

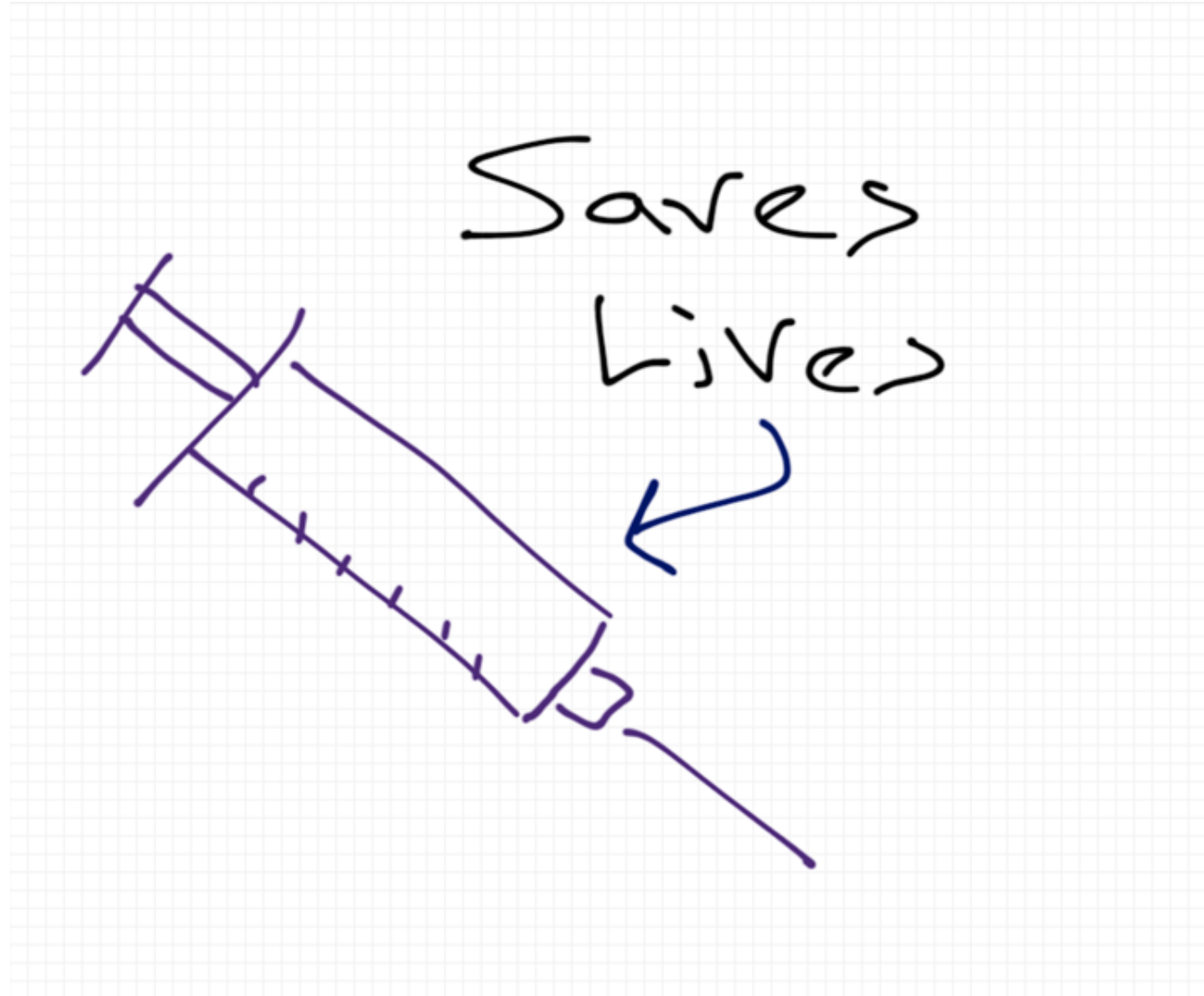
Rashes, Risk Factors and Vaccinations

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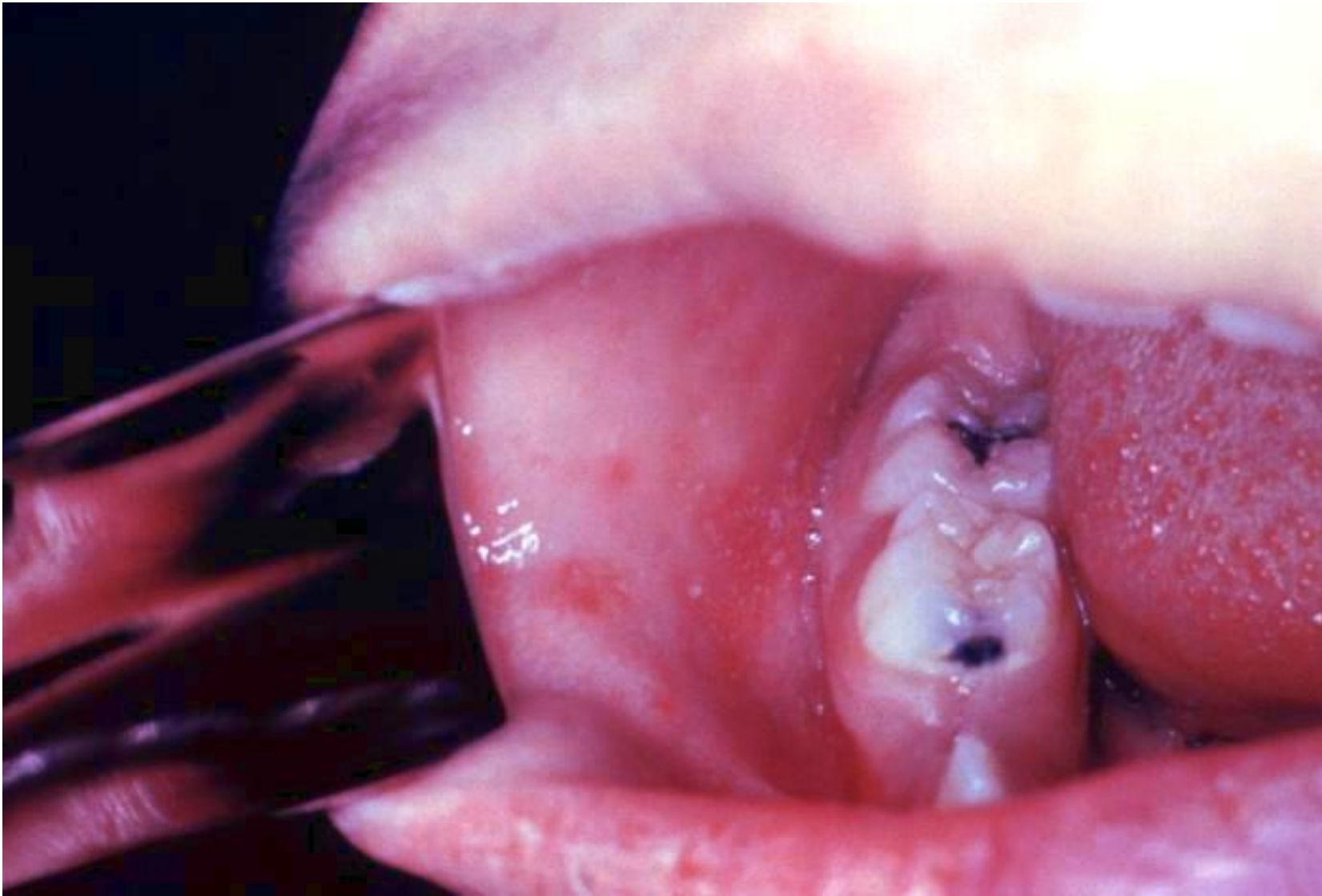
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