Purpose:
The purpose of surveillance indicators is to assess performance of essential components of surveillance and case investigation, and to identify components of each that need improvement. This report provides data that can be used to assess national surveillance and data quality for measles, mumps, rubella, pertussis, and *Haemophilus influenzae*, in terms of surveillance infrastructure, timeliness of reporting, adequacy of case investigation, and appropriateness of laboratory testing and diagnostic effort.

Background:
Surveillance indicators for vaccine-preventable disease (VPD) surveillance were originally developed by the Pan American Health Organization (PAHO) in 1988, in the context of surveillance for polio and acute flaccid paralysis. The national surveillance system in the U.S., the Notifiable Diseases Surveillance System (NNDSS), is a passive system designed to monitor epidemiologic trends and to assess programmatic impact. Cases are reported by the states to CDC electronically through the National Electronic Telecommunications System for Surveillance (NETSS) or the National Electronic Disease Surveillance System (NEDSS).

Many factors contribute to variations in reporting for VPDs, including disease/condition characteristics (e.g., symptoms, incidence, severity), availability of laboratory diagnostics, patient and provider awareness, jurisdiction attributes (e.g., laws, regulations), disease transmission setting, and capacity for electronic data transmission.

Methods/Analyses:

The final surveillance data from NNDSS for 1997- 2005 and provisional (NNDSS week 52) data for 2006 were analyzed to assess surveillance indicators for measles (confirmed and unknown case status), mumps (confirmed, probable, and unknown case status), rubella (confirmed and unknown case status), pertussis (confirmed, probable, and unknown case status), and *Haemophilus influenzae* (confirmed, probable, and unknown case status).

Measles, mumps, and rubella have four indicators in common:

- The proportion of confirmed cases reported to NNDSS with complete information (clinical case definition, hospitalization, lab testing, vaccine history, date reported to health department, transmission setting, outbreak related, epidemiologic linkage, date of birth, and onset date)
- The interval between date of symptom onset and date of public health notification
- The proportion of confirmed cases that is laboratory confirmed
- The proportion of cases that has an imported source

Measles-specific indicators include:

- The proportion of cases for which at least one clinical specimen for virus isolation was submitted to CDC
- The number of discarded measles-like illness (MLI) reports (discontinued January 2006)

Rubella-specific indicator is:

- The proportion of confirmed cases among women of child-bearing age with known pregnancy status

Pertussis surveillance indicators include:

- The proportion of cases reported to NNDSS with complete information (clinical case definition, complications, antibiotic treatment, lab testing, vaccine history, and epidemiologic data – outbreak/epidemiologic linkage)
- The interval between date of symptom onset and date of public health notification
- The proportion of cases meeting clinical case definition that is laboratory tested
- The proportion of cases with complete vaccine history

Haemophilus influenzae surveillance indicators include:

- The proportion of cases reported to NNDSS with complete information (clinical case definition – species, specimen type; vaccine history; and serotype testing)
- The proportion of cases among children < 5 years of age with complete vaccine history
- The proportion of cases among children < 5 years of age with serotyped isolate

Results:

See attached tables 1-3 for national surveillance indicator summaries for 1997-2006. See also state-specific summaries.

Conclusions:

- Surveillance indicators can be monitored using passive surveillance data collected electronically.
- For *H. influenzae* cases, data completeness is very low, especially the percent of cases <5 years with serotype and with complete vaccine history.
- For measles cases, effort must be maintained to ensure data completeness, determination of importation status, and laboratory testing at CDC.
- For pertussis cases, strategies must be implemented to enhance documentation of adult and child vaccine history, while building laboratory testing infrastructure.
- For rubella cases, effort must be enhanced to achieve data completeness, focusing on pregnancy status for females and importation status for all cases.
- For mumps cases, effort must be enhanced to achieve data completeness, and laboratory testing must be provided for case confirmation.

Recommendations:

- Continue annual assessment of VPD surveillance indicators.
- Communicate results to partners.
- Apply results to set surveillance goals and strategies.
- Explore application of surveillance indicators to other VPDs

Limitations of Analyses:

- Phased implementation of data systems (NETSS mid-1990's, NEDSS/NBS ongoing)
- Published data (*MMWR*) possibly different from data set prior to mid 1990's
- Incomplete data possibly due to data system (transmission errors, coding errors) in addition to investigative effort
- Few external standards available to monitor completeness of case reporting