

Polar Vortex: ED Surveillance for Cold-Related Injuries

Marcus Rennick, MPH

Epidemiologist



**MARION COUNTY
PUBLIC
HEALTH
DEPARTMENT**

Prevent. Promote. Protect.

ED Surveillance for Cold-Related Injuries

❑ Weather

❑ Data

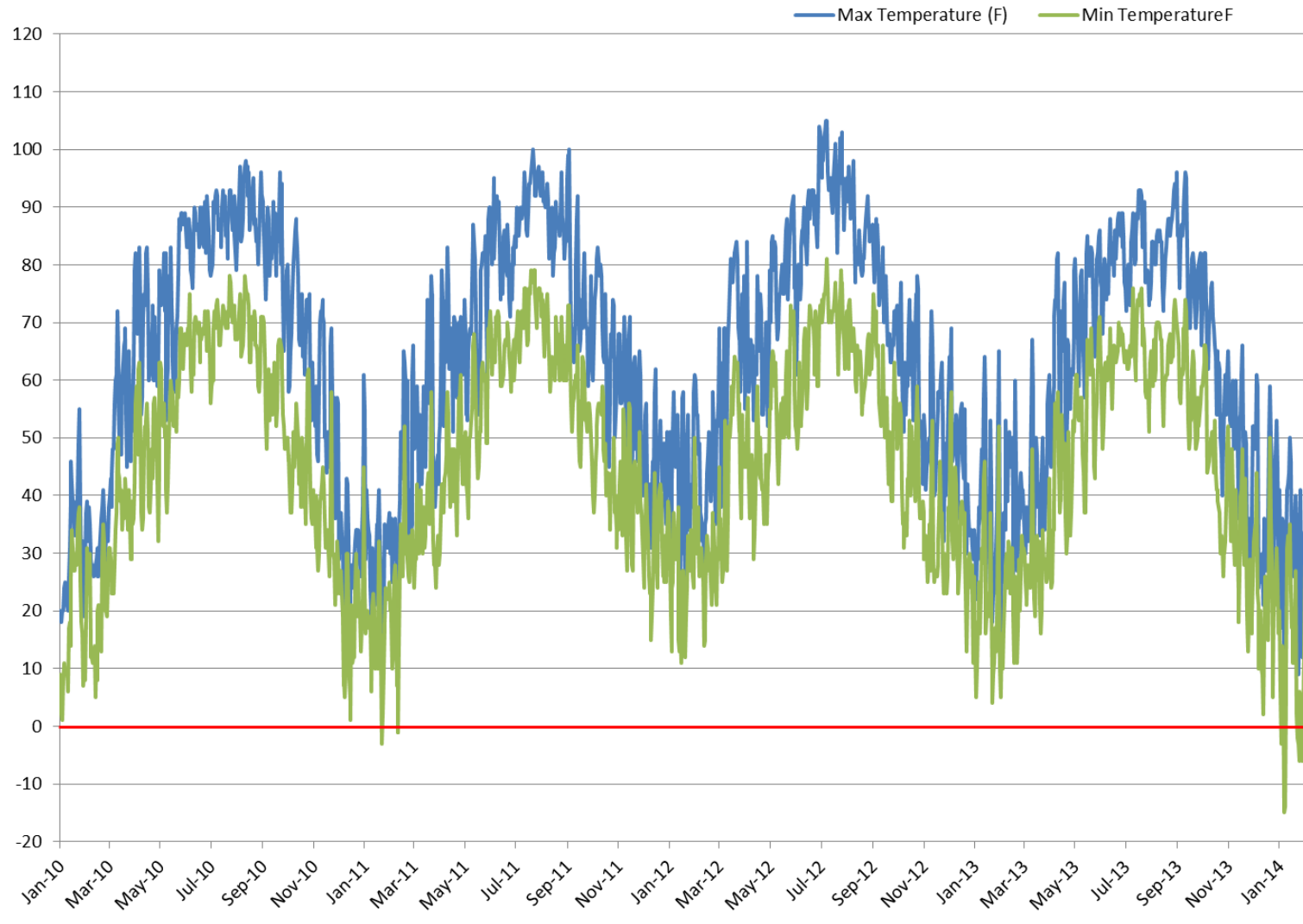
- Perfect data
- Local analytics
- BioSense analytics