Disclosures



Topics for Today

- Measles – what, how and why?
- Healthcare worker immunizations
- Precautions
- Communications



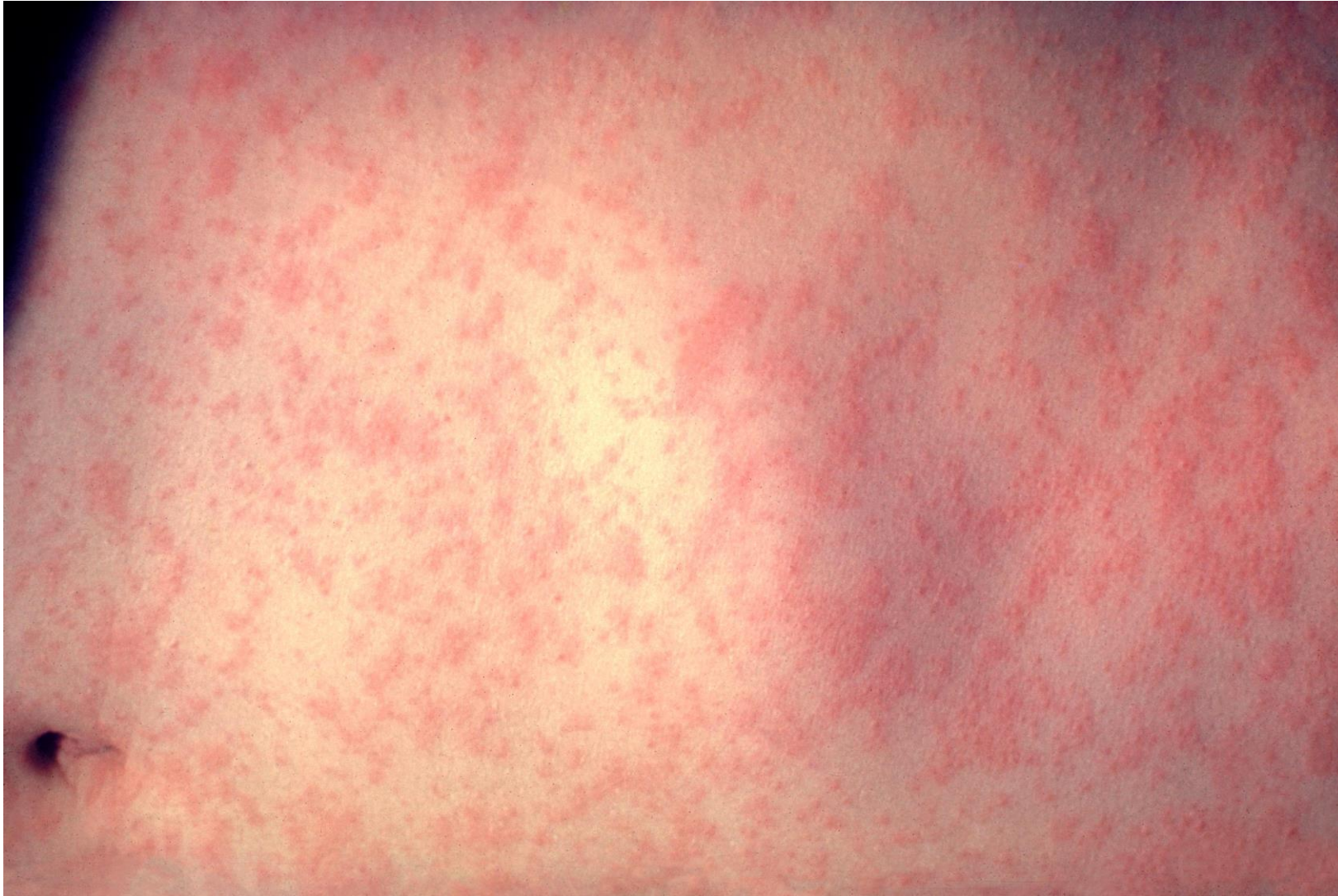
Measles

4 phases:

