# Hepatitis Surveillance: Strengths and Weaknesses

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# Why Do Surveillance?

- Identify previously unrecognized and emerging disease
- Identify new cases, determine disease incidence and trends
- Determine risk factors for infection and disease transmission patterns
- Estimate disease burden
- Identify infected persons who can be counseled and referred for medical follow-up.
- Surveillance for new cases provides the best means to evaluate effectiveness of prevention efforts and to identify missed opportunities for prevention.

Surveillance provides the essential feedback for improvement.

Adapted from MMWR Oct. 16, 1998 /Vol. 47 / No. RR-19

# Epidemiology and Surveillance

- Epidemiology – the study of the distribution and determinants of health-related states or events in specified populations…
  - Studies are valuable but also have limitations
    - National Health and Nutrition Examination Survey (NHANES)

- Surveillance – continuous analysis, interpretation and feedback of systematically collected data…
  - Methods distinguished by practicality, uniformity and rapidity rather than accuracy or completeness

**Is your surveillance good enough to support your PH goals?**

A Dictionary of Epidemiology, Last, 1995

# Hepatitis Surveillance: What and Where

- Acute Hepatitis A (HAV), B (HBV) and C (HCV)
  - Reportable all states*
    - basic information - event date, source of report, demographic characteristics etc.
    - 40% reports to CDC include supplemental information - laboratory test results, clinical information, exposure history etc.
- Chronic Hepatitis B and C
  - Reportable: HBV 44 states, HCV 42 states
    - Often limited basic information e.g. only a lab report
- Perinatal Hepatitis B (surface antigen positive pregnant women)
  - Reportable all states
    - Detailed case management

