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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Routiney recommended vaccines:

- 1944 – Pertussis vaccine
- 1956 – Diphtheria vaccine
- 1958 – 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)
- 1967 – Mumps vaccine
- 1969 – Rabies vaccine
- 1971 – measles, mumps and rubella vaccines combined to form MMR
- 1981 – Hepatitis B vaccine
- 1989 – Hib vaccine
## History of Immunizations

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

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


History of Immunizations

The last known case of naturally occurring small pox, 1977

The last known case of polio in the Americas, 1991

Photos: courtesy of WHO
Importance to Texas

- 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


Importance to Texas

- 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

Obstacles: Fear

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

• Complexity of the immunization recommendations

Obstacles: Fear of Early Sexual Debut

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

Obstacles: Loss of Fear

- 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**

- Rising number of conscientious objections to vaccines

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


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**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
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

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
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

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/

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...

- 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

More Distant Future...

• 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-

More Distant Future...

• New vaccine technology
• New vaccine delivery systems
• Microneedle patch

Photo courtesy of Gary Meek, Georgia Tech
Future of Texas

• 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

Thank you!

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