Role of Health Care Workers in the clarification of myths and promotion of Seasonal Influenza Vaccination

Dr. Leo LUI
IDCTC, HAHO
29 August 2018
Before we clear the myths, let’s go back in time …
The founding of modern vaccination

**Variolation**

Variolation or inoculation was the method first used to immunize an individual against smallpox (Vāriola) with material taken from a patient or a recently variolated individual in the hope that a mild, but protective infection would result. The procedure was most commonly carried out by inserting/rubbing powdered smallpox scabs or fluid from pustules into superficial scratches made in the skin. The patient would develop pustules identical to those caused by naturally occurring smallpox, usually producing a less severe disease than naturally acquired smallpox. Eventually, after about two to four weeks, these symptoms would subside, indicating successful recovery and immunity. The method was first used in China and the Middle East before it was introduced into England and North America in the 1720s in the face of some opposition. The method is no longer used today. It was replaced by smallpox vaccine, a safer alternative. This in turn led to the development of the many vaccines now available against other diseases.
Edward Jenner (1749-1823)
- An English physician who pioneered smallpox vaccine. The term 'vaccination' is derived from the term 'Variola vaccinae' (smallpox of cow).
- He observed that a prior infection with cowpox rendered a person immune to smallpox.
- Inoculated a boy on his arm with pus scraped from cowpox blisters of a milkmaid and then challenged him with variolous materials.

Louis Pasteur (1822-95)
- French microbiologist and chemist famous for vaccination, fermentation and pasteurization.
- Discovered that artificially weakened bacteria & viruses can induce immunity without causing disease, leading to discovery of earliest rabies and anthrax vaccination.
Vaccine oppositions are not new

French caricature from around 1800. The Historical Medical Library of The College of Physicians of Philadelphia

A poisonous tree as metaphor for the effects of smallpox vaccination in early 1900s The Historical Medical Library of The College of Physicians of Philadelphia

James Gillray, The Cow-Pock—or—the Wonderful Effects of the New Inoculation!(1802). Wikipedia
Alleged association between MMR vaccine and autism

Medical Hypotheses
Volume 56, Issue 4, April 2001, Pages 462-471

Regular Article
Autism: a novel form of mercury poisoning
S. Bernard, A. Enayati, L. Redwood, H. Roger, T. Binstock

Abstract
Autism is a syndrome characterized by impairments in social relatedness and communication, repetitive behaviors, abnormal movements, and sensory dysfunction. Recent epidemiological studies suggest that autism may affect 1 in 150 US children. Exposure to mercury can cause immune, sensory, neurological, motor, and behavioral dysfunctions similar to traits defining or associated with autism, and the similarities extend to neuroanatomy, neurotransmitters, and biochemistry. Thimerosal, a preservative added to many vaccines, has become a major source of mercury in children who, within their first two years, may have received a quantity of mercury that exceeds safety guidelines. A review of medical literature and US government data suggests that (i) many cases of idiopathic autism are induced by early mercury exposure from thimerosal; (ii) this type of autism represents an unrecognized mercurial syndrome; and (iii) genetic and non-genetic factors establish a predisposition whereby thimerosal's adverse effects occur only in some children.


Neurodevelopmental disorders after thimerosal-containing vaccines: a brief communication.
Geier MR, Geier DA

Abstract
We were initially highly skeptical that differences in the concentrations of thimerosal in vaccines would have any effect on the incidence rate of neurodevelopmental disorders after childhood immunization. This study presents the first epidemiologic evidence, based upon tens of millions of doses of vaccine administered in the United States, that the risk of autism and other neurodevelopmental disorders increases in individuals who received vaccines containing thimerosal.


Vaccines and autism: a tale of shifting hypotheses.
Gerber JS, Offit PA

Abstract
Although child vaccination rates remain high, some parental concern persists that vaccines might cause autism. Three specific hypotheses have been proposed: (1) the combination measles-mumps-rubella vaccine causes autism by damaging the intestinal lining, which allows the entrance of encephalopathic proteins; (2) thimerosal, an ethylmercury-containing preservative in some vaccines, is toxic to the central nervous system; and (3) the simultaneous administration of multiple vaccines overwhelms or weakens the immune system. We will discuss the genesis of each of these theories and review the relevant epidemiological evidence.
The study was methodologically flawed with conflicts of interest!
"Well, listen, partners, we don't have a flu season," We've already had our shot: He bore our sicknesses and carried our diseases. That's what we stand on."

