

# Hospital Syndromic Surveillance in Arizona

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Arizona Infectious Disease Training and Exercise  
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ARIZONA DEPARTMENT  
OF HEALTH SERVICES

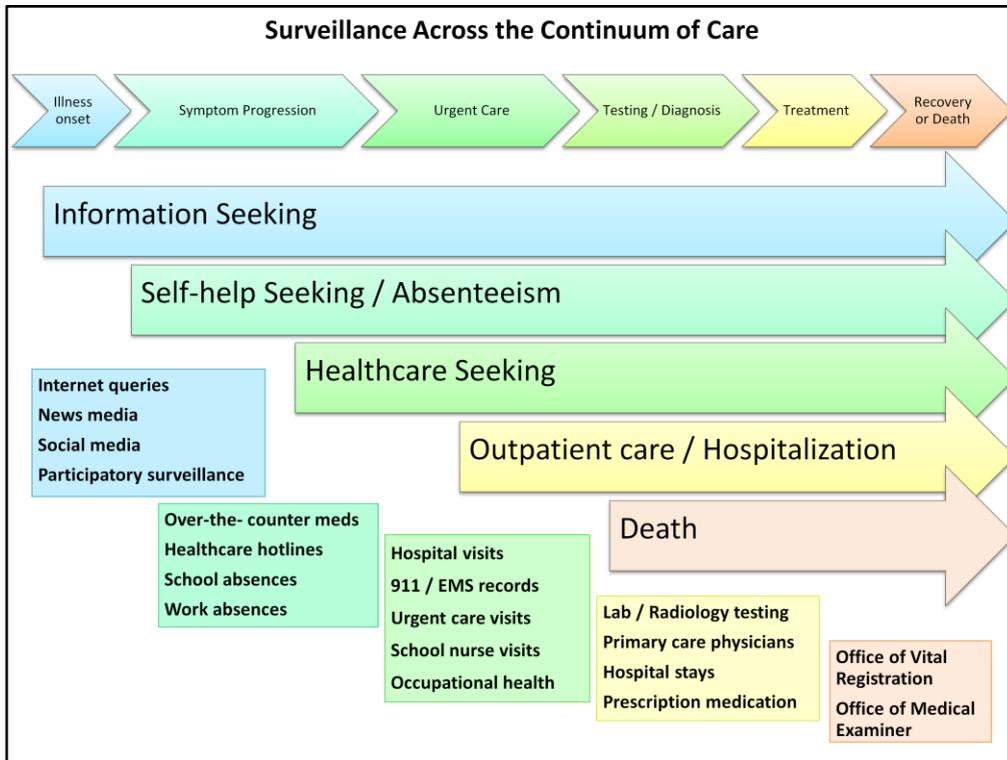
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Public Health agencies have a number of tools available to understand the health of our communities.



Surveillance data are available across the continuum of care. This presentation focuses on hospital visit syndromic surveillance data.

**Traditional Surveillance:**

- NORS
- MEDSIS – Aberration Detection
- NHSN – Nat’l Healthcare Safety Network (HAI surveillance); also: <http://www.medicare.gov/hospitalcompare/>

**Specialized Surveillance:**

- Disaster Relief
  - Shelters surveillance
  - American Red Cross
- Incarceration health records

**Zoonotic surveillance data (vector control)**

Vetsyn (veterinary SyS)



**What is  
Syndromic  
Surveillance?**



Syndromic Surveillance is “quick and dirty”  
Timeliness is more important than specificity



Reports include all patient visits from hospitals with emergency departments.  
Most facilities report visits from the ED and inpatient populations.  
Receive multiple records as visit information is updated



Hospitals report emergency department and inpatient data at least daily



Arizona uses the national BioSense Platform. This provides data processing and a set of tools for use of the data.

Also allows for collaboration across jurisdictions, including a national picture.

