

NOLA - FirstWatch Event Monitoring

Mardi Gras and Super Bowl XLVII

1/1/2013

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Super Bowl XLVII - Event Monitoring

FirstWatch System Overview

FirstWatch is the only system of its kind that is specifically designed to work with disparate data sources for mining, monitoring, analyzing data in near real-time. In addition to the syndromic surveillance and bio-surveillance aspects of the FirstWatch system, it is capable of providing various levels of other analysis related to Situational Awareness, Sentinel Event Detection and Operational and Performance monitoring.

Early Event Detection – Syndromic Surveillance

FirstWatch provides near real-time surveillance and situational awareness of emerging threats by monitoring various data sources from 9-1-1 data, computer aided dispatch (CAD), ProQA advanced call triage, Nurse Triage, Electronic Patient Care Reports, Hospital ED and Poison Control center data. What's more, FirstWatch has the unique ability to aggregate disparate data from an unlimited number of agencies to provide a true regionalized or even national perspective, all in near real-time.

FirstWatch is easily customizable, automatically monitoring whatever trends or threats the user wishes to define. When detecting a possible threat or other qualifying trend, the system alerts authorized users by sending summary charts, a map showing the distribution of suspicious events, and other details, all via e-mail, simple text message, pager or fax. Users can then use this information to determine the nature and significance of the trend and, if necessary, take appropriate steps to protect the public.

Situational Awareness & Data Intelligence

FirstWatch functions as a powerful tool for Public Health and Safety agencies, Homeland Security and related organizations. Analyze data and track real-time trends automatically across multiple jurisdictions and disparate databases. Set passive notification for designated events near high-profile locations. Notify local, state and federal agencies of different patterns, all from the same data sets.

As a powerful weapon in the war on terror, FirstWatch detects hidden patterns and trends that could indicate potential terrorist activity, such as reports of suspicious packages coming in simultaneously from specific high-threat areas, or suspicious person reports at multiple high-visibility locations. FirstWatch's customizable early recognition and warning capabilities give you the edge in investigation and early mitigation.

FirstWatch Triggers

A FirstWatch Trigger is a representation of data based on a set of criteria with one or more analytical methods. A FirstWatch user can view and run ad-hoc data analysis by logging on to the FirstWatch Subscriber web-site. Some Triggers can be configured to send alerts (such as emails) when a set of alerting criteria are met.

A FirstWatch Trigger draws data from one or more Data Sources. Typically data is consumed as Events. Each Event is uniquely identified (e.g. event ID) and has an Event Date-Time stamp. Each event can be supplemented with additional event information (e.g. event location information, event comments, etc...). Trigger criteria are defined based on the event information gathered from the data.



Super Bowl XLVII - Event Monitoring

Event Details

Event Name

Super Bowl XLVII

Location

New Orleans, LA at the Mercedes-Benz Superdome

Event Date

Kickoff at 6:30pm ET on February 3, 2013.

Data Sources Monitored

New Orleans City 911 Computer-Aided Dispatch Data - FirstWatch Currently monitors a subset of 911 data. Data is being queried at a frequency of every five minutes to evaluate new calls, updated calls or newly closed calls.

Large Scale Event Triggers - Super Bowl XLVII

FirstWatch has established near real-time syndromic surveillance and situational awareness triggers for monitoring specified event types during Super Bowl XLVII to be held in New Orleans at the Mercedes-Benz Superdome. These triggers were created with input and direction from New Orleans Departments of Homeland Security, Emergency Preparedness, and Public Health.

Trigger Segments

There are a total of 29 triggers covering the four segments - (CW) Citywide evaluates within city limits, (Hotels) hotel zones evaluate calls within 150 yard radius around the defined hotel zone areas (as noted below), (HZ) hospitality zone evaluates within the defined hospitality zone area, and Convention Center evaluates calls within a geo-fence around the convention center.

FirstWatch Triggers are configured for three geographic segments:

- **Hospitality Zone** - Within specified hospitality zone areas as seen in the image below. These triggers have a (HZ) designation in the trigger identifier.