❑ Uses

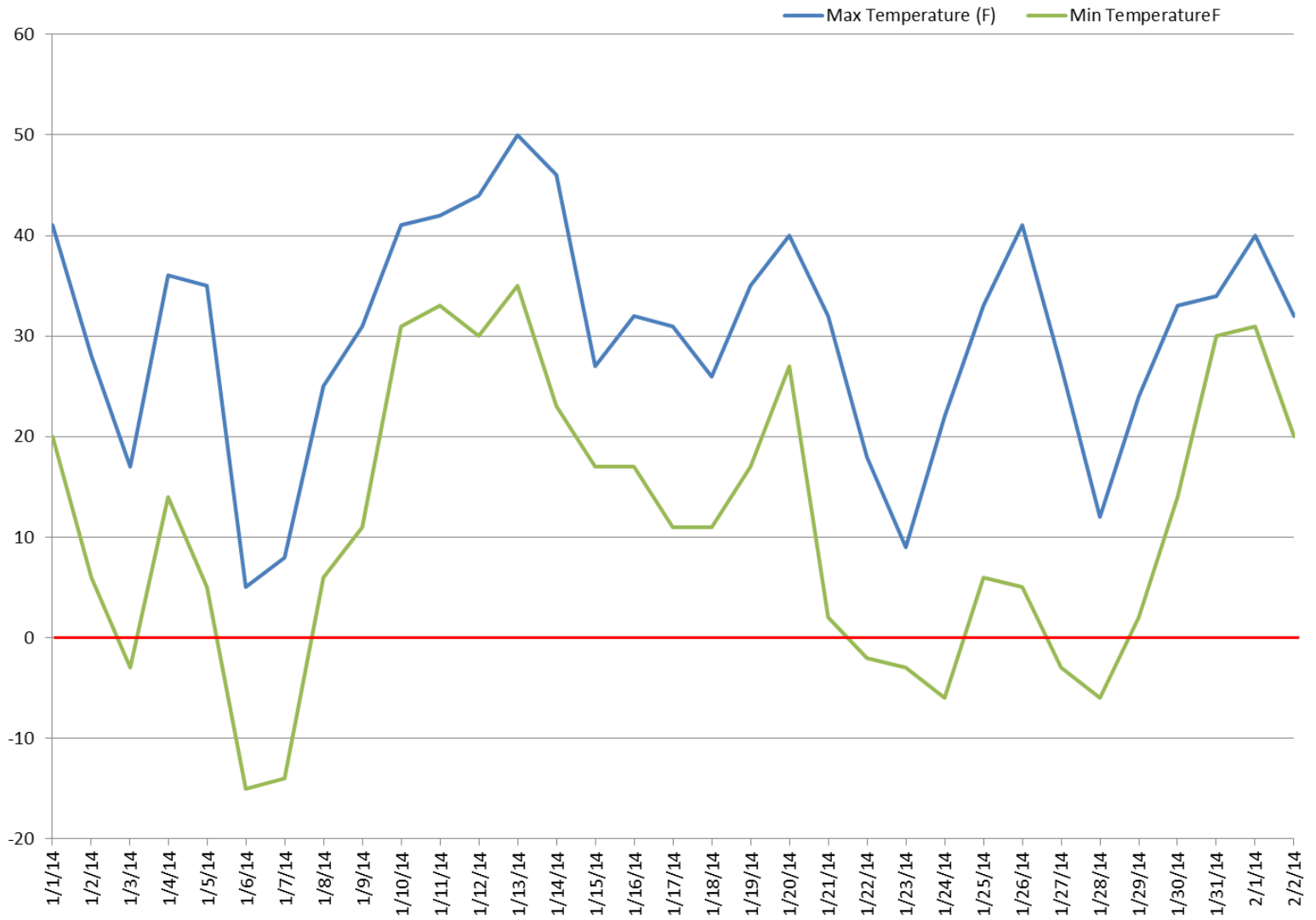
Weather

- ❑ It was (and still is) cold.

Indianapolis Daily Temperature (F), Jan 1, 2010-Feb 2, 2014



Indianapolis Daily Temperature (F), Jan 1, 2014-Feb 2, 2014



January Monthly Temperature Averages

	2010-2013	2014
Average Max Temp (F)	35.4	29.8
Average Min Temp (F)	20.6	10.4

PUBLIC AFFAIRS / JANUARY 7, 2014

Deaths Are Bitter Reminder Of Cold Snap'

NPR   

Indianapolis mayor outlaws driving ahead of brutally cold night

   Tweet 6  Recommend 1.3k  +1  MORE


Associated Press
 Posted on January 5, 2014 at 10:24 PM

INDIANA NEWS HEADLINES

Cold Weather Doesn't Stop Prostitution

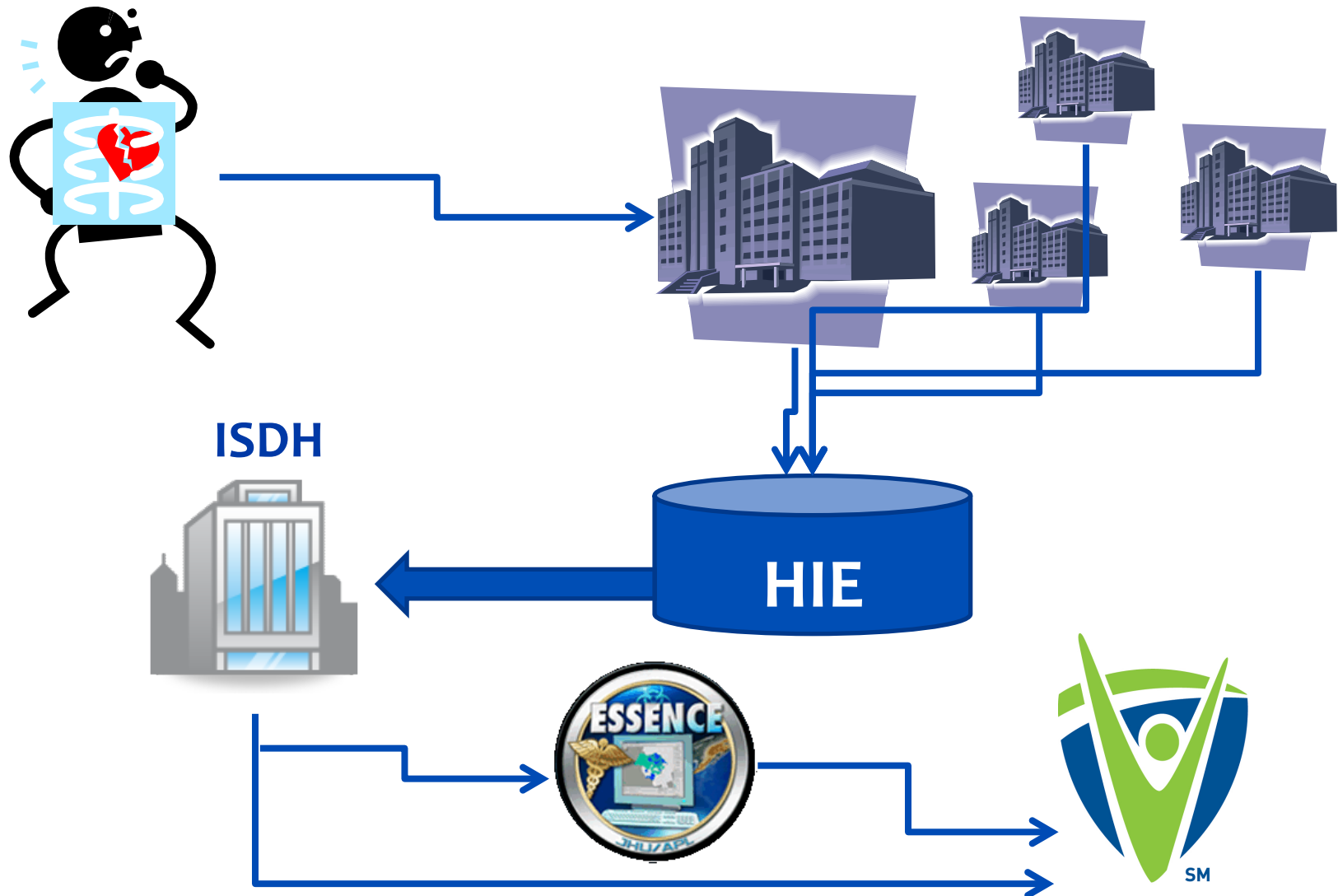
30 arrests in Indy over four days

By Ray Steele - rsteele@wibc.com | [@WIBCRaySteele](https://twitter.com/WIBCRaySteele)

