



Data-Driven EMS Performance Improvement

Presented by: Antonio R. Fernandez, PhD, NRP, FAHA

A little about me

- Nationally Certified Paramedic since 2005



- Completed the NREMT EMS Research Fellowship in 2010



- Currently the Research Director for the EMS Performance Improvement Center and Research Assistant Professor at UNC-Chapel Hill



Data

- ▶ Published, peer-reviewed literature
- ▶ State EMS Data Systems
- ▶ NEMSIS

da·ta

/ˈdɑdə, ˈdādə/

noun

facts and statistics collected together for reference or analysis.

synonyms: facts, figures, [statistics](#), details, particulars, specifics; [More](#)

- **COMPUTING**

the quantities, characters, or symbols on which operations are performed by a computer, being stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.

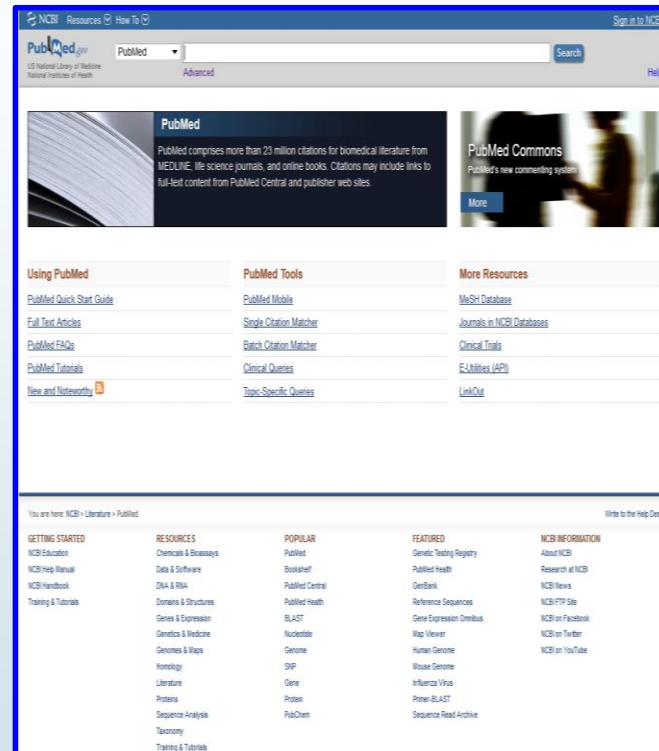
- **PHILOSOPHY**

things known or assumed as facts, making the basis of reasoning or calculation.

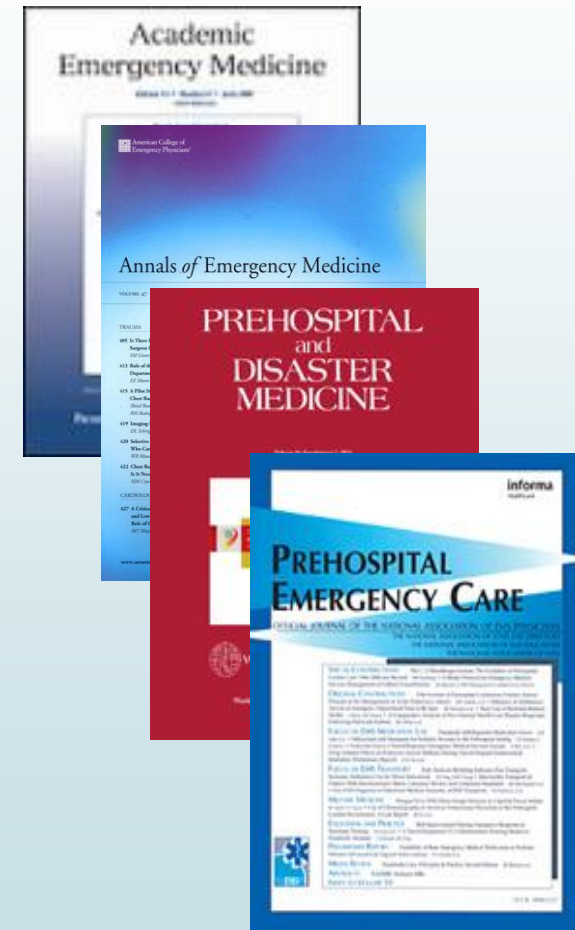


Translations, word origin, and more definitions

Published, Peer-reviewed Literature

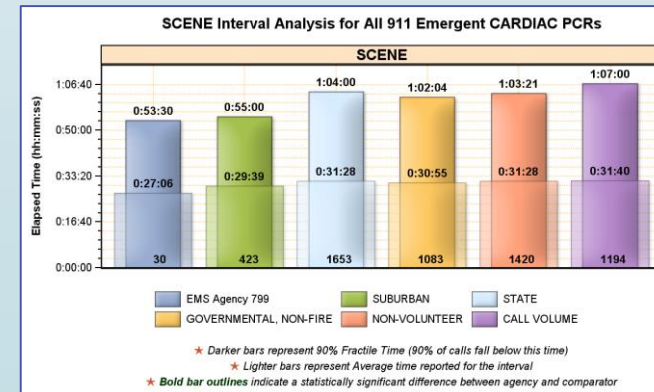
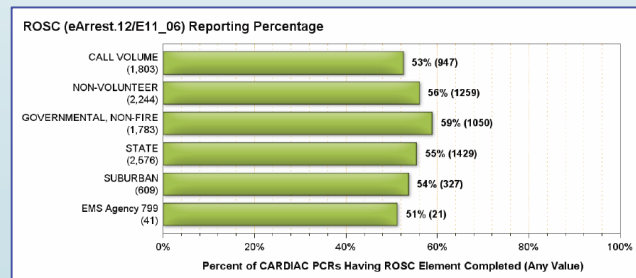