- **Citywide** - Within New Orleans City limits. These triggers have a (CW) designation in the trigger identifier.
- **Hotel Zone** - 150 yard radius around the following specified hotels. These triggers have a (Hotels) designation in the trigger identifier.
 - Hyatt (NFL HQ) - 639 Loyola Ave, New Orleans, LA 70113
 - Marriott Hotel (AFC or NFC Hotel) - 555 Canal St, New Orleans, LA 70130
 - Hilton Riverside (AFC or NFC Hotel) - 2 Poydras St, New Orleans, LA 70130
- **Convention Center Zone** - Geo-fence around the convention center

Surveillance Categories

There are seven general surveillance classifications.

1. Bio Terrorism Free Text
2. CO/Inhalation/Hazmat/CBRN
3. Death Related
4. Gastrointestinal + Free Text
5. Neurological + Free Text
6. Respiratory
7. Undefined

Note: All of these triggers are rolled up into an overall aggregate trigger for each geographic segment. Color grouping: Bio - Red, CO/CBRN - Orange, Death - Black, Gastro - Green, Neuro - Purple, Resp - Blue, Undefined - Yellow.

Situational Awareness Categories

Situational awareness triggers have also been established to monitor all activity in the areas of the hospitality zone, convention center, screening operations and NFL sponsored hotels.

1. All Police, Fire and EMS events

Trigger Configuration/Criteria

Each of the following surveillance trend triggers are configured to use a 24-hour rolling surveillance period, a 52 week baseline for historical average and 3 times standard deviation above the mean for actual events and syndrome to all statistical tests and also uses CUSUM. Three of the situational awareness triggers have a 12-hour surveillance period specified.

Filter criteria used is based on a combination of Medical Priority ProQA Determinant codes or free text keywords where specified. Trigger criteria display the actual ProQA Card descriptions rather than the


Trigger Views

Each trigger provides a variety of views for monitoring the data in near real-time and retrospectively.

- **Event Listing**

A listing of qualified events with the ability to drill-down into incident details for authorized users.

NOLA - Neurological + Free Text (HZ) Current Call Information

Calls displayed represent active or performed calls between the hours of 1/9/2013 4:53:52 PM and 1/10/2013 4:53:52 PM. 
Data and Report from the FirstWatch™ Internet Server

INFO: This trigger is evaluating Convulsions/Seizures, or the following keywords in the CAD incident comments: Seizure.

Agency	Time Sent To Queue	Pri	Problem	Call Disposition	Signal	Incident #	Address/Location	Free Text
EM	1/10/2013 1:59:31 PM	3	CONVULSIONS/SEIZURES	TRANSPORT - NO3 (TOURO)	1202E	MEM130110001990	1001 CAMP ST	Seizure
EM	1/10/2013 3:15:33 PM	2	CONVULSIONS/SEIZURES	TRANSPORT - NO3 (TOURO)	12A1	MEM130110002008	1001 CAMP ST	Seizure