 1/27/2014

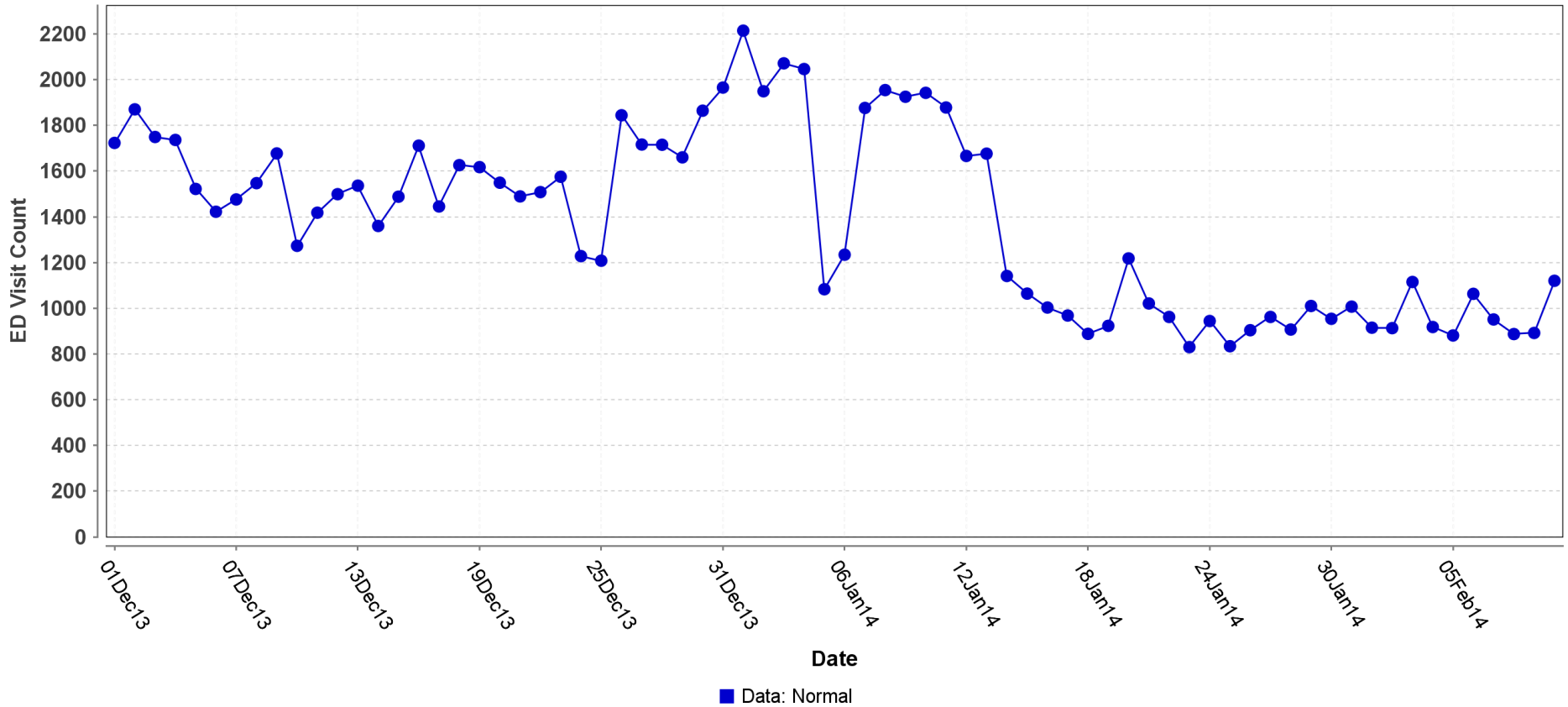


Marion County Public Health Emergency Syndromic Surveillance System



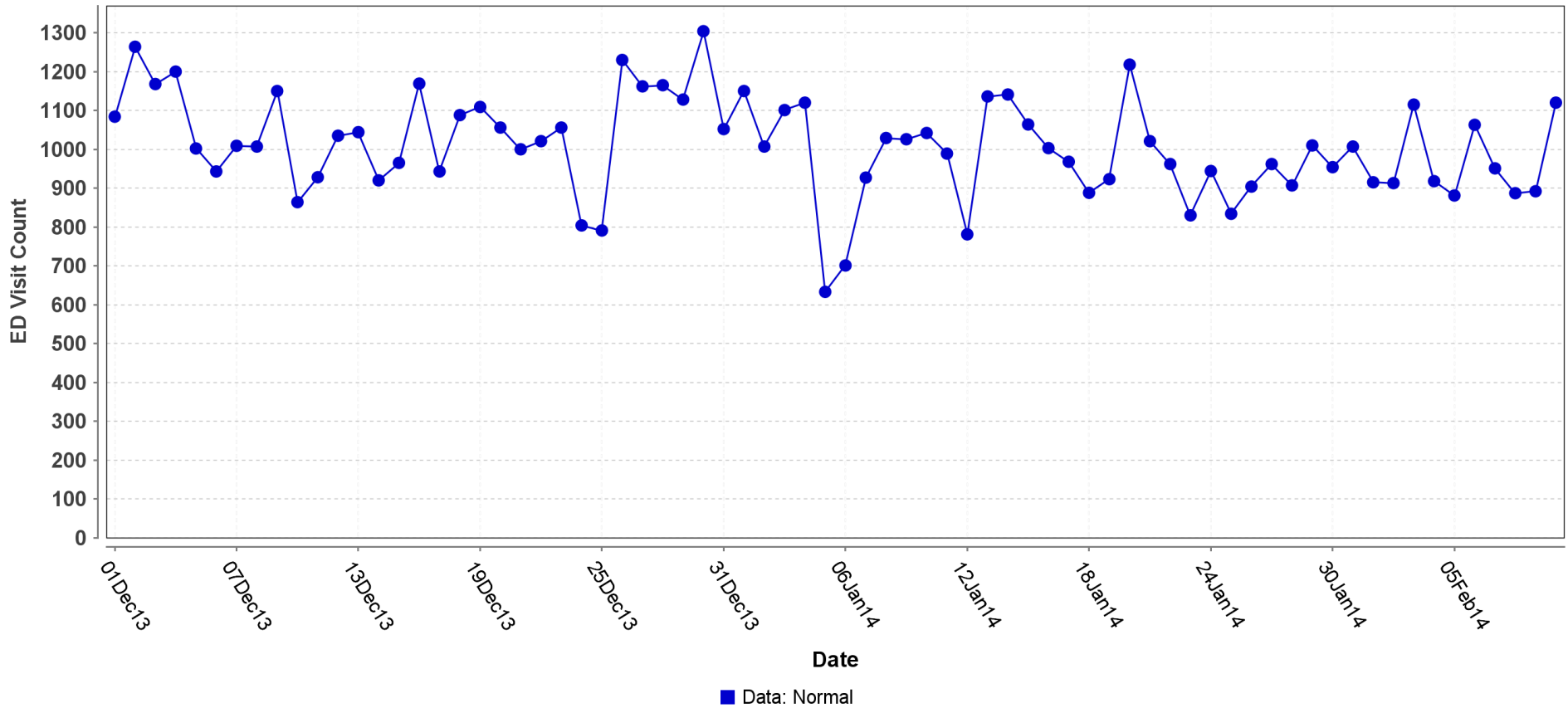
January 1st...

