Affidavit 2 in Response to the Affidavit of Dr. Matthew Hodge

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May 17, 2021

General comments and approach

Public health perspective

To meet the expectations of good public health strategic practice, to comply with the Ontario Emergency Management and Civil Protection Act[1], and to comply with the Canadian Charter of Rights and Freedoms, public health officials and their governments are required to show that the severity of a threat has justified the use of restrictive interventions; how the effectiveness and benefits of the interventions will sufficiently outweigh the harms; and that there are no alternative strategies that would be more effective, less harmful, and/or less restrictive.

Ontario law permits the declaration of an emergency based on the opinion of the premier regarding two matters - the magnitude of the danger and the need for using emergency orders to address it. Section 7.0.1 (3) describes the considerations for forming that opinion.

Section 7.0.1 (3) states that an emergency can be declared only if the lieutenant governor in council, or the Premier is of the opinion that there is a "danger of major proportions that could result in serious harm" and one of the following exists:

- Resources normally available to the Government "cannot be relied upon without the risk of serious delay".
- The resources that are normally available to the Government "may be insufficiently effective to address the emergency".
- "It is not possible without the risk of serious delay to ascertain" whether the resources normally available to Government can be relied upon.

The Act does not specify what information and advice will be used by the premier to form their opinion. Although no specific or measurable criteria are provided for the premier to make this decision, general guidance is provided by section 7.0.2. (1)

"7.0.2 (1) The purpose of making orders under this section is to promote the public good by protecting the health, safety and welfare of the people of Ontario in times of declared emergencies in a manner that is subject to the *Canadian Charter of Rights and Freedoms* 2006, c. 13, s. 1 (4)."

Public health legislation across Canada addresses this issue in various ways, but the principles are similar. Like any medical advice – for an individual or a community - public health leaders

[1] https://www.canlii.org/en/on/laws/stat/rso-1990-c-e9/latest/rso-1990-c-e9.html

are expected to assess the magnitude of the threat and to weigh up the pros and cons of alternative interventions, whether these are preventive or therapeutic.

Public Health Strategy: Making Decisions and Taking Action

Demonstrable justification of public health interventions should primarily be based on quantitative estimates of risk and quantitative estimates of intervention effectiveness. For risk assessment – often referred to as threat assessment - this includes estimations of likelihoods (probabilities) of events and level of severity. For effectiveness of interventions, this includes measurements and estimations of quantitative outcomes, including benefits and harms. These estimates are fundamental to the process of determining and demonstrating that public health interventions are proportionate to the threat and are reasonably necessary. These basic epidemiology descriptors and indicators must include specific probabilities, rates, ratios, and proportions – not only crude numbers (numerators with denominators). Best estimates of these quantitative measures – based on the best available data and evidence - are essential. In addition, critical thinking and equity considerations are also essential for fair and optimal decision-making.

These decisions must consider short-term and long-term benefits and harms for society as a whole. These considerations must include all matters pertaining to health. Even when one specific disease becomes the focus of attention, decision-makers and advisors must consider the morbidity and mortality from all diseases and injury, especially when interventions for one disease may increase the rates or severity of other conditions. These considerations must also include the causes and risk factors of all diseases and injuries. These factors are often referred to as determinants of health. Health Canada lists 12 health determinants including income, employment, social supports and coping skills, and culture.[2]

For these reasons, demonstrable justification for public health interventions that harm the determinants of health for any or all health conditions and infringe on rights and freedoms described in the Charter requires complex considerations, complex decision-making, and complex demonstration. Meeting this requirement in the complex biological and social phenomenon of a respiratory virus pandemic demands a wide range of expertise and engagement. But it all begins with clear definitions and quantitative estimates of the risks of the threat, effectiveness of interventions, and the numeric balance of benefits and harms.

Epidemiological methodology

Epidemiology is the basic science of public health practice. It is both theoretical and practical. It is primarily quantitative but can overlap in purpose and methods with qualitative methods.

