

# *Standards for Early Processing and Display Stages for Over-the-Counter Pharmaceutical Data*

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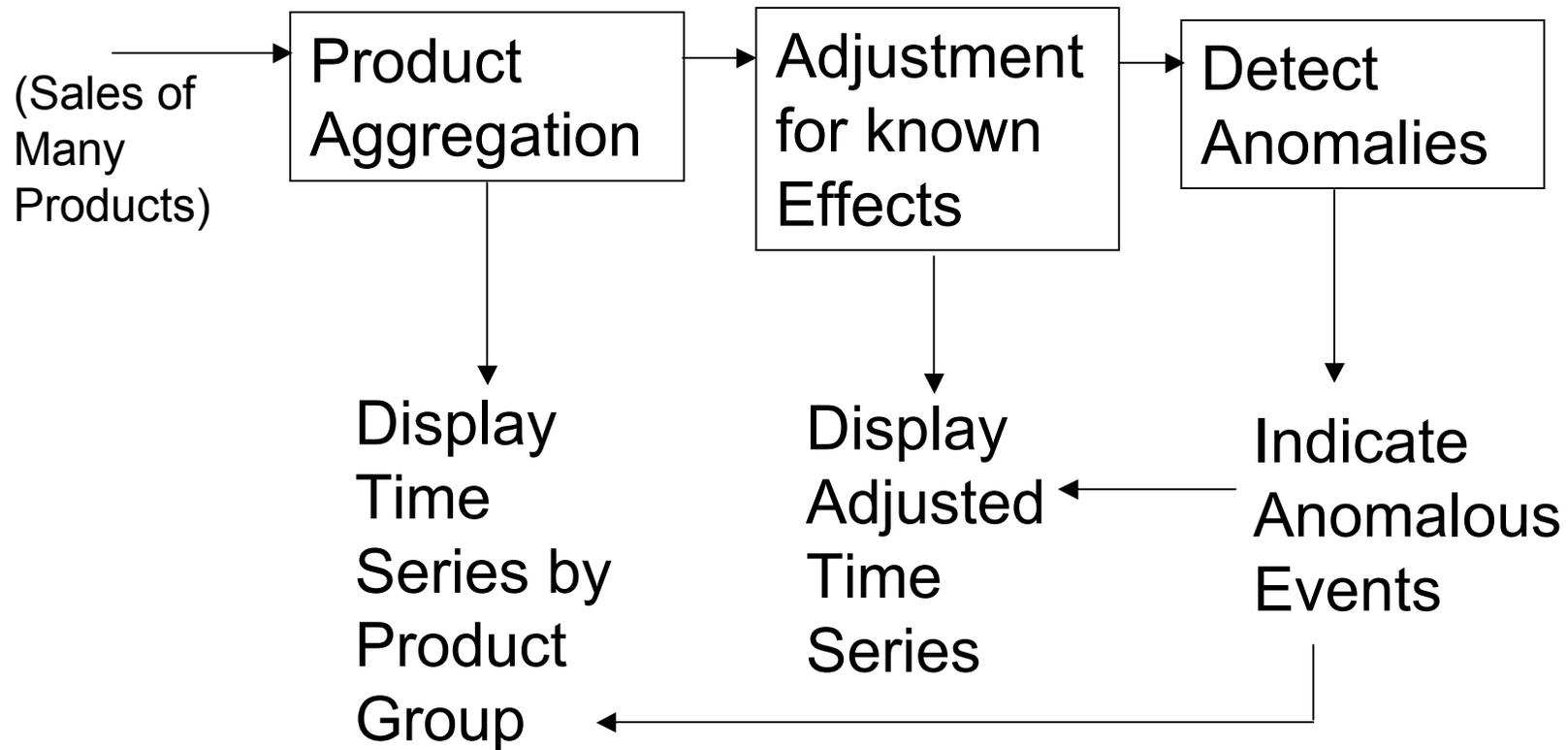


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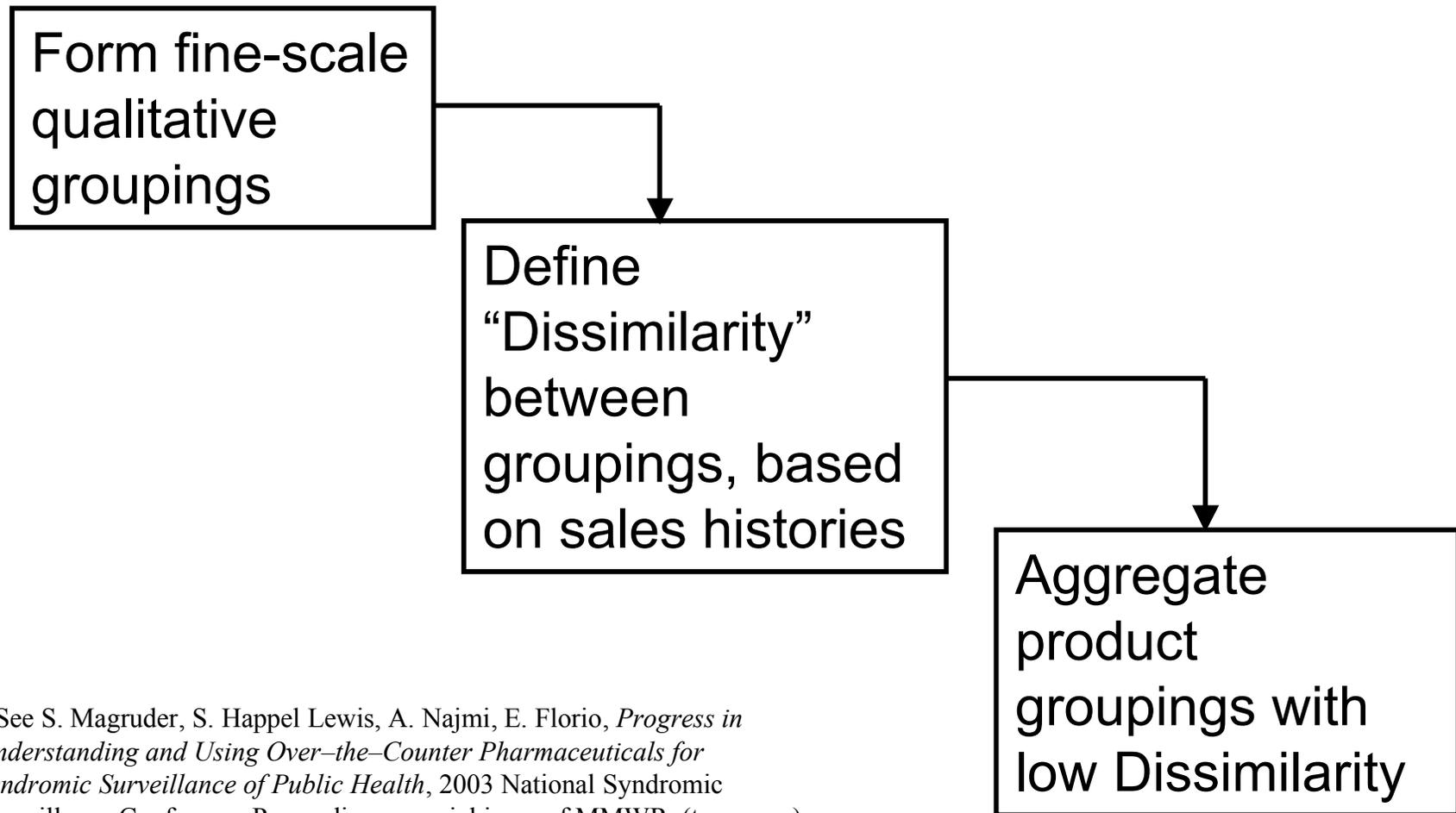


