

ICD Syndrome Grouping

An Examination of EMA Data

The Problem

- How do we decide on inclusion/ exclusion of ICD's within a syndrome group

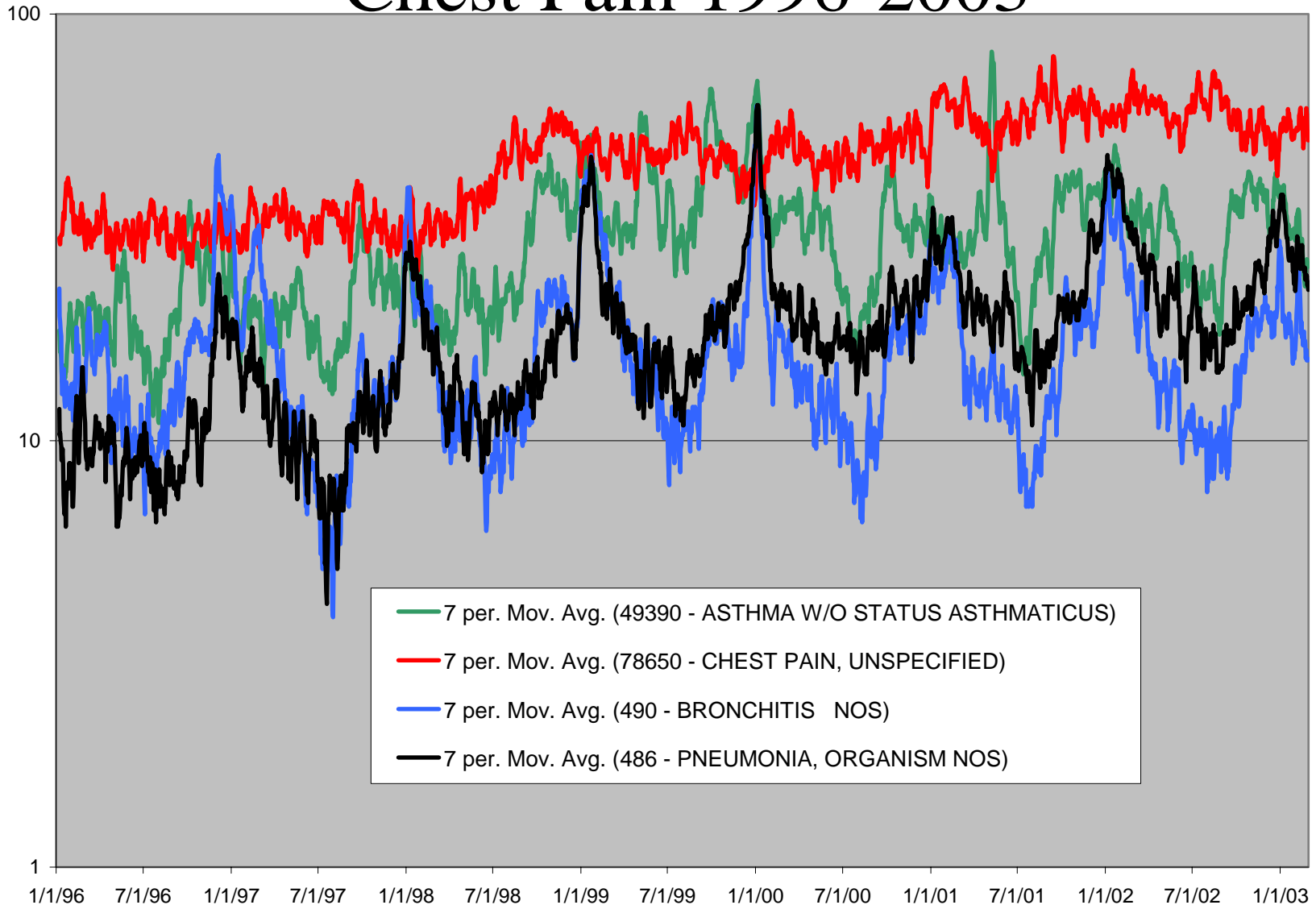
The Approach

- 1) Larger set of potential ICDs identified clinically.
- 2) Those with counts >10 per day selected
- 3) Daily and Weekly analyses
 - a) Correlation matrix/ Lagged Correlation
 - b) Factor analysis
 - c) Regression
 - d) Signal-Noise
 - e) Testing sensitivity/ timeliness for known outbreaks