*New Hampshire does not report HCV

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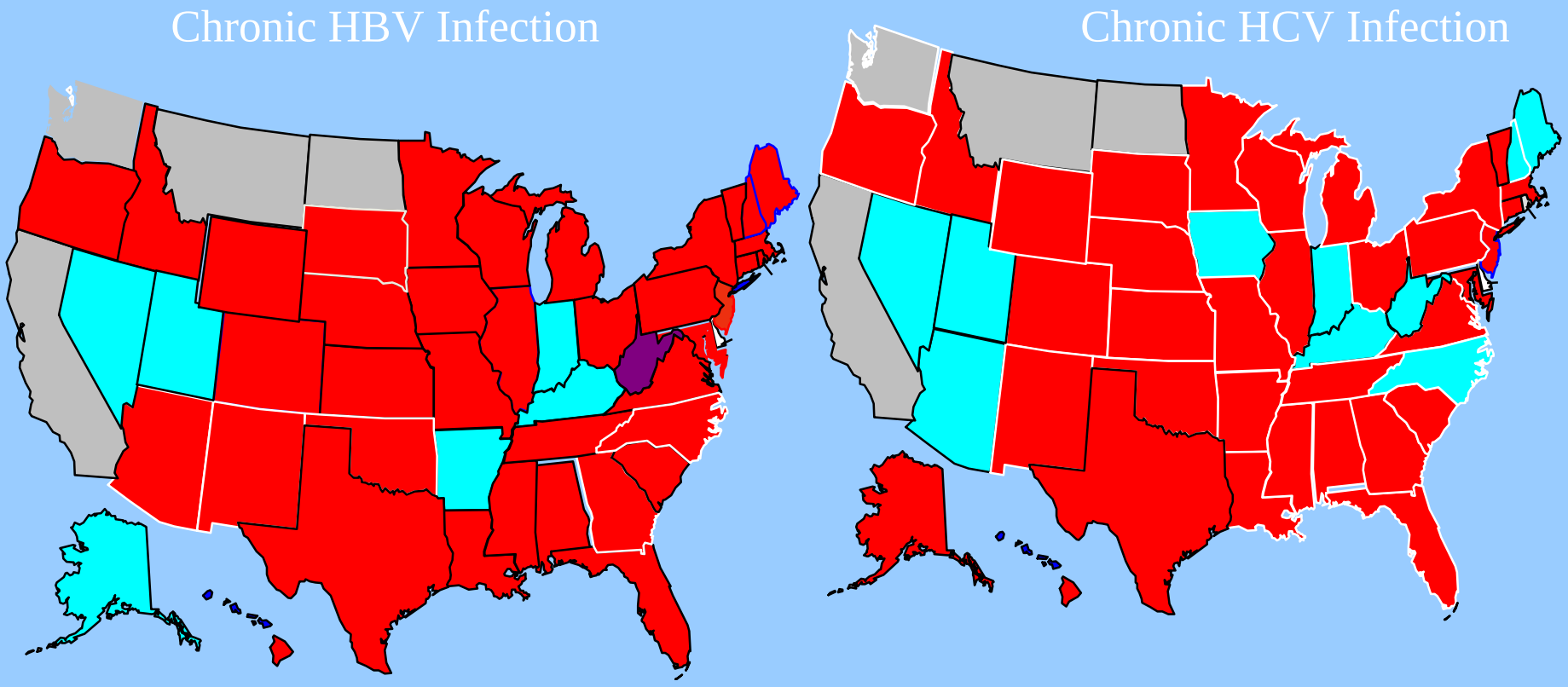
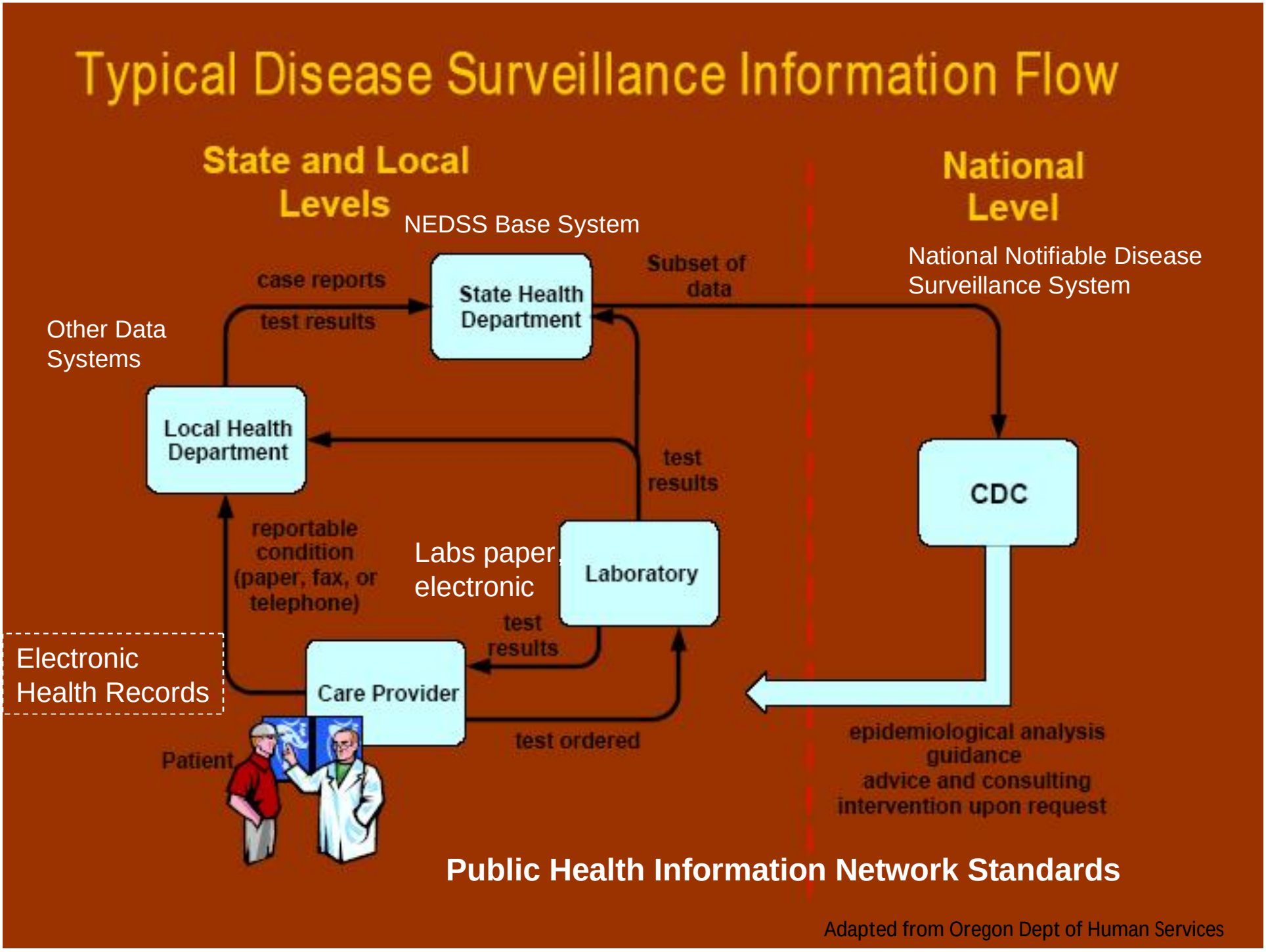
# States Reporting Chronic Hepatitis B and C Virus Infections via NNDSS, 2007