[2] https://www.canada.ca/en/public-health/services/health-promotion/population-health/what-determines-health.html

Like measurement in all sciences, accuracy is the primary concern; for some problems, precision is of secondary importance. Dr. Hodge's affidavit uses several words and descriptions which are not usual epidemiological descriptors.

I have not seen in an epidemiology textbook the term "deadly". I have, however, found terms such as mortality rate, case-fatality ratio, premature mortality rate, and potential years of life lost.

I have not seen in an epidemiology textbook the term "increased significantly". I have, however, found definitions of "statistical significance" and "clinical significance". The words "increased" "more", "higher" and "lower" can be useful, but only if followed by a numerical or quantifiable absolute or relative value. Without quantification, assessment of absolute or relative risk cannot be verified or compared.

When qualitative descriptors such as "crowded", "close", or "confined" are used, they require definition. Without definitions, consistent interpretation or understanding of their meanings cannot be achieved. Clear definitions are necessary for theory and practice.

I have not seen in an epidemiology textbook the term "extremely high" to describe the burden of disease. Without definition it is a subjective unquantifiable term. Without definition of the term "burden", an assertion that the burden of disease is high or low is without meaning. I have, however, seen measurable definitions of burden of illness such as incidence, prevalence, mortality.

Dr. Hodge's Overview and preliminary observation

Disconnects of Dr. Hodge's assertions to clarification, data, evidence, and rationale.

I found the formatting of Dr. Hodge's affidavit confusing. It appears that the overview (**II. Overview**) includes the remainder of the document paragraphs 6 – 30. Perhaps the intention was for paragraphs 6 and 7 to constitute the overview. This is important because paragraph 7 contains only one reference to other paragraphs in his affidavit, namely paragraphs 8-13 for the discussion about rising pressures on hospital and ICU capacity. None of the other assertions in paragraph 7 have a reference to other paragraphs in the affidavit. This is important because there is insufficient or complete lack of organization, clarification, data, evidence, or rationale for these assertions.

The essence of Dr. Hodge's justification for "limiting restaurants to takeout operations" is described as follows in paragraph 7 of his affidavit.

> "As a preliminary observation, my opinions are informed by the realities of public health practice, including the role of public health professionals as providers or advice to governments, the need to make decisions with imperfect information, the challenge of minimizing adverse effects of measures that establish limits on human behaviour and the burden model, which recognizes that it is generally appropriate to implement more restrictive public health measures when an infectious disease imposes a higher burden. This notion of burden can be understood as a function of the prevalence of the disease (i.e. number of cases in a population), the exposure risk (i.e. the probability that one infected person will infect others), and the consequences of infection, such as hospitalization and death. Due to high community prevalence, increasing numbers of cases, and rising pressures on hospital and ICU capacity (see discussion below at paras 8 to 13), the current burden associated with COVID-19 in Ontario is extremely high. Accordingly, in my opinion, limiting restaurants to take out operations contributes to reducing COVID-19 transmission and harms from COVID-19."

The "burden model".

Dr. Hodge refers to "the burden model". I am not aware of this model. I have been unable to find it in several standard references including "*A Dictionary of Epidemiology*"[3], "*Oxford Textbook of Public Health*"[4], or "*Public Health and Preventive Medicine*"[5]. He states that the "burden model" recognizes that it is "generally appropriate" to "implement more restrictive public health measures" when an infectious disease imposes a "higher burden". He goes on to define burden as a function of the prevalence of the disease (number of cases), the exposure risk (probability of infecting others), and the consequence of infection (hospitalization and

[3] Porta, M. International Epidemiological Association. *A Dictionary of Public Health*. 6th edition. Oxford University Press. 2014.
[4] Detels et al. *Oxford Textbook of Public Health*. 5th edition. Oxford University Press. 2009.
[5] Wallace et al. Public Health and Preventive Medicine. 15th edition. McGraw Hill. 2008.

death). Using this "model", he has concluded that due to "high prevalence", "increasing numbers of cases", and "rising pressures on hospital and ICU capacity" that the "current burden associated with COVID-19 in Ontario is extremely high" and that, therefore, in his opinion, "limiting restaurants to take out operations contributes to reducing COVID-19 transmission and harms from COVID-19".

