Analysis of a Health Indicator Surveillance System: Its Ability to Detect Annual Influenza Activity for the 1999-2000 and 2000-2001 Seasons Compared to Traditional Systems

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Introduction

- **Need faster and accurate surveillance for identifying emerging and reemerging infectious diseases**
- **Technology allows improvement in disease surveillance**
  - Electronic databases
  - Ability to rapidly move data
  - Ability to quickly manipulate and analyze data
- **Health indicator surveillance**
  - Using various types of non-traditional data as a surveillance tool to monitor the health of a community

Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)

- Monitors patient data from military treatment facilities to detect changes in disease incidence in the National Capital Area

Primary care clinics located at 26 installations in a 50 mile radius of Washington, D.C.

- >400,000 beneficiaries with > 2 million visits/year

Data captured daily and placed into one of seven syndrome groups based on ICD-9 codes

- Respiratory (cough, pneumonia, URI), Gastrointestinal (vomiting, diarrhea), Neurologic (meningitis, botulism-like), Hemorrhagic manifestations, Dermatologic – vesicular (smallpox-like), Fever/Sepsis, Coma/Sudden Death

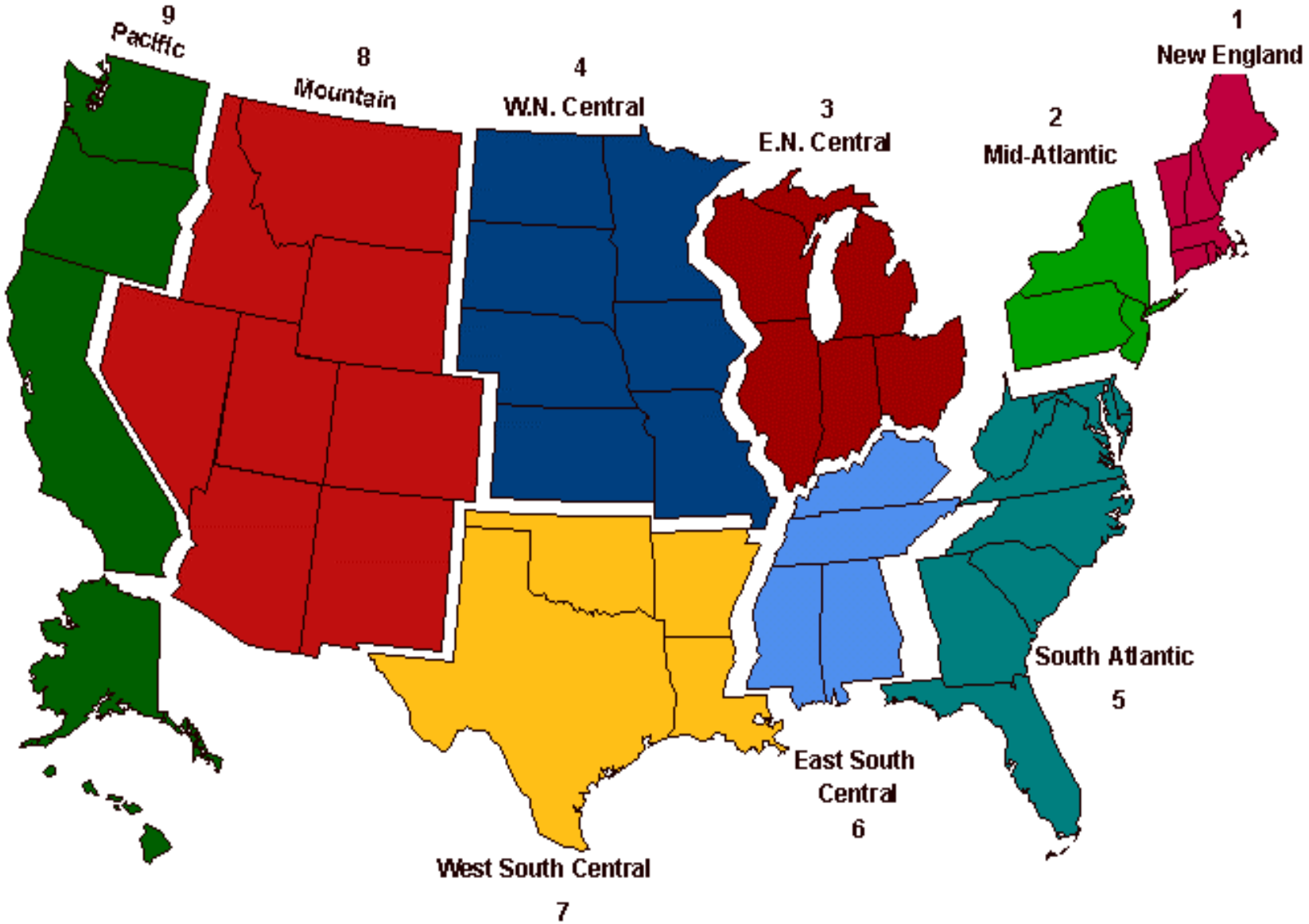
ESSENCE's Influenza Surveillance

- **Faster than traditional surveillance systems**
  - 1-3 day time lag
- **Hypothesis**
  - ESSENCE can detect increases in influenza activity as accurately as more traditional surveillance systems
- **Syndrome groups used for Influenza Surveillance**
  - Respiratory and Fever
    - 219 ICD-9 codes used
  - ICD-9 codes specific to Influenza-like Illnesses (ILI)
    - 32 ICD-9 codes used
    - ICD-9 code 079.99 (viral infection not specified), 460 (acute nasopharyngitis), 480 (viral pneumonia), 487 (influenza), 034 (sore throat), 780.6 (fever), 786.2 (cough)

CDC's Influenza Activity Surveillance

- **Sentinel Physicians Surveillance Network**
  - Volunteer physicians in 47 states and DC
  - Compiled weekly from October through May
  - Report the number of all patient's visits and the number of those visits for ILI (% ILI visits)
    - ILI is defined as cough or sore throat and a temperature of greater than 100 ° F (37.8 C)
  - Rates greater than 3% correlate with increased influenza activity