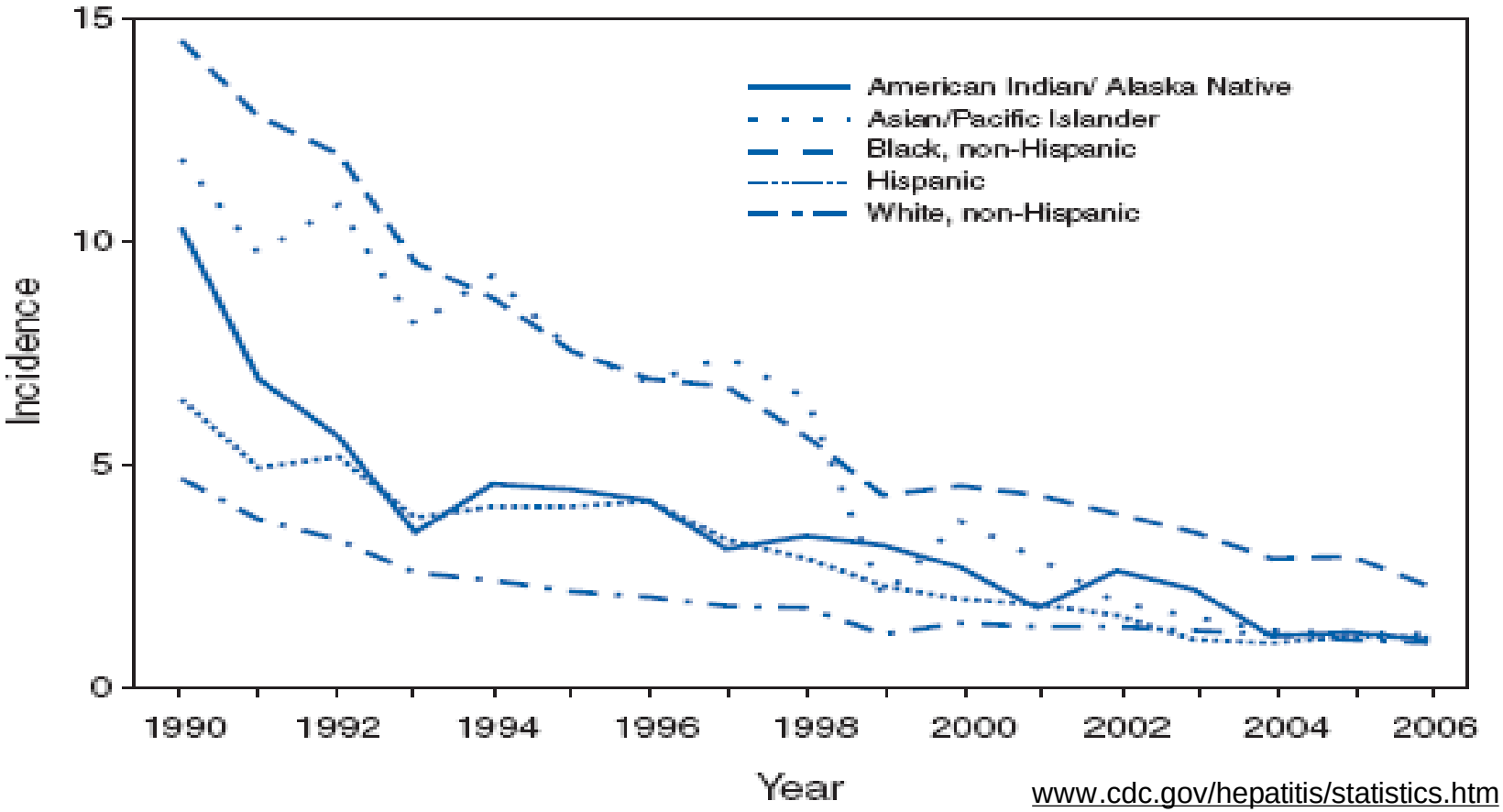
# Typical Disease Surveillance Information Flow




