

Application and Expansion of SyS to Other Extreme Weather Scenarios

December 11, 2018

Presenting To

Monitoring Health Impacts from Extreme Heat Events in North America
Workshop
Phoenix, AZ

Matthew Roach, MPH
Epidemiology Program Manager



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PHOENIX 7 DAY FORECAST

The
Weather
Channel

SAT



43.3 C

26.7 C

0%

Sunny

SUN



45.6 C

29.4 C

0%

Sunny

MON



47.8 C

31.7 C

0%

Sunny

TUE



49.4 C

31.7 C

0%

Sunny

WED



48.3 C

31.1 C

0%

Sunny

THU



46.7 C

30 C

0%

Sunny

FRI



44.4 C

30 C

0%

Sunny

AIR QUALITY ALERT

...HIGH POLLUTION ADVISORY FOR MARICOPA COUNTY INCLUDING THE GREATER PHOENIX



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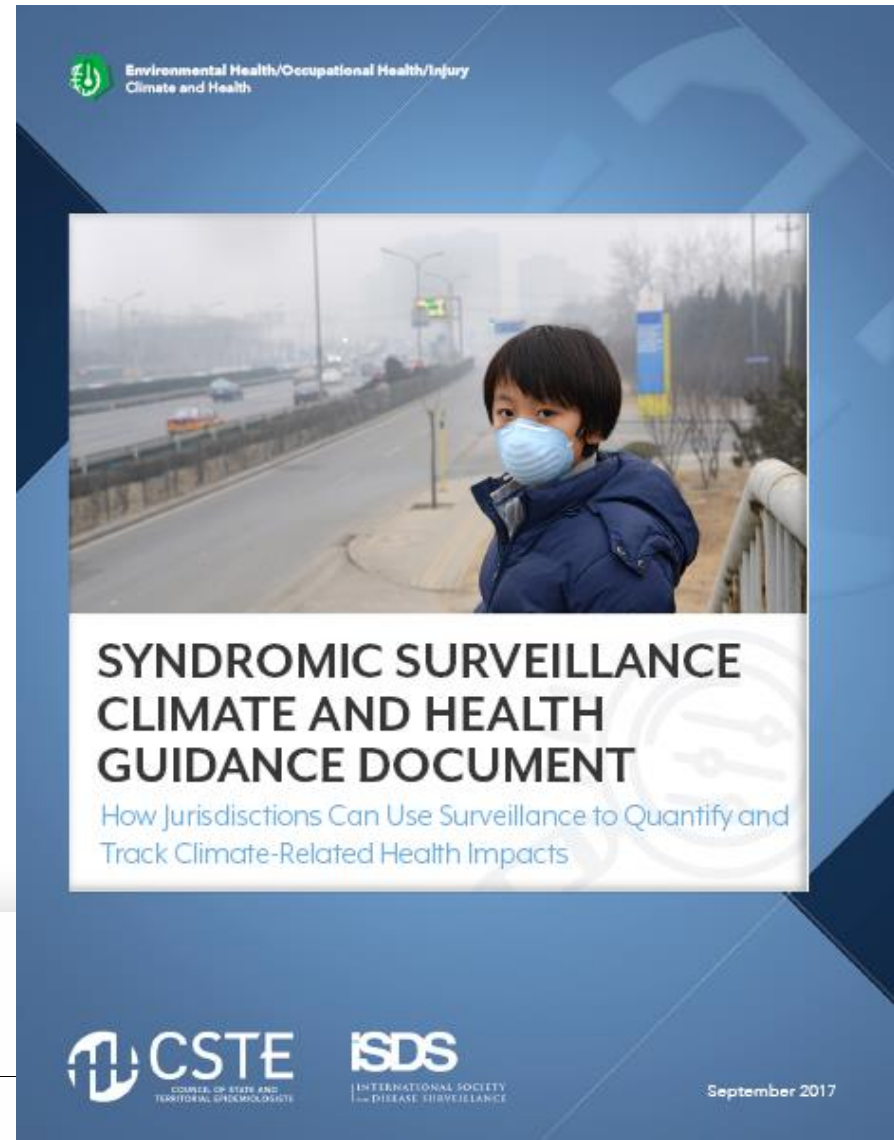