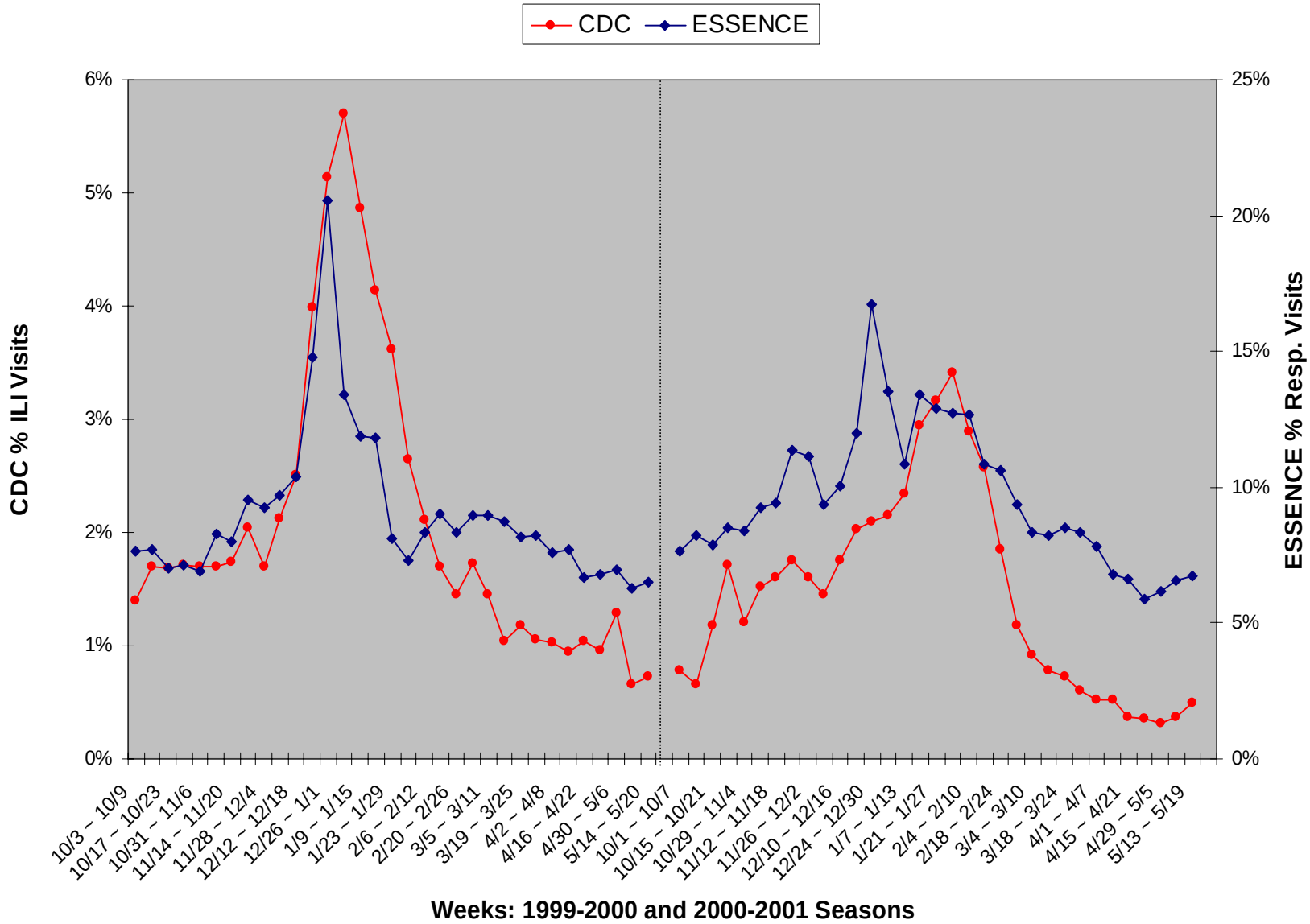
CDC Influenza Regions



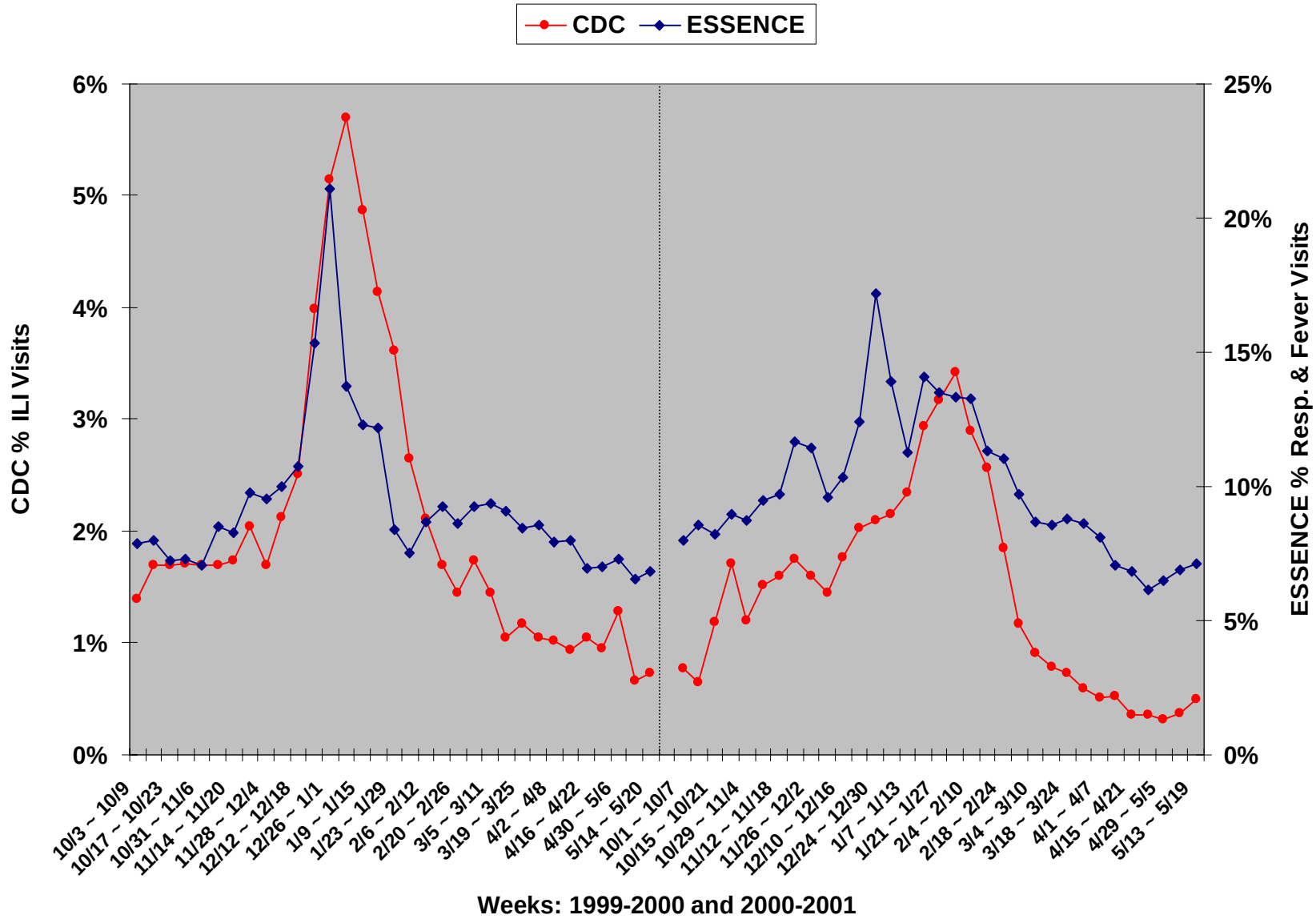
Study Methods

- **Compare the percentage of visits for combinations of specific respiratory and febrile conditions in ESSENCE with what is reported by the CDC's sentinel