Daily ED Visits, All Marion County Hospitals



January 1st...

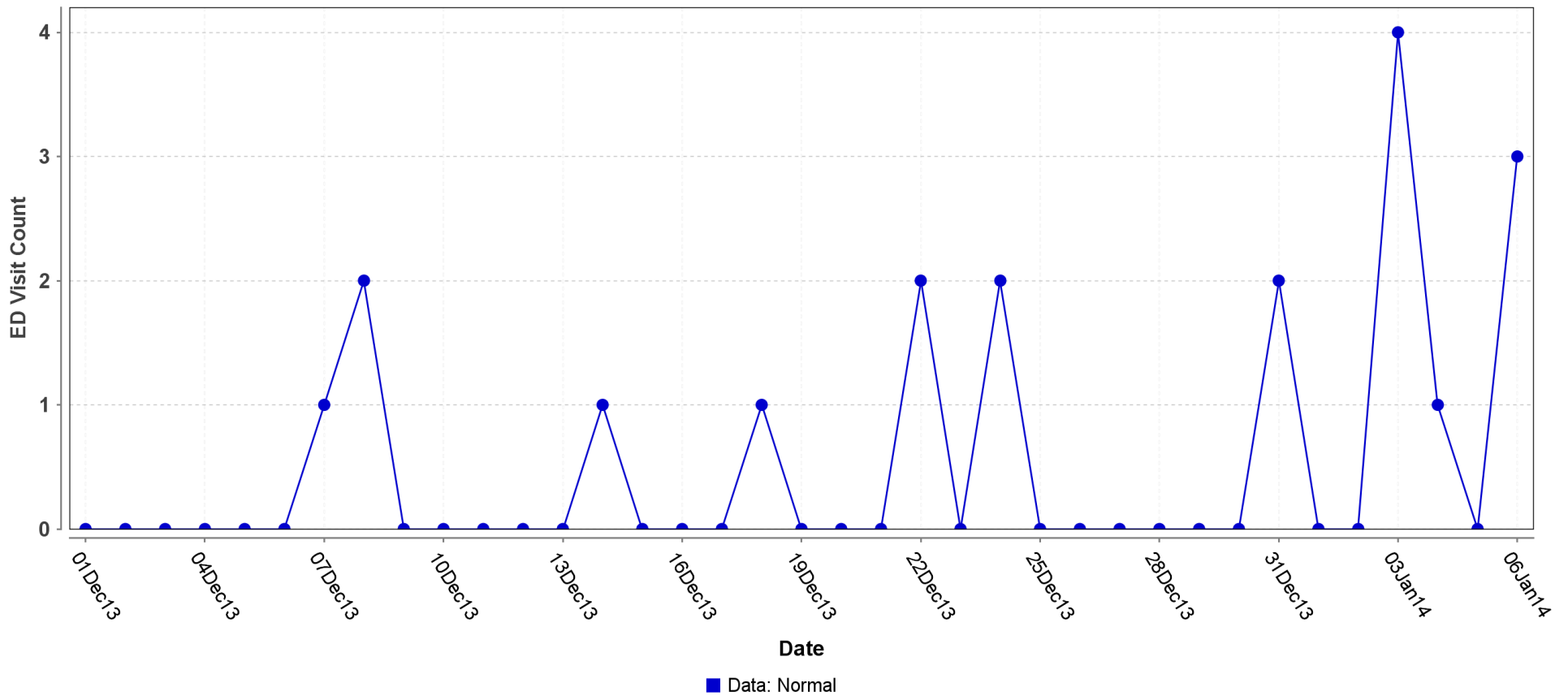
Daily ED Visits, Reporting Marion County Hospitals



Cold Exposure Syndrome

□ ^hypothermia^,or^frostbite^,or^cold exposure^

Daily Cold-related ED Visits, Reporting Marion County Hospitals (Original Syndrome)



Redefine Syndrome

The ISDS Community Forum

Main
Groups
Forum
Events
My Page
About
Invite

Cold-Related Exposure

Posted by [Bill Storm](#) on January 6, 2014 at 3:08pm in [Region 5 Collaboration](#)

[← Back to Region 5 Collaboration Discussions](#)

Ohio has received a number of data requests for cold-related exposures. I assume the rest of you have probably had similar requests. If so, I thought we could share ideas.

Ohio has observed a total of 68 cold-related exposures since 12/24/13, including 31 since Friday.