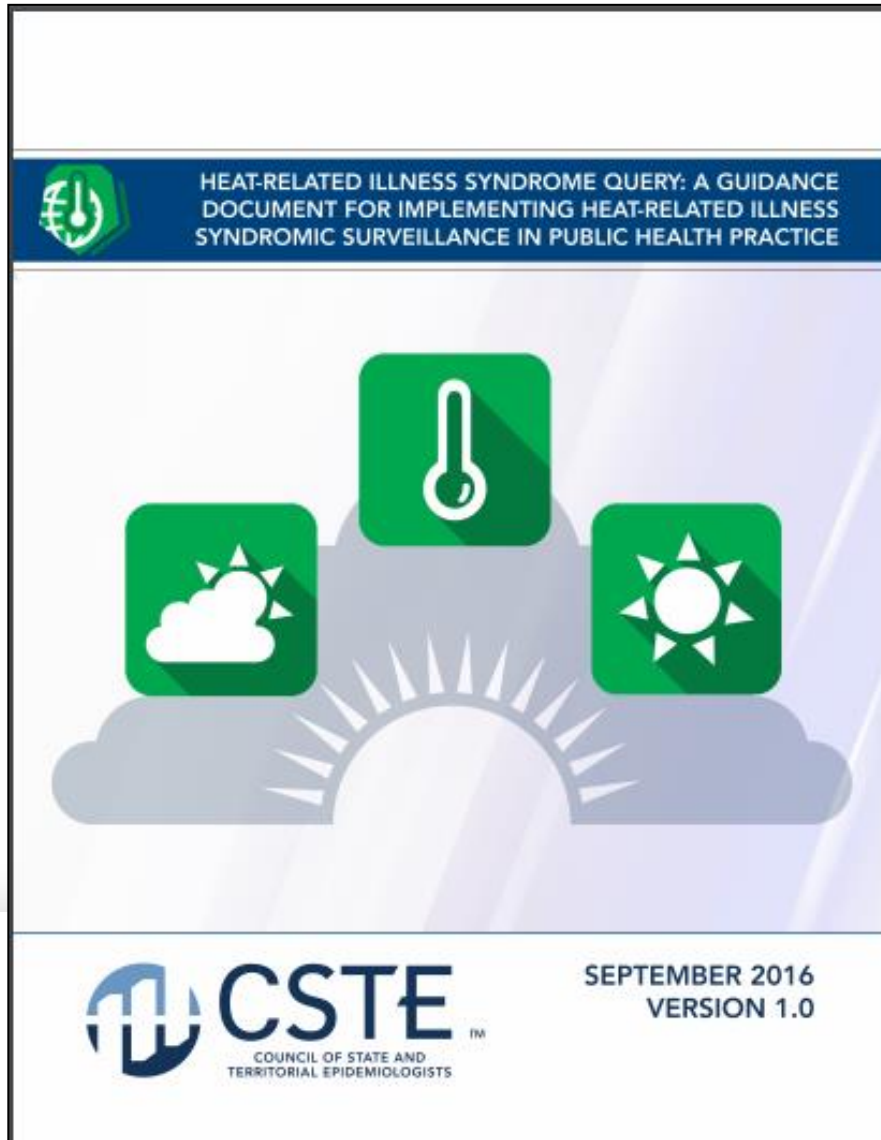
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Council of State and Territorial Epidemiologists Resource Documents



Implementation into the National Syndromic Surveillance Program

**ESSENCE - NSSP**
Data Query

HomeAlert ListmyAlertsmyESSENCEEvent List ▼Overview PortalQuery PortalStat TableMap PortalBookmarksQuery ManagerData Quality ▼Report ManagerMore ▼

Query Wizard

Datasource:Time Resolution:Detector:As Percent Query:Start Date:End Date:
Facility Location (Full Details) ▼Daily ▼Regression/EWMA 1.2 ▼No Percentage Query ▼11Sep1810Dec18

Available Query Fields

CC and DD Category

Select values for CC and DD Category:

Ten Year Age Group

Distribute Age Group

Age Range

Sex

Race

Ethnicity

Patient Class

Calculated Patient Class

Disposition Category

Discharge Diagnosis

Discharge Diagnosis Available

ICD10 Discharge Diagnosis

Time Interval

Diagnosis Type

CC and DD Category

CC and DD

CC and DD Category Free Text

Syndrome Free Text

SubSyndrome Free Text

Chief Complaint (Orig) Free Text

Chief Complaint (Combo) Free Text

All Traffic Related v1

CDC AFM Broad v1-Limit to Pediatric

CDC AFM Narrow v1-Limit to Pediatric

CDC All Drug v1

CDC Heroin Overdose v1

CDC Heroin Overdose v2

CDC Heroin Overdose v3

CDC Heroin Overdose v4

CDC Opioid Overdose v1

CDC Opioid Overdose v2

CDC Stimulants v1

CDC Stimulants v2

Foreign Travel

Heat Related Illness v1

Heat Related Illness v2

ILI CCDD v1

Intimate Partner Violence v1

Marijuana v1

Mumps v1

Norovirus v1

SDC Suicide Related v1

SelectHelpSelectHelp

Table BuilderTime SeriesData DetailsGraph BuilderOverviewAdv QryExplain QryReset

Finding Weather Data

The screenshot shows the 'Query Wizard' interface. At the top, there are input fields for 'Datasource' (Weather Data), 'Time Resolution' (Daily), 'Detector' (Regression/EWMA 1.2), 'As Percent Query' (No Percentage Query), 'Start Date' (11Sep18), and 'End Date' (10Dec18). Below these, the 'Available Query Fields' section is highlighted with a red box. It contains a tree view with 'Weather Data' expanded, showing 'MyFilters', 'Weather Station', 'Time Aggregation Function', 'Station Aggregation Function', and 'Weather Factor'. The 'Weather Station' list is selected, showing a scrollable list of stations including AR - SEARCY AIRPORT, AR - STUTTGART AIRPORT, AZ - DEER VLY/PHOENIX, AZ - DOUGLAS, AZ - FLAGSTAFF AZ AIRPORT, AZ - GRAND CANYON AZ AIRPORT, AZ - KINGMAN, AZ - NOGALES AZ AIRPORT, AZ - PAGE AZ AIRPORT, AZ - PHOENIX (highlighted), AZ - PRESCOTT AZ AIRPORT, AZ - SAFFORD AZ AIRPORT, AZ - SAINT JOHNS AZ AIRPORT, AZ - SCOTTSDALE, AZ - TUCSON, AZ - WINDOW ROCK AZ AIRPORT, AZ - WINSLOW AZ AIRPORT, AZ - YUMA, CA - BAKERSFIELD, CA - BARSTOW-DAGGETT, and CA - BISHOP. To the right, the 'Selected Query Fields' section shows 'Time Aggregation Function' (Max), 'Station Aggregation Function' (Max), and 'Weather Factor' (Maximum Temperature). At the bottom, there are buttons for 'Table Builder', 'Time Series', 'Data Details', 'Graph Builder', 'Overview', 'Adv Qry', 'Explain Qry', and 'Reset'. A 'MyFilter' section with a 'Create' button is also visible.



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Weather Station Variables

Query Wizard

Datasource: Weather Data Time Resolution: Daily Detector: Regression/EWMA 1.2 As Percent Query: No Percentage Query Start Date: 24Mar17 End Date: 22Jun17

Available Query Fields << **Weather Factor** >>

Weather Data

- Weather Station
- Time Aggregation Function
- Station Aggregation Function
- Weather Factor

Select Help

- Maximum Temperature
- Maximum Temperature
- Minimum Temperature
- Average Temperature
- Departure Temperature
- Heating Degree Days
- Cooling Degree Days
- Water Equivalent
- Snowfall
- Snow Depth
- Average Wind Speed
- Maximum Two Minute Wind Speed
- Maximum Two Minute Wind Speed Direction
- Minutes Sun
- Possible Sun
- Sky Cover
- Weather Code