- Incubation
- Prodrome
- Exanthem
- Recovery

Rash

- Starts on the face, then down and out



Measles

4 phases:

- Incubation
- Prodrome
- Exanthem
- Recovery

Rash

- Starts on the face, then down and out

Measles Diagnosis

- Patient with a febrile rash + cough/coryza/conjunctivitis +/- exposure



Other Rashes

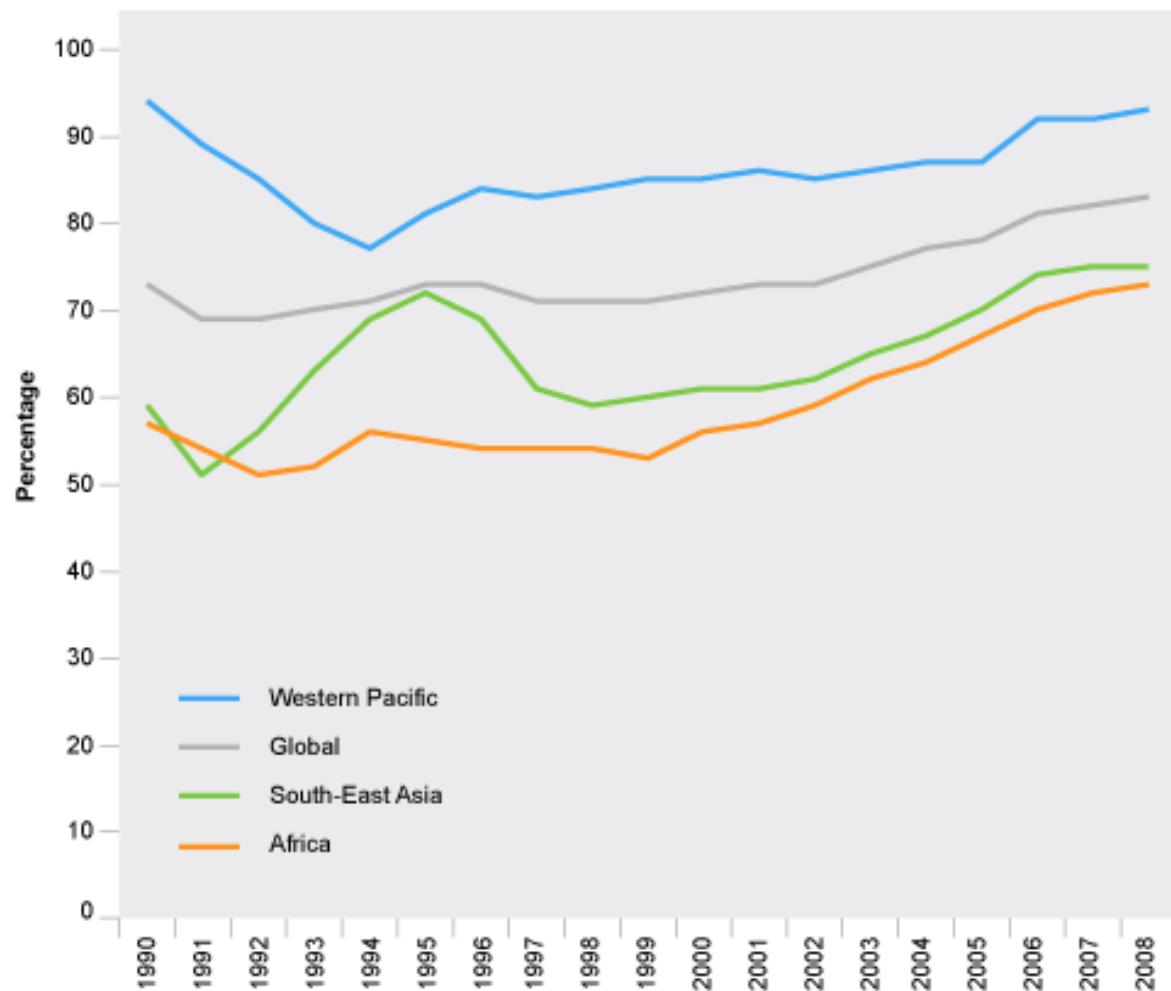
- Prodrome
 - Common respiratory viruses in kids
- Rash
 - VZV, roseola, parvo, HFMD
 - GAS, including scarlet fever and TSS
 - Drug eruption
 - Mono
 - And many others....

Measles Diagnosis

- Patient with a febrile rash + cough/coryza/conjunctivitis +/- exposure
- **Precautions:**
 - Mask and isolate patient (negative pressure if possible)
 - Only staff with immunity to measles
 - Contact local health department
- **Testing:**
 - Specimens for viral culture/PCR - NP swab and urine
 - Serum for measles IgM
 - Usually route through health department

What's going on and what to do when called?

- Children 19-35 months of age in US-Measles, Mumps, Rubella (MMR) (1+ doses): 91.5%



Source: WHO/UNICEF estimates of national immunization coverage [online database] Geneva, World Health Organization, 2009 (http://www.who.int/immunization_monitoring/routine/immunization_coverage/en/index4.html) Estimates based on data available up to December 2009



WHO/H. Hasan

Globally, measles immunization coverage has improved steadily since the early 1990s, to reach 82% by 2007. However, during the 1990s, measles immunization coverage stagnated in the WHO African Region at under 60%. In the WHO South-East Asia Region, coverage rose during the mid 1990s but fell back to under 60% at the end of the decade. Over the same period, coverage in the WHO Western Pacific Region dropped from 94% to 77%. Since around 2005, coverage rates have been increasing in all WHO regions.

What's going on and what to do when called?

- Children 19-35 months of age in US-Measles, Mumps, Rubella (MMR) (1+ doses): 91.5%
- Americans traveling to areas with more measles cases, including the UK, France, India, Vietnam...
- More measles spreading in U.S. communities with unvaccinated people

U.S.