I'm using the following SAS code (I include hyperthermia as well because it is often misused with hypothermia--same as with heat-related illness classifier):

```

data work.Seasonal;
set HMS.EnhancedEpiCenter2013;
where date>(Today()-30);
if ( ((index(Reason1,"FROST") > 0) AND (^((index(Reason1,"FROSTING") > 0 or index(Reason1,"NAFROST") > 0)) OR
index(Reason1,"FROZEN") > 0 OR index(Reason1,"FROSBIT") > 0 OR
((index(Reason1,"FREEZE") > 0) AND (^((indexw(Reason1,"ANTIFREEZE") > 0 OR indexw(Reason1,"ANTI FREEZE")
> 0 OR
index(Reason1,"FREEZER") > 0 )) )OR
index(Reason1,"HYPOTHERM") > 0 OR
index(Reason1,"EXPOSURE TO COLD") > 0 OR
index(Reason1,"COLD EXPOSURE") > 0 OR
index(Reason1,"COLD WEATH") > 0 OR
index(Reason1,"HYPERTHERM") > 0
) THEN DO;
SearchFlag=1;
output work.Seasonal;
end;
run;
                    
```

Tags: [cold-related](#), [exposure](#), [frostbite](#), [hypothermia](#)

Views: 18

+ Add

Marc

Sign Out

✉ Inb

👤 Frie

⚙️ Set

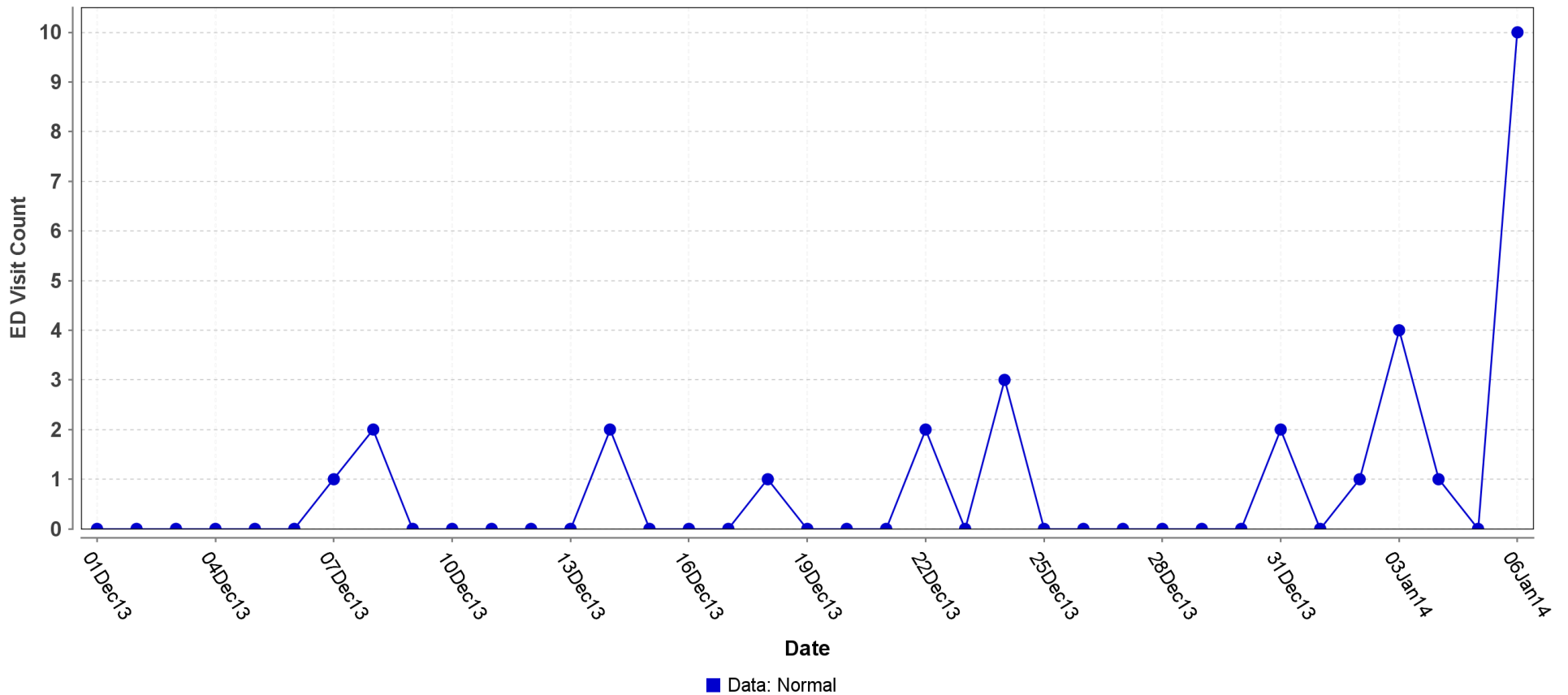
New

1 Group