physicians surveillance network for 1999-2000 and 2000-2001**
  - Three syndrome groups
    - Respiratory
    - Respiratory or Fever
    - ICD-9 codes specific to ILI
  - For each of these three syndrome groups
    - Calculate number and percent of total patients seen
  - Prepare graphs using each combination to find the syndrome group that best matched the CDC data
    - Pearson's and Spearman's rank correlation

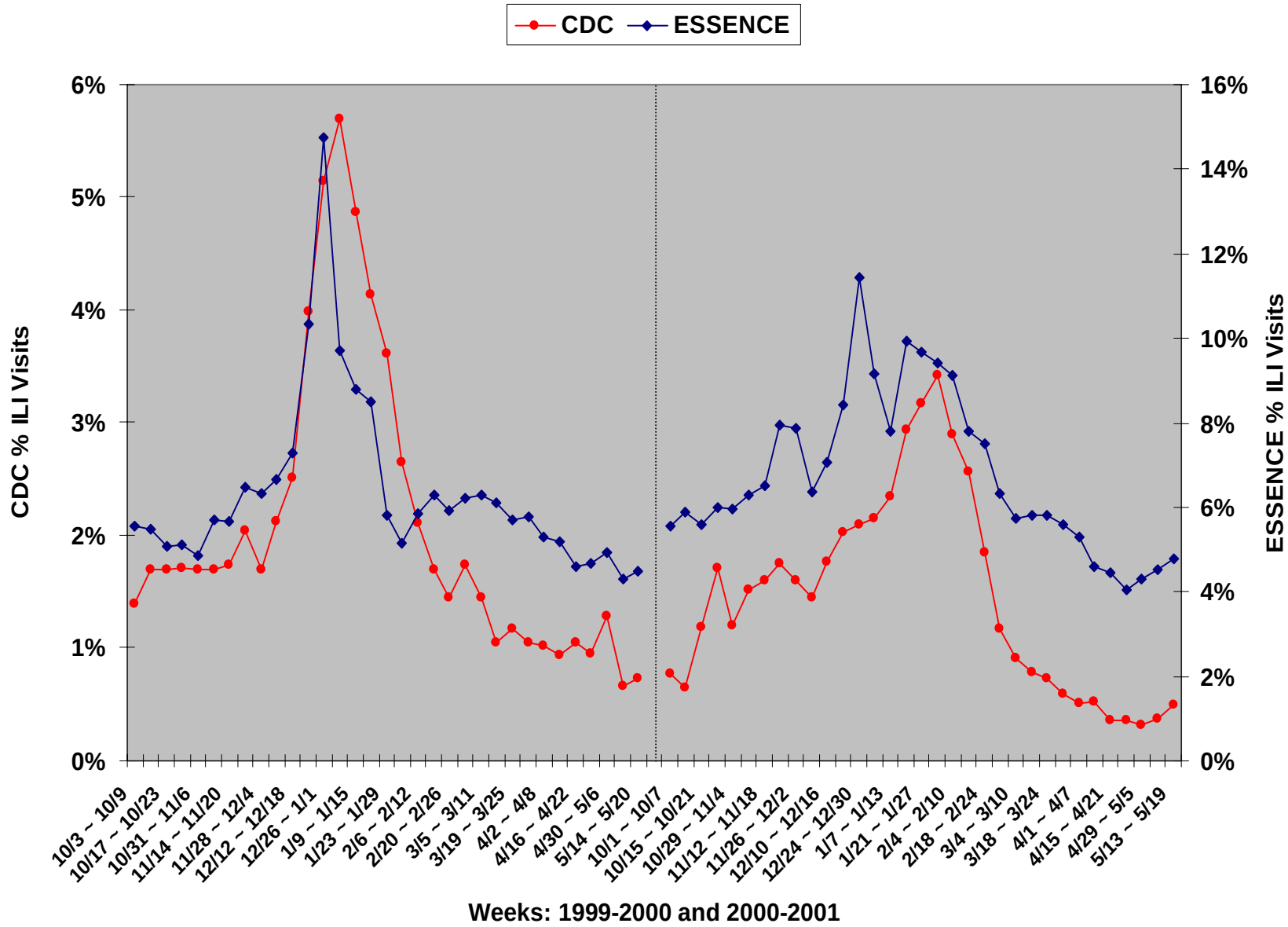
	CDC	ESSENCE
Region	South Atlantic	National Capital
Category	% ILI Visits	% Respiratory Visits



