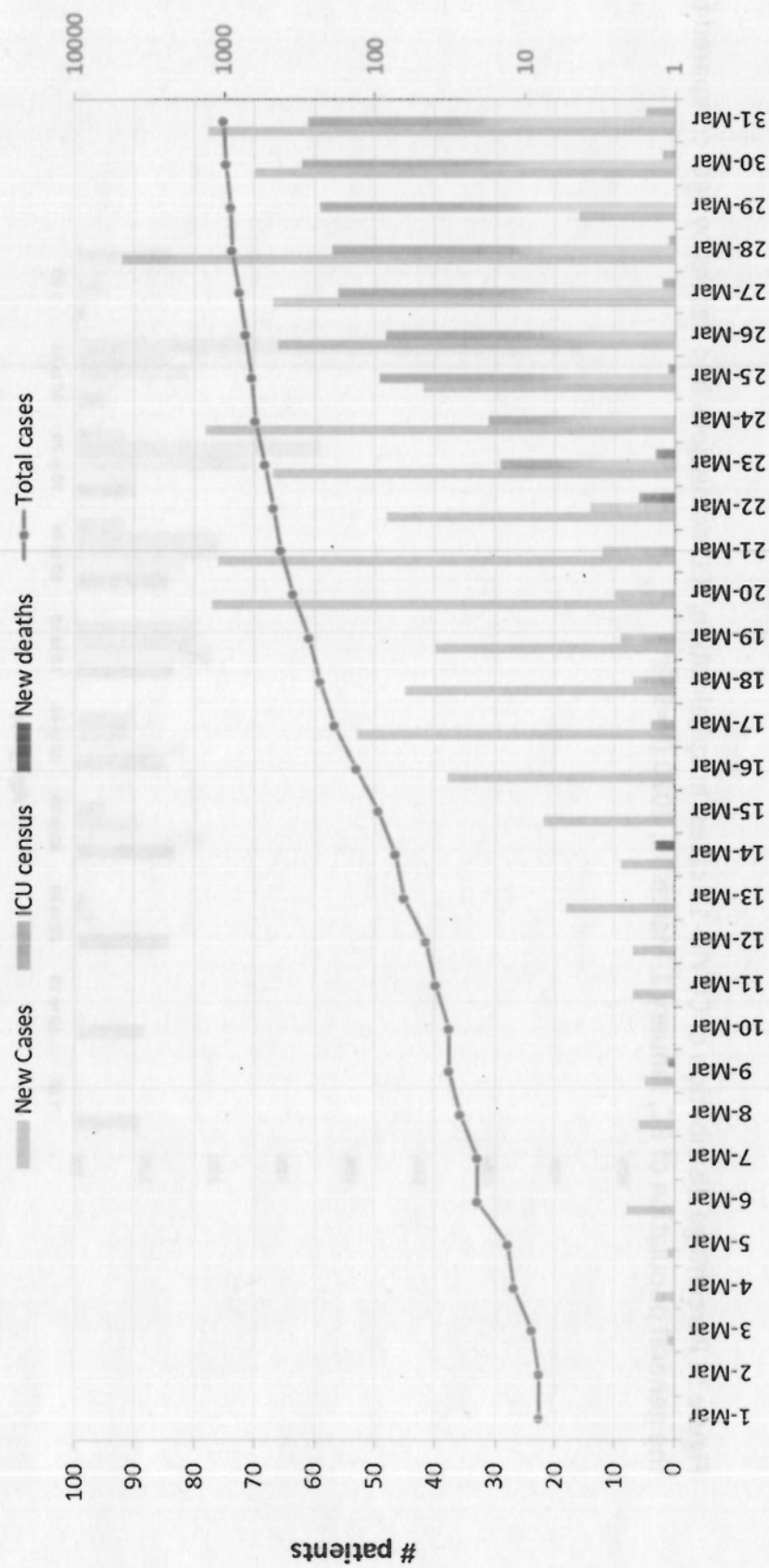




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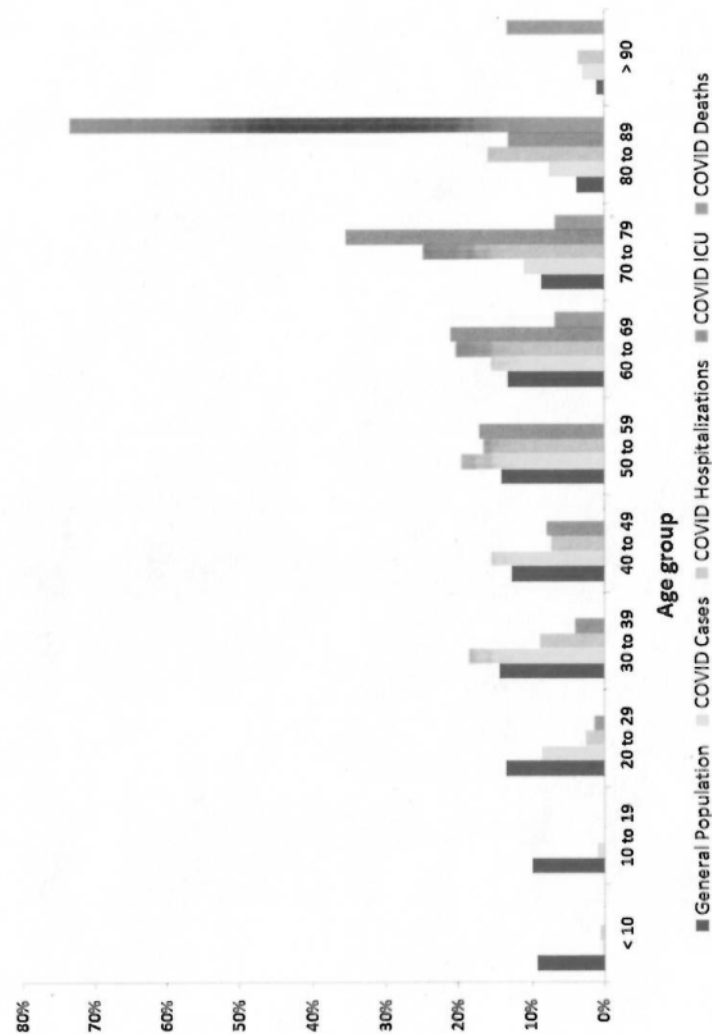
# The current epi curve in BC, up to 31 March



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2020-09-11

**Figure 5: Percentage distribution of COVID-19 cases, hospitalization, ICU admissions and deaths by age, compared to the general population of BC, January 1-March 31, 2020 (N=953\*)**