## Two Goals

- Case finding
  - Investigate each patient, Good for low volume
- Trends
  - Can detect aberrations, Good for high volume



There are typically two goals for use of syndromic surveillance:

Case finding is good for diseases or syndromes of interest that are not reportable or you want to know about cases earlier than traditional surveillance (lab/diagnosis based). This is better for low volume diseases due to resource limitations for follow up.

Trend analysis is used for high volume syndromes and can statistically detect aberrations. Exact numbers are less important than the trend, as long as the syndrome definition performs consistently across facilities and across time.

## Data Elements



Age  
Gender  
Race  
Ethnicity



Partial  
patient  
address:  
City  
State  
ZIP



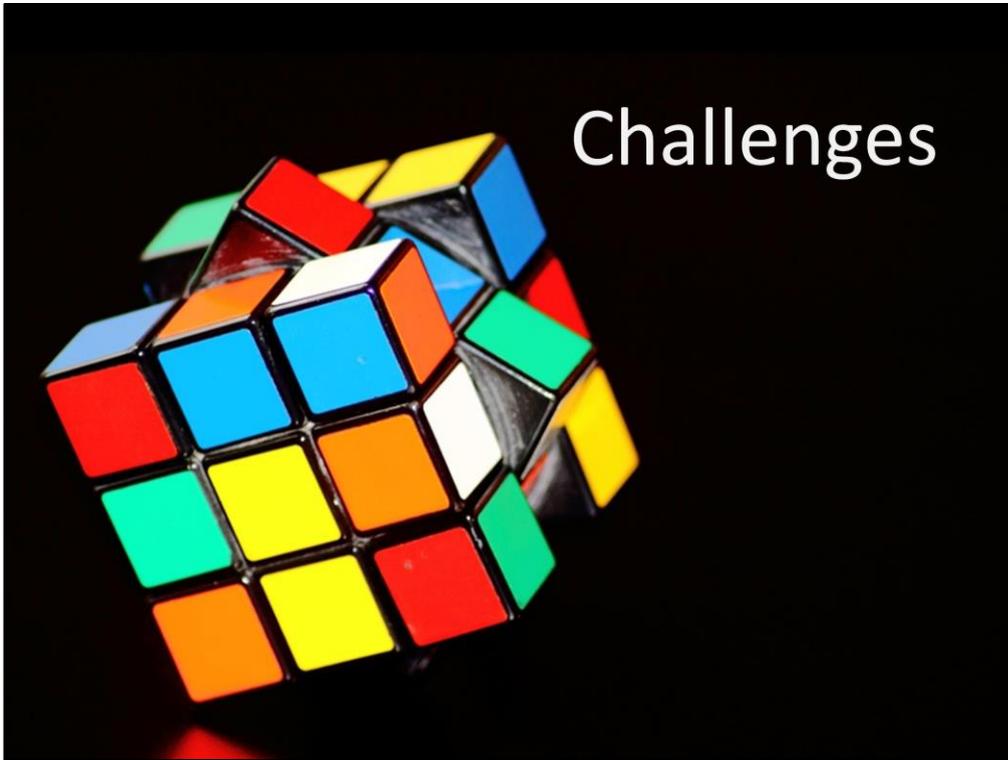
Chief  
complaint  
Diagnosis  
Triage note  
Temp



Hospital  
ED/Inpatient  
Admit date  
Discharge date  
Discharge  
disposition

Partially de-identified data

Receive multiple records as visit information is updated



Data is not always timely. Some hospitals have timely data while others are less timely. Some have diagnosis data during a visit, others only after the visit when coding is done. Some diseases have syndromes that are very common (fever, aches) and hard to distinguish from common illnesses. Some diseases are so rare that most “hits” on the syndrome are false positives.