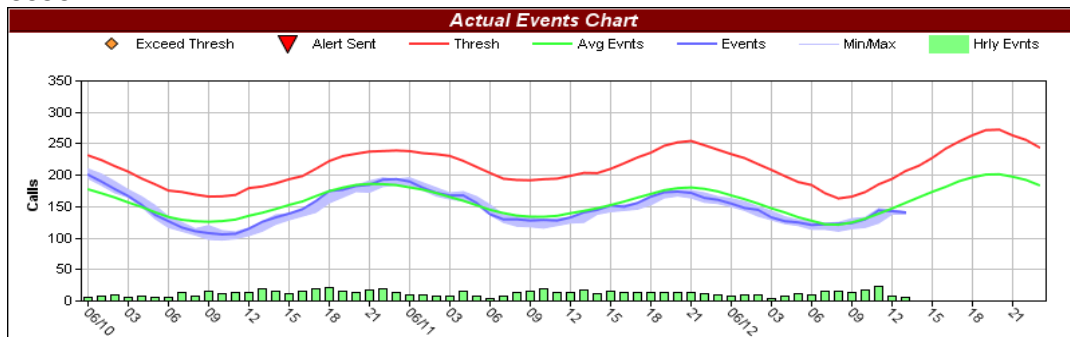
Records Per Page: 50

Total Responses: 2

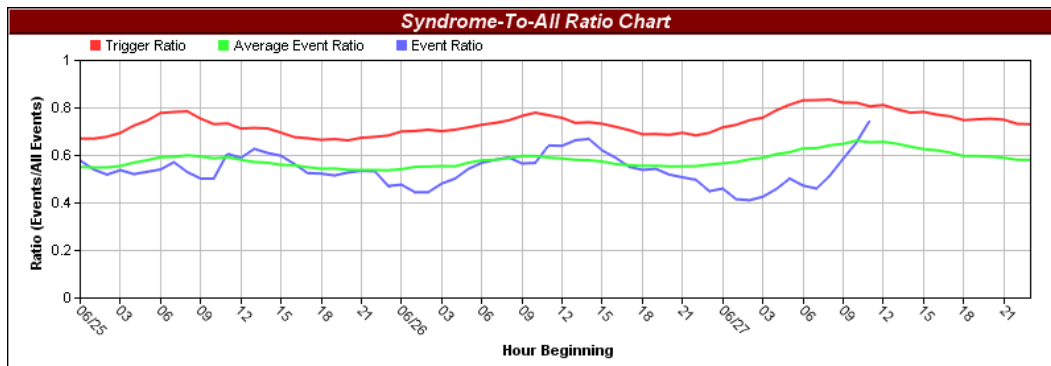
- **Graphs**

Super Bowl XLVII - Event Monitoring

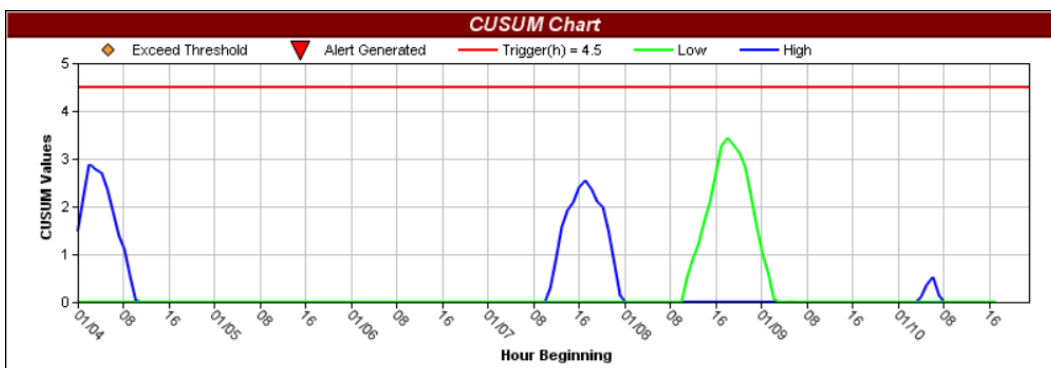
Provides charts/graphs based on the statistical tests - actual events, syndrome-to-all and CUSUM.



The Actual Events chart analyzes the number of events over a period of time and includes a historical average line, actual events line, trigger threshold line (can include high or low) and a rolling count of events that updates every few minutes. Actual Events chart also monitors for variances in values as events are changed or modified. Measures by day of week and hour of day.



The Syndrome-To-All graph presents a ratio of qualified events within the data set compared to all events in the system during the Analysis Period. This approach assists in qualifying volumetric increases as being system-wide or specific to a trigger's data set. Measures by day of week and hour of day.



CUSUM is a time-series analysis method utilizing a moving average for the detection of temporal clusters looking at day-to-day variability and is designed to detect sudden changes in the mean value of a quantity of interest. Cumulative sum methods cumulate the deviations between observed and expected counts in a period, resulting in an alert when the cumulated observed counts have exceeded the expected counts by a predetermined threshold. The FirstWatch application of CUSUM methodology was implemented using input from state level epidemiologists and CDC resources.

- **Map and Google Earth Feed**

FirstWatch provides an integrated mapping system for reviewing the distribution of qualified events. FirstWatch has also created Google Earth overlays for the corresponding Hotel and Hospitality Zones.



- **Analysis Tool**

FirstWatch Analysis Tool provides the ability to review data for the aforementioned near real-time views retrospectively. It also provides the ability to retrieve alerts and perform a time series by day analysis over a larger baseline.