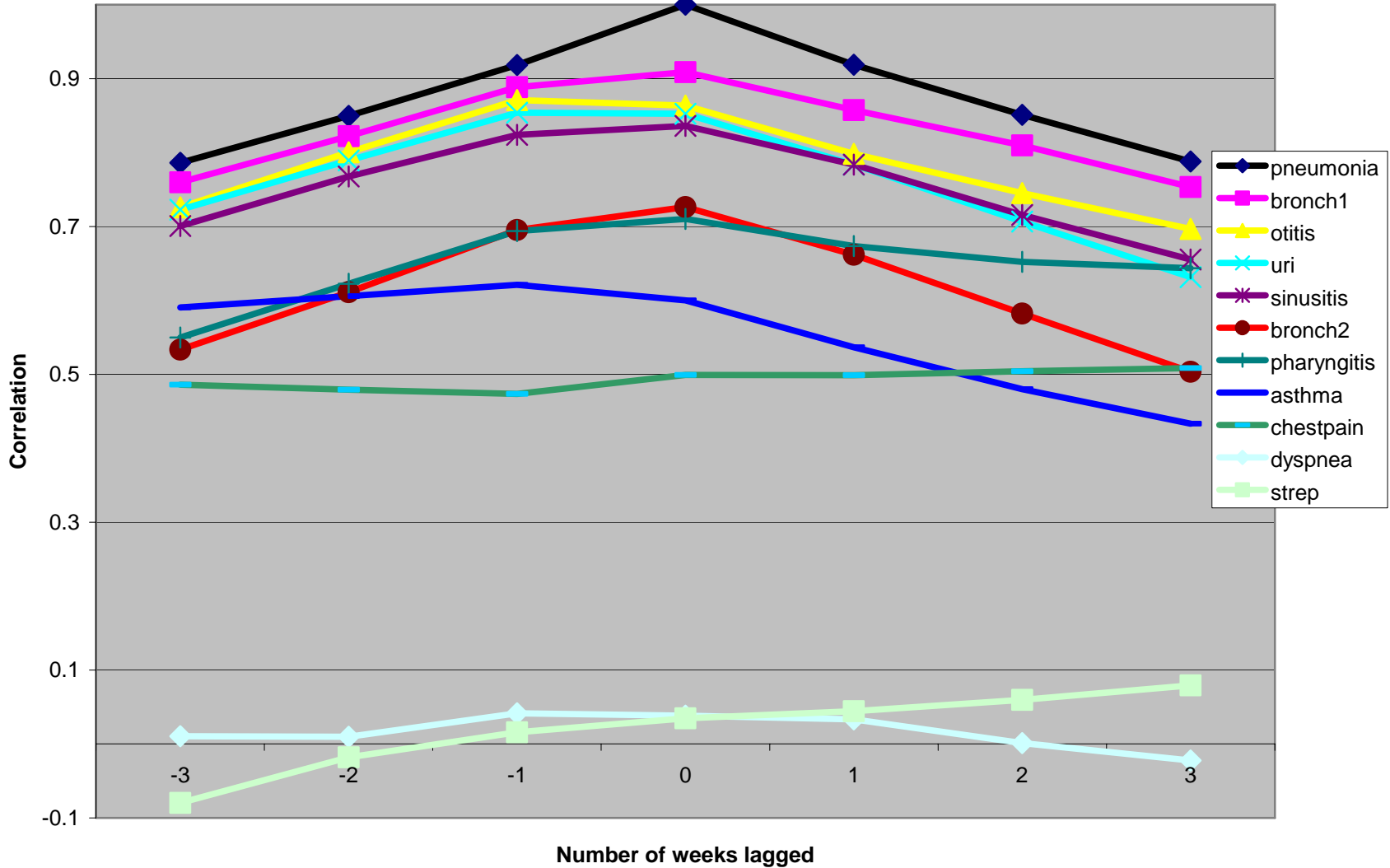
Correlation with pneumonia- weekly counts

bronch1	0.90913 <.0001	asthma	0.60092 <.0001
otitis	0.86519 <.0001	chestpain	0.50588 <.0001
uri	0.85175 <.0001		
sinusitis	0.83382 <.0001		
bronch2	0.72135 <.0001	strep	0.04141 0.4245
pharyngitis	0.71575 <.0001	dyspnea	0.04701 0.3646