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# Elements of OTC Temporal Processing & Display



# Method to Determine Informative OTC Product Aggregations\*



\* See S. Magruder, S. Happel Lewis, A. Najmi, E. Florio, *Progress in Understanding and Using Over-the-Counter Pharmaceuticals for Syndromic Surveillance of Public Health*, 2003 National Syndromic Surveillance Conference Proceedings, special issue of MMWR, (to appear).

# Initial Aggregation Subgroups

(Adult Categories)

## Indication

Anti-Diarrhea  
Allergy  
Bronchial  
Cold  
Cold/Allergy  
Cold/Flu  
Cold/Sinus  
Cold Sore  
Cough  
Cough/Cold  
Fever  
Flu  
Pain  
Sinus  
Sore Throat

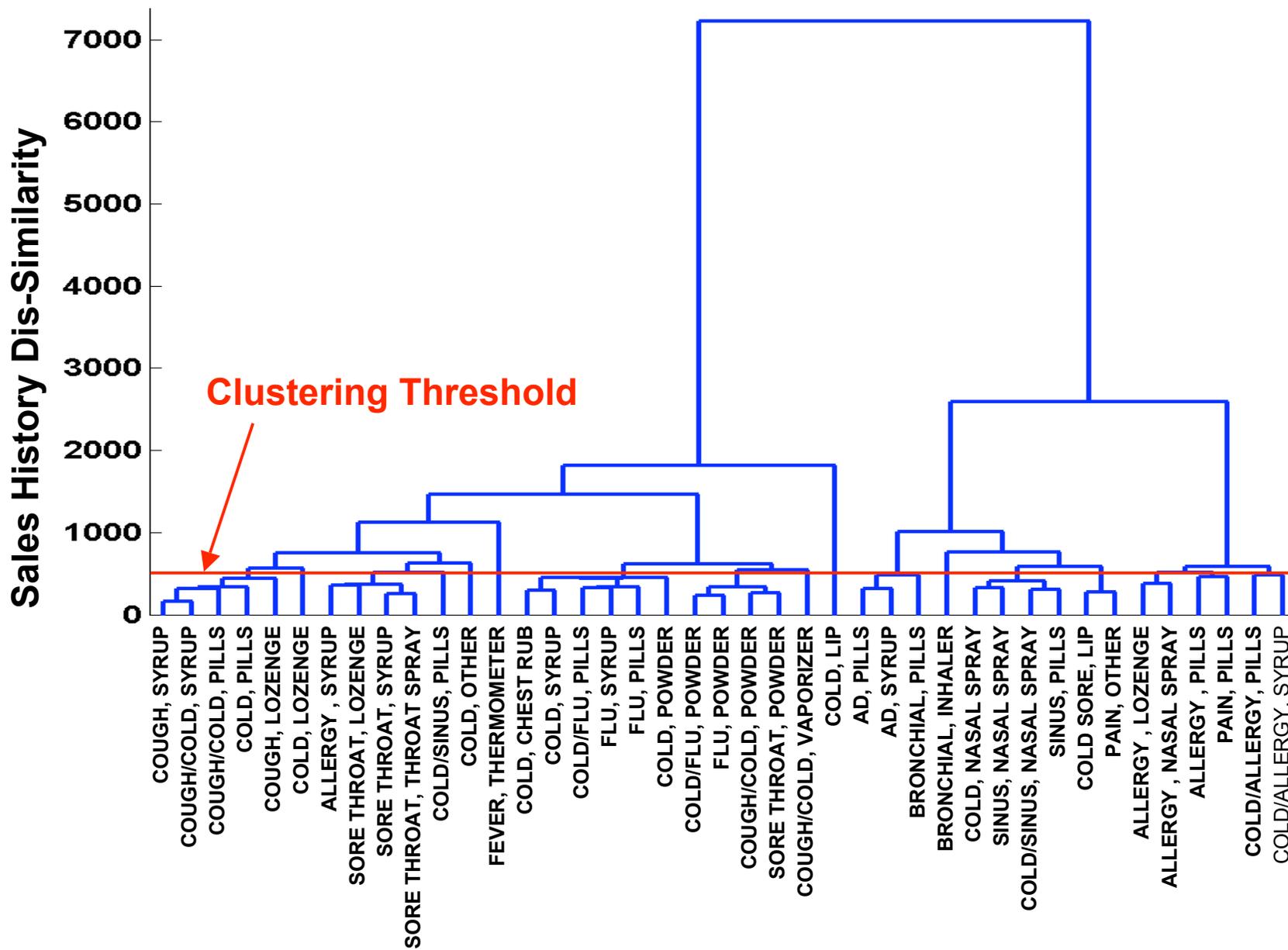
All Pairwise  
Combinations  
of:



