

Using individuals as (mere) means in management of infectious diseases without vaccines.

Should we purposely infect young people with coronavirus?

Immunity against infectious diseases is an interesting phenomenon. Often, the most effective strategies to create individual and herd immunity against infections involve using viruses against themselves. This is typically done by exposing individuals to the very same virus against which we want to protect them and/or protect others, in order to trigger immunity responses.

This mechanism is embedded in the very same nature of vaccination, the best weapon we have against many infectious diseases. Many vaccines (such as the MMR vaccine) contain live-attenuated versions of the virus against which they protect. By triggering a reaction of the immune system to a weakened version of the virus, the vaccine confers immunity against that virus or similar viruses.

However, there are other ways of exploiting the same mechanism.

One alternative strategy is to actually infect individuals with the live virus, which means making the individuals very likely to become sick with the associated disease. This is known as “variola” and was widely used against smallpox in 1700, before Edward Jenner introduced the smallpox vaccine – in the form of an attenuated cowpox virus – in 1796 (Fenner et al 1988). Giving limited doses of the virus and giving them in certain ways (in the case of smallpox, via skin tissue) was very likely to cause a milder version of the disease, which was nonetheless enough to trigger the desired reaction by the immune system and confer protection against future smallpox infections. It does entail some of the risks and of the discomfort of the disease for the individual who is infected, but there might be significant individual and public health benefits, especially if enough individuals get infected and create herd immunity, or at least contribute to speeding up herd immunity. When there is no vaccine (as was the case with smallpox before 1796), and assuming there is not enough cross-immunity from other diseases caused by similar viruses, people getting infected and then immune is the only way to create herd immunity. If the public health benefit is significant enough, a cost-benefit analysis of this strategy at the collective level does not always rule out variola.

At the moment, and for predictably quite a long time to come, the only strategy to gain herd immunity against COVID-19 is to have enough people infected, at least given certain assumptions about the level and duration of immunity the COVID-19 virus confers. We could wait until this happens naturally, or we could promote it by incentivizing active, systematic infection with a coronavirus of people who are very unlikely to suffer serious consequences of it. These include healthy young people (children, adolescents, and young adults), as they have been shown to be at a much lower risk of death and serious complications from COVID-19. Infecting and then isolating enough of them for as long as they remain contagious would contribute to increasing immunity rates at the collective, thus slowing down virus transmission and possibly protecting them against the virus at an older age. It would speed up the realisation of herd immunity and make it more likely it would happen before we have a vaccine. The societal benefit could be enormous, given the many costs entailed by the COVID-19 pandemic and lockdown measures (including health costs of other diseases being neglected, economic costs, mental health costs, inequality costs created by the uneven distribution of the risks of the disease itself and of lockdown measures). Some (Hanson 2020, Cullnerne Bown 2020) have suggested that variola on low risk groups can be an effective strategy to tackle the COVID-19 pandemic. The virus used for variola might not even need to be COVID-19. It has been suggested that a less harmful coronavirus such as HCoV-NL63 could be very effective at conferring immunity against COVID-19 (Cullnerne Bown 2020).

Variola with COVID-19 could be seen as ethically problematic because it involves using certain individuals as means, and possibly as *mere* means, to benefit others and to achieve a societal good. For the purpose of the present discussion, someone can be said to be used as ‘mere’ means when this individual does not give valid consent to being used as a means to achieve some good and/or when the individual does not get any benefit out of it. If the individual gives valid consent and/or if the individual stands to significantly benefit from the procedure, then the individual can be said to be used as a means, but not as a ‘mere’ means. Some people, including Malm and Navin (2020), think that using certain individuals as mere means to protect others against severe infectious diseases is not ethically permissible.