Selected Query Fields >>

Time Aggregation Function Max

Station Aggregation Function Max

Weather Factor Maximum Temperature

Table Builder Time Series Data Details Graph Builder Overview Adv Qry Reset



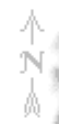
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- This survey was created to understand the use of Syndromic Surveillance Systems (SyS) for detecting and reducing illnesses related to extreme weather events.
- Online survey sent to Syndromic Surveillance Coordinators in the U.S. and Canada in July 2015
 - CSTE disseminated the survey in the U.S.
- Results will help to:
 - Create **inventory** of Canadian and United States SyS systems
 - Inform the development of a **public health guidance document** with best practices and recommendations on how to use SyS for weather related events



$$\uparrow$$
$$N$$
$$\uparrow$$


National Survey on Climate and Health Syndromic Surveillance - CSTE (2015)

Have you used your SyS system to track weather or climate-related events with potential health outcomes? (n=34)

Extreme Heat	23	68%
Extreme Cold	14	41%
Hurricanes	10	29%
Poor Air Quality	10	29%
Climate-Related Disease Vectors	8	24%
Flooding	6	18%
Tornadoes/Straight Line Winds	5	15%
Wildfire	4	12%
Drought	1	3%

What syndromes/illnesses/conditions do you typically track with your SyS system? (n=34)

Influenza-like illness	29	85%
Respiratory	25	74%
Gastrointestinal	24	71%
CO Poisoning	20	59%
Neurological	16	47%
Heat-related illness	16	47%
Infectious dermatological	14	41%
Injuries	13	38%
Cold-related illness (e.g. hypothermia)	13	38%
Asthma	13	38%
Lyme disease	5	15%
West Nile virus	2	6%



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“After a hurricane, surveillance was used for injuries and CO exposures. SyS identified an increase in CO illnesses and public health messaging was distributed.”



“Based off heat-related illness data in our SyS, we worked with the National Weather Service to tailor their messaging to early season heat events.”



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“Surveillance of ED visits and EMS calls has prompted press events and increase PH messaging during heat waves.”



“Used SyS data to find missing disaster victims after a major tornado and reunited them with their families.”



Table 3. What information does your system collect? (n=34)

<u>Emergency Department-Chief complaint data</u>	<u>31</u>	<u>91%</u>
<u>Emergency Department-ICD 9/10 codes</u>	<u>21</u>	<u>62%</u>
Emergency Department-Triage notes	13	38%
Sales of over the counter pharmaceuticals	6	18%
School/work absenteeism data	5	15%
Inpatient-Chief complaint data	3	9%
Inpatient-ICD 9/10 codes	3	9%
Ambulatory/outpatient	3	9%
Prescription drug data	2	6%
Emergency calls (911 calls)	1	3%
Coroner's data/OME (Office of Medical Examiner)	0	0%
Death registration records	0	0%
Telehealth	0	0%
Trauma data	0	0%
Internet searches	0	0%



Comparison to 3rd National Climate Assessment for Weather Hazards By Region

Table 4.

National Climate Assessment		Syndromic Surveillance Survey Responses	
Regions	Weather-related Events	Weather-related Events	Total Survey Responses
Northwest	Wildfire, Disease Vectors*, Extreme Heat	Extreme Heat (2), Extreme Cold (1), Wildfire (2)	2
Southwest	Extreme Heat, Drought, Disease Vectors*, Flooding	Extreme Heat (2), Poor air quality (1), Disease Vectors* (1)	4
Great Plains	Drought, Extreme precipitation, Flooding, Extreme Heat, Extreme Cold, Tornadoes	Extreme Heat (2), Extreme Cold (1), Flooding (1), Tornadoes (2), Poor Air Quality (1)	3
Midwest	Extreme Heat, Extreme Cold, Poor Air Quality, Extreme Precipitation, Flooding, Disease Vectors	Extreme Heat (4), Extreme Cold (4), Drought (1), Flooding (2), Tornadoes (2), Poor Air Quality (1), Disease Vectors* (1)	6
Southeast	Extreme Heat, Hurricanes, Disease Vectors*, Extreme Precipitation	Extreme Heat (3), Extreme Cold (3), Flooding (1), Wildfire (2), Tornadoes (1), Poor Air Quality (3), Disease Vectors* (1)	4
Northeast	Extreme Heat, Flooding, Extreme Precipitation, Hurricanes, Poor Air Quality, Disease Vectors*	Extreme Heat (10), Extreme Cold (6), Flooding (2), Hurricanes (8), Poor Air Quality (4), Disease Vectors* (5)	15