"Flu, I bind you out of the people in the name of Jesus," she continued, adding, "Jesus himself gave us the flu shot. He redeemed us from the curse of flu, and we receive it and we take it, and we are healed by his stripes, amen."

Ahead of the 2016 election, Kenneth Copeland said that Christians who don't vote for Trump "are going to be guilty of murder," are "guilty of an abomination to God" (source: Washington CNN, Dallas News)
Consequence of anti-vaccination movements

Incidence of pertussis increased after vaccination of DTP was disrupted in US, Europe and Japan

CONCLUSIONS AND RELEVANCE

A substantial proportion of the US measles cases in the era after elimination were intentionally unvaccinated. The phenomenon of vaccine refusal was associated with an increased risk for measles among people who refuse vaccines and among fully vaccinated individuals. Although pertussis resurgence has been attributed to waning immunity and other factors, vaccine refusal was still associated with an increased risk for pertussis in some populations.
Prevent Flu  Get Vaccination

合資格人士 Eligible persons

長者 Elderly persons
- 65歲或以上人士
  Persons aged 65 years or above

領取綜援或持有由社會福利署簽發的有效醫療費用減免證明書的香港居民
Comprehensive Social Security Assistance recipients or Hong Kong residents holding a valid Certificate for Waiver of Medical Charges Issued by the Social Welfare Department

- 50歲至未滿65歲人士
  Persons aged between 50 and less than 65 years
- 50歲以下有高風險情況^{1}而在公立診所求診的人士
  Persons aged less than 50 with high-risk conditions^{1} attending public clinics
- 年齡介乎6個月至未滿12歲^{2}的兒童
  Children aged between 6 months and less than 12 years^{2}
- 孕婦
  Pregnant women

有高風險情況^{3}人士 Persons with high-risk conditions^{3}

- 有高風險情況^{3}或須要長期服用亞士匹林的兒科門診病人
  Paediatric out-patients with high-risk conditions^{3} or on long-term aspirin
- 醫院管理局轄下醫院住院病人
  In-patients under Hospital Authority (HA)
- 智障人士
  Persons with intellectual disability
- 傷殘津貼受助人
  Disability Allowance recipients

其他人士 Other persons

- 居於安老院舍的長者和殘疾人士院舍的宿友
  Residents of residential care homes for the elderly or the Persons with Disabilities
- 在養老院、醫院管理局、安老院舍或殘疾人士院舍工作的護理人員
  Healthcare workers working in Department of Health, HA or residential care homes for the elderly or the Persons with Disabilities
- 家禽業從業員或須從事屠宰家禽業的人員
  Poultry workers or workers who may be involved in poultry-culling operations
- 從事養豬或屠宰豬業的人士
  Pig farmers or pig-slaughtering industry personnel
Why get a Flu vaccine?

Yearly flu vaccination is the best tool currently available to protect against influenza (flu), a serious disease which sickens millions of people each year.

The Centers for Disease Control and Prevention (CDC) recommends a yearly flu vaccination as the first and most important step in protecting against flu and its potentially serious complications. Millions of people have safely received flu vaccines for decades. Flu vaccination can reduce flu illnesses, doctors’ visits, and missed work and school due to flu, as well as prevent flu-related hospitalizations.

Reasons to get a flu vaccine:

- Flu vaccination can keep you from getting sick from flu.
- Flu vaccination can reduce the risk of flu-associated hospitalization, including among children and older adults.
  - A 2014 study showed that flu vaccine reduced children’s risk of flu-related pediatric intensive care unit (PICU) admission by 74% during flu seasons from 2010-2012.
  - Another study published in the summer of 2016 showed that people 50 years and older who got a flu vaccine reduced their risk of getting hospitalized from flu by 57%.
- Flu vaccination is an important preventive tool for people with chronic health conditions.
  - A 2013 study showed flu vaccination was associated with lower rates of some cardiac events among people with heart disease, especially among those who had a cardiac event in the past year.
  - Flu vaccination also has been shown to be associated with reduced hospitalizations among people with diabetes (79%) and chronic lung disease (52%).
- Vaccination helps protect women during and after pregnancy. Getting vaccinated also protects the baby several months after birth.
  - A study that looked at flu vaccine effectiveness in pregnant women found that vaccination reduced the risk of flu-associated acute respiratory infection by about one-half.
  - There are studies that show that flu vaccination in a pregnant woman can reduce the risk of flu illness in her baby by up to half. This protective benefit was observed for several months after birth.
  - A 2017 study was the first of its kind to show that flu vaccination can significantly reduce a child’s risk of dying from influenza.
- Flu vaccination also may make your illness milder if you do get sick.
  - Getting vaccinated yourself also protects people around you, including those who are more vulnerable to serious flu illness, like babies and young children, older people, and people with certain chronic health conditions.