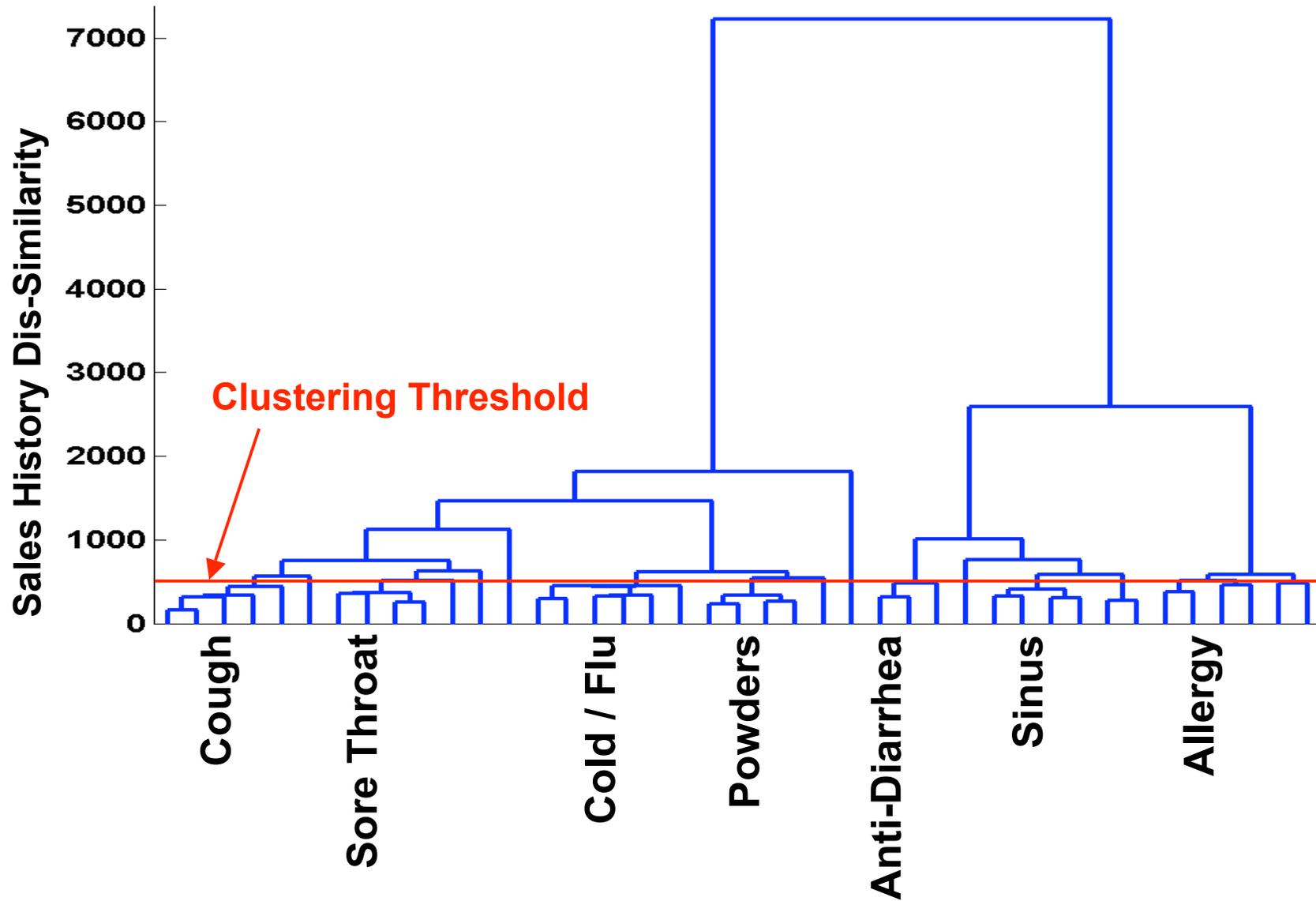
## Physical Type

Chest Rub  
Inhaler  
Lip Balm  
Lozenge  
Nasal Spray  
Other  
Pill  
Powder  
Syrup  
Thermometer  
Throat Spray  
Vaporizer

# OTC Product Classes Form Empirical Clusters



# OTC Product Classes Form Empirical Clusters



# Some Results Were Not Surprising

## Cough Cluster

- COLD, PILLS
- COUGH, LOZENGE
- COUGH, SYRUP
- COUGH/COLD, PILLS
- COUGH/COLD, SYRUP

## Cold/Flu Cluster

- COLD, CHEST RUB
- COLD, POWDER
- COLD, SYRUP
- COLD/FLU, PILLS
- FLU, PILLS
- FLU, SYRUP

# Some Surprising Results

- Pain Pill Sales Found to be Associated with Pollen Season / Allergy-Remedy Sales
- Various Powders Formed Their Own Group
- Allergy Syrups *were* influenced by winter cold season (unlike other allergy remedies)

# Suggestions Re: PHIN Standards

- PHIN product aggregations should reflect the maximum # of distinguishable health conditions
- Products with related uses are not always obvious – researchers should look for regional differences
- If regional differences exist, then national groupings could be based on products common to all regional groupings