The case they analyse is yet different, though only slightly so. Malm and Navin discuss the strategy of exposing children to the varicella virus in order to benefit *only* the elderly who are at risk of shingles. This is a clear example of using the first group *merely* as a means to benefit the second: children do not get any significant benefit out of it and in any case cannot give valid consent. The strategy they discuss is based on the Exogenous Boosting Hypothesis (EBH) and has been adopted by some countries (e.g. by not subsidizing the varicella vaccine) including the UK, Norway, and the Netherlands. The varicella virus causes chickenpox, and shingles occurs when the inactive varicella virus that remains in an individual's nerve cells after the individual recovers from chickenpox is reactivated. According to the EBH, people who had chickenpox can gain protection against shingles by being exposed again to the same virus: this exposure would boost the immune system response to the varicella virus so that it would not result in shingles. Chickenpox is an infectious disease that typically occurs in children, while shingles typically occurs in older adults. Therefore, as Malm and Navin correctly notice, "an EBH-informed vaccination strategy essentially requires that children become worse off, in this case by enduring the risks and harms of active chickenpox infection, so that a different group—in this case the vulnerable elderly—becomes better off" by being more likely to be exposed to the exogenous boosting.

Malm and Navin apply a standard Kantian argument against these policies. According to this argument, it is unethical to intentionally harm children (including withholding benefits like vaccines) in order to benefit older population groups because it is unethical to use people as mere means. Children are harmed twice by this policy, because without vaccination they are at risk of contracting chickenpox and, if they do contract chickenpox, they subsequently become at risk of shingles.

Consider now the current COVID-19 situation. COVID-19 has been shown to entail very small risks for young people, especially for adolescents and children. For instance, less than 1% of COVID-19 cases recorded in China occurred in children younger than 10 (Wu 2020). Children, in particular, tend to be asymptomatic thanks to a better reaction of their immune system to the virus (CDC 2020, Lu et al 2020). They are vectors of the infection, but they are not themselves at a significant risk from it. When adjusted for undiagnosed cases, the death rate of COVID-19 has been estimated to be 7.8% in people aged over 80 and 0.0016% in children aged 9 and under (Mahase 2020, Verity et al 2020). Interestingly, 0.0016% is also the mortality rate of chickenpox, with most deaths occurring in immunocompetent children and adults (CDC 2019).

On the other hand, the lockdown is imposing quite a large toll on children, adolescents, and young adults. In many countries children have been in a lockdown for many months, prevented from attending school, from playing outside, from interacting with their peers, from accessing playgrounds in public parks, and so on. According to the Co-SPACE (COVID-19 Supporting Parents, Adolescents, and Children in Epidemics) survey run at the University of Oxford, significant increases in emotional and mental health difficulties were reported in children aged 4-10 during the lockdown in the UK¹. Also, children and young people will pay a large toll for the long lasting economic consequences of the lockdown. Arguably, young people have been used as a mere means to protect the elderly throughout the whole pandemics.

Using young people as a (mere) means to protect the elderly might or might not be ethically acceptable. Elsewhere, my coauthors and I have argued that it might be permissible in the case of certain vaccination policies targeting certain population groups (typically children) to protect other groups (typically the elderly) (Bamberg et al 2018, Giubilini, Savulescu, and Wilkinson 2020). But when we compare different infectious disease policies, we might want to apply ethical principles consistently, whether we are talking of vaccination policies, of lockdowns, or of variolation.

If we think the EBH-based policies that Malm and Navin discuss is justified, then it means we think that the Kantian imperative to not treat people as mere means can permissibly be violated when the collective good at stake (in that case, reducing the incidence of shingles) is sufficiently large. Malm and Navin rightly notice the public health strategy based on the EBH, in order to be consistent with its

¹ See a summary at <http://www.ox.ac.uk/news/2020-06-16-children-show-increase-mental-health-difficulties-over-covid-19-lockdown>, last access 4 July 2020.

intended goal of protecting the old by getting the young infected, would need not only to remove incentives to get the vaccine (such as subsidization of the varicella vaccine). It would need to actually disincentivize varicella vaccination and encourage behaviours that get children infected – for example ‘chickenpox parties’. Would this be significantly different, ethically speaking, from variolation against COVID-19, especially considering that chickenpox and COVID-19 have roughly the same mortality rate in young people and children? The benefit for society of reaching herd immunity against COVID-19 more quickly is very large, probably larger than the benefit of reducing cases of shingles.