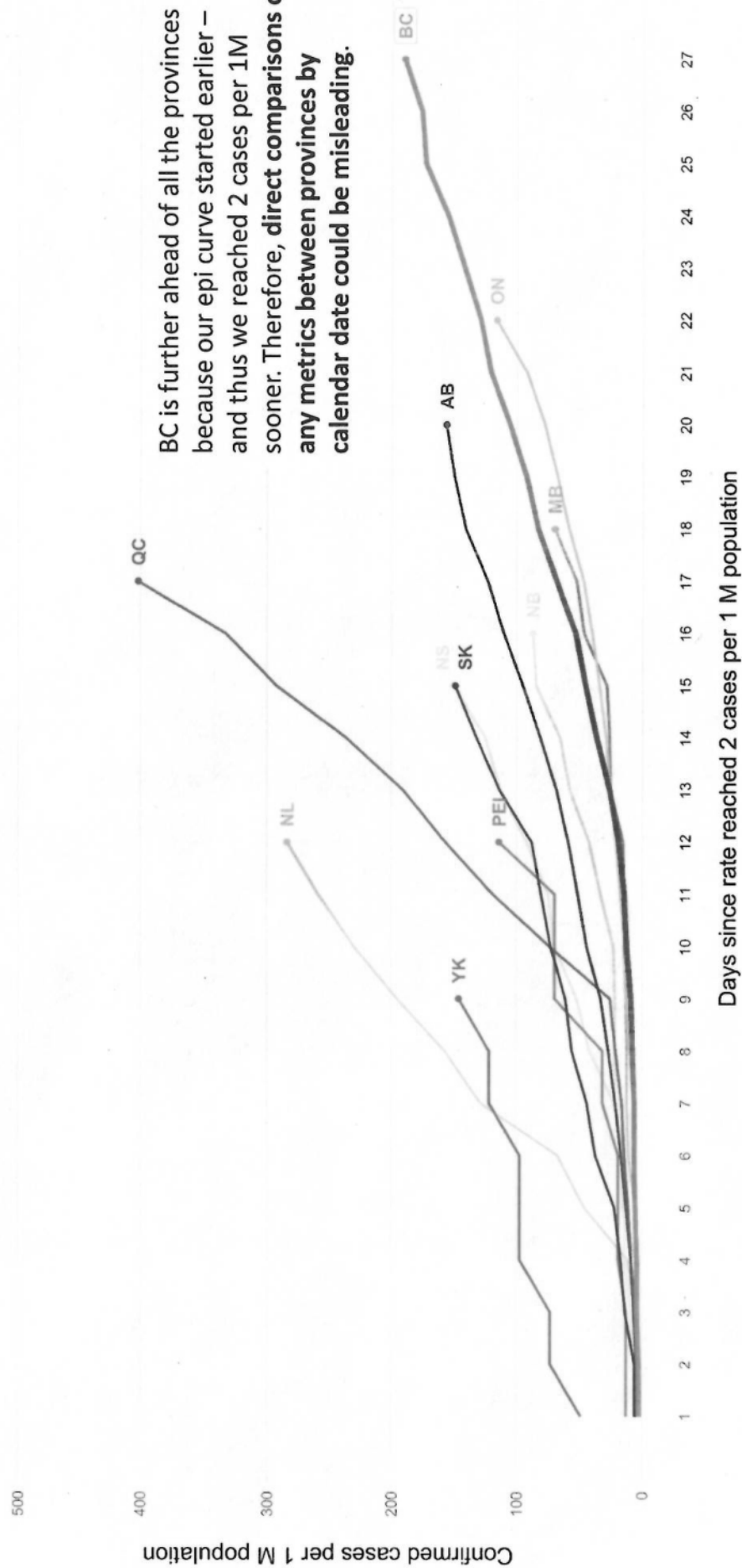


\*Includes 953 cases, 194 hospitalizations, 76 ICU admissions, and 15 deceased with age information available.

**Table 1. Epidemiological profile reported by health authority of case, BC, January 1 - March 31, 2020 (N=1,013)**

|   | Fraser | Interior | Vancouver Island | Northern | Vancouver Coastal | Total N (%) <sup>a</sup>        |
|---|--------|----------|------------------|----------|-------------------|---------------------------------|
| <b>Total number of cases</b>                    | 348    | 107      | 67               | 15       | 476               | 1013                            |
| <b>Number of new cases since March 29, 2020</b> | 25     | 13       | 0                | 1        | 4                 | 43 (4%)                         |
| Median age in years, cases <sup>b</sup>         | 51     | 48       | 50               | 53       | 55                | 53 years<br>(range 0-102 years) |
| Female sex, cases                               | 189    | 59       | 37 <sup>c</sup>  | 9        | 249               | 543/977 (56%)                   |
| <b>Ever hospitalized<sup>d</sup></b>            | 94     | 15       | 9                | 5        | 81                | 204 (20%)                       |
| Median age in years, hospitalized <sup>b</sup>  | 68     | 56       | 72               | 49       | 68                | 67 years<br>(range 0-98 years)  |
| <b>Deaths<sup>d</sup></b>                       | s.22   | 0        | 0                | 0        | 21                | 24 (2%)                         |
| Median age in years, deaths <sup>b</sup>        | 87     | NA       | NA               | NA       | 85                | 85 years<br>(range 64-94 years) |
| <b>Recovered<sup>e</sup></b>                    | s.22   | 22       | 26               | 5        | 291               | 507 (50%)                       |

# Cumulative diagnosed Covid-19 case rates by Canadian provinces



BC is further ahead of all the provinces because our epi curve started earlier – and thus we reached 2 cases per 1M sooner. Therefore, **direct comparisons of any metrics between provinces by calendar date could be misleading.**

