Anti-Vaccine Movement: Strategies to address Vaccine Hesitancy

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Dalhousie University, Halifax, Nova Scotia April 18, 2015
Conflicts of Interest

No financial conflicts to declare

My Biases:
- Consultant to Canadian Peadiatriic Society Imm/ID Cmt
- Consultant to WHO Immunization/ Vaccines and Biologicals
- SAGE Working Group on Vaccine Hesitancy
- Canadian Centre for Vaccinology: Health Policy and Translation Group

I believe vaccines are safe, effective, serious diseases can occur if not immunized
Objectives

By the end of this session, the participants will be able to outline why

- define vaccine hesitancy
- outline factors that influence parental acceptance of vaccines
- describe effective approaches to addressing hesitancy
# Vaccine Preventable Diseases

**NUMBER OF CASES BY DISEASE**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles</td>
<td>28,683</td>
</tr>
<tr>
<td>Mumps</td>
<td>31,640</td>
</tr>
<tr>
<td>Polio</td>
<td>2,692</td>
</tr>
<tr>
<td>Rubella attacks</td>
<td>83,813</td>
</tr>
<tr>
<td>Whooping Cough</td>
<td>104,076</td>
</tr>
<tr>
<td>Other</td>
<td>182</td>
</tr>
</tbody>
</table>

**NUMBER OF CASES BY REGION**

<table>
<thead>
<tr>
<th>Region</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>631,234</td>
</tr>
<tr>
<td>Asia</td>
<td>379,749</td>
</tr>
<tr>
<td>Europe</td>
<td>189,894</td>
</tr>
<tr>
<td>North America</td>
<td>145,223</td>
</tr>
<tr>
<td>Australia</td>
<td>26,272</td>
</tr>
<tr>
<td>South America</td>
<td>3,500</td>
</tr>
</tbody>
</table>

**YEAR**

<table>
<thead>
<tr>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SELECT DISEASE**

- (All)
- Attacks
- Measles
- Mumps
- Other
- Polio
- Rubella
- Whooping Cough

**LEGENDS**

- Attacks
- Measles
- Mumps
- Other
- Polio
- Rubella
- Whooping Cough

*Attacks not to scale

Disneyland Measles Outbreak

USA
- By Jan 2015 > 95 cases in 14 states
- 2014 – record 644 cases measles despite eliminated measles in 2000

Canada
- >130 cases measles- Lanaudière region QC
  - started via Disneyland contact

California:
% personal belief exemptions
### Maximum and Current Reported Morbidity

**Vaccine-Preventable Diseases, Canada**

<table>
<thead>
<tr>
<th>Disease</th>
<th>Pre-vaccine</th>
<th>2007-11 % change</th>
<th>Peak Annual Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria</td>
<td>9,010</td>
<td>4</td>
<td>-100</td>
</tr>
<tr>
<td>Measles</td>
<td>61,370</td>
<td>752</td>
<td>-98.8</td>
</tr>
<tr>
<td>Mumps</td>
<td>43,671</td>
<td>1,110</td>
<td>-97.5</td>
</tr>
<tr>
<td>Pertussis</td>
<td>19,878</td>
<td>1,961</td>
<td>-90.2</td>
</tr>
<tr>
<td>Polio</td>
<td>5,384</td>
<td>0</td>
<td>-100</td>
</tr>
<tr>
<td>Rubella</td>
<td>37,917</td>
<td>10</td>
<td>-99.9</td>
</tr>
<tr>
<td>CRS</td>
<td>29</td>
<td>1</td>
<td>-96.6</td>
</tr>
<tr>
<td>Tetanus</td>
<td>25</td>
<td>6</td>
<td>-91.6</td>
</tr>
<tr>
<td>Invasive Hib</td>
<td>671</td>
<td>18</td>
<td>-97.4</td>
</tr>
</tbody>
</table>

**TOTAL** | 477,955 | 3862 | **99.2%**

*Adapted from: [http://www.phac-aspc.gc.ca/publicat/cig-gci/p01-02-eng.php#tab1](http://www.phac-aspc.gc.ca/publicat/cig-gci/p01-02-eng.php#tab1)*
Immunization So Important....

Global Vaccine Action Plan 2011-2020: Passed by World Health Assembly 2012:

“Immunization is, and should be recognized as, a core component of the human right to health and an individual, community and governmental responsibility.”  