Taken literally, Dr. Hodge's assertion that limiting restaurants to take out operations contributes to *reducing* COVID-19 transmission and harms from COVID-19 is irrelevant and irrefutable. Reducing exposure to potentially infectious persons will doubtless contribute to reducing transmission and harm. The job of the public health scientist is to estimate the effect size of an intervention, its benefits and harms, its costs, and its fairness. A one-dimensional assertion of a mere reduction without any quantification of the size of that reduction and without considerations of other consequences does not meet the test of appropriate public health analysis.

It is reasonable to believe that the higher the burden of an infectious disease, the more important it is to use effective measures, but there are no principles in public health theory or practice that I am aware of which state that it is "generally appropriate" to "implement more restrictive measures". I believe that Dr. Hodge and most other public health physicians would agree that there are many examples of "high burden" infectious disease epidemics in which measures that restrict rights and freedoms were neither considered necessary nor appropriate. Influenza, a respiratory infection transmitted in a similar way to COVID-19, has resulted in more deaths in children and healthy young adults than COVID-19. It has been considered to be a high enough burden to justify an annual campaign of education about non-pharmaceutical interventions in addition to a universal vaccination program. Despite annual occurrences, some with more "burden" than others, it has not been deemed "generally appropriate" to close schools, churches, restaurants, recreation centres, or other settings. The reasons for restraint from implementing more restrictive public health measures are the lack of evidence of effectiveness and the public health ethic and laws which require proportionality of response. Stated simply, the prevention should not be worse than the disease. To justify public health measures which interfere with daily life, more details and more explanations are required than the "current burden associated with COVID-19 in Ontario is extremely high" and therefore "limiting restaurants to take out operations contributes to reducing COVID-19 transmission and harms from COVID-19". If paragraphs 8-30 provided such details and explanations, then Dr. Hodge's broad and qualitative assertions in his overview paragraph 7 might be justified. However, in my opinion, there is insufficient detail or explanation provided in any part of his affidavit to justify his conclusion.

Dr. Hodge's definition of burden is, at best, unclear. It has three components: prevalence of the disease (number of cases), the exposure risk (probability of infecting others), and the consequence of infection (hospitalization and death).

Prevalence is an epidemiological measure that is usually reserved for chronic infections and other conditions. COVID-19 is an acute infectious disease with short incubation and

communicable periods. A typical symptomatic case occurs within one week of exposure, has 1-3 days of infectiousness before symptoms begin, and is infectious for about one week after symptoms begin. The number of cases (whether counted daily or cumulatively) is a measure of new cases (incidence), not the number of existing cases (prevalence). This is an important distinction because the prevalence of infectious persons at any one time – usually called the point prevalence – is an estimate of importance for a risk assessment of the probability of exposure to an infectious person.

This is relevant, however, to the second component – "the exposure risk (probability of infecting others)". Here too, Dr. Hodges' terminology is, at best, unclear. There is an important difference between exposure and transmission (i.e. "infecting others"). For transmission to occur, one person that is not infected must be exposed to a person who is infectious. An exposure is not synonymous with transmission. Transmission means that infection has occurred from that exposure. A risk assessment takes into account several factors such as the probability of infectiousness in the source, the duration, distance, nature of exposure, and the presence of barriers to respiratory droplets or droplet nuclei. Dr. Hodge has not provide us with such risk assessment despite the fact the Public Health Ontario defines high risk exposures and close contacts to guide decisions in their case and contact management strategy.