How well do flu vaccines work?

Studies by CDC researchers and other experts indicate that flu vaccine reduces the risk of doctor visits due to flu by approximately 40% to 60% among the overall population when the vaccine viruses are like the ones spreading in the community. Other studies have shown similar protection against flu-related hospitalizations.

A flu vaccination does not guarantee protection against the flu. Some people who get vaccinated might still get sick. However, people who get a flu vaccine are less likely to get sick with flu or hospitalized from flu than someone who does not get vaccinated.

The most important factors that affect how well the flu vaccine works include:

- The ‘match’ between the flu vaccine and the flu viruses that are spreading that season; and
- Factors such as the age and overall health of the person being vaccinated. For example, older people with weaker immune systems may respond less well to vaccination.

Experts are working to create flu vaccines that work better, but existing flu vaccines still offer important health benefits to the community.

The following is a list of all the health and age factors that are known to increase a person’s risk of getting serious complications from the flu:

- Asthma
- Blood disorders (such as sickle cell disease)
- Chronic lung disease (such as chronic obstructive pulmonary disease [COPD] and cystic fibrosis)
- Endocrine disorders (such as diabetes mellitus)
- Extreme obesity (people with a body mass index [BMI] of 40 or greater)
- Heart disease (such as congenital heart disease, congestive heart failure, and coronary artery disease)
- Kidney disorders
- Liver disorders
- Metabolic disorders (such as inherited metabolic disorders and mitochondrial disorders)

Other people at high risk from the flu:

- Adults 65 years and older
- Children younger than 5 years old, but especially children younger than 2 years old
- Pregnant women and women up to 2 weeks after the end of pregnancy
- American Indians and Alaska Natives

Influenza Vaccination for children in Hong Kong

the coverage rates of children aged six months to under 12 years was 17.4% in 2016-2017 (Does not include private sectors)

Side effects, if any, are usually mild

Summary of mild and severe adverse events – Inactivated influenza vaccine

<table>
<thead>
<tr>
<th>Nature of Adverse event</th>
<th>Description</th>
<th>Rate/doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Local reactions</td>
<td>10 - 64 per 100</td>
</tr>
<tr>
<td></td>
<td>Injection site reactions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Generalized reactions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fever in children 1 – 5 years of age</td>
<td>12 per 100</td>
</tr>
<tr>
<td></td>
<td>Fever in children 6 – 15 years of age</td>
<td>5 per 100</td>
</tr>
<tr>
<td>Severe</td>
<td>Anaphylaxis</td>
<td>0.7 per $10^6$</td>
</tr>
<tr>
<td></td>
<td>Guillain-Barré</td>
<td>1 – 2 per $10^6$</td>
</tr>
<tr>
<td></td>
<td>Oculo-respiratory syndrome (events of moderate severity)</td>
<td>76 per $10^6$</td>
</tr>
</tbody>
</table>
Recent example of anti-vaccination in HK
MYTH # 1 Flu vaccine contains mercury!?;

What are the Health Effects of Mercury Exposure?

The health effects that can be caused by breathing mercury depend on how much mercury vapor you breathe and how long you breathe the vapors. Health problems can result from short-term or long-term mercury exposure.

Who is most likely to have health problems after breathing mercury vapors?

The following groups of people are particularly sensitive to the harmful effects of mercury:

- Premature children - Mercury can pass from mother's body to her developing fetus.
- Women - Mercury can also be passed to nursing infants through breast milk.
- Young children - They tend to play on floors where mercury may have been spilled, and are more likely to breathe more vapors than an adult because they breathe faster and have smaller lungs.