The vision: for the Decade of Vaccines (2011–2020) is of a world in which all individuals and communities enjoy lives free from vaccine-preventable diseases.

Vaccine Concerns & Reluctance to Immunize

- Pertussis – SIDS
- Hep B – demyelinating dis
- MMR- autism
- Thimerosal- ASD
- Alum- inclusion myositis
- HPV-lowers sexual debut; more sexually active
- Multiple vaccines as cause of – cancer, diabetes, multiple sclerosis
- Multiples vaccines overwhelm immune system
- Natural infection is better than immunization

Tafuri et al Addressing the anti-vaccine movement and role of HCWs. Vaccine 2014 - http://dx.doi.org/10.1016/j.vaccine.2013.11.006
## Relative Importance of Different Vaccines

How important do you think the following vaccines are in preventing disease in children?

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Not important (1-2)</th>
<th>Moderately important (3-5)</th>
<th>Highly important (6-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetanus/diphtheria/Hib/pertussis/polio vaccine</td>
<td>3</td>
<td>15</td>
<td>80</td>
</tr>
<tr>
<td>Vaccine to prevent meningococcal disease</td>
<td>4</td>
<td>17</td>
<td>76</td>
</tr>
<tr>
<td>Measles/mumps/rubella (MMR) vaccine</td>
<td>5</td>
<td>19</td>
<td>75</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>5</td>
<td>25</td>
<td>68</td>
</tr>
<tr>
<td>Vaccine to prevent pneumococcal disease</td>
<td>5</td>
<td>23</td>
<td>67</td>
</tr>
<tr>
<td>Vaccine to prevent Human Papillomavirus</td>
<td>11</td>
<td>30</td>
<td>52</td>
</tr>
<tr>
<td>Vaccine for chicken pox (Varicella)</td>
<td>14</td>
<td>35</td>
<td>51</td>
</tr>
<tr>
<td>Flu vaccine (influenza)</td>
<td>27</td>
<td>46</td>
<td>26</td>
</tr>
</tbody>
</table>

- Not important (1-2)
- Moderately important (3-5)
- Highly important (6-7)

n=1745

Vaccine Safety Survey, 2011
Concerns about Vaccine Safety

“To what extent do you agree with the following statements?”

- Concerned that newer vaccines are not safe as older vaccines: Agree (5-7) - 51, Neither (4) - 22, Disagree (1-3) - 25
- More concerned about safety of vaccines now than five years ago: Agree (5-7) - 43, Neither (4) - 19, Disagree (1-3) - 38
- Adverse reactions to vaccines don’t get enough attention in the media: Agree (5-7) - 40, Neither (4) - 28, Disagree (1-3) - 30
- Children today receive too many vaccines: Agree (5-7) - 31, Neither (4) - 18, Disagree (1-3) - 51
- Don’t think that vaccines are safe: Agree (5-7) - 16, Neither (4) - 13, Disagree (1-3) - 71
- Use of alternative practices: Agree (5-7) - 14, Neither (4) - 19, Disagree (1-3) - 63

n=1247-1285
Vaccine Safety Survey, 2011
Angus Reid Poll February 2015

1500 Canadians thoughts on vaccinations

Good and not so good news

- 88%: vaccinations prevent diseases in individuals
- 86%: vaccines are effective for the community as a whole.*


- 83%: would vaccinate their own children.
- 74% agreed people who oppose childhood vaccinations are "irresponsible."
- 63% said vaccinations should be mandatory.
1500 Canadians thoughts on vaccinations

**BAD News**

- 39% said "the science on vaccinations isn't quite clear."
- Approx 30% believed "serious" side-effects may accompany vaccinations.
<table>
<thead>
<tr>
<th>Anti Vaccine Tactics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skewing science</strong></td>
</tr>
<tr>
<td>Deny or reject science that fails</td>
</tr>
<tr>
<td>to support antivac</td>
</tr>
<tr>
<td><strong>Shifting hypothesis</strong></td>
</tr>
<tr>
<td>Ongoing proposal new theories</td>
</tr>
<tr>
<td>for vaccine harm; ever moving</td>
</tr>
<tr>
<td>target</td>
</tr>
<tr>
<td><strong>Censorship</strong></td>
</tr>
<tr>
<td>Suppress dissenting opinion;</td>
</tr>
<tr>
<td>shut down critics</td>
</tr>
<tr>
<td><strong>Attacking the opposition</strong></td>
</tr>
<tr>
<td>Attack critics via personal insults</td>
</tr>
<tr>
<td>and by filing legal claims</td>
</tr>
</tbody>
</table>