*Chief Complaint*

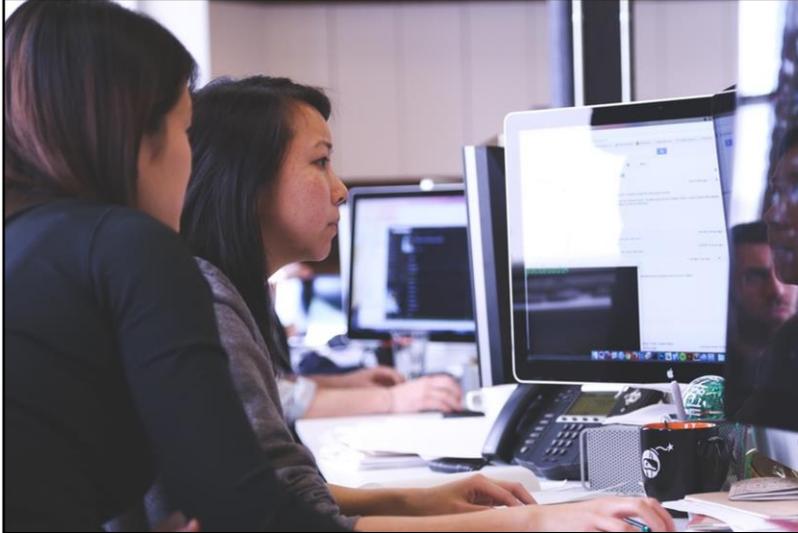
Challenges



Chief Complaint data is not uniform, not always correct, text may be difficult to interpret, especially for a machine.

*Diagnosis*

Challenges



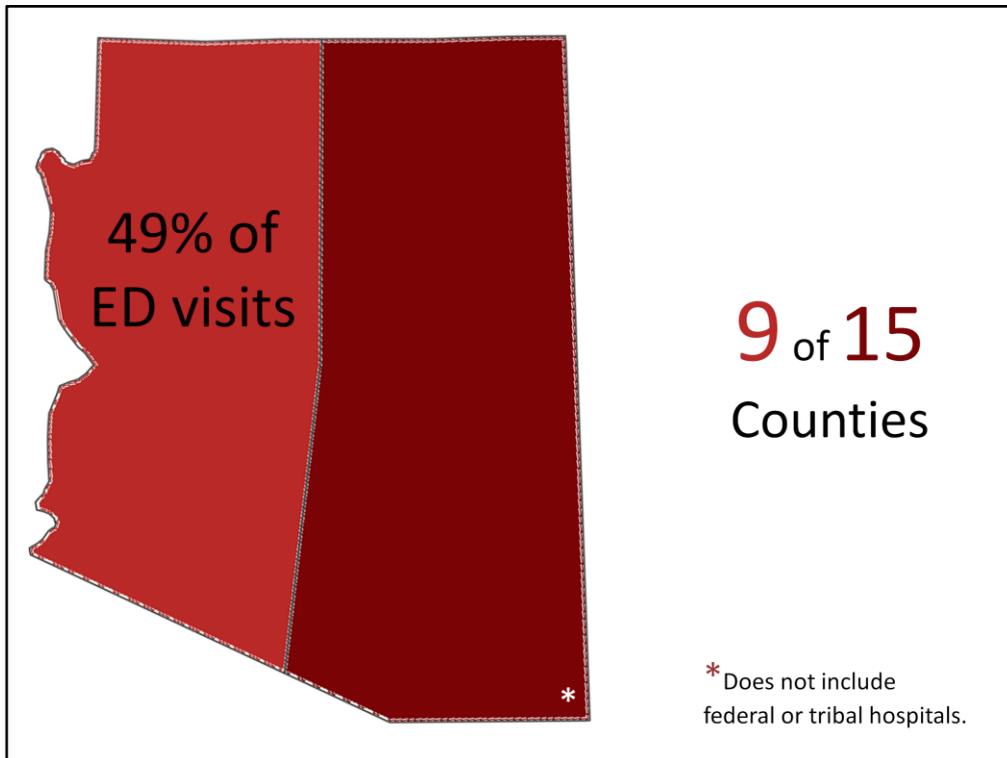
Data is not always timely. Some hospitals have timely data while others are less timely. Some have diagnosis data during a visit, others only after the visit when coding is done.