CDC

Health effects caused by short-term exposure to high levels of mercury vapors

- Dizziness
- Headache
- Nausea, vomiting, diarrhea
- Increase in blood pressure or heart rate
- A metallic taste in the mouth
- Eye irritation
- Headache
- Vision problems

Health effects caused by long-term exposure to mercury vapors

- Anxiety
- Excessive shyness
- Anorexia
- Sleeping problems
- Loss of appetite
- Irritability
- Fatigue
- Forgetfulness
- Tremors
- Changes in vision
- Changes in hearing

IRRELEVANT
What is thiomersal (硫柳汞)?

- A compound of ethyl mercury for prevention of microbial contamination in inactivated vaccines presented in multi-dose vials
- Flu vaccines used in HK are presented in single-dose preparations and do not contain thiomersal
- According to WHO expert advisory group, there is no evidence to suggest the amount of thiomersal used poses a health risk. Other expert groups have reached similar conclusions.
- Ethyl mercury, in contrast to methyl mercury, has short half-lives (6 days) It is actively excreted via GI tract and does not accumulation in body.
- Organic mercury is less harmful than inorganic mercury
- Switching over to single-dose vials without a sound scientific basis will cause huge impact on world wide immunization campaigns
MYTH # 2 - ‘live’ virus will mutate and become more virulent !?

* Flu vaccines used in HK are inactivated influenza vaccine (IIV). They do not contain ‘live’ viral particles and therefore cannot cause infection or replicate

One type of Live attenuated Influenza Vaccine (LAIV) is registered in HK, but experience of use is limited. HCW should observe contraindications before recommending it e.g. severe asthma, compromised immunity.

LAIV also does not cause Flu


https://www.cdc.gov/flu/about/qa/nasalspray.htm
MYTH # 3 – vaccine works only 1 in 10 due to poor matching

According to the WHO, when the vaccine strains closely match the circulating influenza viruses, efficacy of IIV in individuals younger than 65 years of age typically range from 70% to 90%, whereas the efficacy of IIV to prevent influenza infection in individuals aged 65 years or above is at best modest, irrespective of setting, population and study design. Nevertheless, vaccination remains the most efficacious public health tool currently available to protect elderly individuals against influenza.
**MYTH # 4 - I am allergic to eggs, I cannot receive the flu shot**

Preparations of flu shots ever invented

I. Live attenuated nasal sprays (egg-based)
   I. Lowered ovalbumin content similar to IIV level since 2016
II. Inactivated (egg-based in initial step of production)
III. Recombinant DNA technology (egg-free)
   I. Flublok (less immunogenic?) (not registered in HK)
IV. Mammalian cell culture-based (egg-free)
   I. Flucelvax/Optaflu (not registered in HK)

UK definition of very low ovalbumin content: <0.12ug/ml (Greenbook, Ch. 19 Dec 2017)
Prior skin test no longer recommended before flu shot whether or not the person has egg allergy

Both LAIV and IIV with low ovalbumin content can be used

Observation for 30 minutes for allergic reaction after receiving flu shot is not necessary

Those with severe allergic reactions to eggs should be referred to specialists for immunization under medical care with staff experienced in recognizing and treating anaphylaxis

Rate of anaphylaxis after all vaccines is 1.35 per one million doses of IIV. Most of the cases were due to components other than egg proteins present. (Vaccine Safety Datalink Study, US)
In order to promote flu shot, we must first believe in them ourselves.

**Physician recommendation is the most important factor influencing a patient’s decision to be immunized.**

**Who most influences adults’ decisions to get immunized?**

<table>
<thead>
<tr>
<th>Personal physician</th>
<th>69 percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family member</td>
<td>19 percent</td>
</tr>
<tr>
<td>Celebrity physician, public figure, other</td>
<td>7 percent</td>
</tr>
<tr>
<td>None of the above</td>
<td>4 percent</td>
</tr>
<tr>
<td>No answer</td>
<td>1 percent</td>
</tr>
</tbody>
</table>

Why do some doctors/clinicians refuse the flu vaccine?

There are a variety of reasons why staff decline the vaccine. A recent survey of healthcare workers in University Hospitals of Leicester and Leicestershire Partnership Trust found that one third of unvaccinated clinician respondents felt that universal infection control practices are sufficient. One third of unvaccinated clinician respondents reported they were not vaccinated because they have a good diet and/or take vitamins or supplements that work as well as or better than the influenza vaccine.