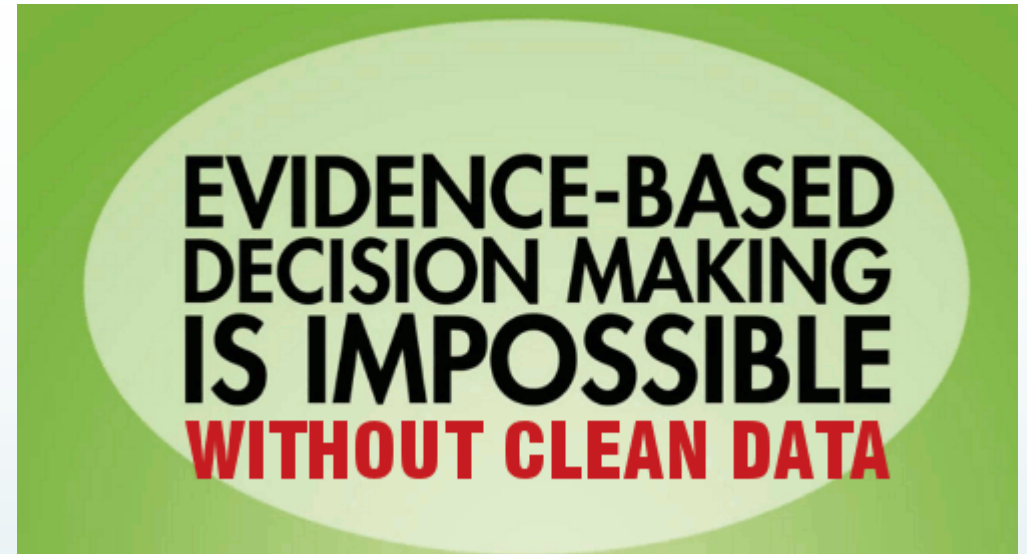
<http://www.ncbi.nlm.nih.gov/pubmed/>



Statewide EMS Data

- ▶ Allows benchmarking and comparative analyses
 - ▶ Local agency data doesn't allow for comparisons
- ▶ May be challenging to obtain
- ▶ Typically standardized (NEMESIS)
 - ▶ Mapped from locally collected data
- ▶ Data quality and completeness must be evaluated





Statewide EMS Data

► Data Quality

► 1+1 = 2 vs. 1+3=2

<u>Validation Error Message</u>	<u>Element</u>	<u>Count</u>
Beginning Odometer must be provided if any odometer readings are present	E02_16	3210
On Scene Odometer must be provided if any odometer readings are present	E02_17	3159
Crew missing Driver.	E04	893
-25 is not a valid county code for Patient's Home County	E06_06	324
Incident address is missing City	E08_12	313
-20 is not a valid county code for Patient's Home County	E06_06	218
Destination Facility Code is required when patient transported by EMS	E20_02	164
Person performing procedure not provided	E19_09	123
Seat Row Location of Patient in Vehicle is required for motor vehicle accident	E10_06	76
Condition of Patient at Destination is required when patient transported by EMS	E20_15	51
Crew Member with State Id SC54321, role Driver and credential EMT Basic for Agency Top Notch Ambulance not recognized	E04_01	44
Vital Signs Taken Date/Time must be between Unit Notified Date/Time and Unit Back In Service Date/Time	E14_01	43
SC12345 not recognized as a personnel code for Report Author	E23_10	25
Crew Member with State Id SC54321, role Primary Patient Caregiver and credential EMT Basic for Agency Top Notch Ambulance not recognized	E04_01	25
Crew Member with State Id SC54321, role Driver and credential EMT Paramedic for Agency Top Notch Ambulance not recognized	E04_01	20

Statewide EMS Data

➤ Data completeness

➤ 1 + = 2

NEMESIS Code	Data Element	EMS Agency Completion Rate	State Completion Rate
D01_07	Level of Service	100%	100%
E01_01	Patient Care Report Number	100%	100%
E01_02	Software Creator	100%	100%
E01_03	Software Name	100%	100%
E01_04	Software Version	100%	100%
E02_01	EMS Agency Number	100%	100%
E02_04	Type of Service Requested	100%	100%
E02_05	Primary Role of the Unit	100%	100%
E02_06	Type of Dispatch Delay	64%	72%
E02_07	Type of Response Delay	68%	79%
E02_08	Type of Scene Delay	68%	70%
E02_09	Type of Transport Delay	63%	77%
E02_10	Type of Turn-Around Delay	64%	77%
E02_12	EMS Unit Call Sign	100%	98%
E02_16	Beginning Odometer Reading of Responding Vehicle	0%	48%
E02_17	On-Scene Odometer Reading of Responding Vehicle	<1%	63%
E02_18	Patient Destination Odometer Reading of Responding Vehicle	<1%	67%
E02_20	Response Mode to Scene	100%	100%
E03_01	Complaint Reported by Dispatch	83%	74%
E03_02	EMD Performed	0%	42%
E03_03	EMD Card Number	0%	21%
E04_01	Crew Member ID	100%	96%
E04_02	Crew Member Role	97%	95%
E05_02	PSAP Call Date	100%	88%

Improving Data Quality & Completeness

Evaluating the Success of the South Carolina Statewide Data Improvement Plan

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² Emergency Medical Services and Trauma, South Carolina Department of Health and Environmental Control, Columbia, SC, USA.



INTRODUCTION

The South Carolina (SC) Bureau of EMS uses prehospital patient care data submitted to the Pre-Hospital Medical Information System (PreMIS) for system performance improvement initiatives including setting benchmarks, identifying trends, detecting weaknesses, and researching new treatments. Data quality issues such as inaccurate or missing data limit the ability to utilize these data for performance improvement. Recognizing the importance of valid and complete data, the South Carolina Bureau of EMS initiated a multi-faceted statewide Data Improvement Plan in 2013 to facilitate a wider range of data driven performance improvement initiatives.

OBJECTIVES

To evaluate impact of the SC Bureau of EMS 2013 Data Improvement Plan.

METHODS

In SC, it is required that 100% of prehospital care reports (PCRs) in the state be submitted to PreMIS.

Data errors are defined as responses to SC required elements that are either impossible, such as an arrived scene time that is prior to the dispatch time, or are missing/not reported.

Statewide data quality scores (DQS) are calculated by averaging the number of data errors per PCR for records submitted to PreMIS.