CSTE Heat/Cold Syndrome Workgroup

Climate WG - Cold Syndrome Document

AK AF BG BM B BH CB CW DH ER FM HM HM JC JC JF [Add/remove people](#)

Campfire

- FM** Fatema Mamou 7:30am
- FM** Fatema Mamou 7:31am
Here are the frozen chief c...
- FM** Fatema Mamou 7:32am
We could get specific and ...
- AF** Anna Frick 11:11am
I'm looking through my dat...
- KL** Katie Lane 6:28am
sounds good -- we could ke...

Message Board

- HM** Call tomorrow CANCELLED
Good afternoon everyone. ^a
- HM** Link to Live Google Sheet
You can reach the live/real-

To-dos



Make lists of work that needs to get done, assign items, set due dates, and discuss.

Schedule



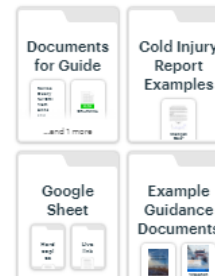
Set important dates on a shared schedule. Subscribe to events in Google Cal, iCal, or Outlook.

Automatic Check-ins



Create recurring questions so you don't have to pester your team about what's going on.

Docs & Files



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Guidance Document Process

Background

Methods

Regional
Variation in
Terms

Query

Steps for
Implementing

- Data Source
- Validation
- Frequency
- Analysis methods
- Potential uses for data

Limitations

Conclusions and
Recommendations



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Draft Cold-Related Illness Query in ESSENCE Syntax

(,^cold exp^,or,^cold-exp^,or,^env exp^,or,^environmental
exp^,or,^exp to env^,or,^exposure to env^,or,^exp to
cold^,or,^exposure to cold^,or,^cold
exposure^,or,^coldexposue^,or,^out in the
cold^,or,^frostbit^,or,^forstbit^,or,^forst bit^,or,^frost bit^,or,^frost
nip^,or,^frostrnip^,or,^frost
ni^,or,^hypothe^,),or,(,^froze^,and,^hand^,andnot,^meat^,),or,(,^froz
e^,and,^feet^,),or,(,^x31^,or,^t68^,or,^t69^,or,^t33^,or,^t34^,or,^;991
;^,or,^e901.0^,or,^e901.8^,or,^e901.9^,or,^e988.3^,or,^e9010^,or,^e9
018^,or,^e9019^,or,^e9883^,),andnot,(,^recheck^,or,^re-
check^,or,^history of frostbite^,or,^history frostbite^,or,^dressing
chang^,or,^asthma^,or,^chest^,or,^congestion^,or,^cough^,or,^ear^,or
,^ears^,or,^infection^,or,^preg^,or,^pregnant^,or,^sob^,or,^sore
throat^,or,^sx^,or,^symptoms^,or,(,^991.8^,and,^asthma^,),or,(,^9918
^,and,^asthma^,),or,^w93^,or,^e901.1^,or,^780.65^,or,^e9011^,or,^7
8065^,or,^xd^,)



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Draft CRI Syndrome Inclusion and Exclusion Criteria

Category	Terms to include in query
Chief complaint search terms	COLD EXP
	COLD - EXP
	COLD-EXP
	COLDEXPOSURE
	ENV EXP
	ENVIRONMENTAL EXP
	EXP TO COLD
	EXP TO ENV
	EXPOSURE TO ENV
	EXPOSURE TO COLD
	FROST BIT
	FROSTBIT
	FROST NI
	“FROZEN” and “HANDS”
	“FROZEN” and “FEET”
	HYPOTHE
	“OUT IN THE COLD”
	“FROZE “
ICD-9-CM diagnosis codes	991 – Effects of reduced temperature E901.0 – Excessive cold due to weather conditions
	E901.8 – Excessive cold, other specified origin
	E901.9 – Excessive cold, of unspecified origin
	E988.3 – Extremes of cold, undetermined intent
ICD-10-CM diagnosis codes	X31 – Exposure to excessive cold of natural origin
	T68 – Hypothermia
	T69 – Other effects of reduced temperature
	T33 – Superficial frostbite
	T34 – Frostbite with tissue necrosis