Although infection control measures are vital and a good diet is encouraged, these actions alone will not prevent influenza; vaccination is the best option for protecting yourself, your family and vulnerable patients from the virus.

| Table 1. General characteristics of questionnaire about influenza vaccination and nurses’ responses |
|---------------|--------------|--------------|--------------|--------------|--------------|
| No. questionnaires delivered | 2,825 | 2,929 | 2,929 | 2,494 | 2,492 |
| Response rate, % | 36.2 | 26.9 | 27.7 | 28.4 | 26.9 |
| Total no. respondents | 903 | 739 | 779 | 477 | 651 |
| Male, % | 11.7 | 14.1 | 14.2 | 17.6 | 15.1 |
| Reasons for getting vaccinated, no. respondents* | 510 | 339 | 306 | 127 | 161 |
| Self-protection, % | 74 | 88 | 87 | 94 | 91 |
| Protecting others, % | 32 | 58 | 53 | 71 | 67 |
| Work requirement, % | 36 | 55 | 62 | 39 | 33 |
| Reasons for not getting vaccinated,* no. respondents | 377 | 397 | 451 | 350 | 490 |
| Concern about side effects, % | 42 | 55 | 62 | 70 | 56 |
| Ineffectiveness for self-protection, % | 50 | 57 | 51 | 45 | 50 |
| Ineffectiveness for protecting others, % | 9 | 22 | 14 | 13 | 23 |
| Lack of work requirement, % | 7 | 9 | 6 | 6 | 5 |

* A multiple-choice list was provided for respondents. Only common reasons specifically chosen by respondents in each survey are included in the table, in order of their preferences. Less than 5% chose “other” as their reason for getting vaccinated, whereas >20% chose “other” as their reason for not getting vaccinated.

Should flu vaccination be mandatory for healthcare workers?

Amy Behrman believes that mandatory vaccination is needed to protect vulnerable patients, but Wilf Offley argues that evidence on effectiveness is not sufficient to override healthcare workers’ right to choose.

PMCID: PMC4209272
Published online 2014 November. doi: 10.2105/AJPH.2013.301514
PMD: 2432628

Mandatory Influenza Vaccination for Health Care Workers as the New Standard of Care: A Matter of Patient Safety and Nonmaleficent Practice

Nicolás Cortés-Penfield, MD

Author information ► Article notes ► Copyright and License information ► Disclaimer

Go to ►

Abstract

A growing body of literature defends the efficacy of seasonal influenza vaccination for health care workers in reducing the mortality of hospitalized patients. I review the evidence concerning influenza vaccination, concluding that universal vaccination of health care workers against influenza should be considered standard of patient care and that nonvaccination represents nonmaleficent care. I further argue that the ethical responsibility to ensure universal vaccination of staff against seasonal influenza lies not only with individual health care providers but with each individual health care institution.
Promotion of flu shot needs everyone of us!

⭐ Strong and visible leadership
Senior management including COSs, HCEs, CGMs and CCE supported the campaign symbolically and also involved directly in the campaign in substantive ways.

⭐ Dedicated Flu team
A very structured NTEC GVP committee that includes all hospital representatives (e.g. HR, pharmacy, ICN, SOPCs, GOPCs, and Allied Health Professionals) forms a strong network both horizontally and vertically.

⭐ Free readily available vaccine and convenience to get a flu vaccine is the KEY to the success. With easy checking at CMS vaccination module, we can offer flexible vaccination at convenient
1. Location, e.g. staff clinic, canteen, meeting places, doctor lounge, working places........ AND
2. Time/ occasions, both scheduled and ad-hoc vaccination

⭐ Extensive communication
1. Staff forums and educational sessions to deliver objectives, messages and clinical evidence of health care workers flu vaccination as an important measure to protect staff, relatives and patients.
2. Prompt clarification of misunderstandings at website.
3. Photos sharing of flu vaccination promotion activities at website.
4. Creative promotional activities: Pop songs with Flu vaccine lyrics (e.g. Let it be, 皆大歡喜)

⭐ Incentives
1. Drink coupons, Pins
2. Vaccination champions, daily reporting and frequent updating of staff vaccination coverage with regular reports and accessible at website.
THANK YOU