Minnesota Sees Largest Outbreak of Measles in Almost 30 Years

By CHRISTOPHER MELE MAY 5, 2017

What's going on and what to do when called?

Key questions:

- Is the patient isolated?
- Can you tell me about the case?
- Do you know about any contact with another person with measles?
- Has the patient recently traveled?
- Have you checked with the health department? I just looked and there are no documented cases of measles in the last X months/years

Shifting gears to HCP
vaccination....questions so far?

Healthcare Personnel (HCP

"...all persons working in a
healthcare setting."

ACIP 2012

ID Risks for HCP (and their patients)

- Viruses
 - Measles, mumps, rubella
 - Influenza, RSV, human metapneumovirus
 - Norovirus
 - HSV, VZV
 - HIV, HBV, HCV
- Bacteria
 - Tuberculosis
 - Pertussis
 - Meningococcus
 - *Clostridium difficile*, *Staphylococcus aureus*
- Fungi
- Parasites - scabies

Basic reproduction number (R_0)

...the number of cases generated by exposure to a single infected cases.

...in a non-immune population.

Values of R_0 of well-known infectious diseases^[1]

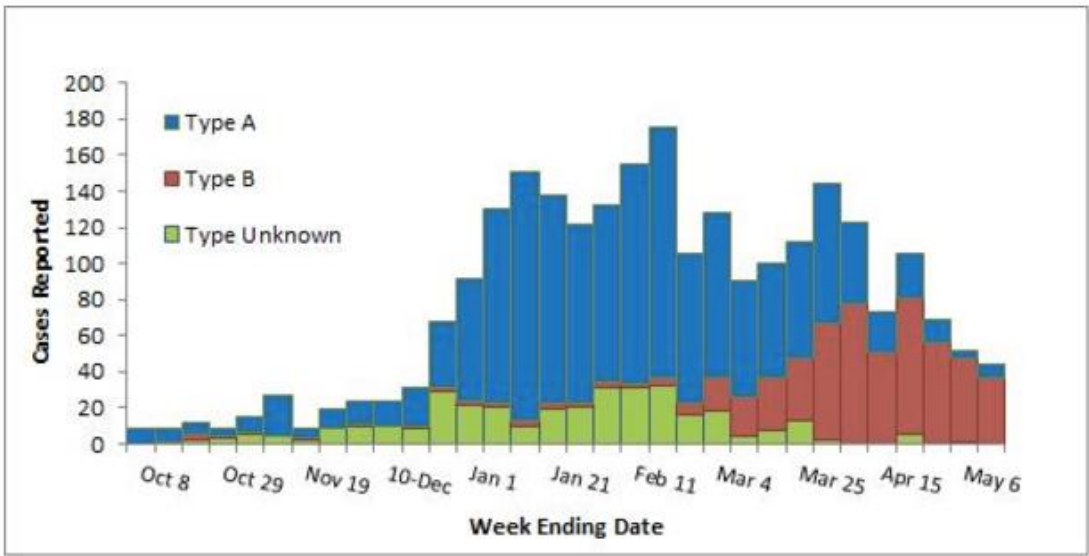
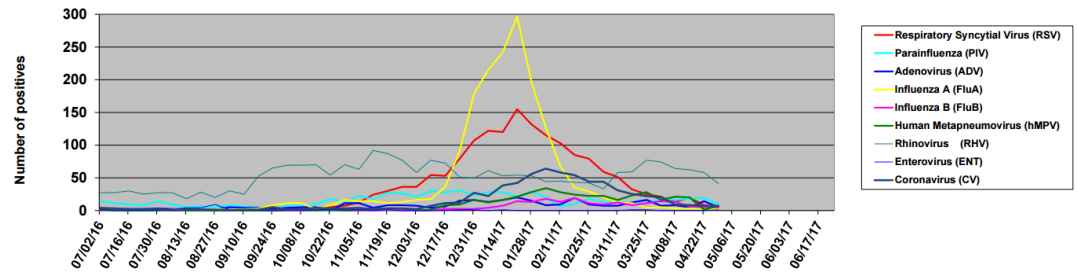
| Disease | Transmission | R_0 |
|-------------------------------------|---------------------|-------------------------|
| Measles | Airborne | 12–18 |
| Diphtheria | Saliva | 6–7 |
| Smallpox | Airborne droplet | 5–7 |
| Polio | Fecal-oral route | 5–7 |
| Rubella | Airborne droplet | 5–7 |
| Mumps | Airborne droplet | 4–7 |
| HIV/AIDS | Sexual contact | 2–5 |
| Pertussis | Airborne droplet | 5.5 ^[2] |
| SARS | Airborne droplet | 2–5 ^[3] |
| Influenza (1918 pandemic strain) | Airborne droplet | 2–3 ^[4] |
| Ebola (2014 Ebola outbreak) | Bodily fluids | 1.5-2.5 ^[5] |

What infectious diseases from the list on the list a couple of slides back were seen in Alaska during the 6 months?



