

Vaccinations: Mandatory or Voluntary? Risk–Benefit Analysis

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Abstract

The discussion regarding mandatory vaccination of children centers mainly around the question of whether producing public good has precedence over the freedom of individuals. In the core of this discussion lies the assumption that mass immunization has been proven as a public good, based on the experts' opinion that there is no proof of significant damage caused by vaccinations. We suggest, however, that this argument is insufficient. Namely, beside acute effects, vaccination (as any intervention) can shorten long-term life expectancy. If, for example, vaccination is intended to prevent an illness that causes 0.05% mortality or permanent disability population-wide (like in the case of measles), the population-wide vaccination can be considered as a public good only if the vaccination itself does not cause life shortening by 0.05%, that is, by about 15 days. Absence of such a small long-term effect has not been proven and cannot be proven in principle for several decades to come. The lack of proof of damage is not proof of lack of damage; in any dispute, the burden of proof lies with those who lay charges. Therefore, we conclude that it is inappropriate today to enforce mandatory immunization.

Keywords

immunization, public health, health policy, side effects

Vaccination, or immunization, is a classic example of hormetic response. The success of vaccination in eradication of smallpox is generally accepted, as well as its input in protection against poliomyelitis or tetanus, for example. However, the present trend of vaccination against additional diseases (measles, varicella, mumps etc) is more controversial. Particularly, the issue of mandatory vaccination of children has become an important matter of public discussion.

The discussion centers mainly around the question of whether producing public good (as a result of mass vaccination) has precedence over the freedom of individuals to decide on the questions of their own health and that of their children. However, in the core of this discussion lies the assumption that mass immunization has been proven as a public good. This assumption is based on the experts' opinion that there is clear proof that without appropriate immunization, illnesses can cause serious and even fatal complications in some cases, while on the other hand there is no proof of significant damage caused by vaccinations besides about 1 serious reaction per 100 000 vaccinations.¹ Researchers from Harvard Medical School estimated that 99% of serious reactions were not reported, so the real damage of vaccinations was higher by 2 orders of magnitude.² However, even accepting the claimed ratio of 1/100 000 we

suggest that the lack of proof of damage is insufficient to consider vaccination as a public good.

Every vaccination, as any medical procedure, has its side effects. In many countries, legal and public entities have been established in order to compensate people ill-treated by vaccinations.^{3,4} Nevertheless, it is presently accepted that the above-mentioned vaccination risk is considerably lower than the benefit of the acquired immunity.

However, there is another kind of reasoning that is not often mentioned in literature: beside acute effects, vaccination (as administration of any drug or other medical procedure) can shorten long-term life expectancy. The vaccinations currently under dispute are mainly vaccinations against relatively mild illnesses, namely illnesses that generally pass relatively easily (often without any symptoms whatsoever) with a low

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percentage of severe complications. If, for example, vaccination is intended to prevent an illness that causes population-wide 0.05% mortality or severe complications like permanent disability—the population-wide vaccination can be considered as a public good only if the vaccination itself does not cause life shortening by 0.05%. In other words, the public good—statistical benefit of the vaccination measured as overall life expectancy extension—cannot be proven as long as it cannot be proven that the vaccination itself does not cause life expectancy shortening by 0.05%.

Let us consider measles and vaccination against measles. The risk of fatal complications of measles is estimated, based on the US statistics before mass vaccination was introduced, as 0.1% of the reported cases (500 000 measles cases per year); the risk of chronic disability is estimated as 0.2%.⁵ At that time (the baby boom era), about 3 000 000 children were born each year. Therefore, measles cases were reported in one-sixth of the birth cohort (probably most school-aged children got measles, and it was not reported). Therefore, the relevant (population-wide) probability of death or severe complications of measles is $(0.1\%+0.2\%)/6 = 0.05\%$.

Assuming the present life expectancy as approximately 80 years, shortening by 0.05% means shortening by about 15 days. In order to prove that vaccination does not shorten the life expectancy by 15 days, it is necessary to compare—after 80 to 90 years—all-cause mortality in vaccinated versus unvaccinated groups, and even then it will be difficult to take into account all the confounding factors. Such a comparison has never been performed, if for the simple reason that the majority of today's accepted vaccinations were invented much less than 80 years ago. Consequently, there is no basis for ruling that public benefit of mass immunization has been proven: the lack of proof of damage is not proof of lack of damage.

In any dispute, the burden of proof lies with those who lay charges (in Latin: *semper necessitas probandi incumbit ei qui agit*). In the case of mandatory immunization, the state lays charges against the parents, not the opposite. Therefore, before any discussion of whether public benefit outweighs individual

freedom becomes practical, this public benefit should be proven. We have shown that it has not been proven yet; moreover, it cannot be proven for decades to come. Therefore, we conclude that it is inappropriate today to enforce mandatory immunization.


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