Dr. Hodge's third component - the consequence of infection (hospitalization and death) – can be used as indicators and outcomes of severe illness and hospital utilization, but it is unclear how he is defining, measuring, or using these descriptors to estimate the burden of COVID-19 and to draw his conclusions.

A. What are the harms caused by COVID-19?

8.-9.

This paragraph is a description of reported numbers in Ontario. The numbers may be accurate – if not precise – but there is no discussion of their validity or reliability. Nor has Dr. Hodge disaggregated or stratified these data, a standard epidemiological practice when there is variation within the population of analysis.

Using the data table below, the accumulated average case-fatality proportion in Ontario, as stated by Dr. Hodge is 8,431/504,533 = 1.7%. The accumulated average case-hospitalization proportion is 24,625/504,533 = 4.9%. Given Dr. Hodge's correct statement that the actual infection rate exceeds the reported case rate, the true proportions of actual infections which have been hospitalized or died is lower. Ontario has not provided valid estimates of the ratio of cases to actual infections.

When these data are analyzed by age stratification, the results show very important differences between age groups. These observations are important when considering the appropriateness

and necessity to "implement more restrictive measures", especially when those strategies are generalized and not targeted to at-risk populations.

For further clarity, I have added some calculations and aggregated some age groups. These calculations show the significant variation of hospitalization rates and death rates. For example, for the age group which most attend restaurants and bars – 20-59 – the population-based hospitalization rate is one per 1000 people and the population-based death rate is one per 16,000 people.

Cumulative COVID-19 case outcomes by age in Ontario
January 15, 2020 to May 14, 2021[6],[7]

Age group	Population	Cases	Case/pop	Hosp rate	Deaths	Hosp/case	Deaths/case	Hosp/pop	1/x	Deaths/pop	1/x
0 to 09	1,485,670	28,062	2%	187	1	0.7%	0.004%	0.01%	7,945	0.0001%	1,485,670
10 to 19	1,645,352	50,848	3%	171	3	0.3%	0.006%	0.01%	9,622	0.0002%	548,451
20 to 29	2,117,094	106,165	5%	845	21	0.8%	0.02%	0.04%	2,505	0.0010%	100,814
30 to 39	2,034,796	81,594	4%	1,392	41	2%	0.05%	0.07%	1,462	0.0020%	49,629
40 to 49	1,853,436	72,705	4%	2,067	93	3%	0.1%	0.11%	897	0.0050%	19,929
50 to 59	2,042,065	72,611	4%	3,712	352	5%	0.5%	0.18%	550	0.0172%	5,801
60 to 69	1,765,205	45,442	3%	4,654	866	10%	2%	0.26%	379	0.0491%	2,038
70 to 79	1,134,561	22,789	2%	4,989	1,694	22%	7%	0.44%	227	0.1493%	670
80 to 89	523,775	15,806	3%	4,575	2,986	29%	19%	0.87%	114	0.5701%	175
90+	132,060	8,403	6%	2,030	2,373	24%	28%	1.54%	65	1.7969%	56
All ages	14734014	504,533	3%	24,625	8,431	4.9%	1.7%	0.17%	598	0.0572%	1,748
0-59	11,178,413	411,985	4%	8,374	511	2%	0.1%	0.07%	1,335	0.0046%	21,876
60 to 69	1765205	45,442	3%	4,654	866	10%	2%	0.26%	379	0.0491%	2,038
70-90+	1,790,396	46,998	3%	11,594	7,053	25%	15%	0.65%	154	0.3939%	254
20-59	8,047,391	333,075	4%	8,016	507	2%	0.2%	0.10%	1,004	0.0063%	15,873