Adapted from Oregon Dept of Human Services

# 2006 HBV: 4,700 Reported Cases
# 46,000 estimated

**FIGURE 15. Incidence* of acute hepatitis B, by race/ethnicity and year — United States, 1990–2006**




www.cdc.gov/hepatitis/statistics.htm

**Chronicity 5% adults**

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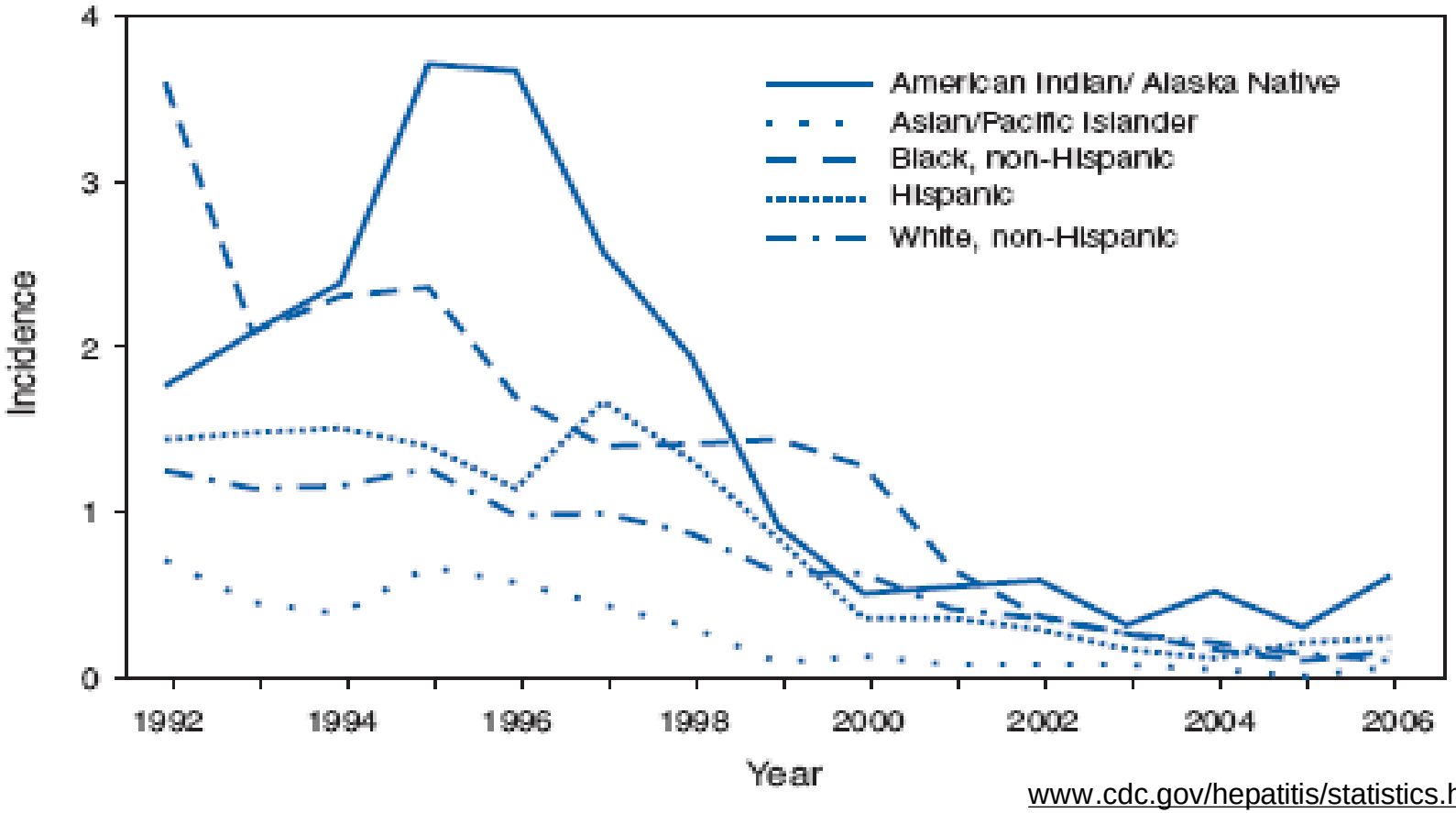
# HCV 2006: 800 Reported Cases
# 19,000 Estimated

**FIGURE 21. Incidence* of acute hepatitis C, by race/ethnicity and year — United States, 1992–2006†**




www.cdc.gov/hepatitis/statistics.htm

**Chronicity 70-80% adults**

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# Surveillance: Who is missing?

- Persons with:
  - Lack of signs and symptoms;  mild or vague
    - New infections have broad spectrum of presentation
      - Not in provider differential
    - Chronic hepatitis often asymptomatic for years
  - Lack of Access (barriers)
    - Transportation, language, no insurance
    - Marginalized social groups
  - Lack of Trust
    - Disclosure of personal risk factors – sex, drugs
      - Providers don't ask
    - Legal and law enforcement issues

**Outreach is a needed component of a complete surveillance program.**

# Chronic Hepatitis Burden

- HBV estimated 1.2M persons
  - 50-70% of these persons born outside U.S.
  - 2,000-4,000 deaths per year
- HCV estimated 3.2-3.7M persons
  - 70% of these persons age 35-54 years
  - 8,000-10,000 deaths per year
  - Elevated ALT, history IDU, and history blood transfusion identified 85% persons 20-59 years
- Chronic liver disease and cirrhosis 12$^{th}$ leading cause of death nationally, 6$^{th}$ for Hispanics

**What proportion of these persons know their sero-status?**

Sorrell et al, Ann Int Med, 2009 150(2):104, Armstrong et al , Ann Int Med 2006;144(10):705, www.cdc.gov/hepatitis/

# Chronic HBV

- "Prompt identification of chronic infection with HBV is essential to ensure that infected persons receive necessary care to prevent or delay onset of liver disease and services to prevent transmission to others."

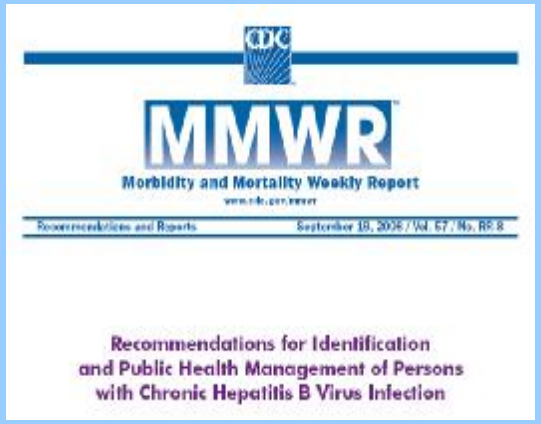





**TABLE 1. Estimated number and percentage of hepatitis B surface antigen (HBsAg)–positive persons, by population segment — United States, 2006**

| Population segment | 2006 population (millions) | HBsAg prevalence (%) | HBsAg–positive persons No. (thousands) | HBsAg–positive persons (%) |
|---|---|---|---|---|
| U.S.-born, noninstitutionalized* | 254.3 | 0.1 (95% CI† = 0.1–0.2) | 356 (229–534) | (30–50) |
| Foreign-born§ | 37.5 | 1.0–2.6 | 375–975 | (47–70) |
| Correctional institutions¶ | 2.2 | 2.0 | 44 | (3–5) |
| Other group living quarters** | 6 | 0.5 | 30 | (2–3) |
| **Total** | **300** | **0.3–0.5** | **805–1,405** | |