*Syndrome*

Challenges



Some diseases have syndromes that are very common (fever, aches) and hard to distinguish from common illnesses. Some diseases are so rare that most “hits” on the syndrome are false positives.



Representativeness:

Currently 26 of 68 hospitals with EDs are reporting  
49% of ED visits  
In 9 of 15 counties

Timeframe:

First hospital on July 2014, still growing



What have we been working on?

• **Case finding**

• **Specific definition**

• **Review with decision tree**

## Mosquito-borne Diseases

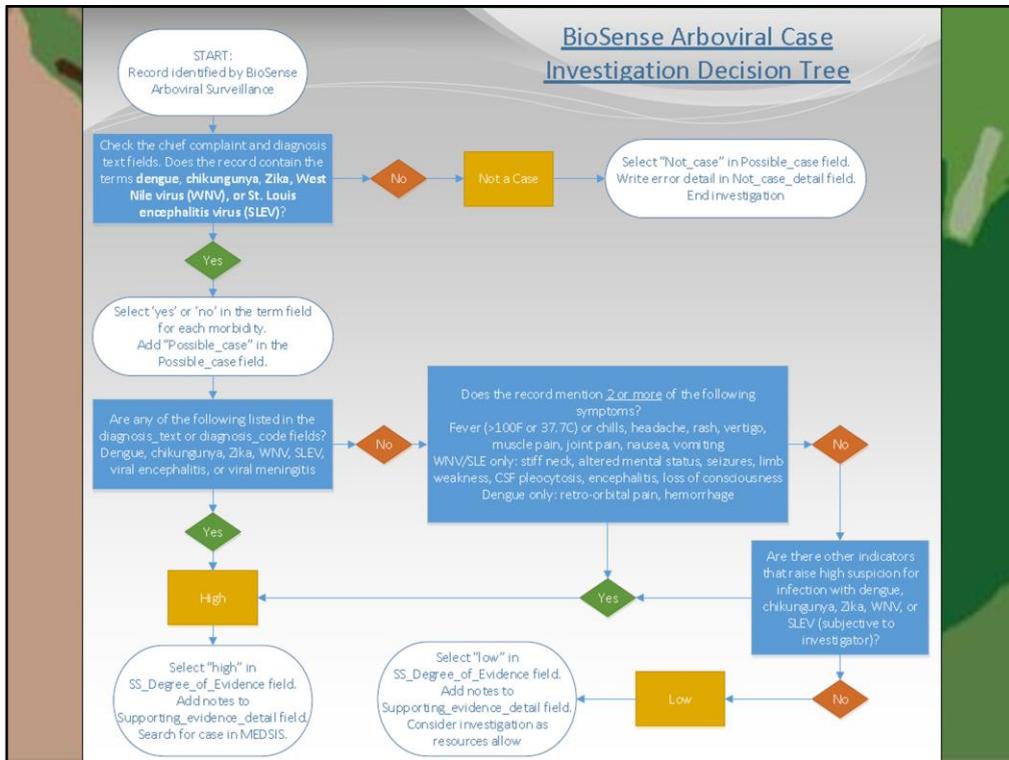
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During the past year, Arizona worked on three state-wide surveillance projects: mosquito-borne diseases, measles outbreak, and heat-related illness.

The mosquito-borne protocol used a specific definition to identify patients with possible arboviral diseases who were yet to be reported to MEDSIS. The protocol for this surveillance effort included a decision tree that helped public health professionals decide whether they should investigate the case further and possibly contact the provider and/or patient. (next slide shows the decision tree)

## BioSense Arboviral Case Investigation Decision Tree



## Measles 2016

- Case finding
- Multi-level definition
- Medical record review

(Photo: <http://www.opensocietyfoundations.org>)



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The measles protocol helped identify patients who might have been part of the outbreak.

The new syndrome was created to be more specific than general “rash and fever”, which would overwhelm the public health professional responsible for reviewing the line list.