Improved Cold Exposure Syndrome

- ^hypotherm^,or,^frost^,or,^cold expos^,or,^exposure to cold^

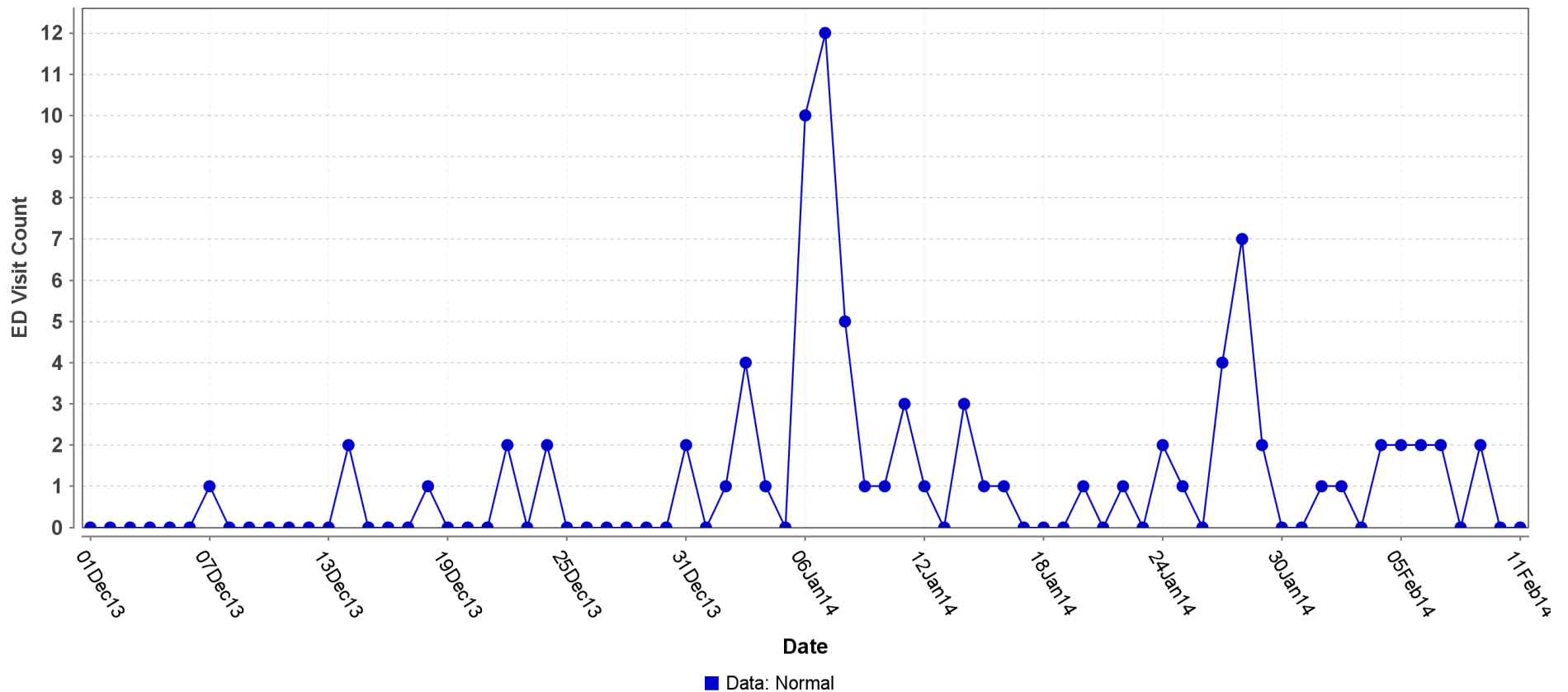
Daily ED Cold-Related Visits, reporting Marion County Hospitals (Improved Syndrome)



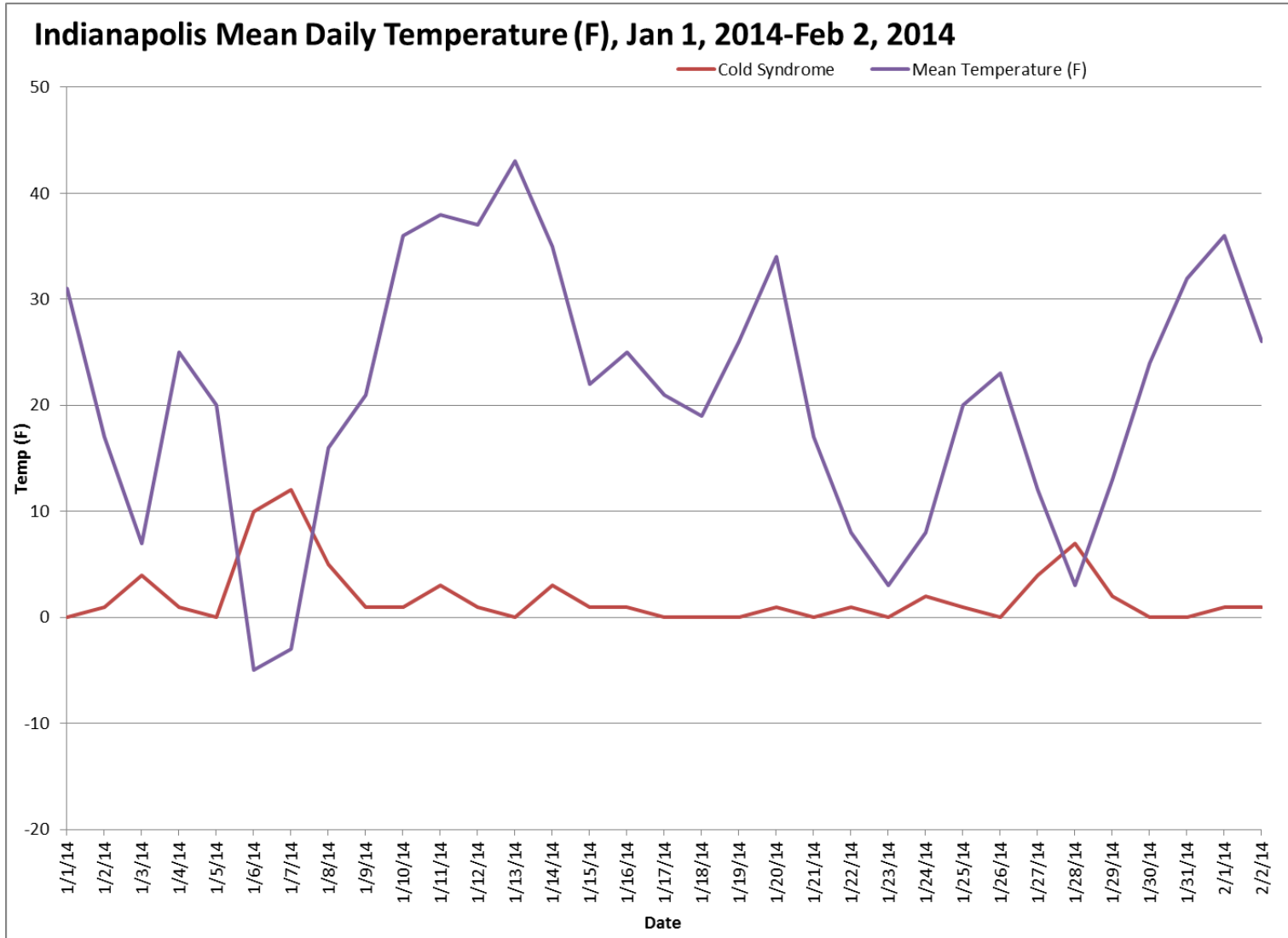
Improved Cold Exposure Syndrome

- ^hypotherm^,or,^frost^,or,^cold expos^,or,^exposure to cold^

Daily Cold-related ED Visits, Reporting Marion County Hospitals



Weather and Cold Syndrome



Cold Syndrome Using BioSense 2.0

- ❑ No predefined syndrome for cold-related injuries

The screenshot shows the BioSense 2.0 search interface. The header is green with the BioSense 2.0 logo and the text 'BETA' and 'Welcome, Marcus'. The main content area is blue. There are three search filters: 'what', 'where', and 'when'. The 'what' filter has 'Cold' entered and a dropdown menu showing 'No Results Found'. The 'where' filter is empty. The 'when' filter has '12/1/2013 - 2/12/2014' entered. There are buttons for 'GO', 'Clear Search', and 'Advanced Options'.