Answers in the chat box, please

2016 - 2017 Respiratory & Enteric Viruses
Seattle, Washington

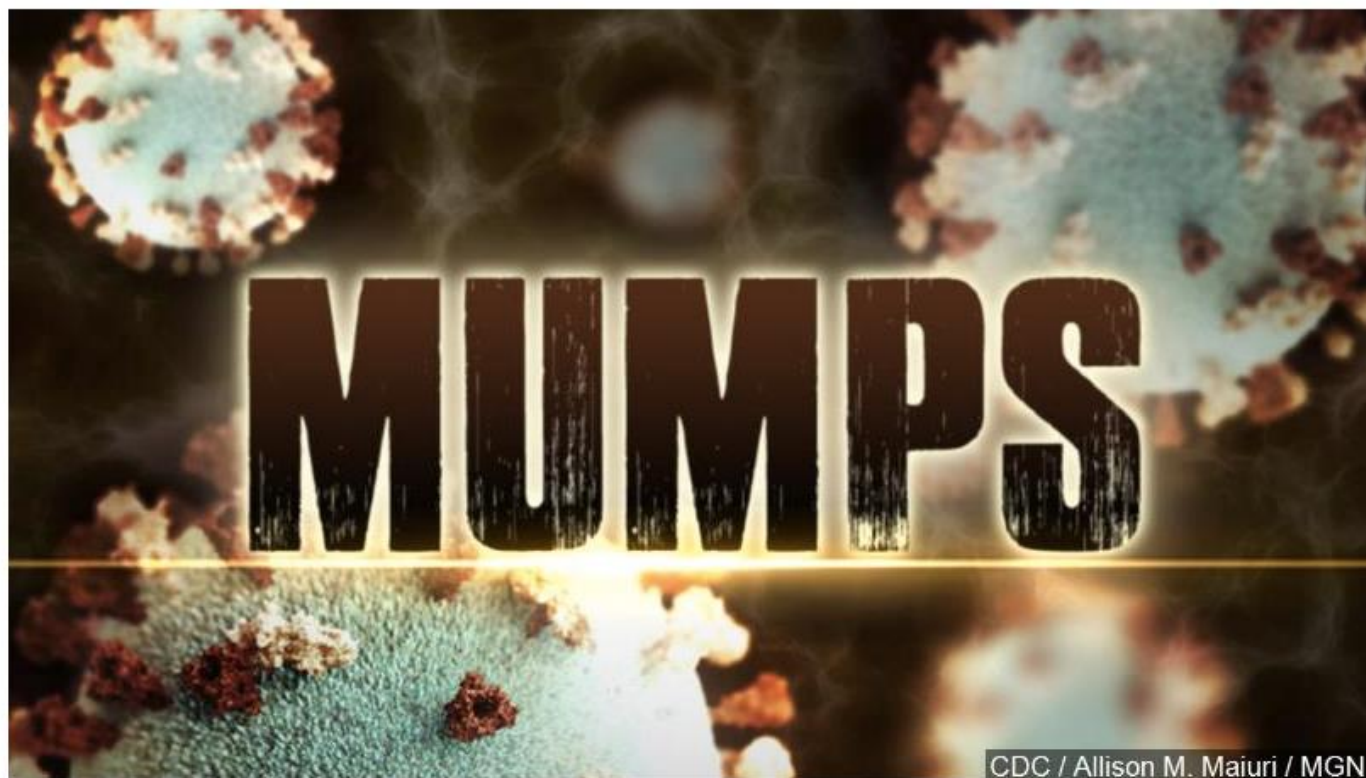


**Mumps outbreak cases (confirmed and probable)
by county, October 2016 - May 2017**

| County | Cases* |
|---------------------|------------|
| Benton County | 3 |
| Ferry County | 3 |
| Grant County | 43 |
| King County | 296 |
| Kitsap County | 2 |
| Okanogan County | 2 |
| Pend Oreille County | 3 |
| Pierce County | 59 |
| Skagit County | 17 |
| Snohomish County | 60 |
| Spokane County | 324 |
| Stevens County | 1 |
| Thurston County | 6 |
| Yakima County | 4 |
| Total | 823 |

* Confirmed and probable cases in WA as of May 3, 2017 at 4:30 p.m.

Mumps case confirmed in Anchorage




CDC / Allison M. Maiuri / MGN


By KTUU Staff | Posted: Thu 4:18 PM, May 11, 2017 | Updated: Fri 9:21 AM, May 12, 2017

Public Health – Seattle & King County has confirmed measles infection in a 6-month-old infant and the infant’s father, both King County residents who had recently traveled to Asia. The infant and the adult were both unimmunized. Before they were diagnosed, they may have exposed others to the measles at a few public locations.

MEASLES



is **highly contagious** and spreads through the air when an infected person **coughs or sneezes**.



It is so contagious that if one person has it, **9 out of 10 people** of all ages around him or her will also become infected if they are not protected.

AMLI 535 Apartments, (lobby and elevators) 535 Pontius Ave N, Seattle during these times:

- March 14, 2017: 9:10 AM-11:15 AM, 12:40 PM -3:15 PM, 7:30 PM-9:45 PM
- March 15, 2017: 9:10 AM -3:15 PM, 5:45 PM-8:00 PM
- March 16, 2017: 9:10 AM-11:15 AM, 12:40 PM-8:45 PM
- March 17, 2017: 9:10 AM-8:00 PM
- March 18, 2017: 8:30 AM-4:00 PM

Whole Foods, 2210 Westlake Ave Seattle 98121 during this time:

- March 14, 2017: 6:45 PM-9:15 PM

The Polyclinic Madison Center, 904 7th Ave, Seattle during these times:

- March 16, 2017: 2:15 PM-5:00 PM
- March 17, 2017: 4:00 PM-7:00 PM

Homegrown Sustainable Sandwiches, 208 Westlake Ave N, Seattle during this time:

- March 18, 2017: 1:30 PM-3:35 PM

Alaska Immunization Laws for HCP (AAC 12.650)

- Hepatitis B – “Ensure”
- Influenza – no (but rates have to be reported via NHSN)
- Measles/mumps/rubella – “Ensure” immunity to rubella
- Varicella – no
- Tdap – no
- Exemptions? Yes

ACIP Recommendations for HCP

- HBV (all HCP with BBE exposure)
- Influenza (all HCP)
- Tdap (all HCP)
- MMR (all HCP)
- Varicella zoster (all HCP)
- Meningococcus (specific HCP subsets)