# Case Definitions – Screening Tests

- Acute Hepatitis panel
  - Serologic markers HAV, HBV and HCV
- Acute vs Chronic HBV
  - IgM antibody to core antigen is key marker
- Acute vs Chronic HCV
  - Serology and chemistry required
    - Enzyme linked immunoassay (EIA) signal to cut-off ratio
      - Threshold set empirically, no IgM specific test
    - ALT over 400 IU/L, *not* part of hepatitis panel
      - May be over threshold in chronic case

# Improvement – Screening Tests

HCV screening

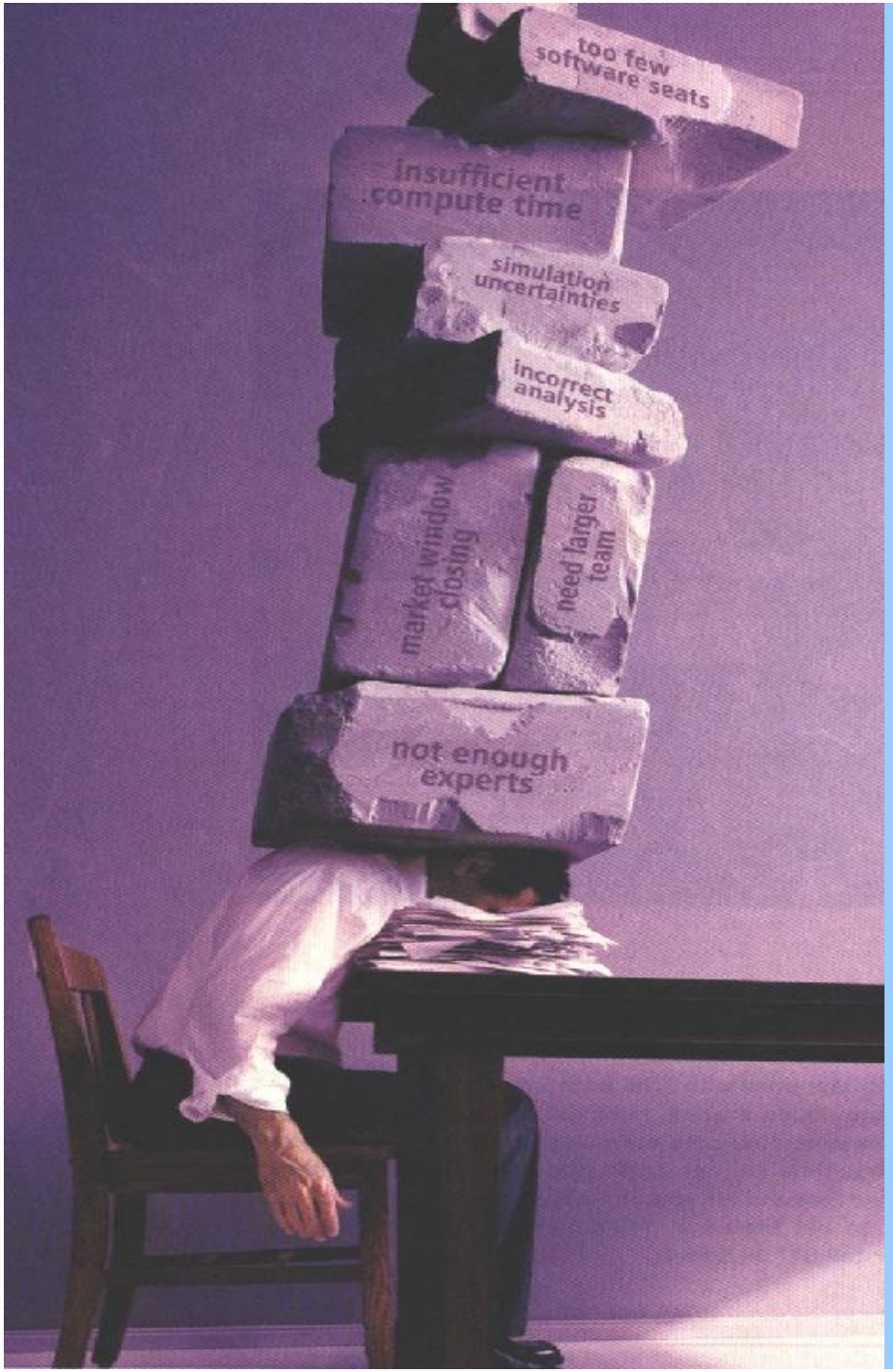
- – Positive EIA reflexes to liver function test ALT
  - EIA and ALT results are on the same report
- – Positive EIA reflexes to PCR