Category	Terms to exclude from query
Chief complaint terms	RECHECK
	HISTORY OF FROSTBITE
	HISTORY FROSTBITE
	DRESSING CHANG
	991.8 & ASTHMA
	ASTHMA
	CHEST
	CONGESTION
	COUGH
	EAR
	EARS
	INFECTION
	PREG
	PREGNANT
	SOB
	SORE THROAT
	SX
	SYMPTOMS
	FROZEN “FROZE” and “HAND” and not “MEAT”
ICD-9-CM diagnosis codes	E901.1 – Excessive cold of man-made origin 780.65 – Hypothermia not associated with low environmental temperature
ICD-10-CM diagnosis codes	W93 – Exposure to excessive man-made cold R68.0 – Hypothermia not associated with low environmental temperature Exclude codes ending in D or S to suppress non-incident cases.

Validation of Draft CRI Syndrome

Cold-Related Illness (CRI) Emergency Department and Syndromic Surveillance Data,¹ New York City, 2014 Cold Season Months

Prevalence	0.04
Sensitivity	38.23
Specificity	99.99
Positive Predictive Value	61.13
Negative Predictive Value	99.98

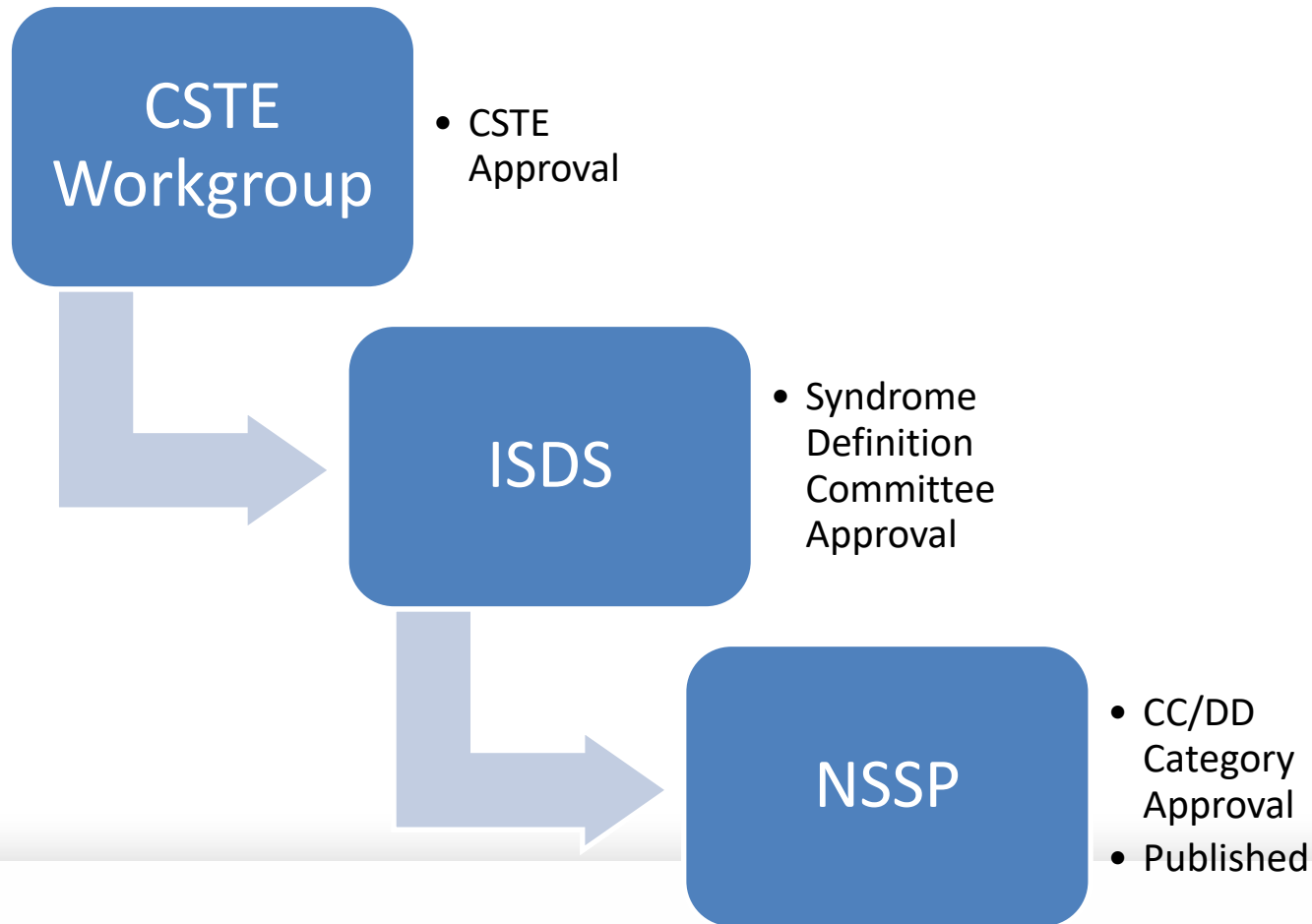
- 1) Data source: New York State Department of Health, Statewide Planning and Research Cooperative System (SPARCS) and Bureau of Communicable Disease Syndromic Surveillance Unit.