In 2013, SC Bureau of EMS instituted a Data Improvement Plan designed to reduce the DQS statewide. This plan consisted of:

- Training all SC Bureau of EMS staff on the NEMSIS standard and data submission requirements.
- Targeted training to EMS agencies throughout SC.
- Institution of a Data Oversight Subcommittee to the SC EMS Advisory Council
- Rule requiring all agencies have a data manager.

DQS was monitored regularly through August, 2016 to evaluate the success of the SC Data Improvement Plan.

The data analysis was completed using Microsoft® Excel software (Redmond, WA) and STATA® 12.1 software (College Station, TX).

This study was determined to be exempt from IRB review by the Office of Human Research Ethics at University of North Carolina - Chapel Hill

RESULTS

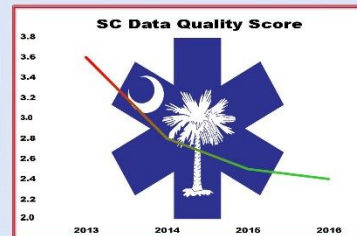


Figure 1: Trend line examining Data Quality Score (average data quality or validation errors per PCR) since the South Carolina Bureau of EMS instituted the Data Quality Improvement Plan.

In January 2013, the statewide DQS average was 3.6 errors per PCR. The first meeting of the SC Data Oversight Subcommittee took place in June of 2013. By December of 2013, the statewide DQS decreased 22.2% to 2.8 errors per PCR. The initial training of SC Bureau of EMS staff and EMS agencies statewide was completed by December 2014. In January 2015, the statewide DQS further decreased by 10.7% to 2.5 errors per PCR. The requirement for all agencies to have a data manager on staff was put in rule in June 2016. Following full implementation of the SC Data Improvement Plan, the statewide DQS average decreased a total of 33.3%, from 3.6 errors per PCR in January of 2013 to 2.4 errors per PCR in August of 2016.

LIMITATIONS

The Data Quality Score is the first line or highest level assessment of data. It provides a the average number of data quality or validation errors per PCR. Further quality assurance and quality assessments must be made on PCR data to ensure EMS Technicians are accurately recording patient encounters using NEMSIS documentations best practice standards.



DISCUSSION

The SC Bureau of EMS makes no distinction between EMS service type and requires all licensed agencies to submit data to PreMIS. While the Bureau of EMS and other EMS stakeholders consider air medical, first responder, interfacility, and medical convalescent data important, it primarily utilizes data from 911 response agencies with transport capability to make assessments and important decisions regarding patient care.

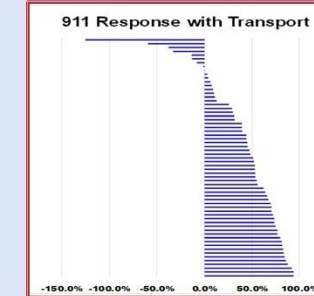


Figure 2: Horizontal bars represent a SC 911 response agency with Transport capability and tracks the percentage of improvement during the course of the Data Improvement Plan.

During this timeframe, 87% of agencies with 911 transport capabilities improved their data quality. The increase in data quality has provided South Carolina EMS the ability to reliably address a wide range of performance improvement initiatives in a more efficient manner.

CONCLUSIONS

Each phase of the SC Data Improvement Plan resulted in statewide improvements in data quality and completeness with a 33.3% overall decrease in the average number of errors per PCR. This work suggests that statewide improvements in EMS data can be achieved with direction from the EMS state office and cooperation from the EMS community.



NAEMSO 2016 Fall Meeting



Improving Data Quality & Completeness

- In 2013, SC Bureau of EMS instituted a Data Improvement Plan designed to reduce the data quality score (DQS) statewide.
- This plan consisted of training all SC Bureau of EMS staff on the NEMSIS standard and data submission requirements.
- This training was also provided to EMS agencies throughout SC.
- Further, the SC Bureau of EMS added a statewide Data Oversight Subcommittee to the SC EMS Advisory Council
- Required, in rule, that all agencies have a data manager.



Improving Data Quality & Completeness

- ▶ Each phase of the SC Data Improvement Plan resulted in statewide improvements in data quality and completeness with a **33.3%** overall decrease in the average number of errors per PCR.
- ▶ Statewide improvements in EMS data can be achieved with direction from the EMS state office and cooperation from the EMS community.

National Data

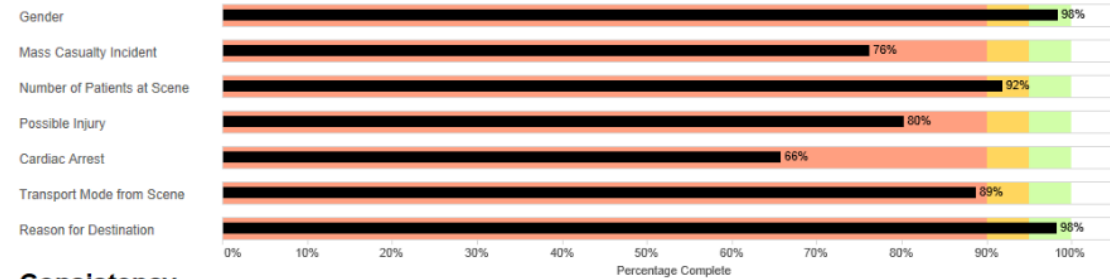


National EMS Information System (NEMSIS)
Helping Unify EMS Data

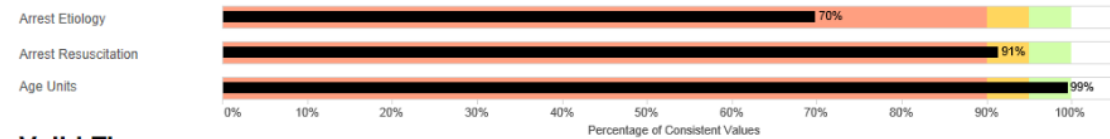
2.2 Data Quality Dashboard

The goal of the data quality dashboard is to present key metrics related to the quality and quantity of data submitted to NEMSIS for the defined reporting period. The dashboard is composed of three supporting reports which allow the data manager to obtain more detail on each measure (Completeness, Consistency, and Valid Times).