- Low cost PCR testing for HAV, HBV and HCV
  - – Resolve false positives HAV IgM, HBV IgM, HCV EIA
- Case status determination – PCR is definitive
  - – Confirmed acute or chronic case
- Monitor antiviral resistance and HBsAg mutants

**Laboratory report must be a complete and usable chunk of information.**

# Case Definition - Investigations

- Inconsistent acute/chronic  investigations
- Chronic HCV confused with acute
- No or few surveillance staff devoted to chronic HCV reports, deduplication and entry
- Volume of reports means some are not investigated
  - Prioritize investigations e.g. younger age cases
  - Use provider letters and faxes for follow-up




# Improving Investigations

•More data entry staff and better (complete) electronic reporting

•Disease Intervention Specialist cover multiple diseases

•Improved sharing of resources, integration with other programs e.g. perinatal B, refugee health, drug rehab

•Better use of case investigational form – standardizes data

•An assessment of state hepatitis investigation efforts will help properly allocate resources.

•Integrated handling of co-infections.

# Follow-up - Known Case

- Acute cases all followed-up, small number?
- Chronic HBV
  - Determine sexual and household contacts
- Chronic HCV with no risk factors
  - Rule out HAI
- Chronic  HCV with risk factor
  - as warranted, available resources
- Vaccinations, educational materials for all
  - Point of care, prisons, drug treatment –part of prevention
- Ensure linkage to care for all

# Reporting

- Provider reporting voluntary, inconsistent and passive
- Repeat testing may inflate numbers (prisons and jails)
  - De-duplication issue
- Clinicians often not familiar with PH case definitions
  - Confusion with lab test results e.g. HBV serology
- Reporting is not integrated into medical care, add-on
- Laboratory  reports discussed above.

# Data Use

- HBV missed vaccination opportunities
- Healthcare associated infections (HAIs)
- Assessment prevention activities
- Describe risk factors

# Data Quality

- Acute tends to be better than chronic
- Chronic HBV tends to better than chronic HCV

# Other Data Sources

- HMO and university medical center databases
  - Used locally or in-house
- Hospital discharge data
  - Cirrhosis and liver disease are multi-factorial
- Vital statistics
- Immunization Registry
  - Usually children rather than adults

# Surveillance System

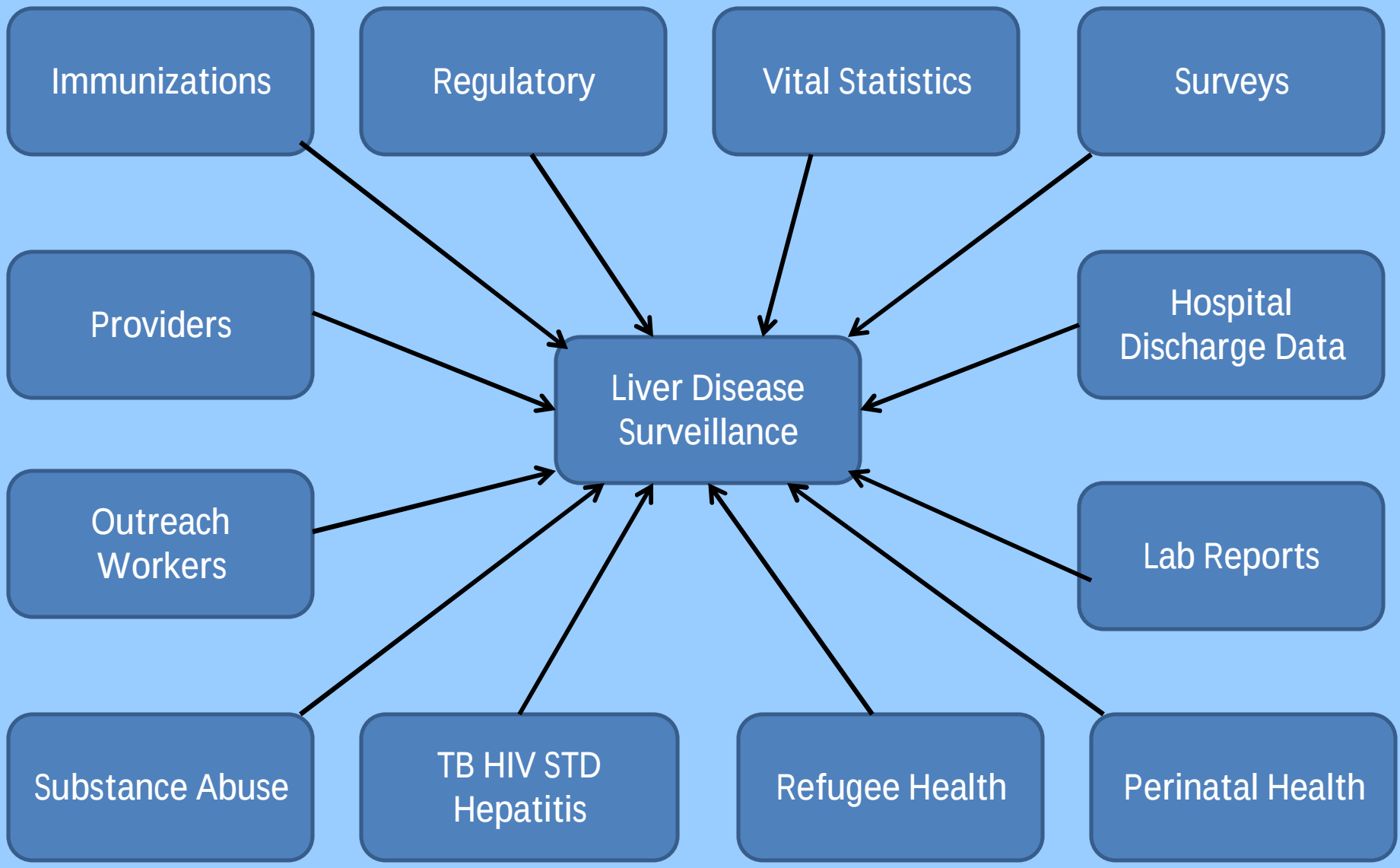
- Strengths
  - The desire of PH workers to be successful
  - Willing to work together, standardize data, PHIN
- Good models and demonstration projects in HDs across country.
- Biases
  - Failure to detect, limited sensitivity
  - Misclassification, incomplete records
  - Lost to follow-up, volume of reports too large