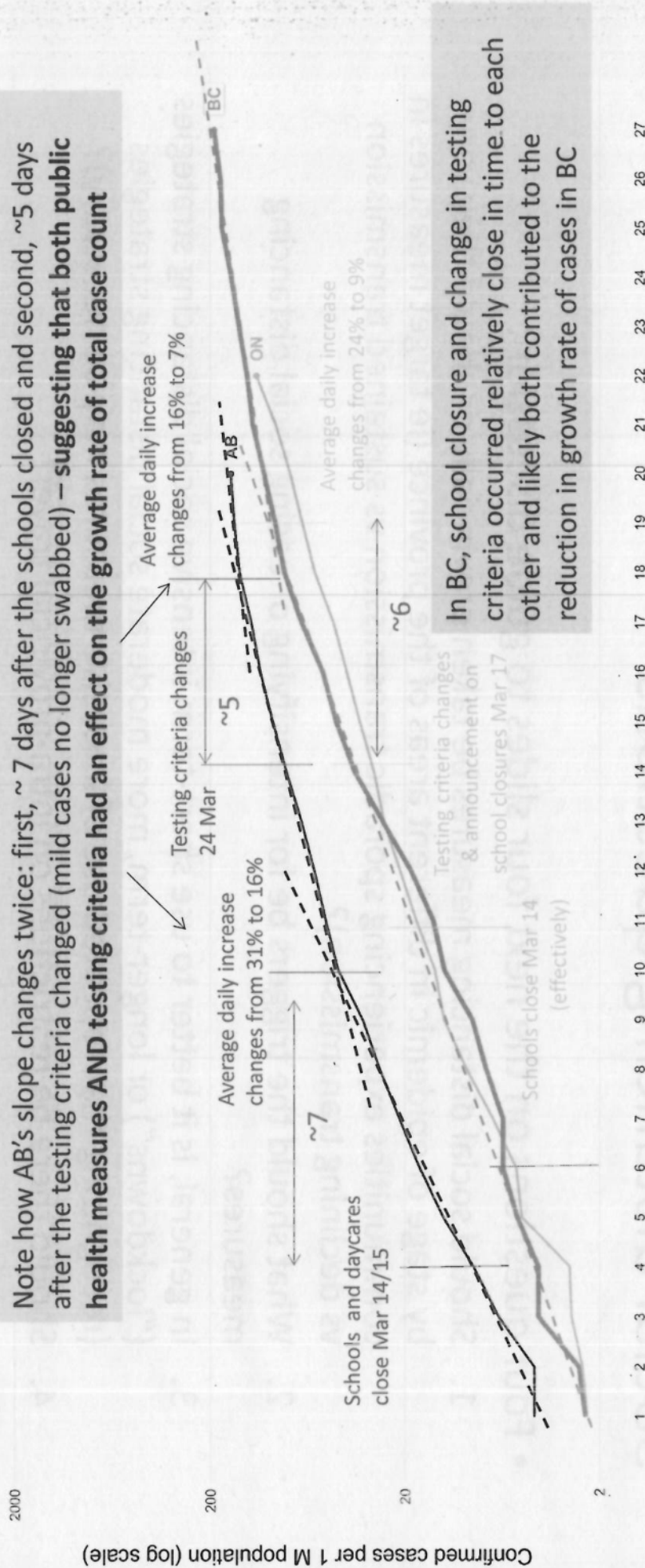
Days since rate reached 2 cases per 1 M population

Data up to 30 March 2020

2020-09-11

DRAFT - NOT FOR FURTHER DISTRIBUTION

# Cumulative diagnosed Covid-19 case rates for Alberta, British Columbia and Ontario





## Social distancing questions

- Four questions on the next four slides to guide discussion:

# Social distancing question #1

s.13



## Social distancing question #2

s.13

## Social distancing question #3

s.13



## Social distancing question #4

s.13

# Unintended consequences



## Measuring unintended consequences question #1

- What information about social and economic impacts of public health measures do decision makers need in order to decide what trade offs are proportionate?

## Measuring unintended consequences question #2

- Where should decisions about the tradeoffs between public health measures and the consequences of those decisions be made?

# Contact tracing

# WHO guidance on contact tracing and management

| Epidemic stage  | Role of contact tracing and management   |
|---|--|
| <b>Sporadic cases</b><br>(one or more cases, imported or locally acquired)                      | Enhance active case finding, contact tracing and monitoring; quarantine of contacts and isolation of cases.  |
| <b>Clusters of cases</b><br>(most cases of local transmission linked to chains of transmission) | Intensify case finding, contact tracing, monitoring, quarantine of contacts, and isolation of cases.   |
| <b>Community transmission</b><br>(inability to link to chains of transmission for most cases)   | Continue active case finding, continue contact tracing where possible, especially in newly infected areas, quarantine of contacts, and isolation of cases; apply self-initiated isolation for symptomatic individuals. |

WHO recommends that:

- Contacts of a lab-confirmed case be quarantined for 14 days
- Contacts of a suspected case be, at a minimum, encouraged in hand hygiene and respiratory etiquette; consider self-monitoring for symptoms, social distancing, or quarantine

<https://www.who.int/publications-detail/critical-preparedness-readiness-and-response-actions-for-covid-19>  
<https://www.who.int/publications-detail/considerations-in-the-investigation-of-cases-and-clusters-of-covid-19>

# Contact tracing questions

- Three questions on the next three slides to guide discussion:
  1. What is the role of traditional contact tracing in areas where there is:
    - Sporadic transmission?
    - Sustained community transmission?
    - Declining transmission?
  2. How should we use technology to supplement traditional contact tracing?
  3. What should be the roles for:
    - Partner notification?
    - Public notification?

# Contact tracing question #1

- What is the role of traditional contact tracing in areas where there is:
  - Sporadic transmission?
  - Sustained community transmission?
  - Declining transmission?



## Contact tracing question #2

- How should we use technology to supplement traditional contact tracing?