BioSense 2.0 BETA

Welcome, Marcus

what where when

Cold

No Results Found

12/1/2013 - 2/12/2014

GO

Clear Search Advanced Options

IN

Cold Syndrome Using BioSense 2.0

- ❑ Could extract data from phpMyAdmin and run in SAS (or other program)

- **SELECT** *
FROM `INDOH`
WHERE `Earliest_Date_Time`
BETWEEN '2013-12-01 00:00:00'
AND '2014-02-12 00:00:00'
GROUP BY 1

Cold Syndrome Using BioSense 2.0

- Or go through R Studio interface

```

# Create database connection
conA <- dbConnect(dbDriver("MySQL"), user=USERNAME, password=PASSWORD, dbname="LockerDB", host="data3.biosen.se")
#####

# Columns needed in query
columns <- c("Row_Number", "Facility_Name",
            "Chief_Complaint",
            "Age", "Gender", "Visit_Date_Time")

# Set Dates
StartDate<-"2013-12-01"
EndDate<-"2014-02-12"

# Pull data set for date range by making query
queryStringA <- paste("SELECT * from INDOH WHERE Earliest_Date_Time BETWEEN '", StartDate, " 00:00:00' and '", EndDate, " 23:59:59'
AND Facility_Name IN ('", MChospitals,") order by Earliest_Date_Time", sep = "'")

# Create Dataset dfA
dfA <- dbGetQuery(conA, queryStringA) ##Data Frame containing matching records

# DE duplicate Records in Raw Database
# Strip dates
as.Date(dfA$Earliest_Date_Time)
dfA$Earliest_Date_Time <- t(as.data.frame(strsplit(dfA$Earliest_Date_Time, ' ')))[,1]
dfA$Earliest_Date_Time <- as.Date(dfA$Earliest_Date_Time)

# Convert dates to numeric for sorting and deduplication
dfA$Message_Date_Time_Sort <- as.numeric(strptime(dfA$Message_Date_Time, format='%Y-%m-%d %H:%M:%S'))
# Sort by descending date value to keep most recent record after deduplication
dfA<-dfA[order(dfA$Unique_Patient_ID,-dfA$Message_Date_Time_Sort),]

# DE duplicate
dfA <- dfA[!duplicated(dfA$Unique_Patient_ID), ]

```

```
# Cold-related Injury
# Time: StartDate(Dec 1 2013)-EndDate(Feb 12 2014)
###
## Define Chief Complaint syndrome
Syndrome<- paste("HYPOTHERM|FROST|COLD EXPOS|EXPOSURE TO COLD")

#Subset pulled deduplicated data for specific syndrome
dfCold<-subset(dfA, grepl(Syndrome, dfA$Chief_Complaint), columns)

# Format dates
dfCold$Visit_Date <- as.Date(dfCold$Visit_Date_Time)

# Add agecat
attach(dfCold)
dfCold$agecat[Age >= 65] <- "65+"
dfCold$agecat[Age > 4 & Age <= 64] <- "45-64"
dfCold$agecat[Age > 17 & Age <= 44] <- "18-44"
dfCold$agecat[Age > 4 & Age <= 17] <- "5-17"
dfCold$agecat[Age <5] <- "<5"
detach(dfCold)

# Create summary dataset
events.per.day <- ddply(dfCold, .(Visit_Date), summarize, Number_of_Visits=length(Visit_Date))

# Add continuous Date seq
dates<- data.frame(Visit_Date= as.Date(seq.Date(as.Date(StartDate), as.Date(EndDate), by="1 day"))))

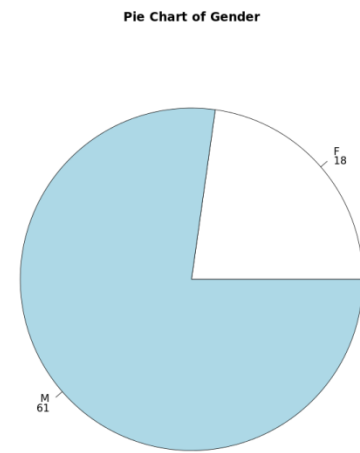
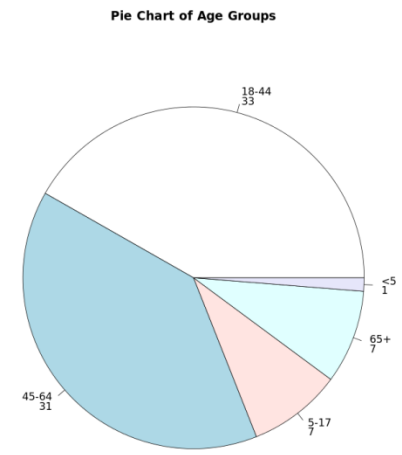
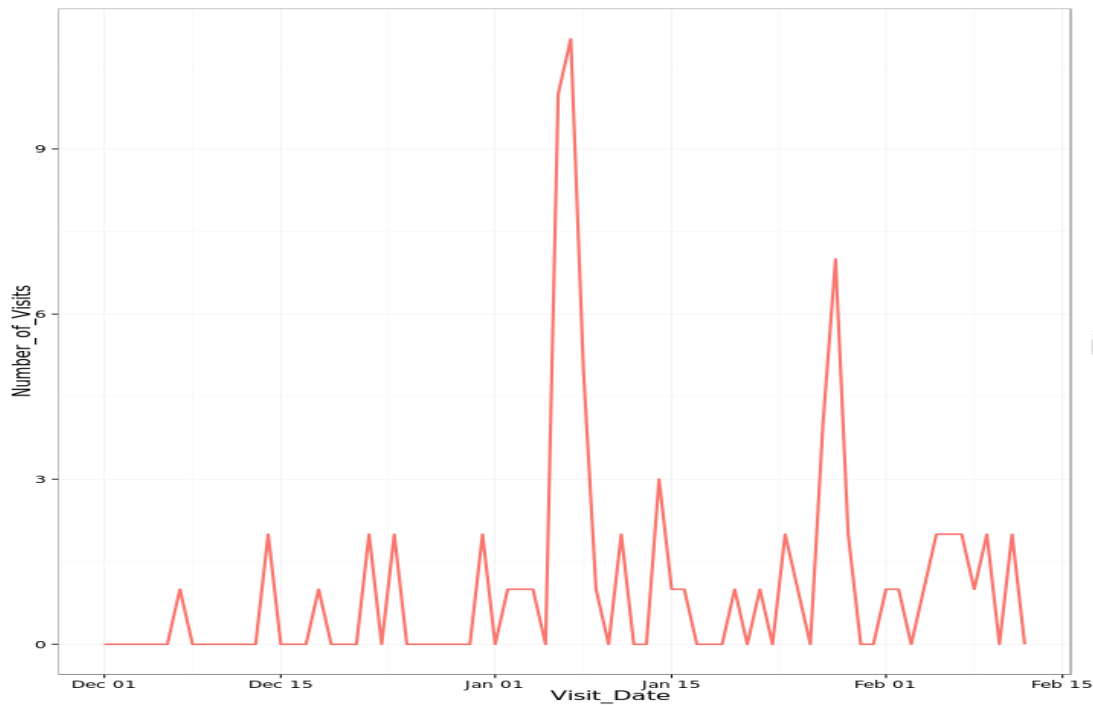
events.per.day<-merge(x=dates, y=events.per.day, by="Visit_Date", all.x=TRUE)
events.per.day$Syndrome <- "COLD" #Name Syndrome in Data Set
events.per.day[is.na(events.per.day)] <- 0
```

```
# Plot
ggplot(events.per.day) +
  aes(as.Date(Visit_Date), Number_of_Visits, color=Syndrome) +
  geom_line(size=1)
```

```
#Pie Chart of Gender
# Pie Chart from data frame with Appended Sample Sizes
Gender_Table<- table(dfCold$Gender)
lbls <- paste(names(Gender_Table), "\n", Gender_Table, sep="")
pie(Gender_Table, labels = lbls,
    main="Pie Chart of Gender")
```