Dr. Hodge refers to variants of concerns which have been "reported to be more transmissible and cause more severe illness", contributing to an increased percentage of people with COVID-9 who need hospitalization and ICU care, including younger people in their 40' and 50's". His reference for this is the dashboard of the Science Table[8], a "COVID-19 Advisory" for Ontario (not an actual advisory board of the government). I have been unable to find any data on this dashboard pertaining to hospitalization and ICU admission rates of people in their 40's and 50's. Moreover, it is evident from the graphs that despite a higher case incidence of the current wave, the mortality is about one-half that of the previous wave and are stabilizing. The peak of

[6] https://www.publichealthontario.ca/en/data-and-analysis/infectious-disease/covid-19-data-surveillance/covid-19-data-tool?tab=ageSex

[7] https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000501&pickMembers%5B0%5D=1.7&pickMembers%5B1%5D=2.1&cubeTimeFrame.startYear=2020&cubeTimeFrame.endYear=2020&referencePeriods=20200101%2C20200101

[8] https://covid19-sciencetable.ca/ontario-dashboard/

hospitalizations and ICU occupancy appears to have passed. Hospitalization occupancy have been decreasing for the past month. ICU occupancy has been decreasing for the past two weeks. Furthermore, the estimate effective reproduction number, an indicator of transmissibility, has declined during the past month. It is difficult to square these data with Dr. Hodge's assertions.

11 – 14.

Dr. Hodge's rationale for the prohibition of indoor restaurant dining is summarized as follows. "Due to high community prevalence, increasing numbers of cases, and rising pressures on hospital and ICU capacity, the current burden associated with COVID-19 in Ontario is extremely high."

Dr. Hodge has asserted correctly that reported hospitalizations had increased over the few weeks prior to his affidavit. His observation that rates were decreasing "slightly" have since been shown to be a greater trend. Of perhaps more importance, there has been insufficient data to describe or to analyze the causes of hospital admissions, the proportion that are truly attributable to COVID-19 in comparison to other health conditions, and the sources of the exposures which resulted in severe illness. Dr. Hodge has not included any such data for his arguments.

Furthermore, despite claims that that hospital system is on the brink of collapse or overcapacity, there have been no data included in Dr. Hodge's affidavit or elsewhere that I have been able to find that shows how many patients have been turned away from hospital or critical care that would have normally been offered such services. Nor has Dr. Hodge provided any data or rationale to support his predictions of possible scenarios that "Even if the incidence of new COVID-19 infections continues to decline, as is projected, hundreds of more people will require hospitalization in addition to those already hospitalized. *A health system in which every available bed is occupied by someone infected with COVID-19* has no way to respond to people with heart attacks, hip fractures or strokes, adding to the elevated mortality attributable to COVID-19. Put simply, the harms caused by COVID-19 could include preventable deaths due to heart attacks, hip fractures and other health conditions from which Ontarians would not be expected to die if there are no beds and no staff available to care for patients with these conditions." Dr. Hodge has omitted to analyse the proportion of hospital beds occupied by COVID-19 patients, which are likely an overestimation, given the current rules for classifying admissions and deaths as COVID-19. Unless there is a clear reason otherwise, most hospitalized patients or deaths with a positive PCR test result are classified as COVID cases.

The hospitalization rate prediction is not age-specific and does not take into account discharges. It does not distinguish between admission incidence rate and hospital bed occupancy prevalence.

The issues of importance are the capacity to deliver care to patients that would have received it before COVID, the accuracy of attribution to COVID, other preventable factors, and in the

context of the topic of Dr. Hodge's affidavit, an estimate of the effect size of restaurant closures to prevent or reduce the need for hospitalization and ICU.

15.

Dr. Hodge provides a dramatic image of excess deaths equal to two fully-booked plane crashes. The measurements and interpretations of excess deaths are a complex epidemiological undertaking. Although called excess deaths, the actual measurement is earlier-than-expected deaths. This can only be determined in retrospect, usually at least one year later. Furthermore, without in-depth analysis, the causes and the magnitude of earlier deaths cannot be surmised. In Ontario, (using the changed rules for death cause certification which over-attributes deaths to COVID-19), the proportion of all deaths attributable to COVID-19 has been 6%. Significantly, Dr. Hodge does not explain what proportion of these "excess deaths" are attributable to exposures in a restaurant or bar.