Hepatitis B

- Important blood-borne pathogen
- Transmission essentially 100% following vaccination
- All HCP with any potential blood and/or body fluid exposure should be offered the vaccine series
- **HBV vaccination:**
 - 3 dose series at 0, 1 and 6 months
 - Followed by anti-HBs Ab 1-2 months after completion of the series, goal is >10 mIU/mL
 - If <10 mIU/mL, repeat series and recheck serology (HBs Ab, HBs Ag, HBc Ab)
 - If still <10, HCP is a non-responder and no additional HBV vaccine should be given
 - Non-responders are considered susceptible and, if exposed, should be treated with HBIG prophylaxis
- For a HCP with documentation of prior vaccination, check HBs Ab if BBE occurs

Measles, mumps, & rubella

- Prior to measles vaccination in the U.S.:
 - 3-4 million cases/year
 - 48,000 hospitalizations/year
 - 500 deaths/year
- 2001-2008, 27 cases of measles transmitted in healthcare settings in the U.S., 8 were HCPs, most not vaccinated
- Mumps declined by 99% following introduction of vaccine in 1967 (2-dose protocol)
- Mumps outbreaks continue to be sporadic and likely introduced by non-vaccinated, exposed individuals
- Major impact of rubella (German measles) is in pregnancy leading to congenital rubella syndrome

MMR Vaccine

- 3 live-attenuated viruses in one vaccine
- Highly-effective (95%-99% for measles, similar for mumps and rubella)
- HCP should have documented evidence of immunity to measles, mumps, and rubella:
 - Written documentation of 2 vaccine doses
 - Laboratory evidence of positive serological testing (IgG)
 - Laboratory confirmation of disease
- Birth before 1957 not longer recommended as exclusion as 3-9% of individuals lack immunity
- If no vaccination -> 2 doses of MMR four weeks apart, serological testing not recommended as interpretation is not straightforward

A moment or 2 to comment on
the MMR vaccine...

Pertussis

- *Bordetella pertussis*, aka whooping cough
- 3 stages:
 - 1-2 weeks, non-specific URI sxs
 - Paroxysmal stage, can last up to 3 months
 - Convalescent stage
- Risk of complications and mortality highest in unvaccinated infants



Pertussis vaccine

- Immunity from childhood vaccination may wane after 5-10 years
- All HCPs should have received routine childhood immunization for pertussis
- All HCPs should receive 1 dose of the Tdap vaccine
- Tdap can be given regardless of the last tetanus toxoid/diphtheria toxoid (Td)
- Serological testing is not indicated
- Uptake in HCPs is low (~25%) but should be made freely available

Varicella zoster virus

- Highly contagious herpes virus spread by direct contact with vesicles and inhalation of aerosols
- Primary infection = chickenpox
- VZV then becomes latent (and life-long)
- Reactivation = shingles
- Transmission from HCPs to patients and to other HCP is well-documented (one HCP can transmit to 30 patients and 30 co-workers)
- Atypical presentations of VZV are more common in immunocompromised, extremes of age and in vaccinated children

VZV vaccination

- Primary and nosocomial transmission of VZV has declined dramatically since introduction of the vaccine in 1995
- All HCP should:
 - Written documentation of 2 doses of vaccine
 - Laboratory evidence of immunity
 - Documented verification of a h/o varicella disease by a healthcare provider
- If no history, give 2 doses of VZV vaccine (live attenuated virus) = 92-99% of adults with positive serology
- Doses given 4-8 weeks apart
- No f/u serology testing recommended

Influenza

- Huge burden of disease globally, ~15% of the population infected annually
- High mortality, 250,000-500,000 /yr
- Lots of virus in secretions from 2 days before symptoms and can last weeks and persist on surfaces
- Many documented nosocomial outbreaks
- Outbreaks linked back to unvaccinated HCP
- Presenteeism continues to be a problem

Pandemic Flu Impact in King County

| CHARACTERISTIC | MODERATE (1957/1968 -like) | | SEVERE (1918 -like) | |
|------------------------|-------------------------------|-------------|------------------------|-------------|
| | U.S. | King County | U.S. | King County |
| Illness | 90 million | 540,000 | 90 million | 540,000 |
| Outpatient care | 45 million | 270,000 | 45 million | 270,000 |
| Hospitalization | 865,000 | 5,190 | 9,900,000 | 59,400 |
| ICU care | 128,750 | 773 | 1,485,000 | 8,910 |
| Mechanical ventilation | 64,875 | 389 | 742,500 | 4,455 |
| Deaths | 209,000 | 1,254 | 1,903,000 | 11,418 |