# Measles 2016

Measles-related terms	Rash-related terms	Situational terms
<ul style="list-style-type: none"> <li>• measles</li> <li>• measels</li> <li>• meesels</li> <li>• meesles</li> <li>• ICD codes</li> </ul>	RASH (not crash...) “bumps on skin” “red bumps” “small spots” ...	<ul style="list-style-type: none"> <li>• center</li> <li>• detainee</li> <li>• inmate</li> <li>• _____ casino</li> <li>• _____ gas station</li> <li>• _____ urgent care</li> <li>• _____ detention center</li> <li>• _____ super center</li> <li>• _____ grocery store</li> </ul>



(Photo: <http://www.opensocietyfoundations.org>)

The measles syndrome was developed to identify patients with various combinations of terms in the chief complaint text or in their diagnosis code field.

Key terms included: variations on the spelling of measles; various terms for rash / prodrome symptoms; and specific names of facilities/situations that were involved in the outbreak.

Priority	<b>Triage 5</b>	situation AND measles terms / codes	
	<b>Triage 4</b>	situation AND rash	- OR - situation AND fever AND prodrome symptoms > 0
	<b>Triage 3</b>	rash AND measles terms / codes	
	<b>Triage 2</b>	measles terms / codes	- OR - possible exposure terms
	<b>Triage 1</b>	rash AND (fever OR prodrome symptoms > 1)	- OR - situation AND (fever OR prodrome symptoms > 1)
	<b>Triage 0</b>	Exclusion terms	- OR - All remaining records

(Photo: <http://www.opensocietyfoundations.org>)

This algorithm was used to triage patients of greatest concern to the top of the line list.

Patients at the top of the list were investigated further. In Maricopa County, those of greatest concern were given to nurses to review the patient's medical record.