B. How is COVID-19 transmitted?

16.- 19.

Many of the points raised in this section have been covered in other parts of this affidavit.

C. What are the risk factors for COVID-19 transmission?

20.

The incidence rate in the community or point prevalence of infectious states at any one point in time are relevant factors in estimating rates of transmission in specific settings and for specific types of exposures. It is reasonable to believe that barriers have some effect on exposure and transmission. The issue is to estimate the rate of transmission under different conditions in different settings and to estimate the probability of such transmissions resulting directly or indirectly in severe illness, hospitalizations, and death.

21.

Whereas it is true that the prevalence of infectiousness is a factor in estimating risk of transmission, Dr. Hodge's statement that "even low risk activities can pose significant transmission risks …". is inconsistent with case and contact tracing strategies of Public Health Ontario. Only high-risk exposures are traced[9]. Here, again, Dr. Hodge makes generalizations without any numerical estimates.

22.

Dr. Hodge refers to the WHO "three C's" of "crowded places, close contact, and confined spaces"[10]. These are reasonable conditions to consider with respect to probabilities of exposure to any respiratory virus. But without clear definitions and valid evidence, one cannot accurately

[9] https://www.publichealthontario.ca/-/media/documents/ncov/main/2020/09/covid-19-contact-tracing-risk-assessment.pdf?la=en

[10] https://www.who.int/images/default-source/wpro/countries/malaysia/infographics/three-3cs/final-avoid-the-3-cs-poster.jpg?sfvrsn=638335c1_2

estimate the quantitative impact of these conditions on the absolute and relative probabilities of exposure and transmission in a restaurant or other indoor settings.

The WHO referenced document states that people should maintain at least one meter distance from others and should wear a mask if physical distancing is not possible. Ontario uses similar guidelines. Close exposure without barriers is not classified as high risk if the duration is less than 15 minutes.[11] Hodge does not provide data on the probability of transmission if these protective measures and conditions are met.

D. Why are measures to limit COVID transmission needed in Ontario?

23.

It is not clear to me what the point of this section is, but if Dr. Hodge is referring to the fact that adherence with guidelines is "not perfect", it behooves him to provide evidence to show that adherence to public health measures is less likely to occur in observable settings like restaurants in comparison to other settings where patrons will eat their take-out food.

E. Why do limits on restaurant operations contribute to reducing COVID-19 transmission and harms from COVID-19?

24.-26.

Dr. Hodge has provided no additional information of relevance in these paragraphs.

27.

It is not clear how preparing food for take-out will alter the risk of exposure for staff in comparison to indoor dining.

28.

There is no estimate of the proportion of all outbreaks or cases in Ontario attributable to restaurant exposure. An average of 2-5 cases per outbreak suggests that the restaurant may have not been the setting of exposure.

The ascertainment of any restaurant outbreak is questionable, especially with small numbers of cases. It may be more likely for outbreaks to occur in settings where people eat their takeout food – or food from home.

Public Health Ontario provides some data on reported cases associated with outbreaks.[12] 1,243 cases have been associated with bars, restaurants, or nightclubs. Assuming that the venue was the source of transmission, this represents 1,243/78,543 = 1.5% of all cases associated with outbreaks and 1,243/511,486 = 0.2% of all Ontario cases.

[11] https://www.publichealthontario.ca/-/media/documents/ncov/main/2020/09/covid-19-contact-tracing-risk-assessment.pdf?la=en

[12] https://covid-19.ontario.ca/data/likely-source-infection

29.-30.

In these closing paragraphs, Dr. Hodge reasserts his previous arguments, again without numerical quantifications of risk of exposure and transmission and without numerical quantifications of the effect size of the closure of restaurants.