## Contact tracing question #3

- What should be the roles for:
  - Partner notification?
  - Public notification?

## BCCDC COVID-19 Surveillance, Epidemiology and Modelling (SEM) Teams

### **Lead: David Patrick (UBC/BCCDC)**

- Theodora Consolacion (BCCDC)
- Kamila Romanowski (UBC/BCCDC)

### **Surveillance Teams**

- Regional Health Authorities – thank you
- BCCDC: Danuta Skowronski (Lead), May Ahmed, Samara David, Marsha Taylor, David Roth

### **Modelling Team**

- Michael Otterstatter (UBC/BCCDC, Lead)
- Naveed Janjua (UBC/BCCDC)
- Caroline Colijn (SFU)
- Dan Coombs (UBC)
- Rebeca Cardim Falcão (UBC)
- Henry Ngo (BC Ministry of Health)
- Nicola Mulberry (SFU)
- Jessica Stockdale (SFU)

### **Global Epidemiology Team**

- Kate Smolina (BC Observatory for Population and Public Health, Co-Lead)
- Alexis Crabtree (UBC/BCCDC, Co-Lead)
- Chris Mill (PHAC/BCCDC)

**Question:** What promising or successful measures have countries, such as South Korea, used successfully to flatten the COVID-19 curve?

## SITUATION

As the COVID-19 pandemic continues to infect large numbers of people across the world, the actions taken by South Korea and some other countries are starting to show some promising results at flattening the curve of COVID-19 infection in their countries. With their close proximity to China, South Korea, Taiwan, Singapore and Hong Kong were some of the initial countries/areas<sup>1</sup> affected and predicted to be the next epi-centers after the outbreak started in Wuhan, China but this has not been the case. South Korea, in particular, appears to have been able to slow the number of new cases. Germany, on the other hand, has a large number of confirmed cases with a low case fatality rate.

Table 1 shows a comparison of these four Asian countries, Germany and BC, in terms of population size, date of the first confirmed COVID-19 case and total cases/deaths. The four Asian countries had their first COVID-19 cases confirmed between January 20-23, 2020 but their current numbers do not reflect the escalation occurring in the United States or Italy. Germany, on the other hand, had its first confirmed COVID-19 case on Jan 27, 2020 but has a low case fatality rate of 0.7% despite 52,547 cases confirmed.

Table 1.

|                              | South Korea       | Taiwan          | Singapore       | Hong Kong       | Germany            | BC              |
|------------------------------|-------------------|-----------------|-----------------|-----------------|--------------------|-----------------|
| Population size              | 51.3 million      | 23.8 million    | 5.7 million     | 7.48 million    | 83.7 million       | 5.07 million    |
| Date of first confirmed case | Jan 20, 2020      | Jan 21, 2020    | Jan 23, 2020    | Jan 23, 2020    | Jan 27, 2020       | Jan 28, 2020    |
| Total cases                  | 9,661<br>(Mar 30) | 298<br>(Mar 29) | 802<br>(Mar 29) | 641<br>(Mar 29) | 52,547<br>(Mar 29) | 884<br>(Mar 29) |
| Total deaths                 | 158<br>(Mar 30)   | 2<br>(Mar 29)   | 3<br>(Mar 29)   | 4<br>(Mar 29)   | 389<br>(Mar 29)    | 17<br>(Mar 29)  |

In South Korea, Taiwan, Singapore and Hong Kong, most of life activities continue, with most schools, restaurants and shopping malls open while other countries have used national lockdowns to try to contain the infection.

## BACKGROUND

### Context

A number of factors play a role in a country's response to the COVID-19 pandemic, including health system jurisdiction, culture and past experience of SARS/MERS (if applicable). Jurisdiction over the health systems differ between the Asian countries noted, and Germany and Canada. In South Korea, Taiwan, Singapore and Hong Kong, the national governments have jurisdiction over the health system whereas in Germany and Canada, authority and decision making related to health is decentralized to the states and provinces. Common in many Asian cultures is placing the need of the public over that of the individual. In German and Canada, however, the predominant value is on individual needs and rights. Lastly, the experience and impact of SARS/MERS outbreaks, in part, influences the preparedness and

<sup>1</sup> Hereto referred as 'countries'

response of a country for the next pandemic. The following highlights some of the common or unique approaches (excluding personal and protective equipment supplies) taken by the countries of interest to address the COVID-19 pandemic.