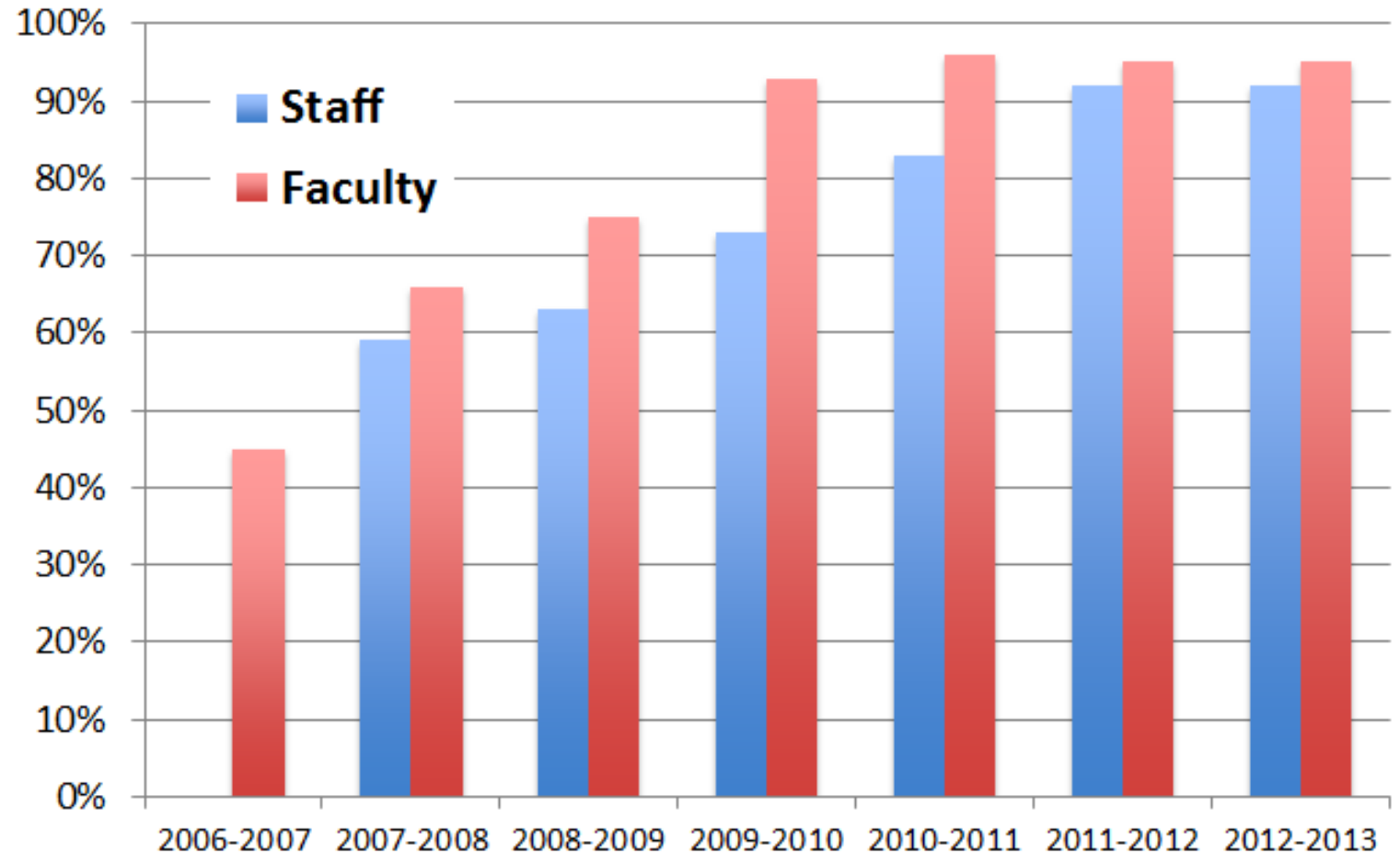
Influenza Vaccines

- Intramuscular
 - Quadrivalent
 - Trivalent (with and without adjuvant)
 - Trivalent high-dose
 - Recombinant, egg-free (Flublok®)
- Intradermal

UW Medicine Influenza Prevention Program

Influenza Vaccination of HCW: Impact of a non-mandatory approach

- Support from board of trustees and leadership
- Visible campaign emphasizing patient safety
- Accessibility
- Online educational module
- One-on-one educational session prior to declining



Ethics of HCP Influenza Vaccination

First, every code of ethics adopted by physicians, nurses, nurses aides, social workers, pharmacists, and other health-care professionals states very clearly, succinctly, and loftily that the interests of patients must come ahead of anyone else's. Since it is clear that newborn babies, the elderly, and the immunocompromised have a powerful interest in not being killed by those caring for them and in having a healthy workforce available to treat them, these self-proclaimed professional ethical codes that extol patients' interests fully support requiring vaccination as a condition of employment. Whatever one's views about personal rights to choose, unless a valid medical reason exists to not vaccinate, the best interests of the patient trumps personal choice in the hierarchy of self-imposed professional values.

Second, all health-care workers are obligated to honour the core medical ethics requirement of "First Do No Harm". Given the evidence that vaccination prevents disease transmission to the vulnerable and maintains the health of health-care providers which allows them to work, the most fundamental moral requirement in all of health care demands that those in care-giving roles treat influenza vaccination as obligatory. It also requires that those who run health-care institutions and programmes act on and implement that principle in the form of making vaccination against influenza a mandatory condition of employment or volunteering.

Lastly, health-care workers have a special duty towards the vulnerable who cannot protect themselves. This is a duty that is widely acknowledged in professional codes of ethics. Newborn babies, infants, and the seriously immunocompromised can do little to protect themselves against acquiring diseases in hospitals, nursing homes, and home-care settings. Few people pick their health-care providers or even know to ask if they have been vaccinated. Health-care providers have an absolute duty to do what can be done to ensure they do not transmit diseases to those at grave risk who cannot protect themselves. Vaccination against influenza and other communicable diseases is an important step in fulfilling this duty to protect the vulnerable. It takes obvious moral priority over one's personal choice not to be vaccinated or individual delusions about why vaccination is not necessary in dealing with patients who are of necessity highly vulnerable to influenza.

أرسلت هذه الرسالة إلى جميع وزراء الصحة بالإقليم.

سلام عليكم ورحمة الله وبركاته، وبعد، فقد زامن إلى ساكنة تشكيلة بعض بلاد الأوطان حول الحكم الشرعي في استعمال بعض المواد المخدرة من حبوب الخشخاش، أو مشتقة من مثل هذا، حيث بعد تم رفضها إلى نوع من الاستحالة الكيميائية، ولاسيما الجيلاتين الذي يستعمل في صناعة الكبسولات الدوائية، والذي قد يكون مشتقا من بعض أعضاء الخنزير أو التمسح، بعد تبرئنا إلى سلسلة من تفاعلات كيميائية التي تؤدي إلى استحالتها إلى جيلاتين.