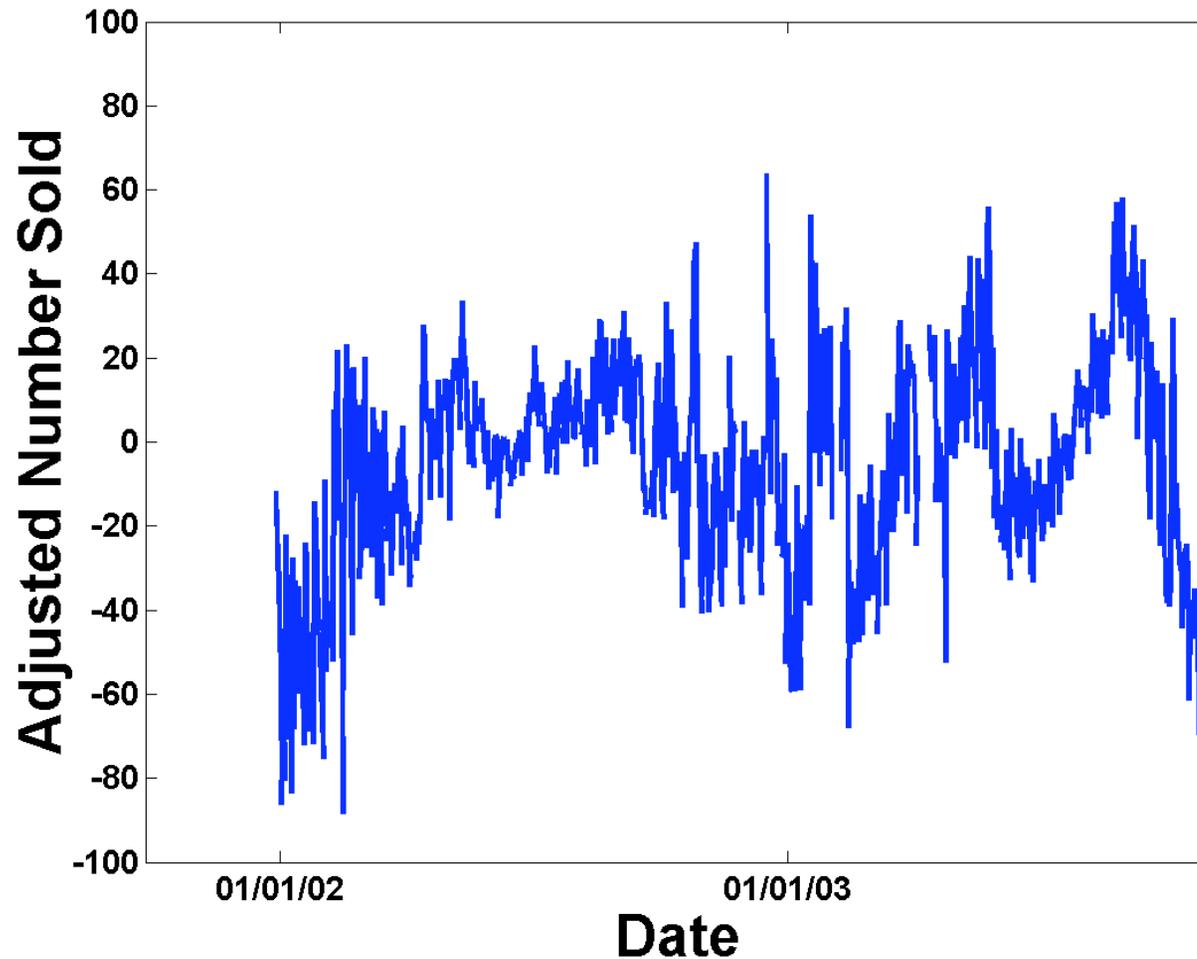
# Adjustment for Known Effects\*

- Effects included
  - Linear Time trend
  - Day of Week
  - Recent History (average sold over recent week)
  - Daily Outdoor Mean Temperature
- Method of Adjustment
  - Poisson Regression + Out-of-Sample Prediction
- Regression Baseline:
  - 13-30 weeks, depending on OTC Product Group

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\* A similar idea is used by BioSense (but different details)

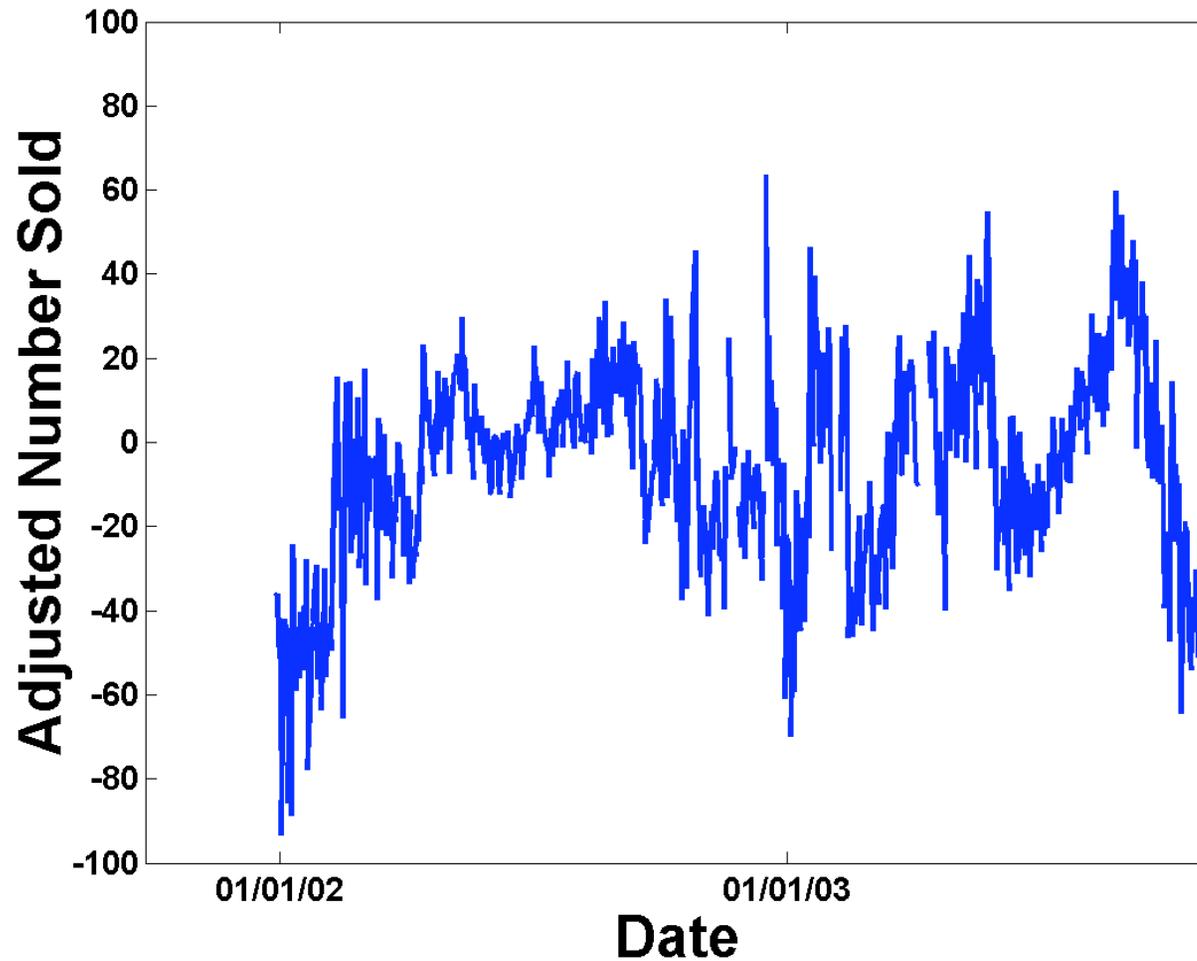
# Cold/Flu-Remedy Sales, After Linear Time Trend\* Adjustment