### Early and aggressive response

An early and aggressive approach before or as soon as China confirmed human-to-human transmission of COVID-19 contributed to the outcomes seen so far in the five countries of interest. For example, South Korea quickly developed its tests and worked with diagnostic manufacturers to develop commercial test kits. In early February, test kits were distributed to regional health centres and for sale by local companies when South Korea only had a few cases. Starting at the end of Jan 2020, Hong Kong introduced progressive border tightening for visitors from mainland China. Also around the same time, Taiwan suspended all flights from China when the World Health Organization had advised against this at that time.

### Testing early and widespread

South Korea offers a number of ways for testing, from setting up make-shift test booths to 'walk-thru' and 'drive-thru' tests. Make-shift booths are set up immediately at the location where someone has tested positive for COVID-19. People who live in/work at building and all that have entered the building are tested. One hospital has a 'walk-thru' booth, where a person enters a transparent protective barrier for the test. Medical staff collect the sample through gloves attached to the front panel – this speeds up testing and minimizes risk to staff. Drive-thru tests allow people to be tested while staying in their vehicles and eliminates the need to disinfect the premises after each test. Currently, there are 43 drive-thru testing stations nationwide. According to local papers, all arrivals from Europe are tested as of Mar 22.

Both Germany and Singapore test widely. In both countries, many of the early cases were mild cases. Singapore offers the test free while other countries provide testing for free (or paid by public health insurance) for those prioritized for testing and those that don't fall within the prioritized category would pay a fee.

Testing capacity of each country is as follows: 1) South Korea – 15,000 per day; 2) Taiwan – 1,300 daily samples; 3) Singapore – greater than 2,000 per day; 4) Hong Kong – 5,000 per week; 5) Germany – estimated between 300,000 - 500,000 per week. South Korea uses rapid tests that detect viral antigens and deliver results quickly. People awaiting test results usually receive a text message within 24 hours.

### Technology for screening, contact tracing and monitoring

All four Asian countries have used technology to enhance their outbreak response. Resulting from the experience and lessons learned from SARS/MERS, these Asian countries have legislation that enables collection of personal information for use during emergencies of national concern when needed.

- *Screening & Triage:* Taiwan uses text messaging for screening and triaging for air passengers who access a health questionnaire by QR code with their phones while still on planes as they are arriving in Taiwan. Passengers will receive a text message to either fast track through immigration or they are urged to go into self-isolation at home. Those in self-isolation are tracked via their cellphone (to ensure self-isolation). This approach helps with quick triage while avoiding large line ups at the airport. German also uses an app for risk assessment. Corona-Bot is updated daily, following the latest scientific publications and data provided by Germany's Robert Koch Institute and the Federal Center for Health Education. The person receives a clear risk assessment and further advice, including a telemedicine consult with a chosen doctor. Arrivals at Hong Kong International Airport are provided containers to provide deep throat saliva



samples that are self-collected and submitted by family/friends while the person is in self-isolation.

- *Contact tracing:* South Korea uses information from mobile phones, credit cards and other data (e.g., surveillance cameras) to reconstruct the whereabouts of a person who tested positive for COVID-19 infection.
- *Monitoring:* Both South Korea and Hong Kong use mobile apps to monitor and track patients under quarantine. South Korea also uses this app to keep close tabs on visitors who are required to enter their symptoms into the app. If people notice symptoms develop, they can use self-quarantine app to notify their symptoms and go to a screening center to be tested. Hong Kong's app uses artificial intelligence and big data to analyse changes of communication signals in the open environment to determine whether persons who are subject to compulsory quarantine are staying at their dwelling places.

### Big data integration

Taiwan has integrated its national health insurance database with immigration and customs information to trace potential cases. This database is accessible by health professionals and certain government officials. Information includes travel history and personal information. Germany's Health Ministry is investing 500 million EURO to link hospitals and laboratory data – this network will also analyse data from all COVID-19 patients.

### Policy and armed forces as additional capacity

The police in South Korea and Singapore work alongside medical teams in contact tracing to aid in the aggressive approach taken by both countries. Some of the countries have also utilized their military to support mask production and/or source additional supplies for ICUs.

### Transparency and Communications

The four Asian countries publicly share a certain amount of information about infected cases to encourage people to come forward for testing. Information such as age, gender, street address, medical symptoms, flight numbers and often the exact location where the infected person works is shared quickly and frequently in a number of ways (e.g., dedicated websites, mobile apps, text messages, TV, press releases, social media). This level of transparency has garnered some criticism and South Korea has noted that no personal information is to be shared unless it is essential to containing the virus.

Mass level communications around preventive measures and social/physical distancing have been frequent but have noted to be too high level, not often addressing specific concerns (e.g., transmission possible through mail?). For some, communications have only been delivered in the national language(s), excluding other residents who may not speak or understand the language.