Trigger Definitions

Surveillance Triggers

NOLA - Bio Terrorism Free Text (CW), (HZ) & (Hotels)

This trigger is evaluating the following keywords in the CAD incident comments: anthrax, spores, inhalation, contaminated, contamination, white substance, white powder, oily substance, unknown substance, unknown agent, Botulism, Ricin, Brucellosis, Plague, Smallpox, E. Coli, Salmonella, Tularemia, cyanide, infectious, cluster, exposure, outbreak, biological, chemical, nerve agent, burns, blisters, airborne, radiological, nuclear, explosion, rash, hives.

NOLA - CO/Inhalation/Hazmat/CBRN (CW), (HZ) & (Hotels)

This trigger is evaluating Carbon Monoxide/Inhalation/Hazmat/CBRN events.

NOLA - Death Related (CW), (HZ) & (Hotels)

This trigger is evaluating Cardiac or Respiratory Arrest/Death events.

NOLA - Gastrointestinal + Free Text (CW), (HZ) & (Hotels)

This trigger is evaluating Abdominal Pain/Problems, or the following keywords in the CAD incident comments: food poisoning, vomit, Diarrhea, Staphylococcal enterotoxin.

NOLA - Neurological + Free Text (CW), (HZ) & (Hotels)

This trigger is evaluating Convulsions/Seizures, or the following keywords in the CAD incident comments: Seizure.

NOLA - Respiratory (CW), (HZ) & (Hotels)

This trigger is evaluating Breathing Problems.

NOLA - Undefined (CW), (HZ) & (Hotels)

This trigger is evaluating Headache, Sick Person, Unconscious/Fainting (Near), and Unknown Problem (Man Down).



Super Bowl XLVII - Event Monitoring

Situational Awareness Triggers

NOLA - Convention Center (12 hour surveillance period)

This trigger monitors all events (Police, Fire, and EMS) within the convention geo-fence.

NOLA - NFL Sponsored Hotels (All Calls) (24 hour surveillance period)

This trigger monitors all events at or within 150 yard radius of each of the three hotels.

NOLA - Hospitality Zone (Geo-Fence) (12 hour surveillance period)

This trigger monitors all events (Police, Fire, and EMS) within the hospitality zone geo-fence.

NOLA - Hospitality Zone Bio Surveillance (12 hour surveillance period)

Incidents with 'Rash' or 'Hives' in the comments, ProQA cards 1, 6, 8, 9, 12, 18, 26, 31, and 32.

NOLA - Super Dome Screening Operations (12 hour surveillance period)

This trigger monitors all calls that occur in and within a 350 yard radius of the screening operations zone - Claiborne Avenue (I-10) at Lafitte Street.

Trigger Alerting Conditions

The current alerting criteria are set to generate an alert if all three of the statistical tests exceed their defined thresholds simultaneously. This is a configurable parameter and can be adjusted in short order. Alerts can be sent via simple text message or in a detailed manner to email or fax. Alerting can also be in a de-identified format.

FirstWatch Workspace and Dashboards

FirstWatch has created an account (Super Bowl 47) and configured a workspace to include specific tabs to monitor each of the segments - Citywide, Hospitality Zone and Hotels for monitoring this event. Additionally, monitoring all Law, EMS and Fire related events.