	CDC	ESSENCE
Region	South Atlantic	National Capital
Category	% ILI Visits	% Resp. or Fever Visits



	CDC	ESSENCE
Region	South Atlantic	National Capital
Category	% ILI Visits	% ILI Visits

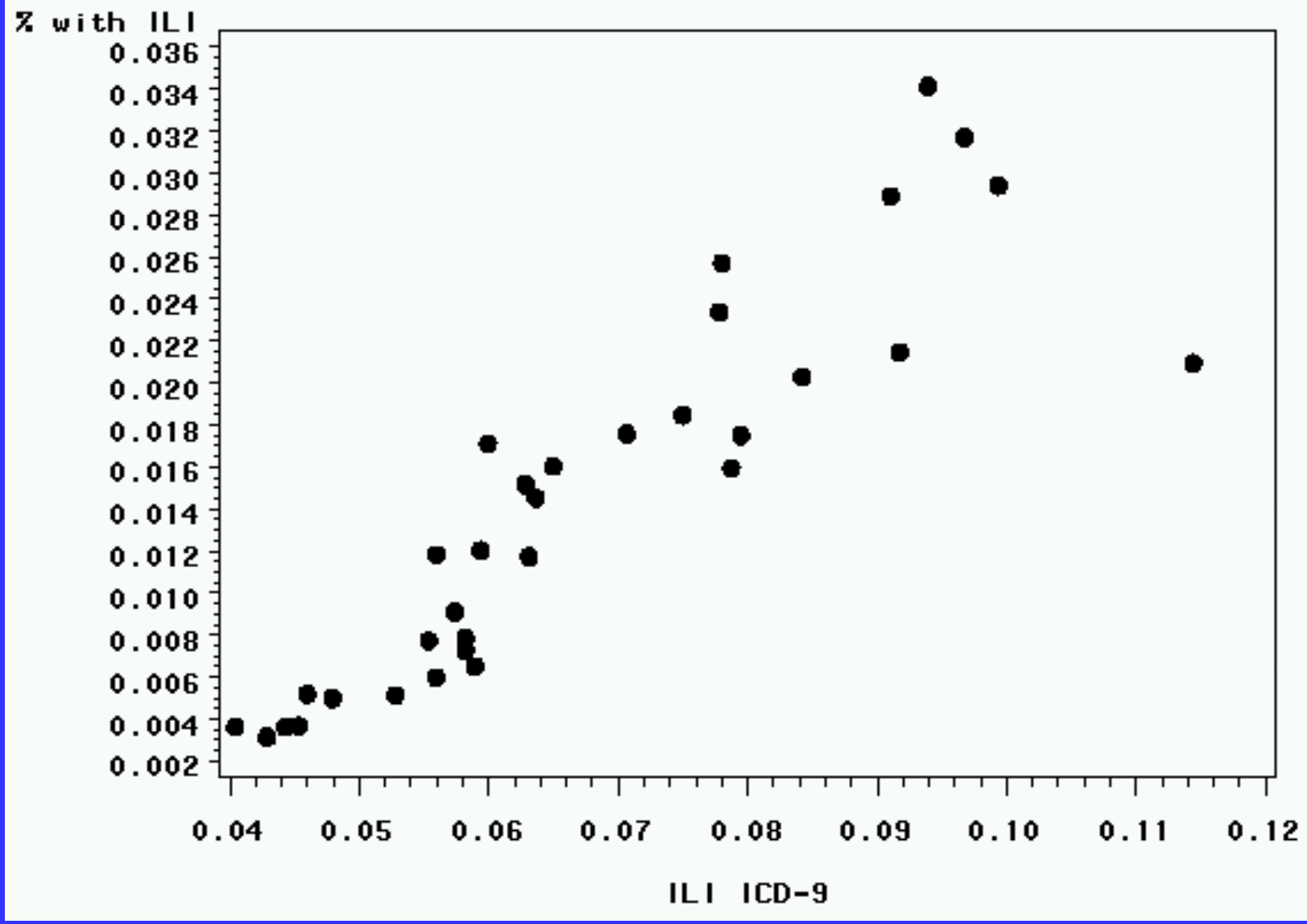


Results

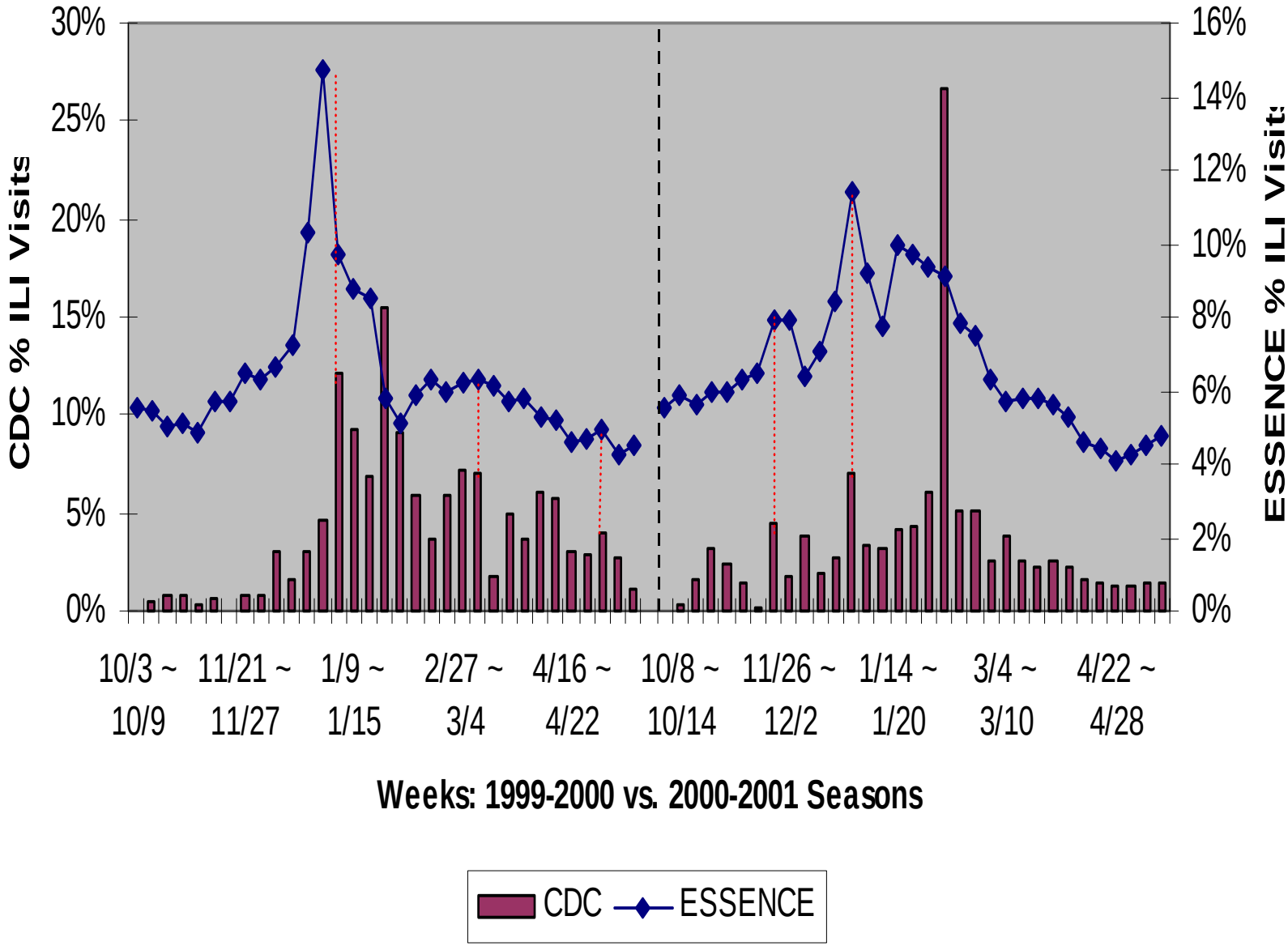
- **Comparison of CDC's % with ILI visits and ESSENCE's % with ICD-9 codes specific to ILI visits showed strongest relationship**
  - R = 0.95 for 2000-2001 season using Spearman's correlation coefficient
  - R = 0.89 for 2000-2001 season using Pearson's correlation coefficient