### Social or physical distancing

All the countries of focus have measures of ensuring people keep their distance from others. For schools that are open, measures such as staggered lunch breaks and dismissals, alternating one e-learning day at home by grade level and cancellation of activities within and between schools have been implemented. Hong Kong and South Korea have asked people to wear surgical masks when taking public transit or staying in crowded places.



## Penalties

The Asian countries have instituted fines, imprisonment or even the loss of permanent residency for those who violate quarantine protocols, spread misinformation about COVID-19 and/or provide false health information.

## ASSESSMENT

Centralized health systems in the Asian countries of focus has supported their efforts in attempting to flatten the curve of COVID-19 infection by enabling quick decisions and coordination across levels and sectors. South Korea has implemented an expansive and coordinated program to test, isolate infected individuals and trace and quarantine their contacts. Germany, on the contrary, appears to have experienced inconsistencies and delays in decision-making and coordination on the approach to take although the scale of testing is significant.

An aggressive approach, testing, technology and transparency appear to be key factors in the success of South Korea, Taiwan, Hong Kong and Singapore, enabling their citizens to continue with their daily lives although with some measures in place. Testing early, using rapid tests and collecting samples in different ways has allowed for early identification of patients for isolation and symptom treatment. Data has shown that with earlier detection, the time between the first confirmed case and when the first death is reported is longer in countries compared other countries that did not start testing early.

Testing widely has also enabled Germany to quickly identify cases and respond in a timely manner; and possibly contribute to a lower death rate. Other potential reasons for Germany's lower death rate could be attributed to the initial detection of more milder cases and differences in whether post mortem includes COVID-19 testing. However, Germany's death rate from COVID-19 has changed over the last few days from 0.5% to 0.7%. The death rate that would be more reflective of COVID-19 wouldn't be known until after the pandemic has subsided.

Technology has been critical for these countries to collect data to support contact tracing and monitoring of individuals in quarantine. Overall compliance with adhering to the social distancing and other measures in South Korea, Taiwan, Singapore and Hong Kong may be reflective of the public's reminder of their past experiences with SARS/MERS, their desire to avoid infection and their prevailing value of public good over individual needs in the context of the COVID-19 pandemic. The use and sharing of personal information to contain the virus appears to be supported by the majority of people in these countries.

From a health equity perspective, while there are measures to support some of the societal impacts of COVID-19 infection on people affected by this (e.g., subsidies, food/supplies to people in isolation), it is not clear the extent to which those most vulnerable or at risk of significant impact have been systematically considered in planning and implementation of measures. Limited information is available from the current evidence. It is very likely with the rapidly evolving context, health authorities are focused on issues related to responding to the escalation of cases.

Despite the current relative successes, each country remains on alert and vigilance as the COVID-19 pandemic evolves across the globe, necessitating adjustments in policies in measures. Currently, there is no treatment or vaccine for COVID-19. An effective vaccine can take 1-2 years to be available. Until a vaccine is available and herd immunity is established, the world can be susceptible to waves of outbreaks.

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## Sullivan, Michelle A HLTH:EX

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**From:** Corneil, Trevor HLTH:EX  
**Sent:** March 17, 2020 10:58 PM  
**To:** Corneil, Trevor HLTH:EX  
**Attachments:** Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf; ATT00001.htm

<https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-NPI-modelling-16-03-2020.pdf>

## **Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand**

Neil M Ferguson, Daniel Laydon, Gemma Nedjati-Gilani, Natsuko Imai, Kylie Ainslie, Marc Baguelin, Sangeeta Bhatia, Adhiratha Boonyasiri, Zulma Cucunubá, Gina Cuomo-Dannenburg, Amy Dighe, Ilaria Dorigatti, Han Fu, Katy Gaythorpe, Will Green, Arran Hamlet, Wes Hinsley, Lucy C Okell, Sabine van Elsland, Hayley Thompson, Robert Verity, Erik Volz, Haowei Wang, Yuanrong Wang, Patrick GT Walker, Caroline Walters, Peter Winskill, Charles Whittaker, Christl A Donnelly, Steven Riley, Azra C Ghani.