• **Monitoring trends**

• **Standard definition**

• **Risk factor identification**

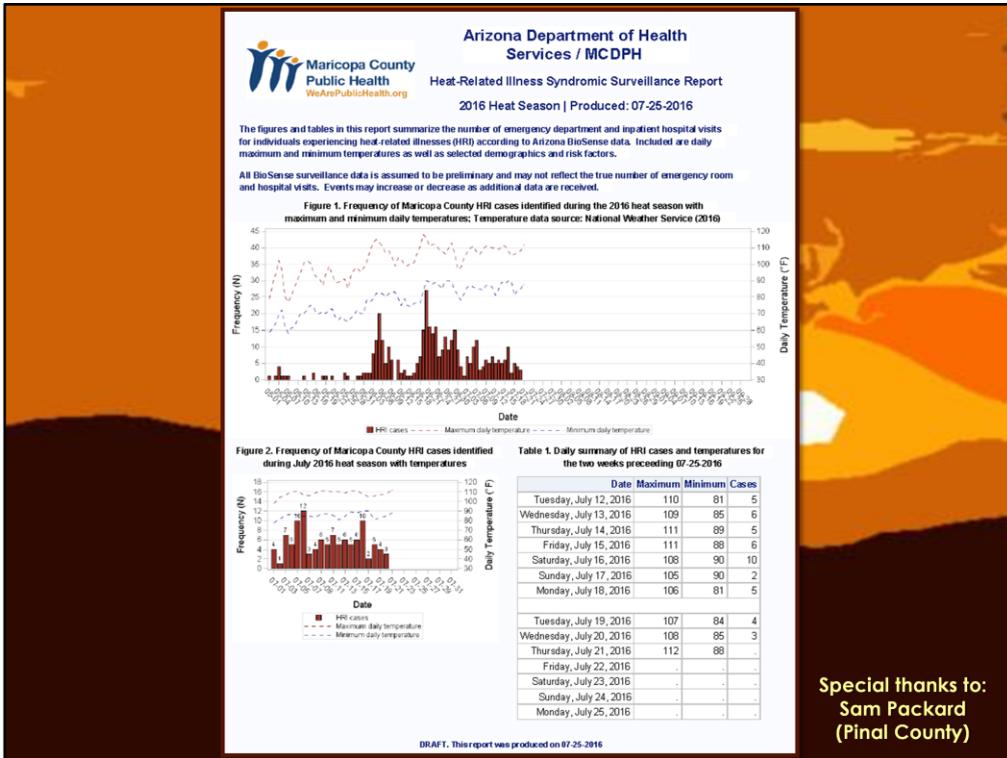
## Heat-related Illness

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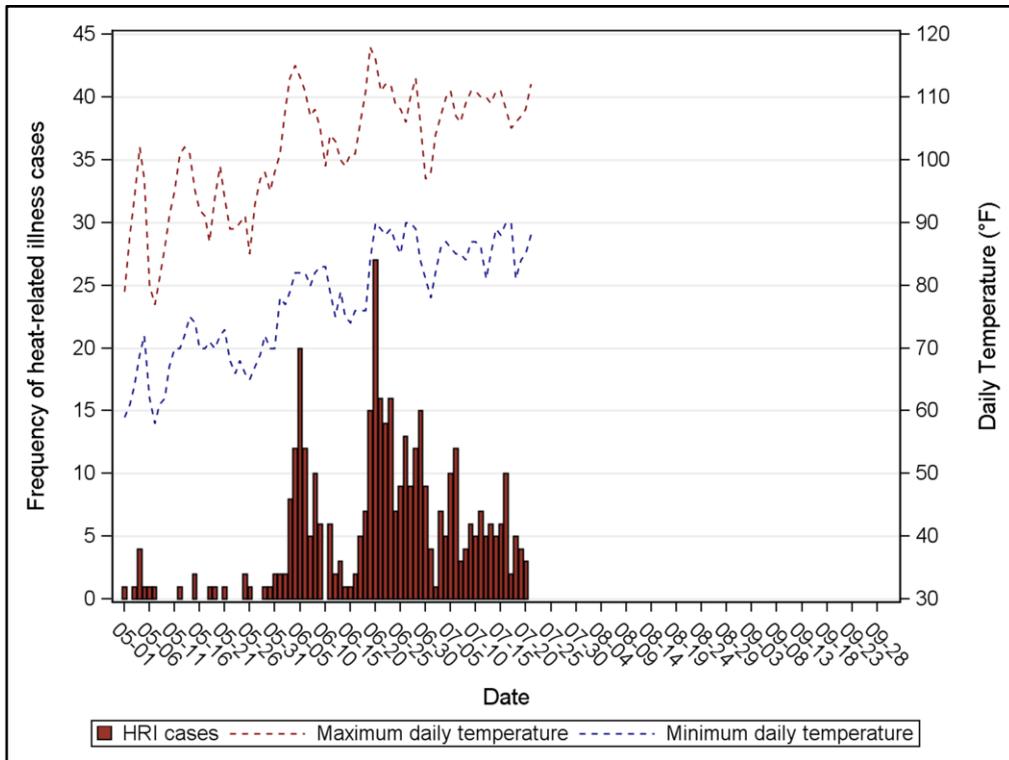
The AZ Exploratory Analysis Subgroup is working to develop a heat-related illness (HRI) report. This report can help jurisdictions understand the trends and risk factors of HRI.

<http://www.gannett-cdn.com/-mm-/2b73faae5ea59de857193a6e3c998aabadcaa7c9/c=2-0-1917-1440&r=x404&c=534x401/local/-/media/2015/08/14/Phoenix/Phoenix/635751110186575447-heat.JPG>



Example of the HRI report with Maricopa County data

<http://www.gannett-cdn.com/-mm-/2b73faae5ea59de857193a6e3c998aabadcaa7c9/c=2-0-1917-1440&r=x404&c=534x401/local/-/media/2015/08/14/Phoenix/Phoenix/635751110186575447-heat.JPG>



2016 heat seasons trends in Maricopa County with max and min daily temps.