Pneumonia, Bronchitis, Asthma, and Chest Pain 1996-2003



Lagged Correlation with Pneumonia



The FACTOR Procedure: Daily counts

Initial Factor Method: Principal Components

Factor Pattern

	<u>Factor1</u>	<u>Factor2</u>	<u>Factor3</u>
STREP_0340	0.08819	0.68280	0.44568
OTITIS_3829	0.83082	0.09484	0.07446
SINUSITIS_4619	0.74064	0.13478	0.08347
PHARYNGITIS_462	0.67795	-0.14742	0.15705
URI_4659	0.85855	0.22429	-0.06216
BRONCHITIS_4660	0.85771	-0.13285	-0.06087
PNEUMONIA_486	0.85977	-0.03992	-0.00142
BRONCHITIS_490	0.70709	0.34941	-0.11673
ASTHMA_49390	0.63073	-0.20423	-0.26671
DYSPNEA_78609	0.03804	-0.25440	0.83831
CHESTPAIN_78650	0.41756	-0.69876	0.13465

The FACTOR Procedure: Weekly counts

Initial Factor Method: Principal Components

Factor Pattern

	<u>Factor1</u>	<u>Factor2</u>	<u>Factor3</u>
strep	0.10264	0.77543	0.36297
otitis	0.92561	0.05401	0.09480
sinusitis	0.89872	0.22519	0.02717
pharyngitis	0.79450	-0.22043	0.27607
uri	0.91131	0.27725	-0.15205
bronch1	0.93469	-0.17082	-0.03891
bronch2	0.77198	0.42129	-0.27368
asthma	0.67084	-0.29771	-0.29595
dyspnea	0.04196	0.07996	0.81054
chestpain	0.54778	-0.65218	0.35926
pneumonia	0.94866	-0.02260	-0.01563

Regression (controlling for seasonality)

The REG Procedure

Model: MODEL1

Dependent Variable: pneumonia

Variable	Partial R-Square	Model R-Square	F Value	Pr > F
cos1	0.3085	0.3829	368.93	<.0001
sin1	0.0065	0.6849	7.79	0.0055
week	0.0861	0.6054	102.92	<.0001
datesq	0.0229	0.6685	27.40	<.0001
Variable	Tolerance	R-Square	F Value	Pr > F
bronch1	0.303291	0.8597	441.43	<.0001
bronch2	0.447161	0.8536	407.74	<.0001
uri	0.327619	0.8648	471.65	<.0001
otitis	0.441154	0.8363	325.60	<.0001
strep	0.435197	0.6943	3.42	0.0653
sinusitis	0.305719	0.7837	156.94	<.0001
pharyngitis	0.365095	0.7612	107.45	<.0001
asthma	0.591148	0.7222	40.77	<.0001
dyspnea	0.962309	0.6915	0.04	0.8463
chestpain	0.271560	0.6914	0.03	0.8727

Comb1= pneumonia + bronch1 + bronch2 + uri + otitis

Regression (controlling for seasonality)

Dependent variable: Combo1= pneumonia + uri + bronchl + bronch2 + otitis

Variable	Partial R-Square	Model R-Square	F Value	Pr > F
cos1	0.4525	0.2172	505.52	<.0001
sin1	0.0048	0.6649	5.41	0.0206
week	0.0352	0.6345	39.27	<.0001
datesq	0.0065	0.6632	7.28	0.0073

Statistics for Entry
DF = 1,368

Variable	Tolerance	Model R-Square	F Value	Pr > F
strep	0.435197	0.6700	0.31	0.5805
sinusitis	0.305719	0.8136	284.03	<.0001
pharyngitis	0.365095	0.8014	244.17	<.0001
asthma	0.591148	0.7295	81.31	<.0001
dyspnea	0.962309	0.6697	0.03	0.8623
chestpain	0.271560	0.6720	2.56	0.1106

Combo2= pneumonia + uri + bronchl + bronch2 + otitis +sinusitis + pharyngitis

Regression

(controlling for seasonality)

The REG Procedure
 Model: MODEL1
 Dependent Variable: combo2

Variable	Partial R-Square	Model R-Square	F Value	Pr > F
cos1	0.4122	0.2711	480.37	<.0001
sin1	0.0111	0.6722	12.98	0.0004
week	0.0410	0.6423	47.78	<.0001
datesq	0.0068	0.6765	7.95	0.0051

Model Variable	Tolerance	R-Square	F Value	Pr > F
strep	0.435197	0.6834	0.03	0.8649
asthma	0.591148	0.7358	73.10	<.0001
dyspnea	0.962309	0.6834	0.06	0.8112
chestpain	0.271560	0.6867	4.00	0.0461

