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Texas Department of State Health Services

# Future of Texas Immunizations

**Jennifer A. Shuford, MD, MPH**

## Future of Texas Immunizations

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- History of Immunizations
- Why is this important to Texas?
- What are the obstacles?
- What can we look forward to?

# History of Immunizations

## Vaccine Availability Timeline

1798 – Smallpox vaccine (*discontinued use for general population in US 1972*)

1885 – First rabies vaccines

1896 – Typhoid fever vaccine

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From: http://www.chop.edu/centers-programs/vaccine-education-center/vaccine-history/vaccine-availability-timeline. Accessed October 24, 2017.



# History of Immunizations

## Routinely recommended vaccines

1914 – Pertussis vaccine

1926 – Diphtheria vaccine

1938 – Tetanus vaccine

1945 – Inactivated influenza vaccine - trivalent (*shot; not routinely recommended*)

1948 – Diphtheria, tetanus, and pertussis vaccines combined to form DTP

1955 – Inactivated polio vaccine (shot)

1960 – Live polio vaccine (oral)

1963 – Measles vaccine

1967 – Mumps vaccine

1969- Rubella vaccine

1971 – Measles, mumps and rubella vaccines combined to form MMR

1981 – Hepatitis B vaccine

1985 – Hib vaccine



From: http://www.chop.edu/centers-programs/vaccine-education-center/vaccine-history/vaccine-availability-timeline. Accessed October 24, 2017.

# History of Immunizations

1991 – DTaP vaccine

1995 – Varicella vaccine

1995-1996 – Hepatitis A vaccine

1998 – Rotavirus vaccine (Rotashield®)(*removed from market 1999*)

2000 – Pneumococcal conjugate vaccine

2003 – Intranasal influenza vaccine – trivalent (*no longer recommended for use in 2016*)

2005 – Meningococcal conjugate vaccine for adolescents

2005 – Tdap vaccine for adolescents

2006 – HPV vaccine for adolescent girls

2006 – Rotavirus vaccine (RotaTeq®)

2006 – Shingles vaccine (60 yrs & older)

2008 – Rotavirus vaccine (Rotarix®)

2009 – HPV vaccine for adolescent boys

2013 – Inactivated and intranasal influenza vaccine – quadrivalent (*the intranasal version was no longer recommended for use in 2016*)

2014 – Meningococcal B vaccine licensed

From: http://www.chop.edu/centers-programs/vaccine-education-center/vaccine-history/vaccine-availability-timeline. Accessed October 24, 2017.



# History of Immunizations

| Disease | Est. average cases/yr | Est. average deaths/yr | % ↓ in death post- vaccine |
|---|---|---|---|
| Diphtheria | 21,053 | 1822 | 100 |
| Measles | 530,217 | 440 | 100 |
| Mumps | 162,344 | 39 | 100 |
| Pertussis | 200,752 | 4034 | 99.3 |
| Polio, paralytic | 16,316 | 1879 | 100 |
| Rubella | 47,745 | 17 | 100 |
| Small pox | 29,005 | 337 | 100 |
| Tetanus | 580 | 472 | 99.2 |
| *H. influenzae* type B, invasive | 20,000 | 1000 | ≥99.5 |

From: Roush SW, et al. JAMA 2007;298(18):2155-2163

# Childhood Immunization Provides Big Savings

**CDC estimates that vaccination of children born between 1994 and 2016 will:**

- Prevent 381 million illnesses
- Prevent 24.5 million hospitalizations
- Help avoid 855,000 early deaths
- Save nearly $360 billion in direct costs and $1.65 trillion in total societal costs

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SOURCE: Updated from previous publication: Benefits from Immunization During the Vaccines for Children Program Era – United States, 1994-2013. MMWR. 25 April 2014.



# History of Immunizations

The last known case of naturally occurring small pox, 1977

The last known case of polio in the Americas, 1991

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 Photos: courtesy of WHO 

# Importance to Texas

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- Texas Department of State Health Services
  - Vision: A Healthy Texas
  - Goals:
    - Improve health through prevention and population health strategies
    - Enhance public health response to disasters and disease outbreaks
    - Reduce health problems through public health consumer protection
    - Expand the effective use of health information



From DSHS website at: https://dshs.texas.gov/about-DSHS.shtm. Accessed October 24, 2017.