وتؤيد أن ندعمي كويم عائلاتكم في أن الكتيب الإقليمي لفترة المتوسط بمنطقة الصحة العامة قد سبق في عام 1995 أن داهم في الشرة التي عقدتها منظمة الإسلامية العام في الكويت، حول المواد المحرمة والتجسس في الغذاء والدواء، وشرك فيها مئة وثلاث عشرة مسارا من الفقهاء والخبراء، وفي ظلمتهم أصحاب الفضيلة: الشيخ الدكتور محمد س. منطاوي (مفتي مصر آية الله وشيخ الأزهر حالي)، والشيخ محمد المختار السلامي (مفتي تونس آنذاك)، والشيخ محمد بن حمد الخليفي (مفتي سلطنة عمان)، والشيخ الدكتور محمد الحبيب بن لوجه (الأمير العام لجمع الفقه الإسلامي بمكة)، والشيخ الدكتور يوسف، والمصري (مدير مركز بحوث السنة والسيرة النبوية في قطر)، والشيخ محمد رشاد قباني (مفتي الجمهورية اللبنانية)، وآية الله العلي محمد مهدي طهراني (رئيس مجلس الإسلامي حقيقي الأعلى في لبنان آنذاك)، وآية الله السيد محمد تقى المجلسي (رئيس مجلس القضاة بباكستان)، والشيخ الدكتور حامد جامع (رئيس الأزهر سابقا)، والشيخ الدكتور خالد المذكور (رئيس لجنة أطباء الشرعية الكويت)، والشيخ خليل ليس (مدير الأزهر سابقا)، والشيخ الدكتور عجيل حاسم الشامي (مدير كلية الشريعة بالكويت، آنذاك)، والدكتور محمد عبد الغفار الشريف (مدير كلية الشريعة بحالي بالكويت)، والدكتور وحيه الرخلى (رئيس كلية الشريعة بدمشق آنذاك)، والشيخ مشعل دارا (مدير إدارة الإفتاء في الكويت)، وغيرهم.

والله

HMC Reasons for Declining Flu Vaccination

- no animal products
- when I turn 65 she will get it
- prefers natural immunity
- has never been sick
- doesn't work with patients
- reiki practitioner
- prefers natural immunity
- does not want
- collective decision with family
- does not think is effective
- does not believe in flu shots
- never had flu shot
- last year's flu vaccine won't help me
- does not believe in flu vaccine
- fairly healthy
- had flu shot once 3 years ago, no side effects
- does not get sick that often
- has not taken vaccine in several years
- takes care of body
- don't believe in vaccine
- don't believe in vaccine
- inconsistency of vaccine
- vegan
- no proof that flu vaccine protects from flu
- my own research found that efficacy of vaccine lacking
- believes that the evidence is not there for vaccine efficacy
- questions long term use of vaccination as being potentially harmful
- concerned about safety
- fear of side effects
- just don't believe
- mid wife recommended not to get

Meningococcus

- *Neisseria meningitidis*
- A risk for laboratory workers (mainly microbiologists) who are **routinely** exposed to meningococcus
- If <56y -> quadrivalent (A, C, W, Y) mening conjugate vaccine
- If 56y+ -> same (not the usual quadrivalent mening polysaccharide vaccine for 56+)
- All -> serogroup B meningococcal vaccine
- Repeat q 5 years
- Also indicated for HCP with asplenia or complement deficiency -> 2 dose series

Precautions (as possible)

- Measles- airborne + standard
- Rubella- droplet + standard
- Mumps- droplet + standard
- VZV- airborne + contact + standard
 - No susceptible HCP
 - No recs for additional PPE for immune HCP

Communication

- Call health department
- Be clear about what you need
- If moving ahead, plan for transparency
- Coordinate a single message with all involved parties

Thank you!

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References

Toolkit Work Group: Ruth Carrico RN FSHEA CIC, Westhusing, K., Mc Kinney, T. W. M. C. W. P. & Peyrani, P. Healthcare Personnel Immunization Toolkit.

Schillie, S. *et al.* CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Postexposure Management. Available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6210a1.htm>. (Accessed: 4th May 2017)

Maltezou, H. C. & Poland, G. A. Immunization of healthcare providers: a critical step toward patient safety. *Vaccine* **32**, 4813 (2014).

Effectiveness of the Flu Vaccine

| Age group (yrs) | Averted hospitalizations | | Averted, medically attended cases | | Averted cases | | Fraction prevented | |
|-----------------|--------------------------|-------------------------|-----------------------------------|------------------------------|------------------|-------------------------------|--------------------|--------------------|
| | No. | (95% CI) | No. | (95% CI) | No. | (95% CI) | % | (95% CI) |
| 0-4 | 10,216 | (5,994-16,502) | 981,851 | (575,222-1,591,166) | 1,465,450 | (859,735-2,367,044) | 29.6 | (28.0-30.2) |
| 5-19 | 4,770 | (2,869-7,722) | 887,256 | (529,333-1,437,481) | 1,739,717 | (1,046,532-2,816,363) | 17.3 | (16.8-17.8) |
| 20-64 | 19,813 | (12,887-30,107) | 1,086,409 | (698,241-1,666,804) | 2,936,241 | (1,909,887-4,461,808) | 14.3 | (14.0-14.5) |
| ≥65 | 44,460 | (17,779-82,413) | 273,876 | (108,797-511,422) | 489,065 | (195,570-906,541) | 17.1 | (10.5-21.3) |
| All ages | 79,260 | (39,530-136,744) | 3,229,393 | (1,911,592-5,206,874) | 6,630,473 | (4,011,725-10,551,756) | 17.3 | (16.2-18.0) |

- **6.6 million fewer illnesses**
- **3.2 million fewer medically attended illnesses**
- **80,000 fewer hospitalizations**

What happened in 2014-2015?

- Vaccine effectiveness (VE) = real world decrease in clinic visits
- Overall VE was 18%
- Flu vaccine did not protect against drifted H3N2 (vaccine effectiveness = 18%)
- 60-80% of circulating H3N2 was drifted
- But did protect against vaccine-like H3N2 and influenza B strains (flu B VE = 45%)