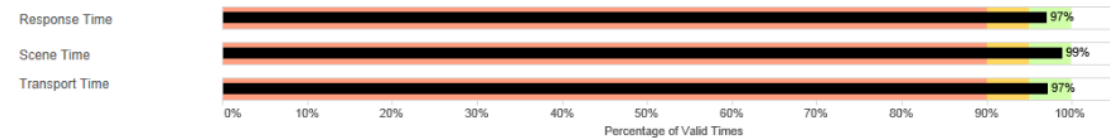
Completeness



Consistency



Valid Times



National Data

NEMSIS
TECHNICAL ASSISTANCE CENTER

National EMS Information System (NEMSIS)
Helping Unify EMS Data

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Home The Project Reporting Tools Version 3 Version 2 Reference Materials Support Contact Info

Home > Reporting Tools > Request NEMSIS Data

07-Sep-2016

Request NEMSIS Data

The 2015 NEMSIS Public-Release Research Dataset is now available! This dataset includes 30,206,450 EMS activations submitted by 10,137 EMS agencies serving 49 states and territories during the 2015 calendar year. Events submitted by states do not necessarily represent all EMS events occurring within a state. In addition, states may vary in criteria used to determine the types of EMS events submitted to the NEMSIS dataset. To evaluate variation in inclusion criteria and the proportion of EMS events submitted by each state, visit <http://www.nemsis.org/support/stateProgressReports/index.html> and click on each state of interest.

To determine which states contributed to the 2015 dataset, click on this [link](#). A User Manual associated with the NEMSIS Public-Release Research Dataset is available at this [link](#). Initial SAS code is available to import an [ASCII file to SAS](#), translate [M:M tables to a flat file](#), generate a [data specification file](#) and, transform [age and date/time values](#).

The 2015 NEMSIS Public-Release Research Dataset does not contain information that identifies patients, EMS agencies, receiving hospitals, or reporting states. To access the list of NEMSIS Version 2.2.1 National Elements and those shared at the public level please click [here](#). Limited identifying information is available in the complete NEMSIS dataset, but may only be accessed with formal institutional review and approval by the NEMSIS TAC Advisory Board. In essence, identifying information may only be released in compliance with HIPAA requirements. To make a request for data including additional NEMSIS variables, contact N. Clay Mann (clay.mann@hsc.utah.edu).

Much care was taken to ensure that the data are as clean as possible. All data submitted by states must comply with the XML standard and are exposed to several hundred error rules. However, for the most part, the NEMSIS TAC does not correct identified errors. The NEMSIS TAC does not have the resources to require states or agencies to correct errors retrospectively, but errors are reported to states, with hopes of future data refinement. Thus, the information contained in this dataset are provided as reported by states.

To obtain a DVD containing the 2015 NEMSIS Public-Release Research Dataset complete a [request form](#) and e-mail it (with electronic signature), or post mail the request form (with written signature) to:

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How Do I Measure Performance?



A photograph of two EMS workers in black uniforms loading a patient onto a yellow stretcher and into the back of an ambulance. The patient is lying on the stretcher, and the workers are focused on the task. The background shows a blurred outdoor setting with trees.

**Improving Patient Care &
Demonstrating Value to
Your Community**

<http://emscompass.org/>



▶ **Stroke-01: Suspected Stroke Receiving Prehospital Stroke Assessment**

Status:
[Public Comment](#)

Domain: Stroke

Clinical Area: Stroke

Description:

To measure the percentage of suspected stroke patients who had a stroke assessment performed by EMS

▶ **Stroke-08: Emergency Department Diagnosed Stroke Identified by Prehospital Stroke Assessment**

Status:
[Public Comment](#)

Domain: Stroke

Clinical Area: Stroke

Description:

Measures the percentage of emergency department diagnosed stroke patients who had a positive stroke assessment by EMS

▶ **PEDS-03: Documentation of estimated weight in kilograms – pediatric**

Status:
[Public Comment](#)

Domain: Clinical

Clinical Area: Pediatric Medication Error

Description:

Frequency that weight or length based estimate are documented in kilograms

▶ **Trauma-04: Trauma patients transported to trauma center**

Status:
[Public Comment](#)

Domain: Clinical

Clinical Area: Trauma

Description:

Hypoglycemia-01: Treatment Administered For Hypoglycemia

Status:

Public Comment

Type:

Process

Domain:

Clinical

Clinical Area:

Hypoglycemia

Description

Measure of patients who received treatment to correct their hypoglycemia

Numerator

Patients receiving treatment intended to correct hypoglycemia (food, administration of oral glucose, dextrose, or glucagon)

Denominator

Patients identified as being hypoglycemic with a blood sugar of <60mg/dl originating from a 911 request

Rationale

Displays the number of patients who received EMS intervention that is intended to correct hypoglycemia

Pseudocode Numerator

eMedications.03 Medication Given =
(4832 - Glucagon (IN – generic)
4850 - Glucose (IN – generic)
237653 – D50
237648 - D10
260258 - D25
309778 - D5W
309806 – D5 ½ NS
OR
eProcedures.03
710925007 - Provision of food (procedure)
225285007 - Giving oral fluid (procedure)

Pseudocode Denominator

WHERE
eVitals.18 Blood Glucose Level < 60 AND eResponse.05 -
Type of Service Requested = 2205001 - 911 Response
(Scene)



NEMSiS Data Dictionary

NHTSA v3.4.0
Build 160713 Critical Patch 2

EMS Data Standard

Version Date: July 13, 2016

Funded by
National Highway Traffic Safety Administration (NHTSA)
Office of Emergency Medical Services

Numerator

Denominator

Hypoglycemia-01: Treatment Administered For Hypoglycemia

NEMSIS Version 3.4.0.160713CP2 eMedications.03

State National

eMedications.03 - Medication Given

Definition

The medication given to the patient

National Element	Yes	Pertinent Negatives (PN)	Yes
State Element	Yes	NOT Values	Yes
Version 2 Element	E18_03	Is Nillable	Yes
Usage	Required	Recurrence	1 : 1

Associated Performance Measure Initiatives

Airway Cardiac Arrest Pediatric STEMI Stroke Trauma

Attributes

NOT Values (NV)

7701001 - Not Applicable 7701003 - Not Recorded

Pertinent Negatives (PN)

8801001 - Contraindication Noted 8801003 - Denied By Order 8801009 - Medication Already Taken 8801019 - Refused

Constraints

Data Type	minLength	maxLength
string	2	7

Data Element Comment

List of medications based on RxNorm (RXCU) code.