		Correlation Coefficient	
	ESSENCE DATA	1999-2000	2000-2001
Pearson's	% with Resp.	0.81	0.85
	% with Resp. or Fever	0.81	0.87
	% with ILI	0.83	0.89
Spearman's	% with Resp.	0.65	0.94
	% with Resp. or Fever	0.65	0.93
	% with ILI	0.65	0.95

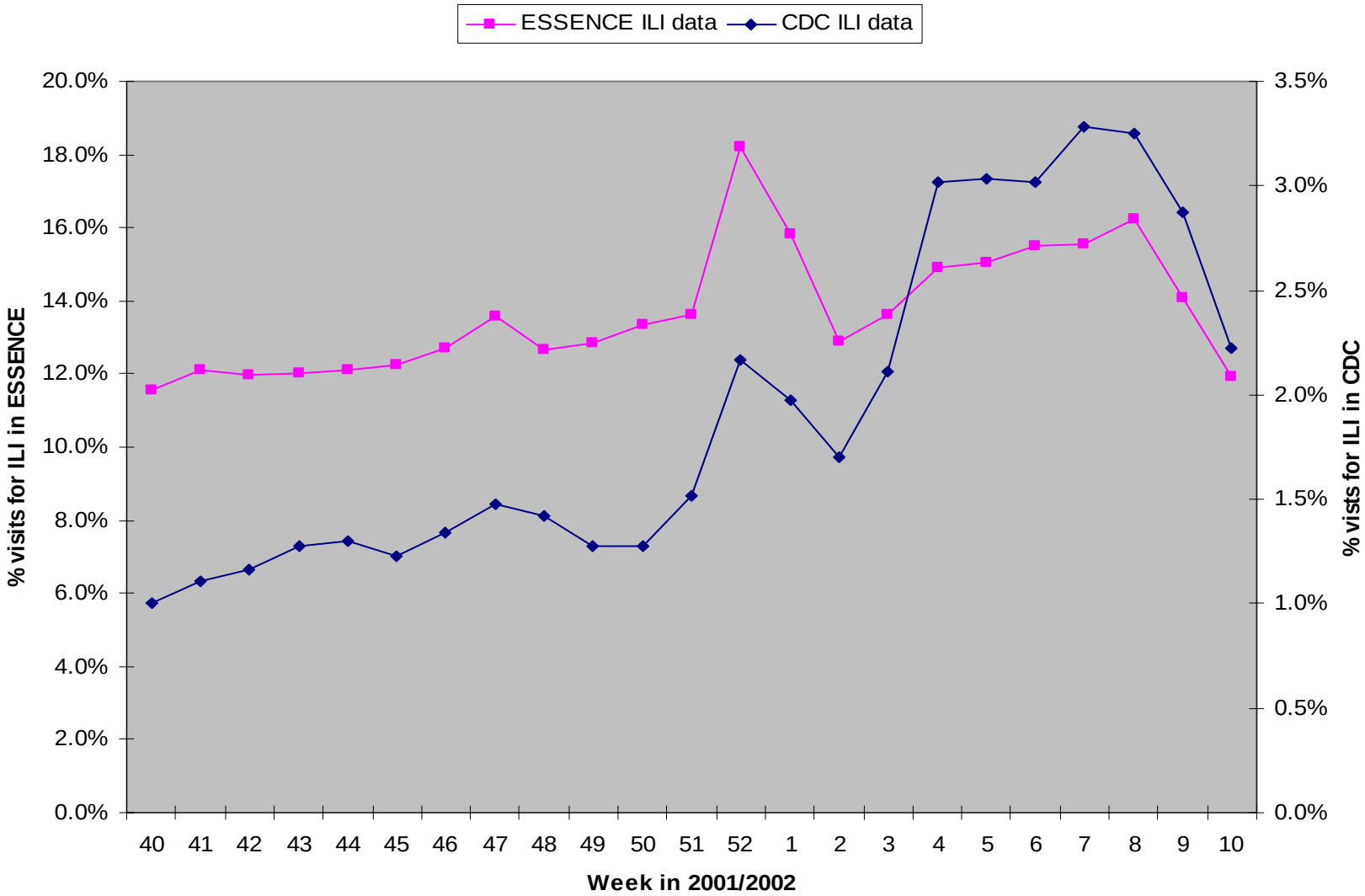
2000/01 CDC vs. ESSENCE ILI category



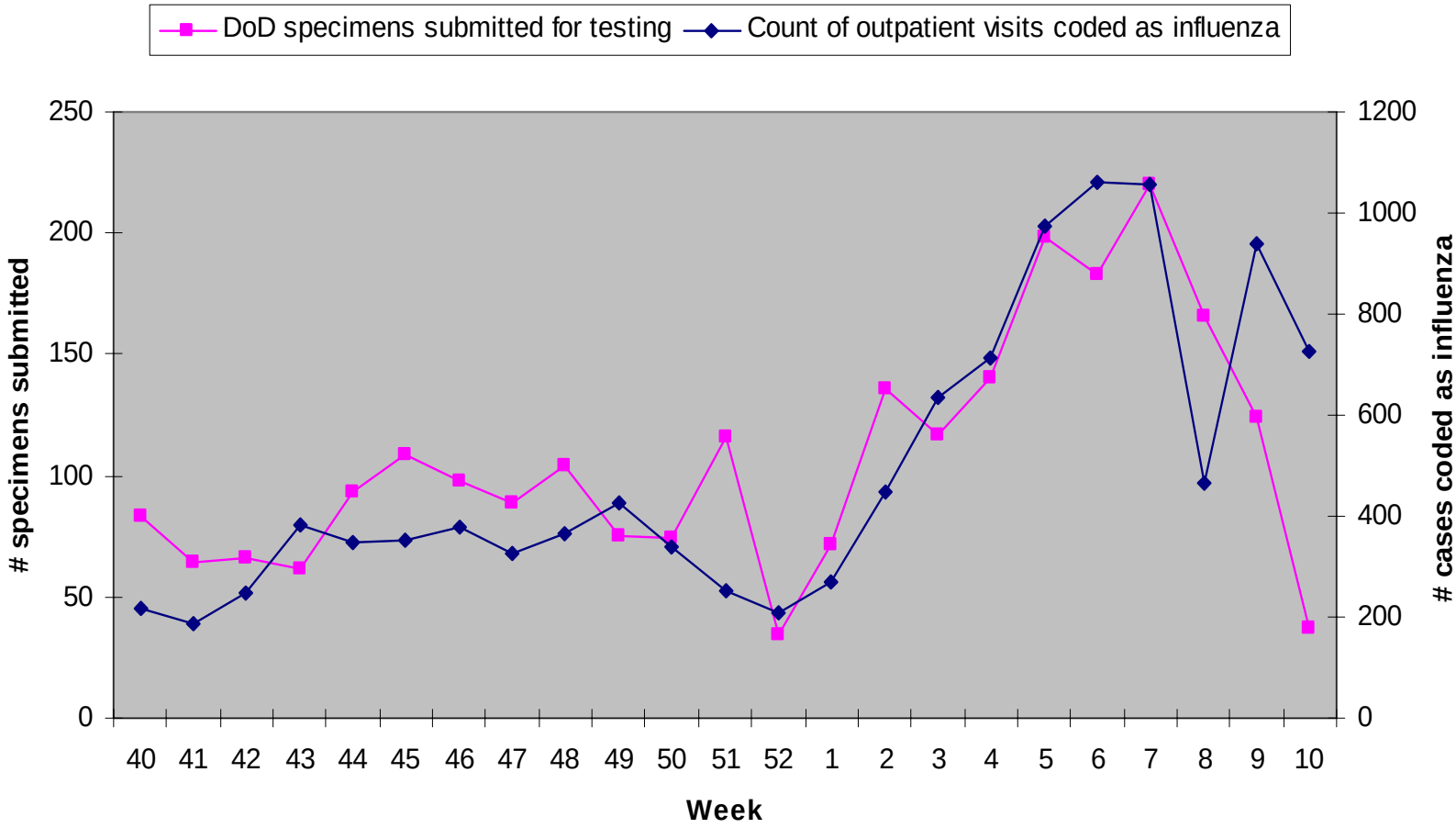
CDC (VA, MD, and DC Area) vs. ESSENCE



CDC Sentinel Physician Compared to ESSENCE ILI Codes Nationwide 2001-2002 Influenza Season



Specimens Received by the DOD Global Influenza Surveillance System Compared to Outpatient Visits Coded as Influenza During the 2001-2002 Influenza Season



Conclusion

- ESSENCE influenza data are as accurate and valid as CDC sentinel physician data in detecting an influenza outbreak by showing similar outbreak curves and peaks
- For 1999-2000 season ESSENCE's measurements of the start date and the end date of the influenza outbreak season did not exceed seven days from similar dates reported by CDC
- Particular ICD-9 codes such as fever, upper respiratory infection, viral syndrome and cough are the best indicators of influenza outbreaks