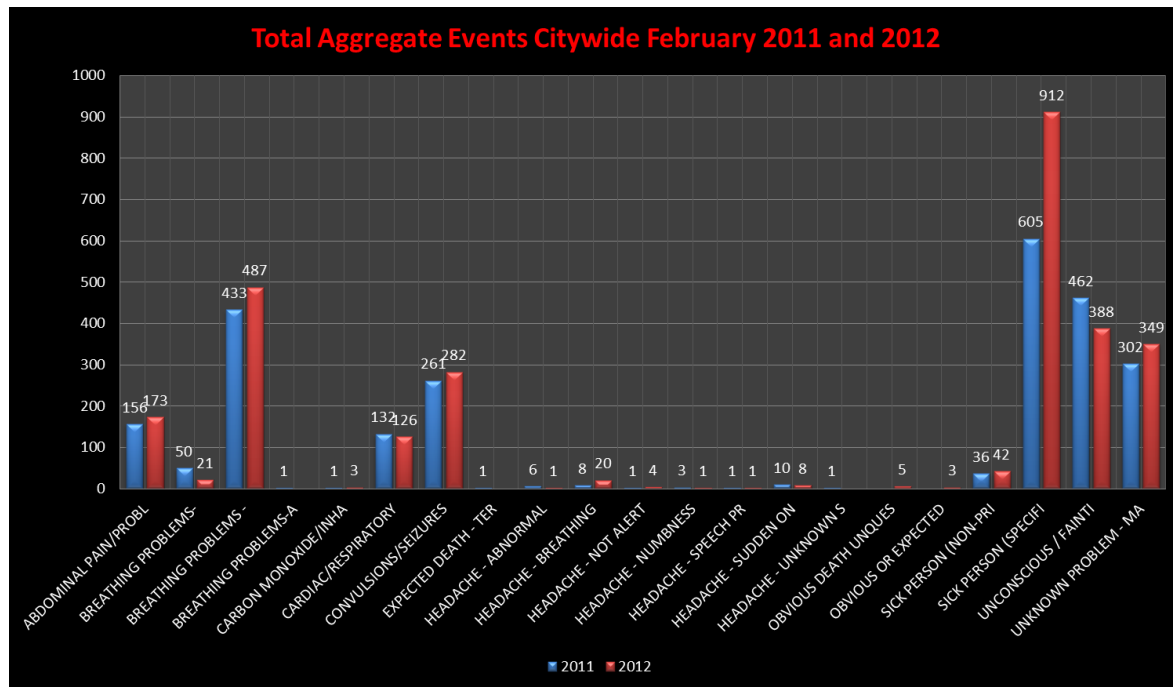
We've also created an account (SB Ops Centers) for monitoring the four situational awareness triggers

Baseline Surveillance Aggregate Data 2011 and 2012

The following baseline numbers using the same criteria for each of the aggregate triggers for the same segments in February 2012.

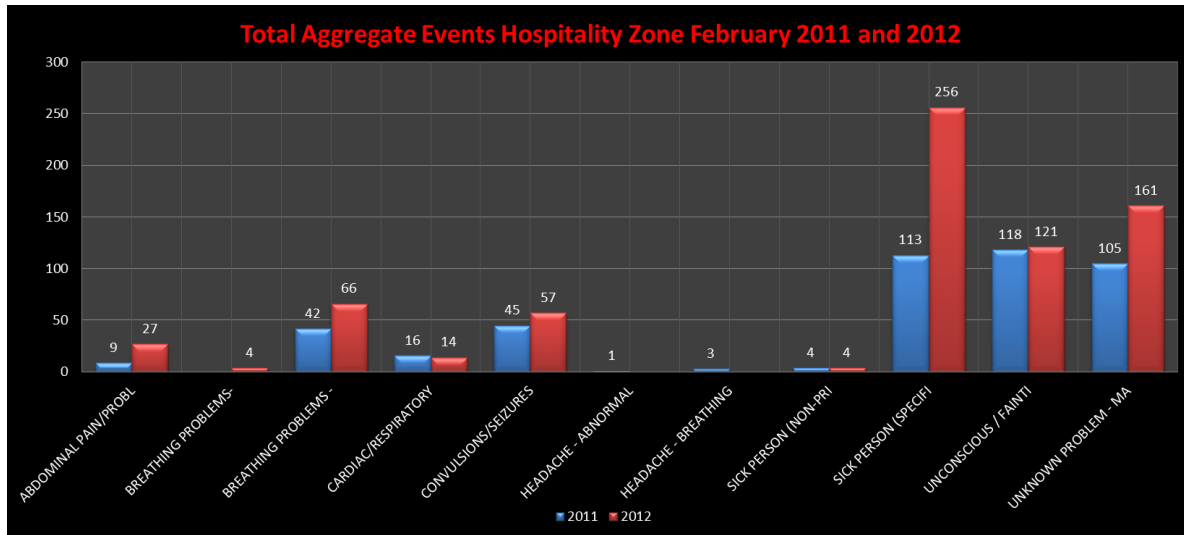
Citywide Baseline Counts February 2011 and 2012