Reference the NEMSIS Suggested Lists at: <http://nemsis.org/v3/resources.html>

RxNorm

Website - <http://uts.nlm.nih.gov>

Product - UMLS Metathesaurus

Website - <http://www.nlm.nih.gov/research/umls/rxnorm/docs/rxnormfiles.html>
Product - RxNorm Full Monthly Release

eMedications.03 Medication Given =

(4832 - Glucagon (IN - generic)

4850 - Glucose (IN - generic)

237653 - D50

237648 - D10

260258 - D25

309778 - D5W

309806 - D5 1/2 NS

Published: 07/13/2016

www.NEMSIS.org

NEMSIS Version 3.4.0.160713CP2

eProcedures.03

State National

eProcedures.03 - Procedure

Definition

The procedure performed on the patient.

National Element	Yes	Pertinent Negatives (PN)	Yes
State Element	Yes	NOT Values	Yes
Version 2 Element	E19_03	Is Nillable	Yes
Usage	Required	Recurrence	1 : 1

Associated Performance Measure Initiatives

Airway Cardiac Arrest Pediatric STEMI Stroke Trauma

Attributes

NOT Values (NV)

7701001 - Not Applicable 7701003 - Not Recorded

Pertinent Negatives (PN)

8801001 - Contraindication Noted 8801003 - Denied By Order 8801019 - Refused

Constraints

Data Type	maxInclusive	minInclusive
integer	999999999999999	100000

Data Element Comment

Procedures which are recorded as a Vital Sign do not have to be documented in the Procedure Section. Code list is represented in SNOMEDCT. Reference the NEMSIS Suggested Lists at: <http://nemsis.org/v3/resources.html>

SNOMEDCT

Website: http://www.nlm.nih.gov/research/umls/Snomed/snomed_main.html
Product: Product - UMLS Metathesaurus

eProcedures.03

710925007 - Provision of food (procedure)

225285007 - Giving oral fluid (procedure)

Published: 07/13/2016

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NEMSIS Version 3.4.0.160713CP2

eVitals.18

State National

eVitals.18 - Blood Glucose Level

Definition

The patient's blood glucose level.

National Element	Yes	Pertinent Negatives (PN)	Yes
State Element	Yes	NOT Values	Yes
Version 2 Element	E14_14	Is Nillable	Yes
Usage	Required	Recurrence	1 : 1

Associated Performance Measure Initiatives

Pediatric Stroke

Attributes

NOT Values (NV)

7701001 - Not Applicable 7701003 - Not Recorded

Pertinent Negatives (PN)

8801001 - Contraindication Noted 8801003 - Denied By Order 8801009 - Medication Already Taken 8801019 - Refused

Constraints

Data Type	minLength	maxLength
string	2	7

Data Element Comment

Report "600" for "High" and "20" for "Low".

eVitals.18 Blood Glucose Level < 60

NEMSIS Version 3.4.0.160713CP2

eResponse.05

State National

eResponse.05 - Type of Service Requested

Definition

The type of service or category of service requested of the EMS Agency responding for this specific EMS event

National Element	Yes	Pertinent Negatives (PN)	No
State Element	Yes	NOT Values	No
Version 2 Element	E02_04	Is Nillable	No
Usage	Mandatory	Recurrence	1 : 1

Associated Performance Measure Initiatives

Airway Cardiac Arrest Pediatric Response STEMI Stroke Trauma

Code List

Code	Description
2205001	011 Response (Scene)
2205003	Intercept
2205005	Interfacility Transport
2205007	Medical Transport
2205009	Mutual Aid
2205011	Public Assistance/Other Not Listed
2205013	Standby

Data Element Comment

"Interfacility Transfer" has been changed to "Interfacility Transport." "Public Assistance/Other Not Listed" added for EMS expanded scope events such as elderly assistance, injury prevention, public education, immunization programs, etc.

Published: 07/13/2016

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Improving Systems of Care Through Meaningful Measures

www.emscompass.org

11/30/16 EMS Compass® Vendor Readiness Key

Numeric Value **Self-Reported Vendor EMS Compass® Readiness Score**

1	Automatic Software has capability to "turn on" Compass defined performance measures by local EMS agency request without additional fees/charges to be incurred.
2	Manual (by vendor) Software has capability to provide data export/report of Compass defined performance measures by local EMS agency request without additional fees/charges to be incurred. Programming, reporting, exporting is done by vendor in a timely manner (same week).
3	Manual (by local EMS agency) Software has capability to provide data export/report of Compass defined performance measures by local EMS agency request without additional fees/charges to be incurred. Programming, reporting, exporting is done by local EMS agency as needed.
4	Not now but is planned Does not have capability to provide data export/report of Compass defined NEMSIS v3 based performance measures but reports they plan to do so with release of their NEMSIS v3 based system.
5	No current plans Does not have capability to provide data export/report of Compass defined NEMSIS v3 based performance measures and/or does/will not have a NEMSIS v3 product.
6	Incomplete Vendor has not volunteered their level of Compass Readiness.