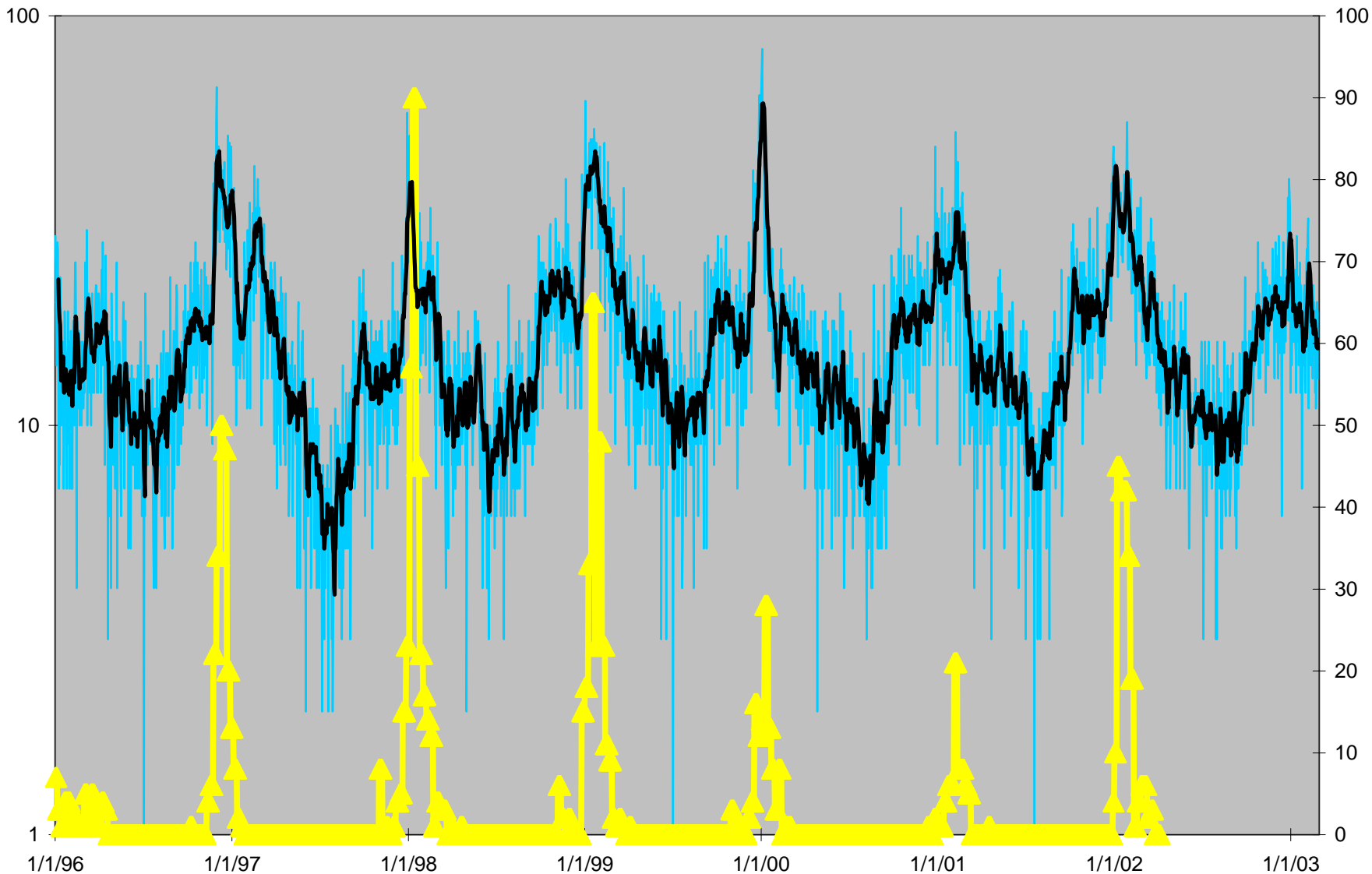
Combo3 = pneumonia + uri + bronch1 + bronch2 + otitis + sinusitis + pharyngitis + asthma