On behalf of the Imperial College COVID-19 Response Team

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# National Coronavirus Response

A ROAD MAP TO REOPENING

**Scott Gottlieb, MD**

**Caitlin Rivers, PhD, MPH**

**Mark B. McClellan, MD, PhD**

**Lauren Silvis, JD**

**Crystal Watson, DrPh, MPH**

MARCH 28, 2020

A M E R I C A N E N T E R P R I S E I N S T I T U T E

# **National Coronavirus Response**

A ROAD MAP TO REOPENING

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A M E R I C A N   E N T E R P R I S E   I N S T I T U T E



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**Brown, Stephen R HLTH:EX**

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**From:** Henry, Bonnie HLTH:EX  
**Sent:** March 18, 2020 9:59 AM  
**To:** Reka Gustafson; Brown, Stephen R HLTH:EX  
**Subject:** FW: 3rd Must Read: Review of Ferguson

FYI, this is a helpful review of the modelling that Imperial College did and accounts for some of the external factors that can assist. And as per our discussion this am Steve, looks at lifting restrictions in less affected areas earlier and sequencing which is important.

My best,

Bonnie

*Dr Bonnie Henry  
Provincial Health Officer  
Office of the PHO  
Ministry of Health  
British Columbia*

250 952 1330

# Review of Ferguson et al “Impact of non-pharmaceutical interventions...”

Chen Shen<sup>†</sup>, Nassim Nicholas Taleb\*, Yaneer Bar-Yam<sup>†</sup>

<sup>†</sup>New England Complex Systems Institute, \*School of Engineering, New York University

First version, March 17, 2020. Corresponding author: yaneer@necsi.edu

Neil Ferguson and an Imperial College team perform detailed simulations of outbreak response [1]. This is an important work because they model social/government response, not just contagion. They show suppression (lockdown so that  $R_0 < 1$ ) is essential because mitigation ( $R_0 > 1$ , “flattening the curve”) necessarily results in massive overload of hospitals and many dead. This is an important conclusion that should inform policy makers.

However, they make structural mistakes in analyzing outbreak response. They ignore standard Contact Tracing [2] allowing isolation of infected prior to symptoms. They also ignore door-to-door monitoring to identify cases with symptoms [3]. Their conclusions that there will be resurgent outbreaks are wrong. After a few weeks of lockdown almost all infectious people are identified and their contacts are isolated prior to symptoms and cannot infect others [4]. The outbreak can be stopped completely with no resurgence as in China, where new cases were down to one yesterday, after excluding imported international travelers that are quarantined.

Their assumptions are equivalent to ergodicity, as they consider new infections to be a function of infected fraction and immunity, and not influenced by where in the trajectory of the outbreak they are, distinguishing going up from going down.

They also don’t specify whether achieving less than one case (extinction of the virus) is possible in their model. The actual minimal number for resurgence is larger than 1 because (1) a significant percentage of infected individuals do not infect others, indeed only 5% of close contacts of infected individuals traced in China subsequently tested positive [2], and (2) small outbreaks can be stopped by contact tracing, which is enhanced by the availability of testing [5]. The availability of testing is also not included in their analysis. These interventions imply the exponential growth they report after relaxing restrictions would require a significant number of initial cases.

Since lockdowns result in exponentially decreasing numbers of cases, a comparatively short amount of time can be sufficient to achieve pathogen extinction, after which relaxing restrictions can be done without resurgence. Since the exponential decay is highly sensitive to the interventions made by both government and social action, simulating their effects is less helpful than the advice to “go all out” and refine the effort over time with improved tracing, testing, and other protocols.

Finally, the use of geographic boundaries and travel restrictions allows for effective and comparatively low cost imposition and relaxation of interventions. Such a multiscale approach accelerates response efforts, reduces social impacts,

allows for relaxing restrictions in areas earlier that are less affected, enables uninfected areas to assist in response in the areas that are infected, and is a much more practical and effective way to stop otherwise devastating outbreaks [6]. If actions had been taken earlier, successful local lockdowns, as performed in China in Hubei province, would have been possible instead of national lockdowns.

A few other issues are of importance: They ignore the possibility of superspreader events in gatherings by not including the fat tail distribution of contagion in their model. This leads them to deny the importance of banning them, which has been shown to be incorrect, including in South Korea [7]. Cutting the fat tail of the infection distribution is critical to reducing  $R_0$  [8].

The model they use appears to be in the general class of SIR differential equations used in epidemiology and is therefore not well suited for incorporating real world conditions at fine or large scale. These include (1) significant interactive local dynamics and travel restrictions that cannot be seen from aggregate quantities or averages across geographic locations, (2) non-normal distributions of the number of infections per person (superspreader events) as well as the infection period, and (3) dynamic or stochastic values of parameters that arise from variations in sampling of distributions as well as the impact of changing social response efforts. Despite including details of the contagion and response options, their model is several degrees of abstraction away from what is warranted by the situation.

While the efforts to model social response are important, leaving out critical aspects of the response yields incorrect answers. Focusing on details but using incorrect assumptions makes for bad policy advice. Where lives are at stake, it is essential for science to adhere to higher standards.

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