# Importance to Texas

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- Texas
  - ~29 million Texans
  - ~8 million Texans under the age of 18

# Future of Immunizations in Texas

## A Few Obstacles We Are Facing

- Fear of vaccines among parents
- Loss of fear for vaccine-preventable illnesses
- Difficulty in maintaining records
- Vaccine procurement/storage issues

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# Obstacles: Fear

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- Bad Science
  - Autism after MMR
- Real adverse effects
  - Allergies, anaphylaxis
  - Guillain-Barre syndrome after influenza vaccine

# Obstacles: Fear

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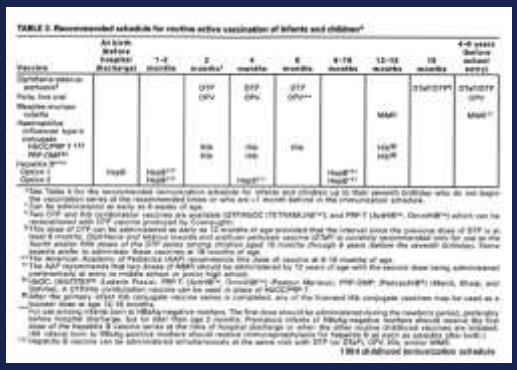
- Complexity of the immunization recommendations





# Obstacles: Fear

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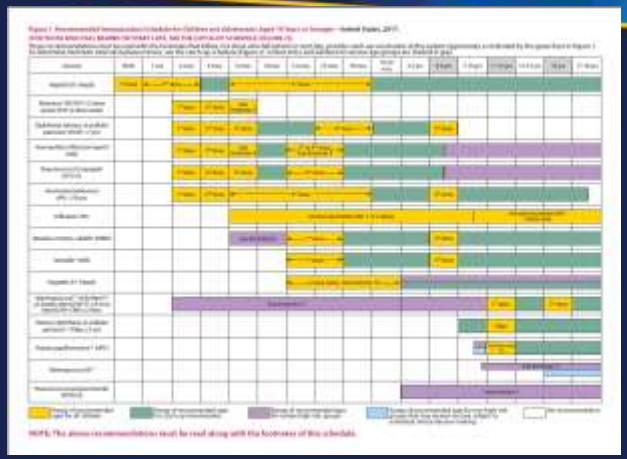

From: https://www.cdc.gov/vaccines/schedules/downloads/child/0-18yrs-child-combined-schedule.pdf. Accessed October 25, 2017.

# Obstacles: Fear of Early Sexual Debut

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- HPV vaccine has caused fear among parents of earlier sexual activity
- CDC addressing this fear in media campaign


From: https://www.cdc.gov/vaccines/partners/downloads/teens/close-the-door-f.pdf. Accessed October 26, 2017.



# Obstacles: Loss of Fear

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- Many new parents have no experience with vaccine-preventable illnesses

Diphtheria
Photo courtesy of College of Physicians of Philadelphia

Measles
Photo courtesy CDC PHIL

Polio
Photo courtesy CDC PHIL

# Result of Obstacles: Vaccine Refusal

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- Rising number of conscientious objections to vaccines

State Totals

Percent of Students with Conscientious Exemptions - Statewide

| County | 2011-2012 | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 |
|---|---|---|---|---|---|---|
| State Total | 0.57% | 0.64% | 0.76% | 0.79% | 0.84% | 0.87% |

- Remains <1% state-wide
  - much higher in some populations
  - one private school has conscientious objections on file for 49% of its students


From: http://www.dshs.texas.gov/immunize/coverage/conscientious-exemptions-data.shtm#totals. Accessed October 26, 2017.


# Future of Immunizations in Texas

## Cause for Optimism

- Involvement of HCPs and Vaccine Advocates
- ImmTrac2
- TVFC/ASN
- Development of new vaccines and vaccine delivery systems

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# Future of Immunizations in Texas

## ImmTrac2

- Need strong immunization registry for increasingly complex vaccine recommendations, growing population
- ImmTrac2 was rolled out in 2017
- Continues to be a safe place to house vaccine records for children and adults
- New features include:
  - enhanced immunization history and forecasting capabilities
  - client and immunization de-duplication
  - report generating capabilities

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# Future of Immunizations in Texas

## TVFC and ASN

- Texas leads nation in uninsured/underinsured children
- TVFC
  - Provides vaccines to providers at no cost
  - For uninsured and underinsured kids
- ASN
  - Provides vaccines to providers at no cost
  - For uninsured adults
- Ongoing program improvements