*Kata A. Anti-vaccine activists, Web2.0 and the post modern paradigm....Vaccine 2012;30:3778-89*
Vaccine Hesitancy

- refers to delay in acceptance or refusal of vaccines despite availability of vaccine services
- is complex and context specific varying across time, place and vaccines
- is influenced by factors such as complacency, convenience and confidence.

Problem in HIC, MIC, LIC

http://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf?ua=1
Vaccine Hesitancy
Determinant Categories

- **Trust** in vaccines, in delivery system, in the policy-makers who decide which vaccines are needed and when.

- Perceived risks VPD low; vaccination not deemed a necessary preventive action. Other life /health responsibilities higher priority at time.

- Physical access-availability, affordability, willingness to pay; geographical access, ability to understand (language, health literacy); appeal of immunization services.

- **Confidence**

- **Convenience**

- **Complacency**

Antivaxers May influence

SAGE Working Group Vaccine Hesitancy 2014
Fact conflicts with belief = rejected

Fact consistent with belief = accepted, changing belief

Assimilation Bias
Public
HCP
Imm Program
Policy Makers

Risk Perception Problem: Impact of Heuristics

“Hard wired” to deal with life threatening situations with reflexive reactions

Heuristics: cognitive shortcuts
-simplify complex decisions & judgments
...“automatic intuition”

MacDonald NE et al. Risk perception, risk management and safety assessment: What can governments do to increase public confidence in their vaccine system? Biologicals 2012;40(5):384-8
Cognitive Shortcuts - Heuristics -

**Anchoring**
Estimate by starting from a value known (anchor)
Judge probability of future events by what occurred in the past
Hear about serious AEFI - estimate AEFI as “more common” than reality

**Omission bias**
*Actions* more harmful than inactions
Reluctance to immunize

**Availability**
Judge an event as frequent or likely to occur if can easily imagine or recall it
Not recall serious vaccine preventable disease, e.g., measles
Have seen autism

Stories are powerful; anti vaccine movement knows this
Access to Vaccine Information

Vaccine Confidence Project: study media ++ vax > 10,000 in 144 countries in 1 year Larson H et al Lancet Infect Dis 2013;13(7):606-13.

2010 >80% households in US, Can, UK internet access: > 80% seek health info...esp like user-generated content (Web 2.0), such as online news groups and blogs

PEW Research Group 2010, Kata A. Vaccine 2012

Web2.0 “everyone, anyone is an expert”

now big audience for “fringe” views

Google™ provides personalized search results based on user’s previous browsing habits

Critics concerned-infringe users' privacy

Immunization problem – if find anti vaccine sites in searches and use them – will appear on first pages next searches...
Influence Vaccine Critical Websites: Vaccine Risk Perception

Websites
Accessing *vaccine critical* websites for 5 to 10 minutes
- ↑ perception of risk of vaccination
- ↓ perception of risk of omitting vaccination and changes intention to vaccinate. *Betsch C et al J Health Psychology 2010 15:446-455*

Blogs
Accessing *vaccine critical* blog on HPV: “stories”
- ↑ perception of risk of vaccination
- ↓ changes intention to vaccinate
HPV vaccine supportive blog +ve; less effect: “facts”

HPV on YouTube:
2008 review majority +ve
2011 review 1/2 now -ve, 1/3 +ve, rest neutral
Medical Conspiracy Theories and Health Behaviors in the United States