EMS Compass® Ready
Version 14; 11/30/16

NEMSIS Compliance data taken from
<http://nemsis.org/v3/compliantSoftware.html>
on June 21, 2016



NEMSIS Version 3.3.4 and 3.4.0 Software Vendors For EMS Agencies

Software Company	Product Name	Product Version	Current Standard Tested	Date NEMSIS-Compliant	EMS Compass® Ready
American Medical Response	MEDS	4.0	v3.3.4	3/10/2015	1
ESD Solutions	FHR	5.0.0	v3.3.4	12/11/2015	1
Imagifund, Inc.	Imagifund File	1	v3.3.3	12/22/2014	1
American Ambulance	Simco	2.0.0	v3.4.0	2/24/2016	2
emsCharts, Inc.	emsCharts.com	4	v3.3.4	8/21/2015	2
Physio-Control	HEALTHEMS	5x	v3.3.4	2/25/2015	
Starwest Tech	Zoi	1.0	v3.3.4	7/24/2011	
World Advancement of Technology for EMS and Rescue	Street EMS	3.0	v3.4.0	9/15/2011	
ZOLL	ePCR	6.0	v3.3.4	10/10/2011	
Beyond Lucid Technologies, Inc.	MedView	2014	v3.3.3	12/11/2011	
Forti Holdings Inc.	ePCR	v3.6	v3.4.0	8/1/2015	
Intermedix	EMTix 4.0	4.0	v3.3.4	6/29/2011	
OCI Software	AMBUPDS EMS	35	v3.4.0	6/28/2011	
Application Data Systems Inc.	DatatorWeb File & EMS	3.1	v3.3.4	8/21/2011	

NEMSIS Compliance data taken from <http://nemsis.org/v3/compliantSoftware.html> on June 21, 2016



NEMSIS Version 3.3.4 and 3.4.0 Software Vendors For State Systems

Software Company	Product Name	Product Version	Current Standard Tested	Date NEMSIS-Compliant	EMS Compass® Ready
Digital Innovation, Inc.	UX NEMSIS Aggregator	2014.0r	v3.3.4	10/1/2014	1
ESD Solutions	Health Data Exchange	1.x	v3.3.4	10/20/2014	1
Imagifund, Inc.	Imagifund File	1	v3.3.3	12/11/2014	1
ZOLL	ZOLL Device	1.0	v3.3.4	4/1/2015	2
Conscience	Master	5.x	v3.3.4	7/8/2015	3
Intermedix	911Tix CDX	4.0	v3.3.3	1/20/2014	4
Center for Advanced Public Safety	RESOLVE Submission Aggregator	1.0.0	v3.3.4	1/20/2015	6
EMS Data Systems	EMScan	3	v3.3.4	11/18/2015	6
World Advancement of Technology for EMS and Rescue	Street Sense Street Analytics	2.0	v3.4.0	12/29/2015	6

NEMSIS Compliance data taken from <http://nemsis.org/v3/compliantSoftware.html> on June 21, 2016