Demographics for HRI in Maricopa County during 2016

<http://www.gannett-cdn.com/-mm-/2b73faae5ea59de857193a6e3c998aabadcaa7c9/c=2-0-1917-1440&r=x404&c=534x401/local/-/media/2015/08/14/Phoenix/Phoenix/635751110186575447-heat.JPG>

Patient Demographics	Homeless / Substance Abuse / Mental Illness Category							Total
	Homeless Only	Homeless & Substance Use	Homeless & Mental Illness	Substance Use Only	Substance Use & Mental Illness	Mental Illness Only	Homeless, Substance Use, & Mental Illness	
Female	4	2	1	11	3	6	.	27
Male	5	6	.	29	6	15	1	62
5 to 19 years	.	.	.	3	.	1	.	4
20 to 29 years	2	1	.	9	2	2	.	16
30 to 39 years	1	2	.	6	3	6	.	18
40 to 49 years	3	2	.	7	2	6	1	21
50 to 59 years	1	2	.	9	1	2	.	15
60 to 69 years	2	1	1	3	1	.	.	8
70 to 84 years	.	.	.	1	.	2	.	3
85 years and over	.	.	.	2	.	2	.	4
American Indian or Alaska Native	.	1	.	.	.	.	.	1
Black or African American	1	2	.	3	1	1	.	8
White	8	5	1	32	6	17	1	70
Other race	.	.	.	5	2	3	.	10
Hispanic or Latino	2	.	.	7	3	4	.	16
Not Hispanic or Latino	7	8	1	33	5	16	1	71
Total	9	8	1	40	9	21	1	89

Special thanks to: Pima County

Looking for risk factors within the BioSense record: Homeless, substance use, mental illness – by demographics (Maricopa County, 2016 data)

<http://www.gannett-cdn.com/-mm-/2b73faae5ea59de857193a6e3c998aabadcaa7c9/c=2-0-1917-1440&r=x404&c=534x401/local/-/media/2015/08/14/Phoenix/Phoenix/635751110186575447-heat.JPG>



This slide shows 3 situations / conditions that are currently being explored in Maricopa County.

<http://vectorlogo4u.com/wp-content/uploads/2016/02/2016-Copa-America-Centenari.png>

[http://www.underconsideration.com/brandnew/archives/ncaa\\_championships\\_final\\_four\\_2017\\_detail.png](http://www.underconsideration.com/brandnew/archives/ncaa_championships_final_four_2017_detail.png)

<https://mariannerobison.files.wordpress.com/2014/02/pesticides.jpg>

[http://az616578.vo.msecnd.net/files/2015/11/22/635838208389351204-1561601166\\_homeless.jpg](http://az616578.vo.msecnd.net/files/2015/11/22/635838208389351204-1561601166_homeless.jpg)



This slide shows 5 conditions that may be explored in the near future.

<https://www.ted.com/topics/mental+health>

<http://www.ibtimes.com/arizona-wildfire-rages-dramatic-photos-707018>

[http://www.noperi.org/images/pill\\_bottle.png](http://www.noperi.org/images/pill_bottle.png)

[http://www.noperi.org/images/pill\\_bottle\\_2.png](http://www.noperi.org/images/pill_bottle_2.png)

<http://www.clipartkid.com/images/237/weed-leaf-clipart-panda-free-clipart-images-urOq9X-clipart.png>

[http://i2.wp.com/maze.airstreamlife.com/wp-content/uploads/2009/05/dsc\\_0002.jpg](http://i2.wp.com/maze.airstreamlife.com/wp-content/uploads/2009/05/dsc_0002.jpg)



Hospital syndromic surveillance helps us be better equipped for current or emerging public health issues.

Syndromic surveillance is a unique tool for public health. It is not without its challenges and may not be the right tool for every job.

However, healthcare data is at our fingertips without a lengthy process of gathering data for a new issue or condition of interest.



THANK YOU

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