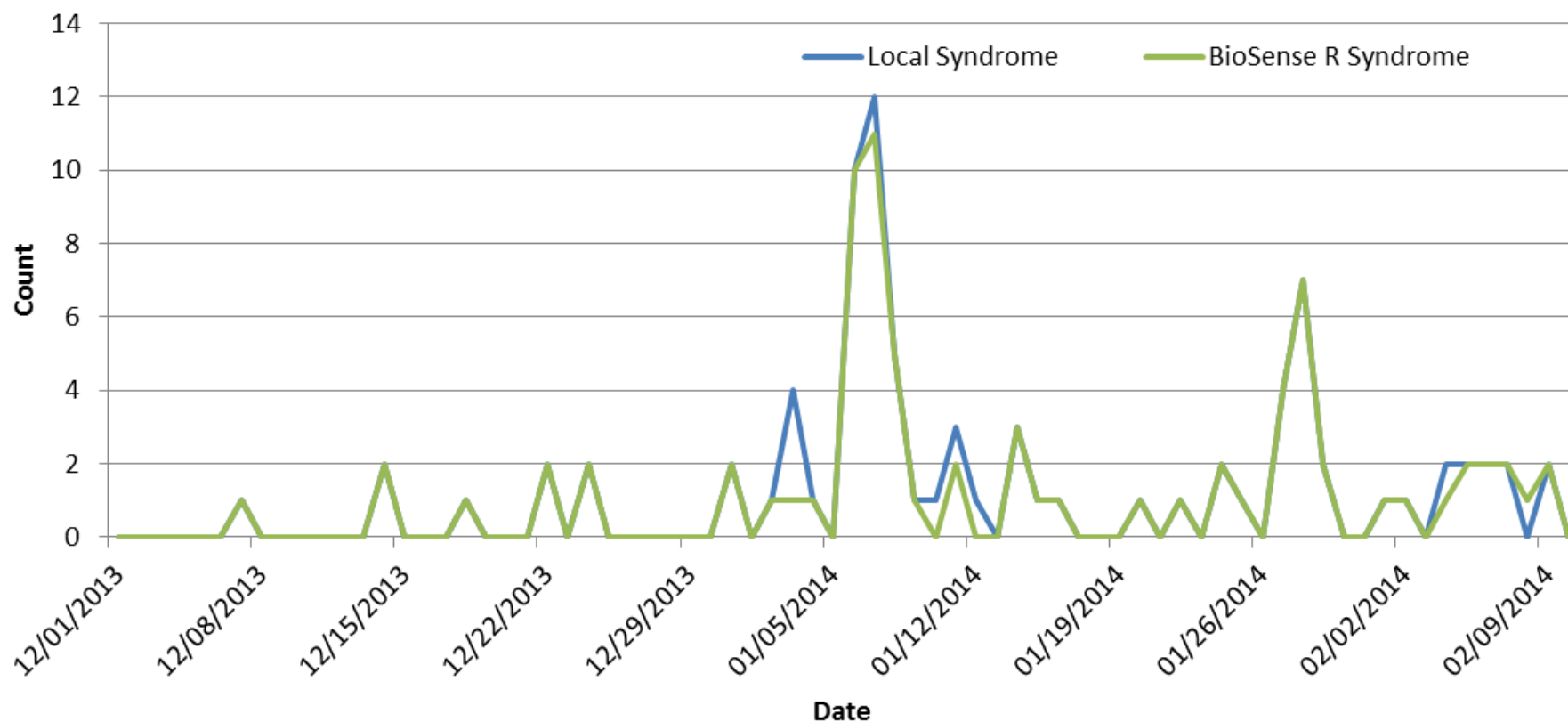
```
#Pie Chart for Age Group
Age_Table<- table(dfCold$agecat)
lbls <- paste(names(Age_Table), "\n", Age_Table, sep="")
pie(Age_Table, labels = lbls,
    main="Pie Chart of Age Groups")
```

Cold Syndrome Using BioSense 2.0—R Output



BioSense 2.0 Syndrome Compared to Local Syndrome

Data Comparison- Local v BioSense



Uses



Questions?

mrennick@hhcorp.org

317-221-3362