Table 1. Americans Agreeing With Various Medical Conspiracy Theories, 2013

<table>
<thead>
<tr>
<th>Medical Conspiracy Narrative</th>
<th>Respondents, % (N = 1351)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Food and Drug Administration is deliberately preventing the public from getting natural cures for cancer and other diseases because of pressure from drug companies.</td>
<td>63  37  31  32</td>
</tr>
<tr>
<td>Health officials know that cell phones cause cancer but are doing nothing to stop it because large corporations won’t let them.</td>
<td>57  20  40  40</td>
</tr>
<tr>
<td>The CIA deliberately infected large numbers of African Americans with HIV under the guise of a hepatitis inoculation program.</td>
<td>32  12  37  51</td>
</tr>
<tr>
<td>The global dissemination of genetically modified foods by Monsanto Inc is part of a secret program, called Agenda 21, launched by the Rockefeller and Ford foundations to shrink the world's population.</td>
<td>19  12  46  42</td>
</tr>
<tr>
<td>Doctors and the government still want to vaccinate children even though they know these vaccines cause autism and other psychological disorders.</td>
<td>69  20  36  44</td>
</tr>
<tr>
<td>Public water fluoridation is really just a secret way for chemical companies to dump the dangerous byproducts of phosphate mines into the environment.</td>
<td>25  12  41  46</td>
</tr>
</tbody>
</table>

Abbreviations: CIA, Central Intelligence Agency; HIV, human immunodeficiency virus.

*Percentages may not total 100% because of rounding.*

49% of Americans agree ≥ 1 conspiracy theory; 18% agree ≥ 3

Conspiracy beliefs > avoid traditional health care e.g. flu vac

Congruence of Beliefs, Context and Outcome

- Fully Vaccinated
- Complete Acceptance
  - good availability product / services
  - good quality care
  - good accessibility
  - good acceptability – trust in HCP, vaccine, health care system
- Complete Refusal
- Unvaccinated
- OUTCOME
  - BELIEFS
Systematic Review of Strategies to Address Vaccine Hesitancy

Systematic review of strategies peer-reviewed and gray literature (2007-2013) & Review of Reviews

Identified:
- no strategies to specifically overcome hesitancy in all populations
- strategies that improved vaccine uptake
- multicomponent more effective than single

http://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf
10 Approaches to Enhance Vaccine Acceptance/Address Hesitancy

At Immunization Program Level
1. Diagnose if there is a problem- TIP
2. Employ strategies known to increase vaccine uptake.
3. Effective communication e.g. exploit heuristics
4. Reinforce resiliency; impact messages varies
5. Help shape beliefs; work with partners

At individual Level
6. HCP are credible; don’t dismiss from your practice
7. Don’t underestimate parental value of vaccines
8. *Tell don’t ask* strategy
9. Mitigate pain at immunization
10. Clarity language;
    - frame message;
    - emphasize safety;
    - community immunity

and evaluate the outcome
Vaccine Hesitancy: WHO EUR: The Guide to Tailoring Immunization Program- "TIP"

At Immunization Program Level:
Don’t assume you know cause of low uptake......

TIP framework to help
1) identify and prioritize vaccine hesitant populations and subgroups,
2) diagnose the demand and supply –side barriers and enablers to vaccination in these vax hesitant populations
3) design evidence –informed responses to vaccine hesitancy appropriate to the setting, context and hesitant population
4) Evaluate impact and outcomes.


http://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf?ua=1 Section 5C
Immunization Program Interventions
Most Effective on ↑ Vaccine Uptake

KEY: Segment population, individuals:
Diagnose problem and tailor action to fit

a) directly target
   • unvaccinated or under-vaccinated populations
   • specific populations: e.g. local community, HCW;

b) aim to increase knowledge, awareness about vaccination;

c) improve convenience and access to vaccination;

d) employ reminder and follow-up;

e) engage religious or other influential leaders to promote vaccination in the community.

f) mandate vaccinations / sanctions for non-vaccination;

SAGE Vax Hes WG 2014
Communications: Effective Tool to Help Address Hesitancy

Effective health communication: Targeted

1. Be proactive - not just reactive
   - develop a communication plan

2. Two way process: listening and telling

3. Knowledge not enough
   - important but insufficient to change behaviour.
   - many models e.g. exploit Cognitive Shortcuts

4. Tools: target group - select tools to fit:
   - mass electronic media, digital media,
   - print media, social mobilisation,
   - mobile technology,
   - service oriented communication

Goldstein, MacDonald, Guirguis et al. Health Communication and Vaccine Hesitancy. Vaccine in press
E.g. Exploit Cognitive Program /Individual Level

Tell compelling stories
HCPs own  Or

- [www.immunize.org/reports/](http://www.immunize.org/reports/)

Parent telling story very powerful

- [www.ovg.ox.ac.uk/meningococcal-disease](http://www.ovg.ox.ac.uk/meningococcal-disease)

