

# The Space-Time Scan Statistics and SaTScan for Syndromic Surveillance

# Space-Time Scan Statistic

## Application Areas:

- Intentional or Natural Outbreaks
- Syndromes / Symptoms or Diagnosed Disease
- Known or Unknown Disease
- Known or Unknown Etiology
- Monitoring Health Services
- Data Quality Control

# Space-Time Scan Statistic

## Syndromic Surveillance Data Sources:

- Hospital Emergency Department Visits
- Ambulance Dispatch Data
- Primary Physician Visits
- Lab Test Requests
- Work / School Absenteeism
- Pharmacy Sales
- Telephone Inquiries

# Space-Time Scan Statistic

Spatial Data Aggregation:

- Counties
- Census Tracts
- Zip Code Areas
- Individual Coordinates

Less aggregation is typically better as more information is retained.

# Space-Time Scan Statistic

Retrospective Surveillance

Our Focus: Prospective Surveillance

# Prospective Space-Time Scan Statistic

Primary Purpose:

- Early Detection of Disease Outbreaks

Secondary Purpose:

- Management and Control of Occuring Outbreaks

# Prospective Space-Time Scan Statistic

- Hourly analyses
- Daily analyses
- Weekly analyses
- Yearly analyses

# What is Wrong with Purely Temporal Surveillance Methods?

- They are great!
- Very important for public health
- Have a long track record

But: Many disease outbreaks are local in nature, or, they may start locally.

# What Area Should be Monitored?

If we pick New York City:

- What if the outbreak is only Manhattan?

If we pick Manhattan:

- What if the outbreak is in Bronx?
- What if the outbreak is the whole City?
- What if the outbreak is only on the Upper West Side?

# Purely Temporal Methods

Can be used simultaneously for multiple geographical areas, such as Manhattan, Bronx, Queens, Brooklyn and Staten Island, but that leads to multiple testing.

Disease outbreaks may not conform to pre-specified geographical areas.

# How About Testing Different Combinations of Areas?

- **Manhattan**
- **Bronx**
- **Queens**
- **Brooklyn**
- **Staten Island**
- **Manhattan + Bronx**
- **Manhattan + Queens**
- **Bronx + Queens**
- **Manhattan + Bronx + Queens**
- **Queens + Brooklyn**
- **Manhattan + Queens + Brooklyn**
- **.....**
- **....**
- **The Whole City**

# How About Testing Different Combinations of Areas?

Combination of Burroughs:

- Even more multiple testing than before!
- Outbreak may still no conform to Burrough boundaries.

# How About Testing Different Combinations of Areas?

Instead of Burroughs, could we use combination of zip-code areas?

- Yet even more multiple testing!!!

Solution: Scan Statistics

# Outline

- Purely Spatial Scan Statistic
- Prospective Space-Time Scan Statistics with Denominator Data
- Space-Time Permutation Scan Statistic, Using Only Case Data
- Adjustments for Natural Variation
- Dealing with Missing Data

# Comments and Questions

WELCOME AT ANY TIME

## SaTScan Software

AVAILABLE AT: [www.satscan.org](http://www.satscan.org)

## Slide Presentation

TO BE POSTED ONCONFERENCE WEB SITE