**Variability at state and local levels impacts national data.**

# Improving Surveillance System

- Acute hepatitis
    - Increased sentinel sites, part of preparedness
    - Put surveillance into prevention, target risk groups
- A capacity surge (3-5years) to identify chronic cases
    - Increased screening, vaccination and outreach
    - Incased staffing, cross-program integration
    - Improved linkage to care
- IT and Lab investment
    - Improved de-duplication tools and reduced manual entry
    - PH report integrated-provider Electronic Health Record
    - Improved laboratory report, PCR and integrated ALT
- HIV surveillance as a possible model

# Surveillance: A Better Picture



# Acknowledgements

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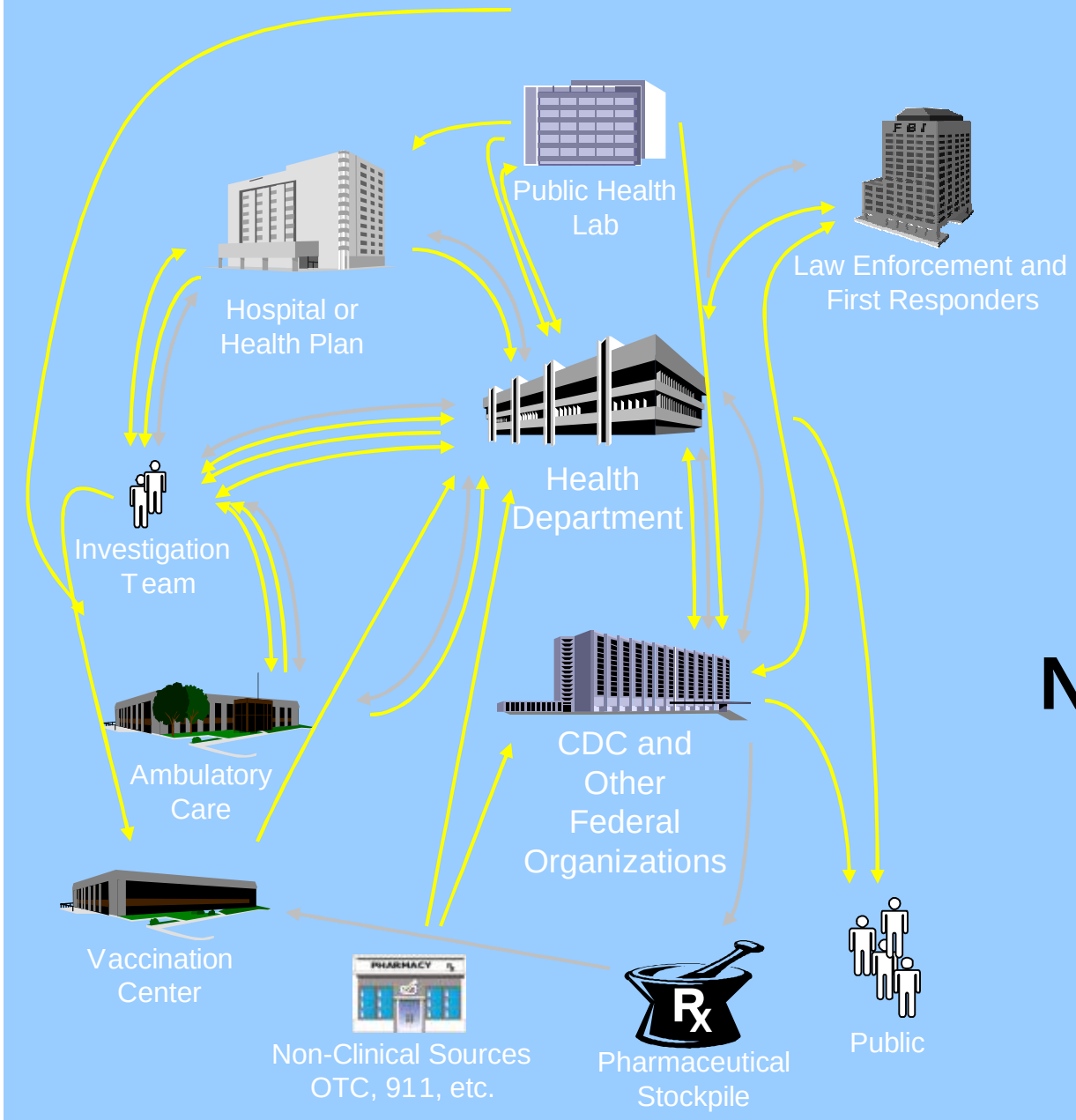
Centers for Disease Control and Prevention (CDC)