Image courtesy of CDC

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# Outcomes in the Near Future

## Reducing HPV-related cancers

- Almost all cervical cancer caused by HPV
  HPV types 16,18 cause about 70% of cases

- HPV also causes:
  - ~95% of anal cancer
  - ~70% of oropharyngeal cancers
  - ~65% of vaginal cancer
  - ~50% of vulvar cancer
  - ~35% of penile cancer

Photos courtesy of CDC and NCI

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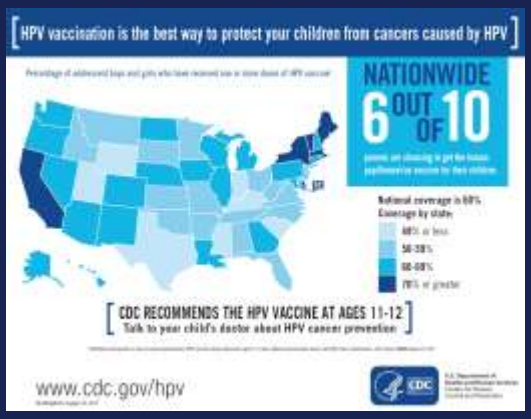
From: https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-fact-sheet#q2. Accessed October 26, 2017.



# Outcomes in the Near Future

## Reducing HPV-related cancers

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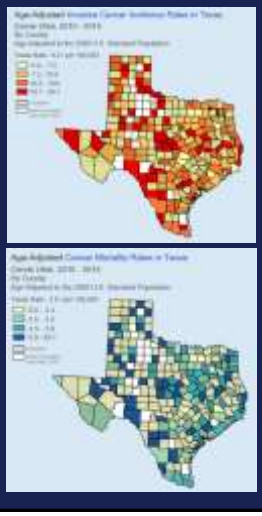
Available at: https://www.cdc.gov/hpv/infographics/vacc-coverage.html. Accessed November 16, 2017.

# Outcomes in the Near Future

## Reducing HPV-related cancers

- Texas cancer statistics
  - Cervical cancer
    - ~1200 cases/yr
    - ~365 deaths/yr
  - Anal cancer
    - ~400 cases/yr
    - ~60 deaths/yr



From: https://www.cancer-rates.info/tx/. Accessed November 20, 2017.



# Outcomes in the Near Future

## Reducing Meningogoccal Disease

- Neisseria meningitidis (meningococcus)
  - Can be highly lethal in short period of time
- At risk populations include:
  - Children <2 and teens/young adults
  - Asplenia and some immune disorders

Photo courtesy of CDC PHIL.

# More Distant Future…

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From: http://www.who.int/immunization/diseases/en/. Accessed October 26, 2017.



# More Distant Future…

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- Universal Flu Vaccine
  - Protect against next epidemic or pandemic virus before it hits
- Vaccines for Resistant Organisms
  - Targeting resistant clonal strains of a pathogen
  - Targeting resistance determinants



From: Ni Y, et al. Vaccine 2017; 2017 Oct 25. pii: S0264-410X(17)31459. Lipsitch M, et al. mBio 2016;7(3):e00428-16.

# More Distant Future…

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- Therapeutic vaccines
  - Treatment rather than prevention
  - One approved for prostate cancer
  - More being developed
    - Cancer
    - Alzheimer's dementia
    - Infections, like HIV

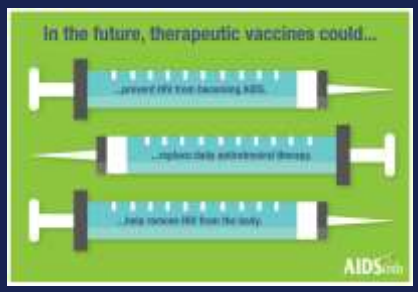



Image available at: https://aidsinfo.nih.gov/understanding-hiv-aids/fact-sheets/19/91/what-is-a-therapeutic-hiv-vaccine-. Accessed November 20, 2017.


# More Distant Future…

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- New vaccine technology
- New vaccine delivery systems
  - Microneedle patch


Photo courtesy of Gary Meek, Georgia Tech

# Future of Texas

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- Our goal is to keep all Texans healthy
  - Requires a strong immunization program
  - Reasons for optimism
- We need your help!
  - DSHS wants to support you in your efforts
- We look forward to the future of Texas and rewards of our collaboration



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# Thank you!

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