Signal to Noise

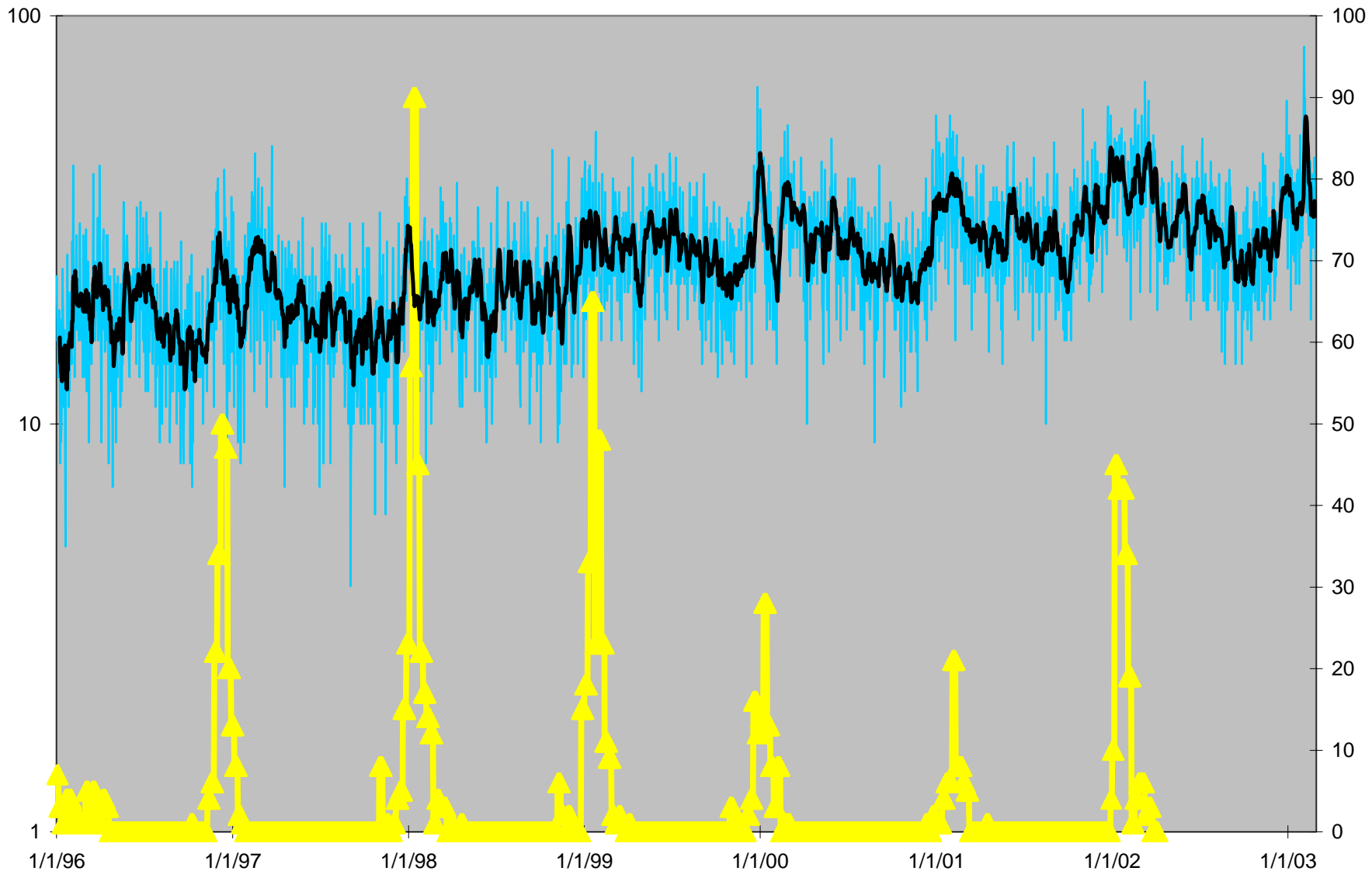
- Define outbreak periods using influenza surveillance data (viral isolates)
- Calculate difference in means between flu season and non-flu (“Signal”)
- Calculate SE during non-flu (“Noise”)
- Calculate Signal/Noise

Obs	_NAME_	signal	noise	signal/noise
1	BRONCHITIS_490	14.2154	6.4147	2.21608
2	URI_4659	28.4212	15.3369	1.85313
3	PNEUMONIA_486	11.0196	7.5528	1.45901
4	OTITIS_3829	14.7549	11.8881	1.24115
5	SINUSITIS_4619	6.0992	5.5638	1.09624
6	BRONCHITIS_4660	6.5500	6.6303	0.98788
7	ASTHMA_49390	4.3940	11.9291	0.36834
8	PHARYNGITIS_462	3.2823	9.0054	0.36448
9	STREP_0340	0.7397	2.3466	0.31521
10	DYSPNEA_78609	0.1703	3.8646	0.04406
11	CHESTPAIN_78650	-1.8063	14.5223	-0.12438

BRONCHITIS_490 flua 7 per. Mov. Avg. (BRONCHITIS_490)



PHARYNGITIS_462 flua 7 per. Mov. Avg. (PHARYNGITIS_462)



Conclusions

- Different methods yield similar results (Pneumonia, Bronchitis, Otitis, URI)
- Signal-Noise analysis best able to exclude pharyngitis
- Visual examination may be sufficient!