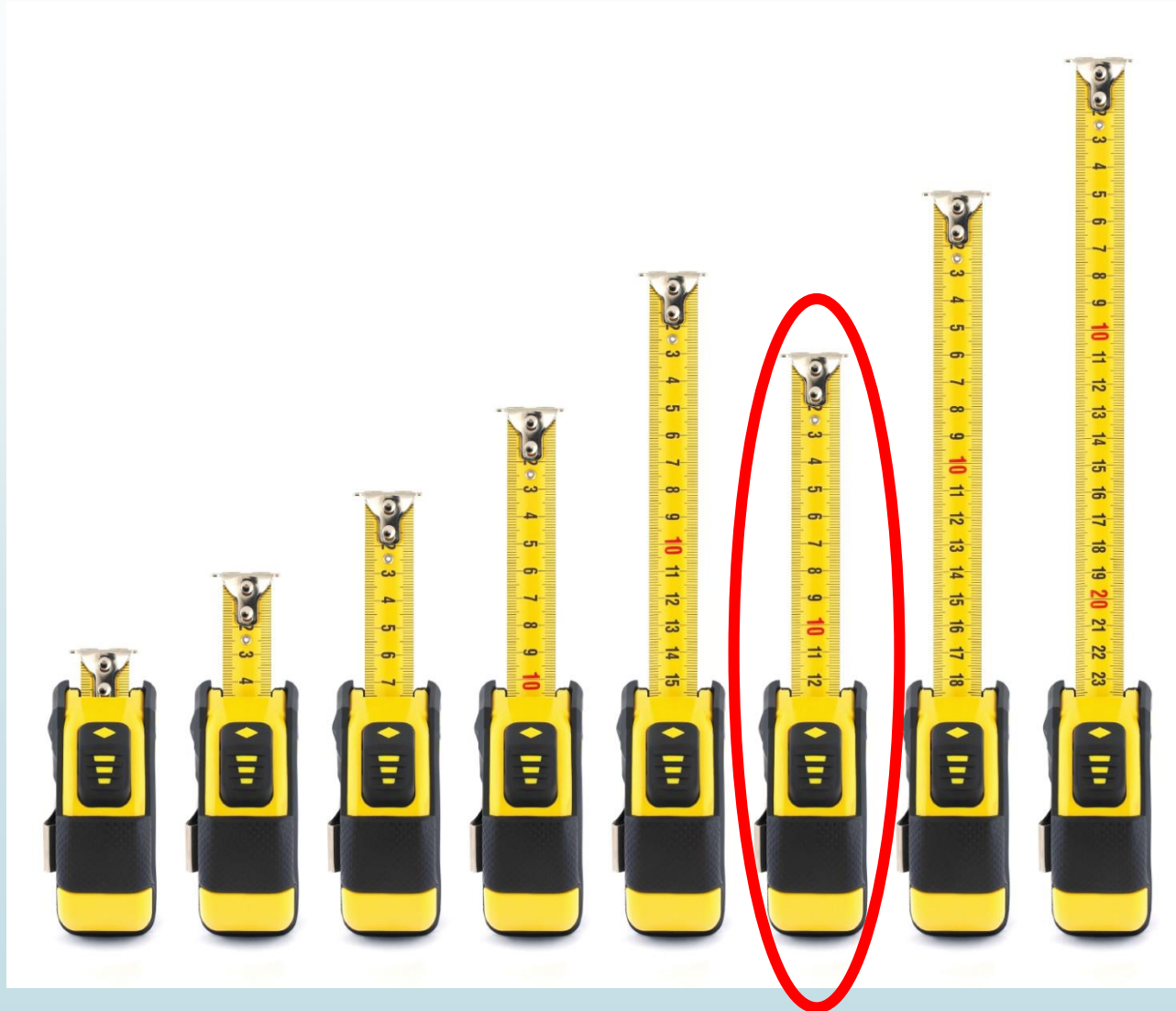


NEMSIS Version 3.3.4 and 3.4.0 Software Vendors For EMS Agencies

Software Company	Product Name	Product Version	Current Standard Tested	Date NEMSIS-Compliant	EMS Compass® Ready
Eos Logic Inc.	Pos PCR	5.0	v3.4.0	5/12/2016	5
A/R Concepts, Inc.	ARC ePCR	4.0.0.4	v3.3.3	2/4/2014	6
Action Ambulance	ePCR	08.01.05	v3.4.0	4/19/2016	6
AngelTrack LLC	AngelTrack	7.1	v3.4.0	6/9/2016	6
EmergData	Rescue Medic	3.3.4	v3.3.4	10/30/2015	6
EMS Consultants Ltd.	Perigo ePCR	3.0	v3.4.0	2/16/2016	6
FIREHOUSE Software, A Xerox Solution	111 Medic	3.0	v3.3.4	10/8/2015	6
Golden Hour Data Systems	Golden Hour Live	2015	v3.4.0	5/1/2016	6
			v3.3.4	12/29/2015	6
			v3.4.0	3/18/2016	6
			v3.3.4	6/10/2014	6
			v3.3.4	8/25/2015	6

NEMSIS Compliance data taken from <http://nemsis.org/v3/compliantSoftware.html> on June 21, 2016

Measurement vs. Standard Setting

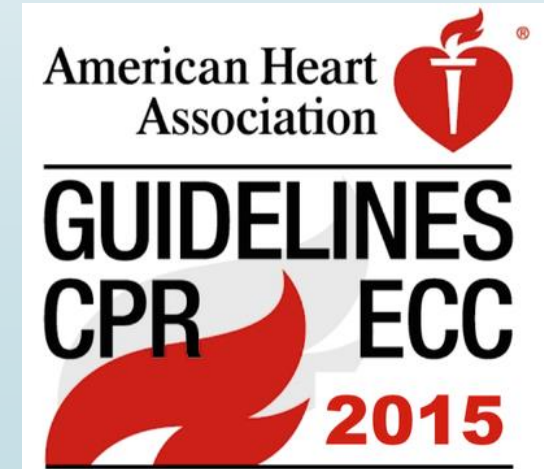


Measurement vs. Standard Setting

- ▶ Measurement tells you where you are



- ▶ Standards tell you where you should/want to be



Implementing Interventions

- ▶ Best to implement one intervention at a time
 - ▶ Otherwise it is difficult to identify what worked or did not work
- ▶ Allow enough time to see a difference
 - ▶ Usually two to three months depending on frequency
- ▶ Reassess using the same measurement



A dark blue arrow points to the right from the left edge of the slide. Several thin, curved lines in shades of blue and grey sweep across the left side of the slide, creating a dynamic, abstract background element.

Did we improve?

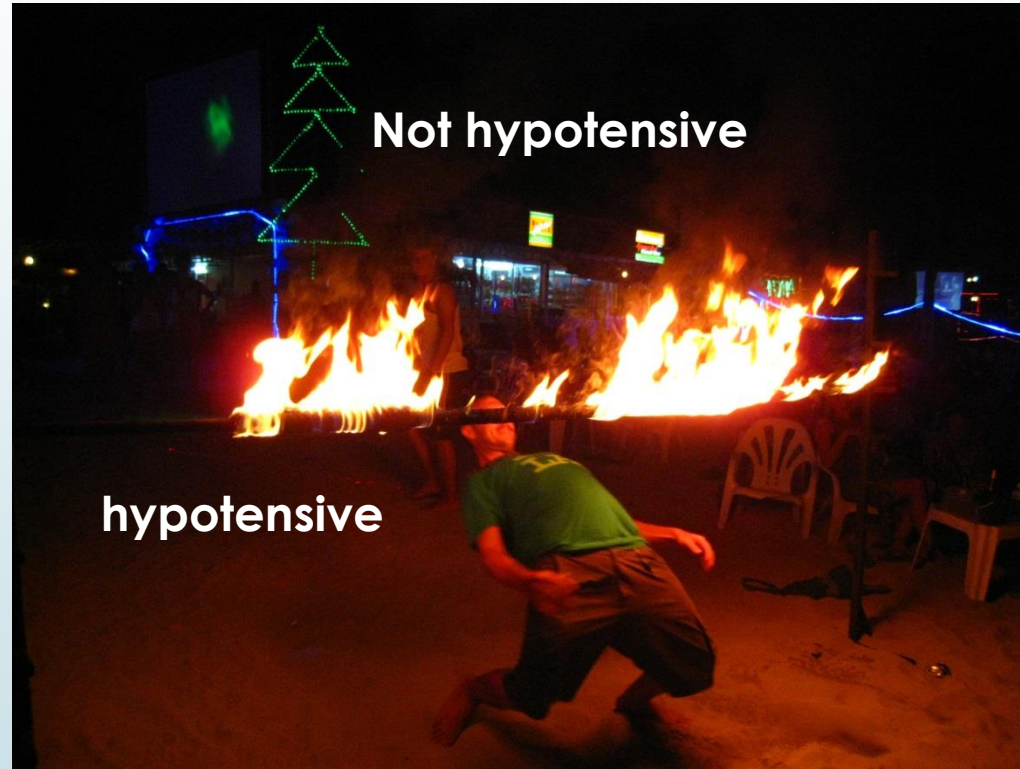
- ▶ Don't just rely on percentages
- ▶ Get a statistician (if you can!)
- ▶ You can do some things on your own in Excel:
<https://www.youtube.com/watch?v=jBejYHHkkY8>
 - ▶ Chi Square for categorical data
 - ▶ T-tests for continuous data