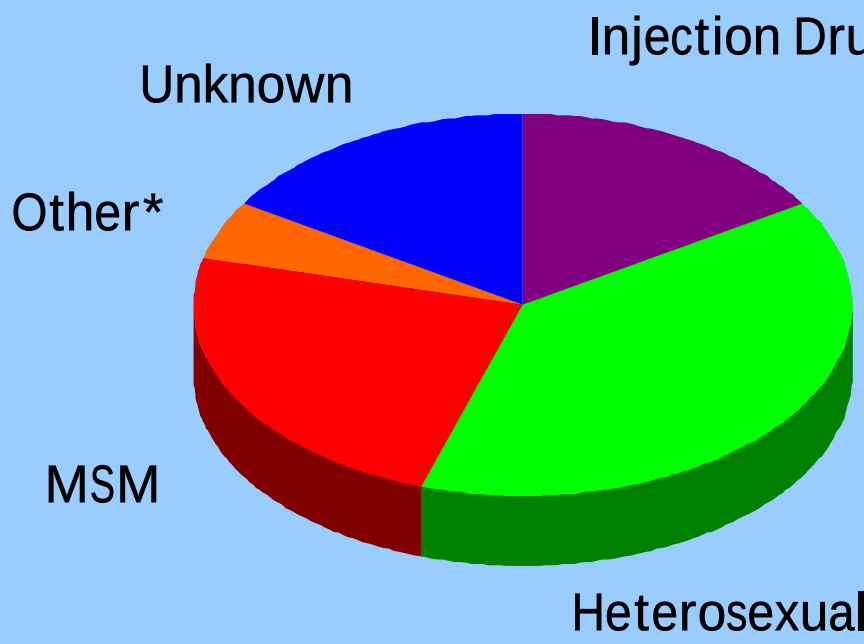
Advocates and patients



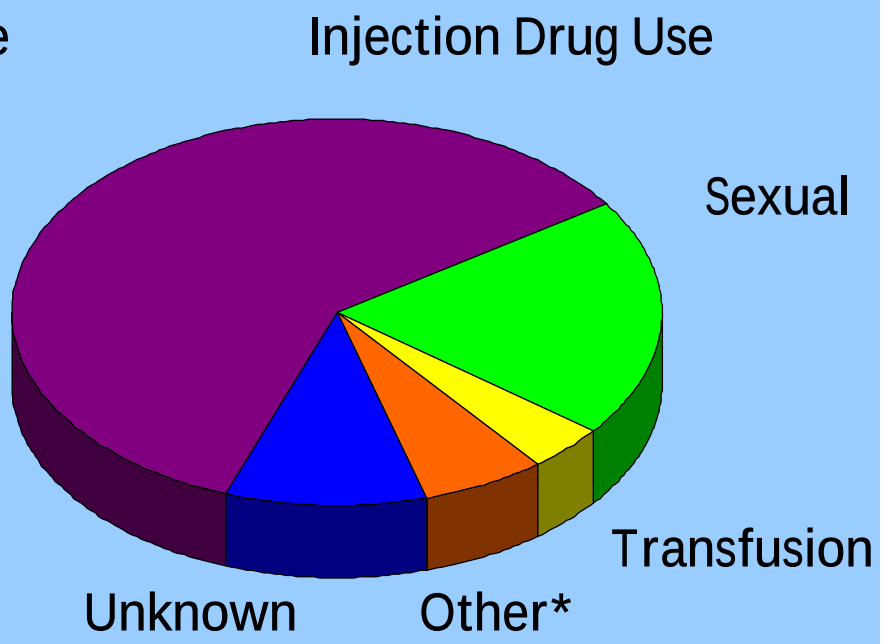

# Public Health Information Network (PHIN)

# Reported Risk Characteristics Among Adults

## HBV Recent (<8 yr ago)




## HCV Recent (<15 yr ago)




With shared risk behaviors integrated testing and prevention makes sense.

*Other: Household contact, institutionalization, hemodialysis, occupational exposure etc.

**Modified from Sentinel Counties Study of Viral Hepatitis, CDC**