Charlotte Nott’s story and video

Protecting Our Tomorrows: Portraits of Meningococcal Disease: Anne Geddes


[http://protectingourtomorrows.tumblr.com](http://protectingourtomorrows.tumblr.com)

**anchor and recall** Shelby A, Ernst K. Story and Science .How providers and parents can utilize storytelling to combat anti-vaccine movement. Hum Vac and Immuno 2013; 9:1795-1801
March 2014
Lost appeal to keep its name—forced to change
Lost charity status for fund raising
Impact of Vaccine Messages

Effectiveness varies with parental vaccine attitudes

Nyhan B et al Pediatrics 2014;133; e835-42

Pro-vaccine messages:
work for those who are favorable: important for ↑ resiliency
but in unfavorable - not reduce vaccine misperceptions, nor
increase uptake-i.e. “backfire effect” reinforce negative views

Partisans see unfavorably slanted content as even more
polarized than it is  Gunther AC et al Comm Res 2012;39: 439-57

Key: test messages in advance; tailor to fit

Targeted may work: Vax hesitant mothers of 2 week olds – video, info–
increased uptake Williams et al Acad Pediatr 2013: 475-80
Shape Young People’s Beliefs on Vaccine Necessity, Benefits, Safety

Start early:

- **Primary**: what vaccines are, why needed, benefits, safety
- **Secondary**: weave into history, science and health
- **Engage expert teachers and students** - many resources

Evidence can shape beliefs and behaviour
- Bullying
- Exercise initiatives
- Environmental activism
- Earth Sciences literacy (US)


[http://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf?ua=1](http://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf?ua=1) Section 6A.3

Opel D, Marcuse E. Human Vaccines & Immunotherapeutics 2013;9:2672–2673
At Individual Patent Level: Role MD/HCW

“For all vaccines, the **attitude of the physician** ......is very influential in the decision to vaccinate a child.....”

Favin et al . International Health 2012; 4:229-238

Parents received vaccine information from MDs: < vac concerns vs from friends/family/books

Wheeler M, Buttenheim A. Human Vaccines & Immunotherapeutics2013; 9:1782–1789

HCP information or assurances - main reason why parents who planned to delay or refuse a vaccine for their child changed their minds


Beware: Health Care Professional’s Imm Status  program uptake. If HCP not up to date: patients less likely up to date

Zhang J., While AE, Norman IJ. Vaccine 2010, 28:7207-14

**HCP immunization education key**
Do not Dismiss Children from your Practice over Vaccine Hesitancy or Refusal

Dismiss not prompt parent to immunize and not in best interest of child

Complex legal, ethical and public health issues

Frustrating BUT

Refusers - small minority
- Canada <1-3%

Worth time and effort
– child’s best interest

Consider referral to “expert in vaccines” – may refuse..... “What will it take to get you to a yes?“

### Parent Opinions on Importance of Vaccines; Provider Estimate Parental Opinion

<table>
<thead>
<tr>
<th>Vaccine Importance</th>
<th>Parent N=401</th>
<th>Provider N=105</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Health</td>
<td>9.5 (0-10)</td>
<td>9.3 (4-10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Meningitis</td>
<td>9.4 (0-10)</td>
<td>9.2 (2-10)</td>
<td>0.002</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>9.5 (0-10)</td>
<td>8.7 (3-10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Rotavirus</td>
<td>9.0 (0-10)</td>
<td>8.4 (2-10)</td>
<td>0.535</td>
</tr>
<tr>
<td>Pertussis</td>
<td>9.5 (0-10)</td>
<td>9.3 (0-10)</td>
<td>0.006</td>
</tr>
<tr>
<td>Influenza</td>
<td>9.3 (0-10)</td>
<td>7.0 (1-10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>HPV</td>
<td>9.2 (0-10)</td>
<td>5.2 (0-10)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Tell- Don’t Ask: Vaccine Hesitancy Study

Who initiated the vaccine recommendation or plan specifically? (n = 111)

- No plan verbalized (3%; n = 3)
- Parent (13%; n = 15)
  - Provider (84%; n = 93)

How does the PROVIDER initiate the vaccine recommendation? (n = 93)

- Presumptive (74%; n = 69)
- Participatory (26%; n = 24)

How does PARENT respond to the provider’s initiation?