Median  
Absolute  
Value = 15.5

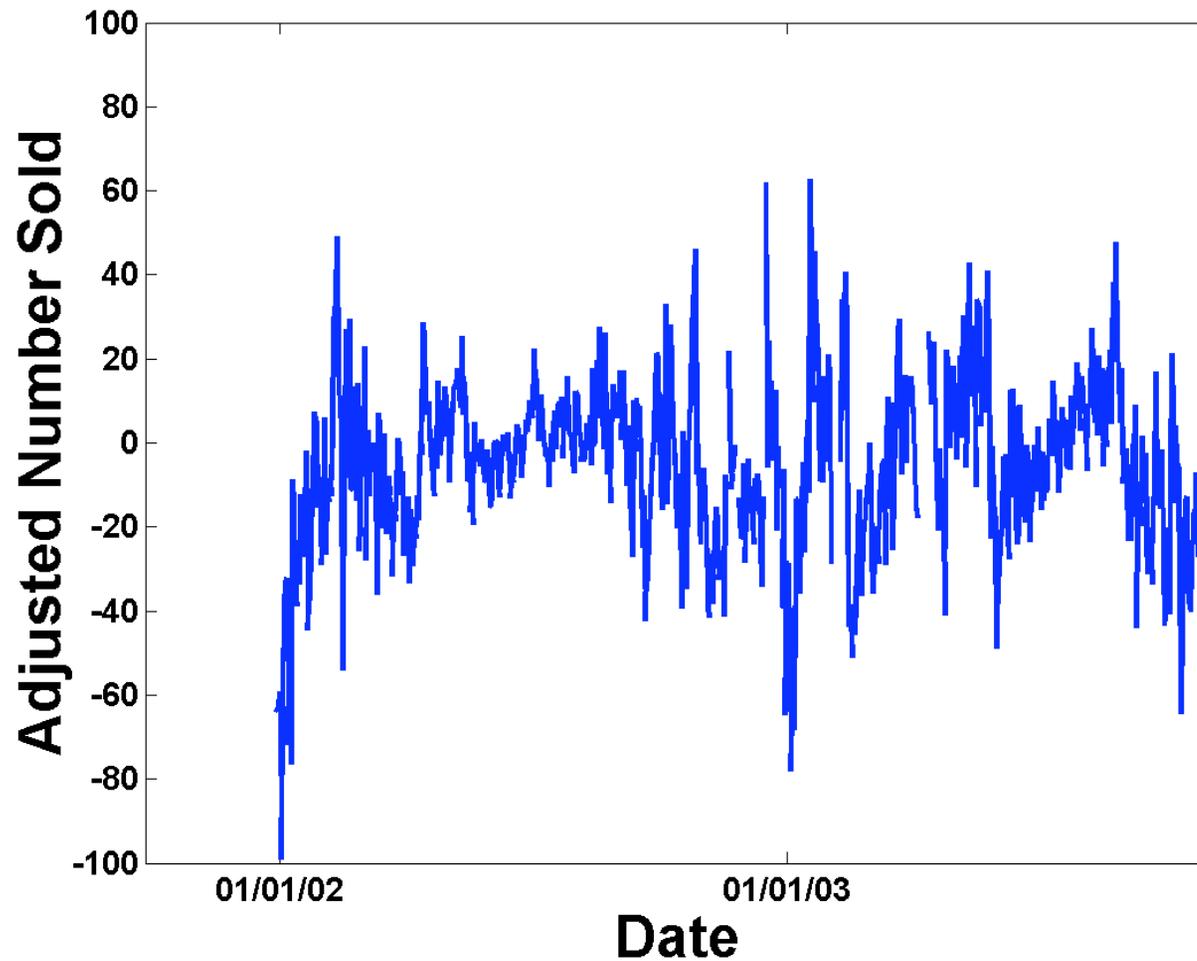
\* Over 13 week baseline

# Plus Day-of-Week Adjustment



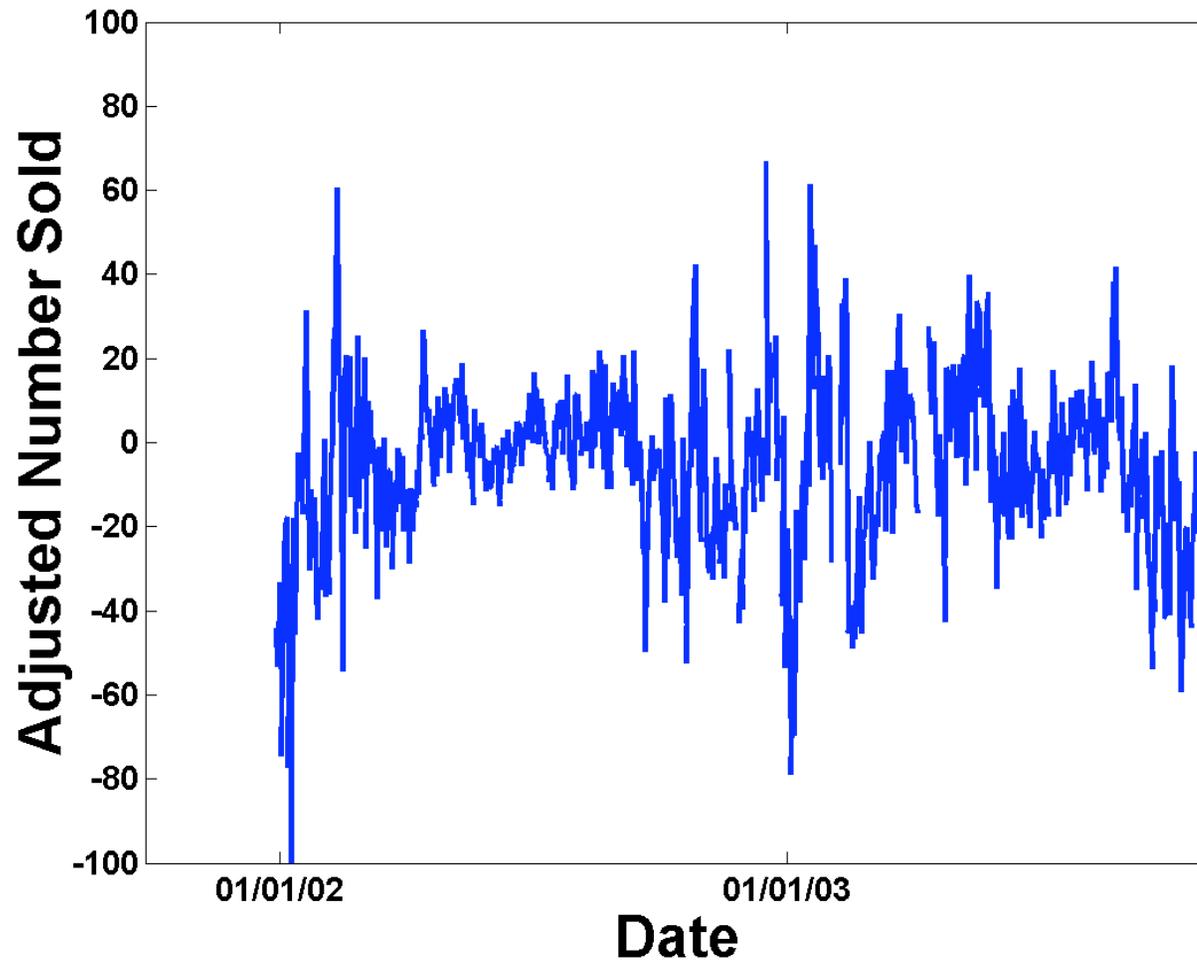
Median  
Absolute  
Value = 14.5

# Plus Recent History Adjustment



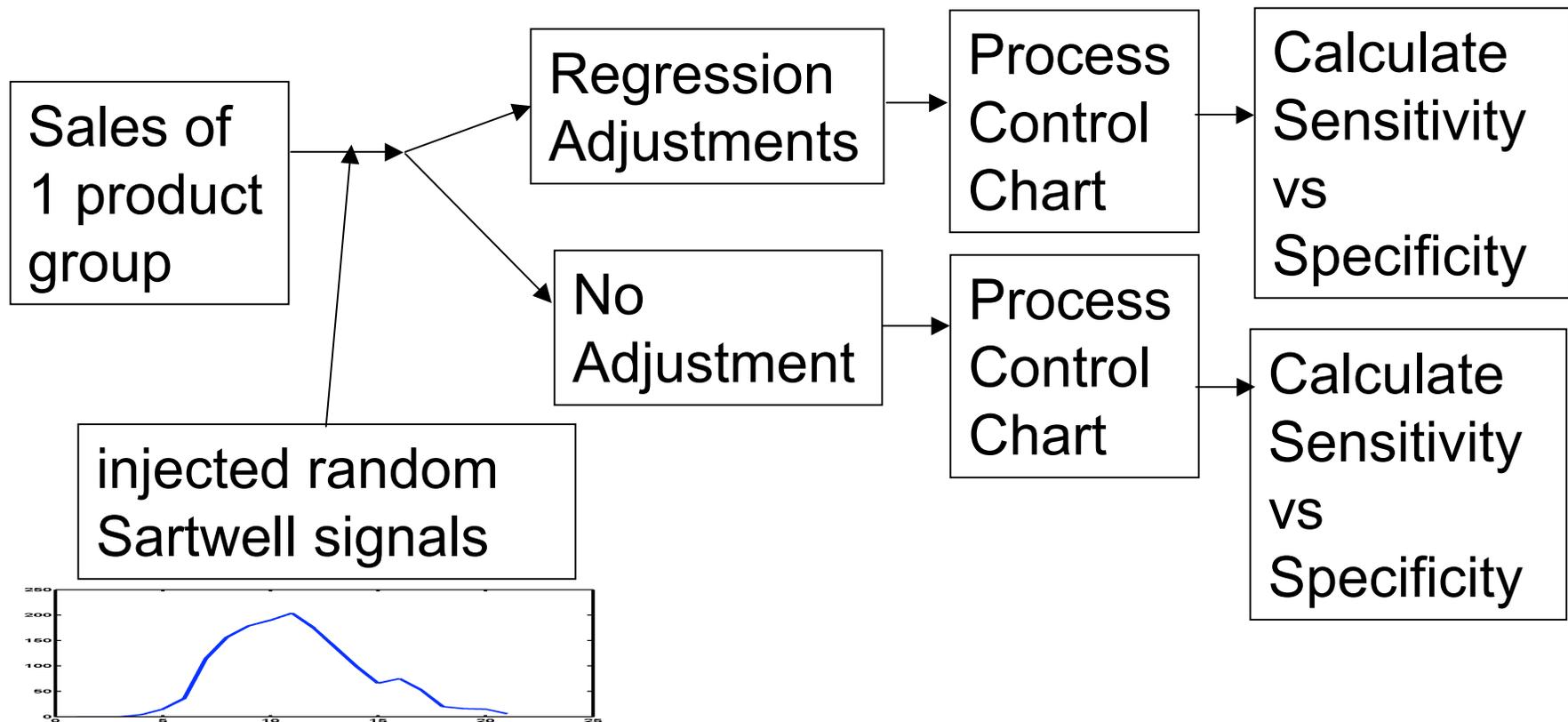
Median  
Absolute  
Value = 12.5

# Plus Outdoor Temperature Adjustment



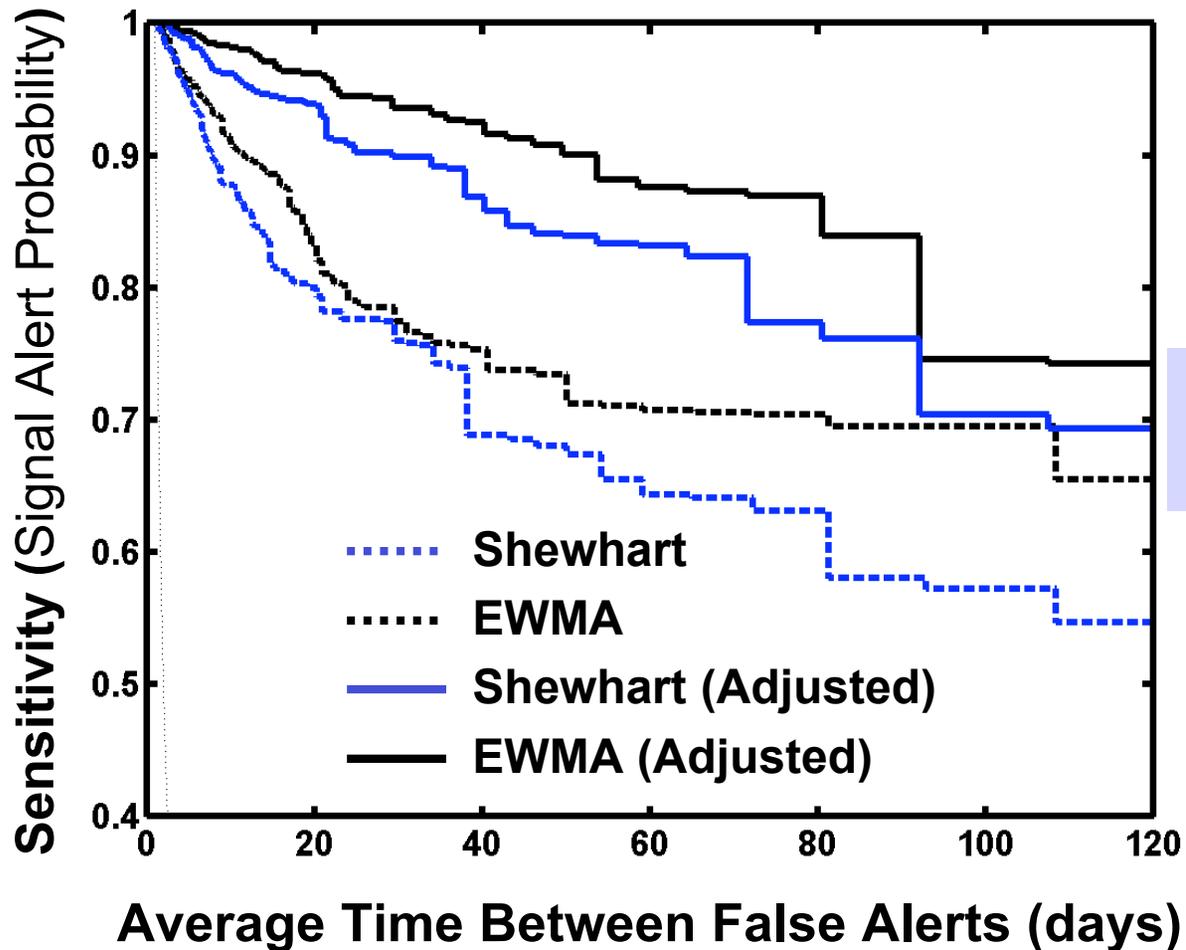