Count of Incident # Problem	Year		Grand Total
	2011	2012	
ABDOMINAL PAIN/PROBL	156	173	329
BREATHING PROBLEMS-	50	21	71
BREATHING PROBLEMS -	433	487	920
BREATHING PROBLEMS-A	1		1
CARBON MONOXIDE/INHA	1	3	4
CARDIAC/RESPIRATORY	132	126	258
CONVULSIONS/SEIZURES	261	282	543
EXPECTED DEATH - TER	1		1
HEADACHE - ABNORMAL	6	1	7
HEADACHE - BREATHING	8	20	28
HEADACHE - NOT ALERT	1	4	5
HEADACHE - NUMBNESS	3	1	4
HEADACHE - SPEECH PR	1	1	2
HEADACHE - SUDDEN ON	10	8	18
HEADACHE - UNKNOWN S	1		1
OBVIOUS DEATH UNQUES		5	5
OBVIOUS OR EXPECTED		3	3
SICK PERSON (NON-PRI	36	42	78
SICK PERSON (SPECIFI	605	912	1517
UNCONSCIOUS / FAINTI	462	388	850
UNKNOWN PROBLEM - MA	302	349	651
Grand Total	2470	2826	5296



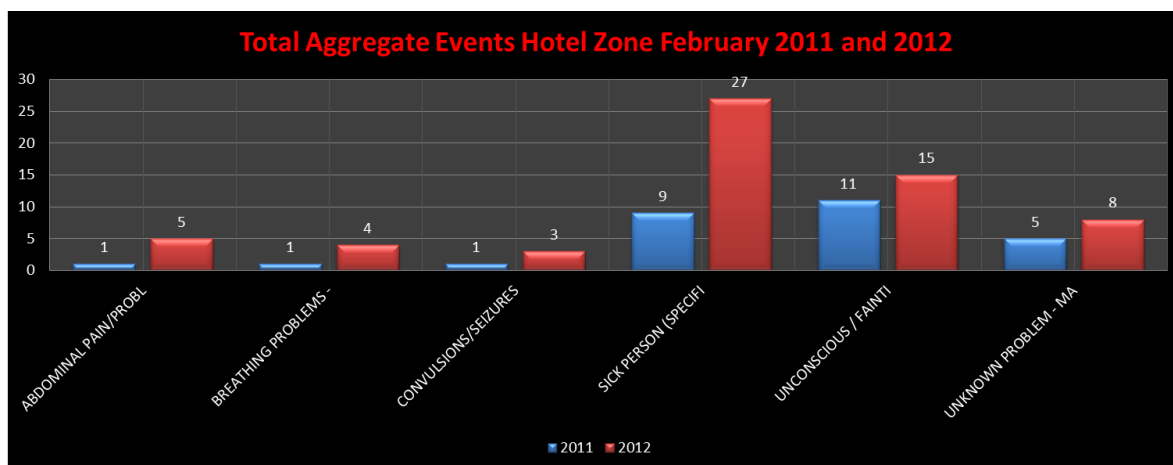
Hospitality Zone Baseline Counts February 2011 and 2012

Count of Incident # Problem	Year		Grand Total
	2011	2012	
ABDOMINAL PAIN/PROBL	9	27	36
BREATHING PROBLEMS-		4	4
BREATHING PROBLEMS -	42	66	108
CARDIAC/RESPIRATORY	16	14	30
CONVULSIONS/SEIZURES	45	57	102
HEADACHE - ABNORMAL	1		1
HEADACHE - BREATHING	3		3
SICK PERSON (NON-PRI	4	4	8
SICK PERSON (SPECIFI	113	256	369
UNCONSCIOUS / FAINTI	118	121	239
UNKNOWN PROBLEM - MA	105	161	266
Grand Total	456	710	1166



Hotel Zone Baseline Counts February 2011 and 2012

Count of Incident # Problem	Year		Grand Total
	2011	2012	
ABDOMINAL PAIN/PROBL	1	5	6
BREATHING PROBLEMS -	1	4	5
CONVULSIONS/SEIZURES	1	3	4
SICK PERSON (SPECIFI	9	27	36
UNCONSCIOUS / FAINTI	11	15	26
UNKNOWN PROBLEM - MA	5	8	13
Grand Total	28	62	90



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