- Accepts (74%; n = 51)
- Resists (26%; n = 18)

- Accepts (4%; n = 1)
- Provides own plan (13%; n = 3)
- Resists (83%; n = 20)

Hesitancy – not on Schedule

Listen and check 3 C’s:

- Complacency
  - Off schedules not tested
  - Give best evidence based care for child
  - Not practice inferior medicine

- Confidence

- Convenience
  - Importance on schedule, on time

- Access, clinic times, costs

Address Pain at immunization - crosses all 3 c’s
Address Pain Mitigation

Vaccine Pain Concerns

patient, parent, HCP

44% parents*

*Kennedy et al. Pediatrics 2011;127 suppl S92-99

measures to mitigate imp

perception of benefit

anchor and recall

Evidence based Immunization Pain Mitigation Guidelines


Being updated …..

WHO recommendations coming

http://www.youtube.com/watch?v=KgBwVSYqfps

http://pediatric-pain.ca/it-doesnt-have-to-hurt
Use Clear Language

1. Standard vocabulary
2. Consistent denominator
3. Present risks/benefits fairly
4. Explain single event probability (rain, not rain) visual aides
5. Absolute numbers not relative risk or %
6. Frame your message

1000 Children

Meningococcal invasive Disease 10% die even with ICU care = 100 in 1000
Frame the Message: HCP, Immunization Programs

What is framing?

• Presenting information of the equivalent outcome in terms of

• gains (positive) or losses (negative)

Ground Beef 25% fat

Ground Beef 75% lean


Frame Vaccine Message

**Anxious about negatives:**

*Pneumococcal conjugate vaccine*

> 99.9% safe

better /more effective

than say <<0.1 % serious side effects

**Often HCP focus discussions on side effects not emphasize safety!**


Emphasize: Safety Monitoring for Vaccines

1. Pre-licensure review and approval
2. Good manufacturing procedures
3. Lot assessment before release
4. Post marketing surveillance AEFI – reporting
5. Causality assessment review: serious AEFI
6. Process for action of vaccine performance issue
7. Vaccine recommendations based upon epidemiology, vaccine effectiveness and efficacy (EMA, Country NITAG)
8. International collaboration (WHO/GACVS)

Vaccine Safety Throughout the Product Life Cycle. Pediatrics 2011;127 Supplement 1
MacDonald N, Pickering L. Canadian Paediatric Society, Infectious Diseases and Immunization Committee.. Paediatr Child Health 2009;14(9):605-8,
Parrella A et al. Vaccine 2013;31:2067-74
Community Protection: Herd Immunity

Romina Libster: The power of herd immunity
TEDxRiodelaPlata · 14:41 · Filmed Nov 2014
Subtitles available in 4 languages

https://www.ted.com/talks/romina_libster_the_power_of_herd_immunity
Vaccine Hesitancy

Global problem that is complex and context specific varying across time, place and vaccines

Approach to Hesitancy :

- Diagnosis-
  - understand determinants hesitant subgroup/ individual;
- Tailor strategy to fit;
- Assess outcome;
- Support resiliency of those who are pro-vaccine
- Work for next generation to be pro-vaccine
Hilary Clinton’s Tweet mid Feb 2015 vs Anti vaxers:
The science is clear: The earth is round, the sky is blue, and #vaccineswork. Let's protect all our kids.
#GrandmothersKnowBest

http://www.huffingtonpost.com/2014/10/27/anti-vaccine-disease-outbreaks_n_6056862.html
Vaccine Communication Resources

www.cdc.gov/vaccinesafety
www.immunizationinfo.org (Nnii)
www.immunize.org (IAC)
www.dovaccinescausethat.com
www.fda.gov/cber/safety
www.vaccinateyourbaby.org
www.voicesforvaccines.org
www.caringforkids.cps.ca/handouts/immunization_information_on_the_internet
www.vaccineinformation.org/
www.bccdc.ca/NR/rdonlyres/DADA3304-7590-48AC-8D2C-65D54ADFC77E/0/CDC_IC_Tool.pdf

WHO EURO: If You Choose Not to Vaccinate Your Child, Understand the Risks and Responsibilities.

http://www.who.int/immunization/sage/meetings/2014/october/SAGE_working_group_revised_report_vaccine_hesitancy.pdf