Median  
Absolute  
Value = 11.0

# Method for Evaluating Regression Adjustment Approach



# Cold/Flu Remedy Results

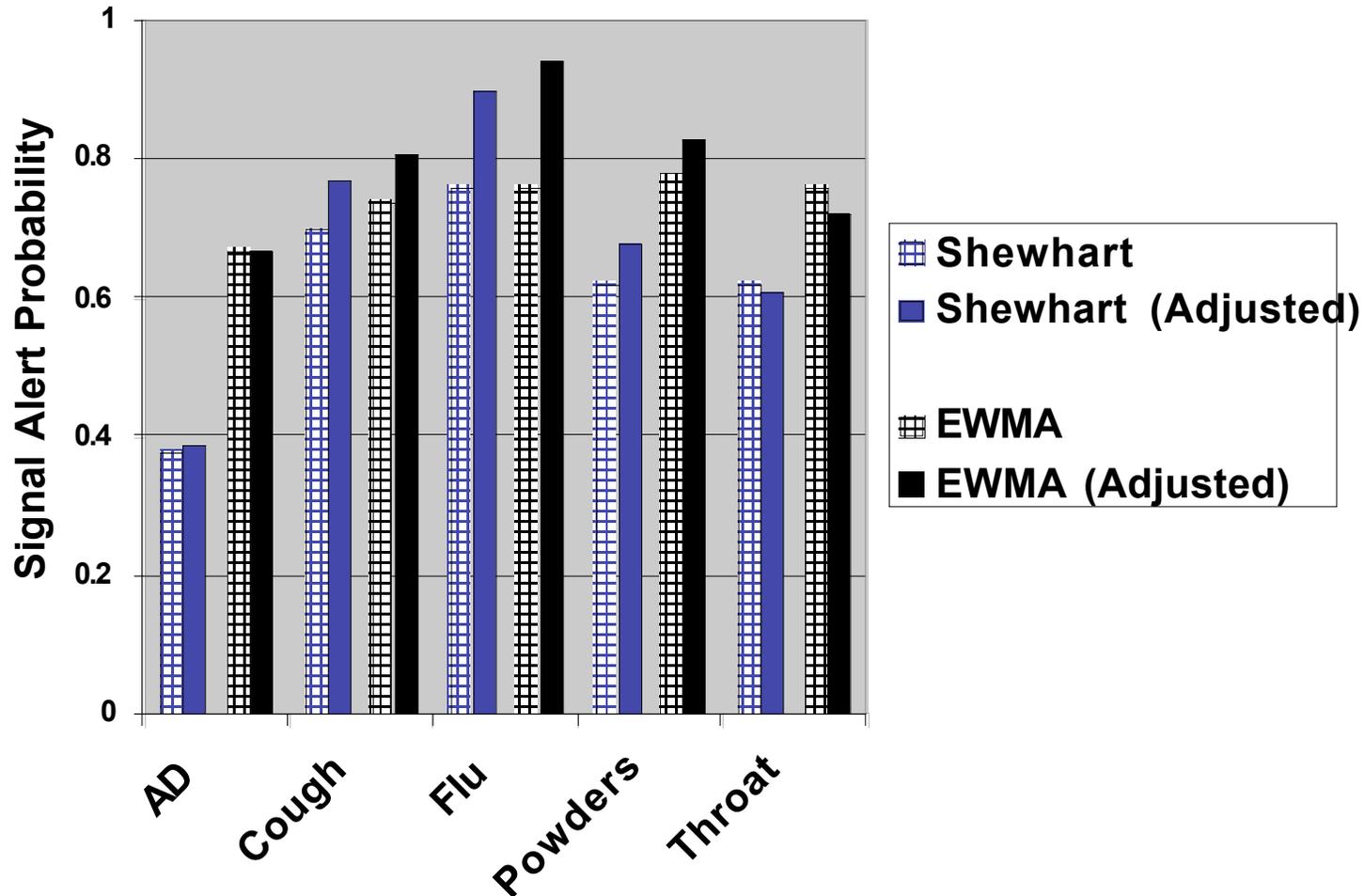
Median Signal Incubation: 11 days



653 Signal Injection Trials  
675-day Time Period

# Signal Alert Probability\*

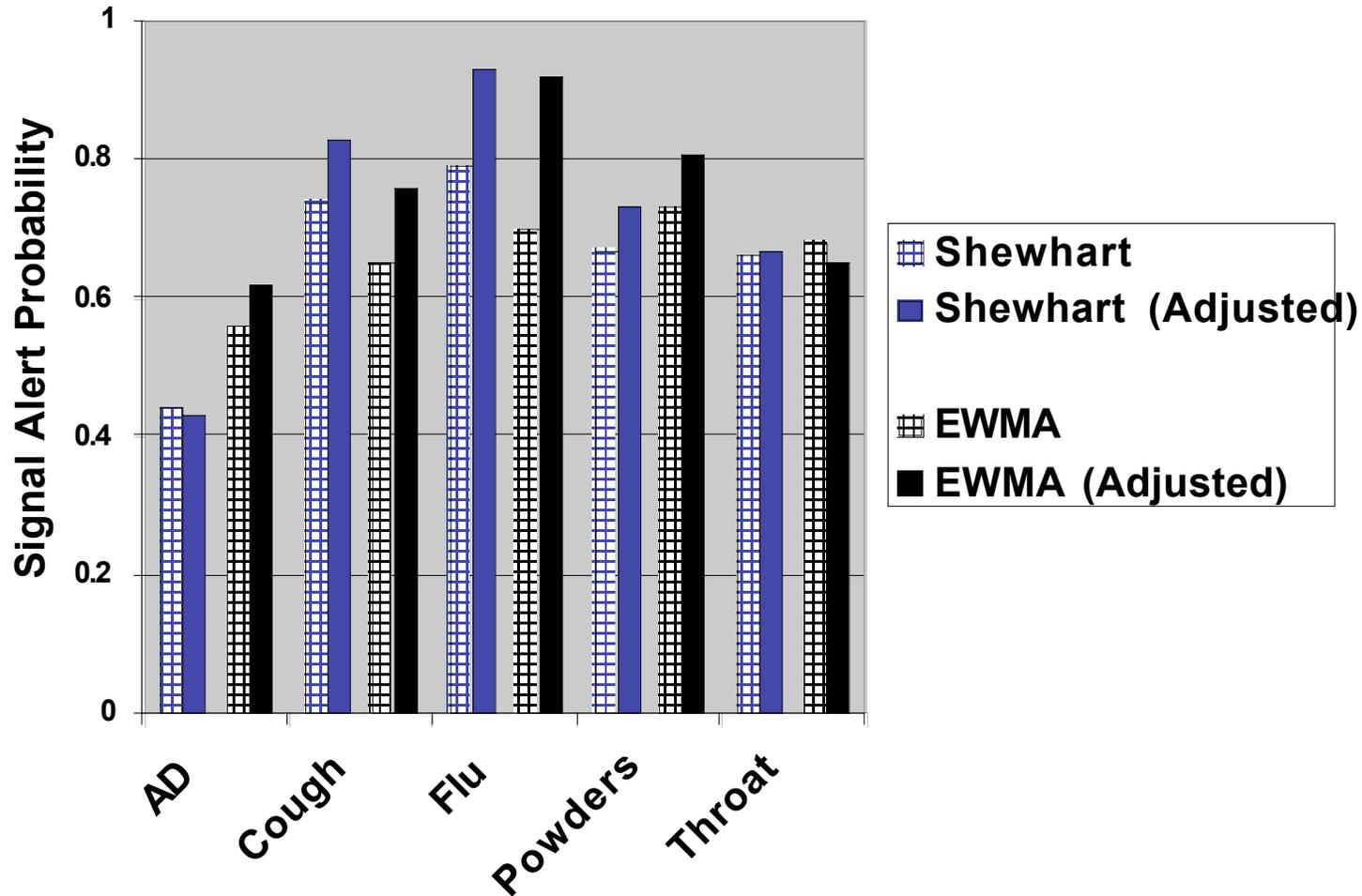
(@ 33 days between false alerts)



\*Median Signal Incubation = 11 days, Peak Signal Amplitude =  $2\sigma$

# Signal Alert Probability\*

(@ 33 days between false alerts)



\*Median Signal Incubation = 3.7 days, Peak Signal Amplitude =  $2\sigma$

# Conclusions about Data Adjustment

- Our data adjustment approach provides added value to OTC processing for several product groups
- The use of data adjustment is compatible with the use of EWMA for multi-day time aggregation

# Implications for PHIN Standards

- PHIN data adjustments should consider outdoor temperature and recent history as covariates.
- Adjusted data should be considered in standard displays.
- Time aggregation may provide some advantages, and is compatible with regression-based adjustments.