If instead we agree with Malm and Navin that treating people merely as a means in infectious disease policies is not ethically justified, then we need to ask what alternative scenarios are preferable in this very same respect. So far, in the case of COVID-19, the alternative most countries have adopted has been a strict lockdown that, as we have seen, has harmed many young people and risks harming them even more in the future (in light of the likely economic crisis and recession). Many countries, such as the UK, are openly prepared to reintroduce lockdowns in case of new local or national spikes or second waves of the virus. Is treating them as mere means through lockdown worse, in terms of harm imposed, than treating them as mere means through variolation? When asking this question, we need to consider that if the immunity against COVID-19 is long-lasting (which at the moment is a big ‘if’), then variolation might also benefit young people by better protecting them against COVID-19 later on in life, especially if the future vaccine will turn out to provide less immunity (that is, lower level of protection and/or protection for a shorter time) than the infection itself.

I am asking these questions to point out how consistency among different public health policies could produce better outcomes both from a public health and an ethical point of view, by prompting us either to revise existing policies or to introduce new ones. Of course, whether variolation against COVID-19 is a feasible, safe enough, and ethical option depends on many empirical assumptions (about immunity against COVID-19, the effectiveness of variolation, the actual risks of the virus or other coronaviruses that might be used in variolation, and so on) and on an accurate risk assessment. But there seems to be a case at least for testing these assumptions and conduct this risk assessment.

If it turns out variolation is an effective and safe enough strategy, we should consider it among the strategies to speed up achievement of herd immunity against COVID-19. Other ethical considerations, beyond that of treating certain groups as (mere) means, would need to be addressed. Most notably, fairness and reciprocity might require some form of compensation for young people or family who take on the risks of coronavirus, and it would need to be established which incentives or disincentives to use in order to achieve the desired number of young people who get inoculated. This is probably a discussion we should be having right now.

REFERENCES:

- Bamberg, B., T Douglas, M. Selgelid, H. Maslen, A. Giubilini, A. Pollard, J. Savulescu, 2018, Influenza vaccination strategies should target children, *Public Health Ethics*, 11, 2: 221-234
- CDC 2019, *Varicella*, at <https://www.cdc.gov/vaccines/pubs/pinkbook/varicella.html>, last accessed 5 July 2019
- Cullerne Bown, William, Exit Route? The Case for Variolation Against COVID-19 (April 27, 2020). Available at SSRN: <https://ssrn.com/abstract=3587397> or <http://dx.doi.org/10.2139/ssrn.3587397>
- Fenner, Frank, Henderson, Donald A, Arita, Isao, Jezek, Zdenek, Ladnyi, Ivan Danilovich. et al. (1988). Smallpox and its eradication / F. Fenner ... [et al.]. World Health Organization. <https://apps.who.int/iris/handle/10665/39485>

Giubilini, Savulescu, Wilkinson 2020. COVID-19 vaccine: vaccinate the young to protect the old? *Journal of Law and the Biosciences*, published ahead of print 26 June 2020, <https://doi.org/10.1093/jlb/ljaa050>

Hanson, R 2020. Variolation (+ Isolation) May Cut Covid19 Deaths 3-30X, *Overcomingbias*, at accessed 4 July 2020

Lu et al 2020, SARS-CoV-2 Infection in Children, *New England Journal of Medicine*, 18 March 2020

Mahase Elisabeth. Covid-19: death rate is 0.66% and increases with age, study estimates *BMJ* 2020; 369 :m1327

Malm, H and M Navin 2020, Pox Parties for Grannies? Chickenpox, Exogenous Boosting, and Harmful Injustices, *American Journal of Bioethics*

Verity R, Okell LC, Dorigatti I, et al. Estimates of the severity of coronavirus disease 2019: a model-based analysis. *Lancet Infect Dis* 2020 Mar 30

Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020 February 24 (Epub ahead of print).