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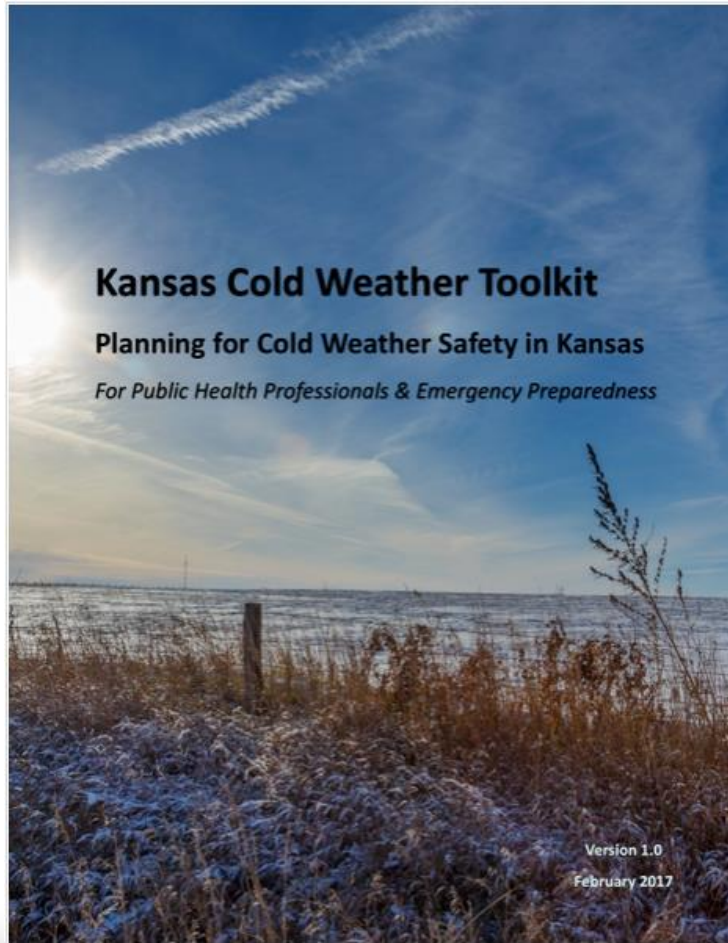
Process Flow for Adding New Syndrome



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Examples



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Discussion and Questions?



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Acknowledgements

- CSTE Heat/Cold Syndrome Workgroup
- CDC Environmental Public Health Tracking Network
- CDC Climate Ready States and Cities Initiative



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It's OK to Bake Cookies ...but Not People and Pets!

THANK YOU

Matthew Roach, MPH

Epidemiology Program Manager

Matthew.roach@azdhs.gov

602 364-3673

azhealth.gov

@azdhs

facebook.com/azdhs

Remember our Cookie Baking Experiment from June 2013? Temperatures rose above 130°F in a vehicle?

Excessive Heat will occur over the Desert Southwest this weekend and into the middle of next week. Check out next Monday's high temps. Be Ready!



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