Stats

- ▶ Stats show your results are not due to chance alone (probably!)
 - ▶ Is difference seen between groups due to chance alone or likely a real difference?
- ▶ Stats tell if chance played a role in findings
 - ▶ Based on sample size and variability
- ▶ Stats do **not** tell you
 - ▶ Bias in study
 - ▶ Results are clinically significant

cut points



SBP= 90 mmHg

cut points



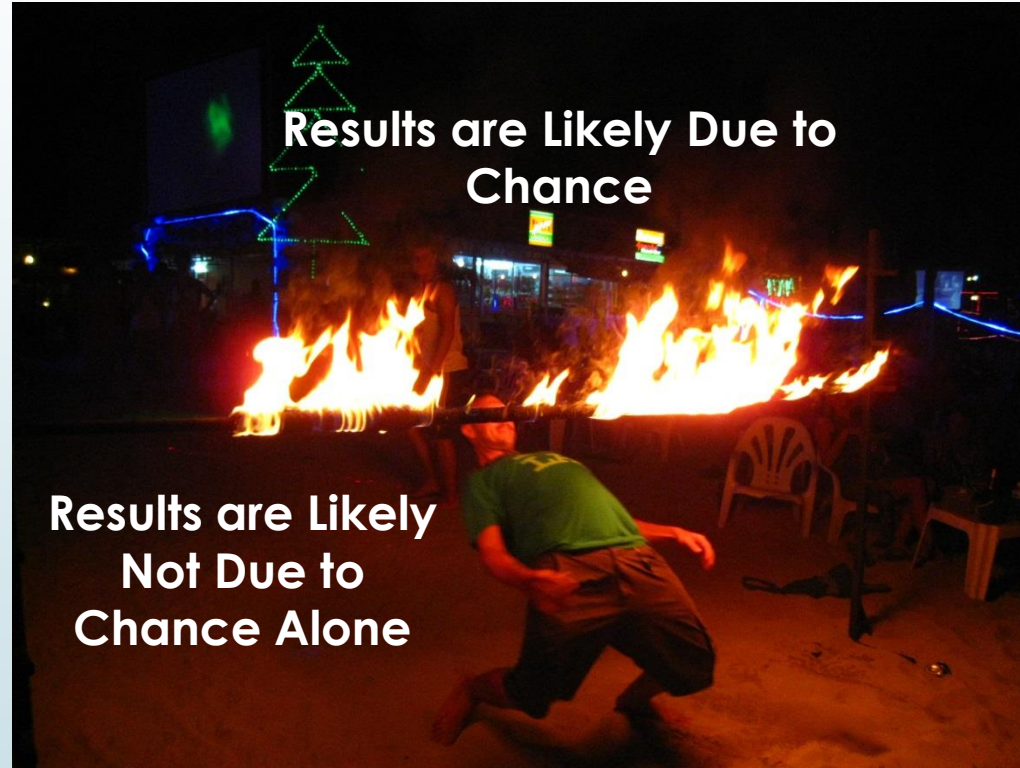
SpO₂ = 90%

What is Statistical Significance?



Pvalue=0.05

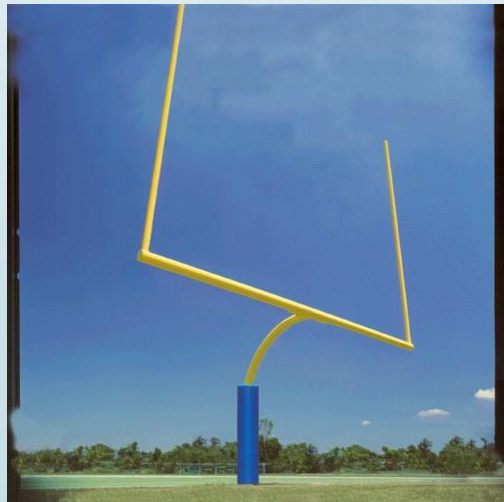
What is Statistical Significance?



Pvalue=0.05

What is a p-value?

- ▶ Probability of being wrong when asserting a difference exists
- ▶ How do you use it
 - ▶ Prior to starting study chose a threshold for α
 - ▶ Chance that you are willing to take of rejecting null hypothesis when it was true
 - ▶ Claiming there is a difference when there isn't



α commonly 0.05 or 1/20

What is a p-value?

➤ If $p < \alpha$

- Conclude there is a difference between groups
- Result is “Statistically Significant”

➤ If $p > \alpha$

- Therefore, conclude no difference
- Result is NOT “Statistically Significant”

What is a p-value?

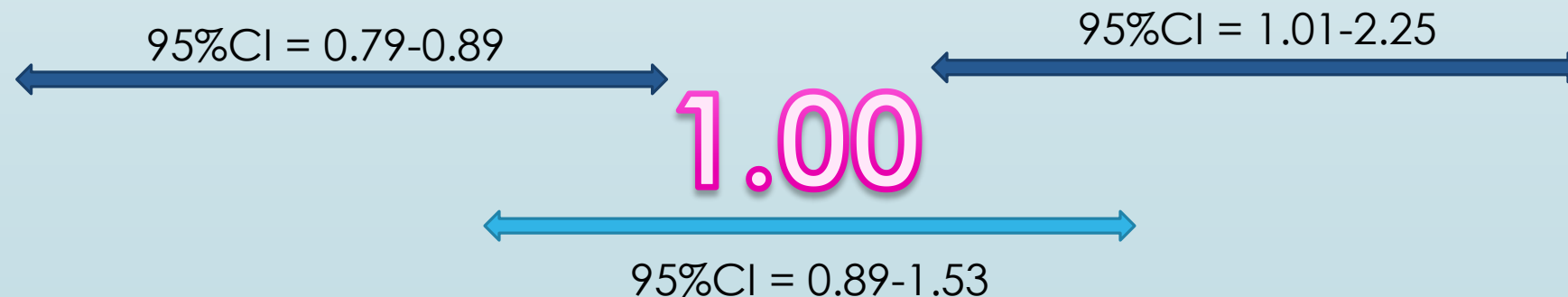
► Example:

$$\alpha = 0.05$$

- Difference in time is 3.1 min. and $p < 0.001$
- Conclude:
 - There is a statistically significant difference between groups
- If mean difference was 4.5 min. and $p < 0.156$,
- Conclude:
 - There is **not** a statistically significant difference between groups

Odds Ratios & Risk Ratios

- ▶ Dichotomous outcome (example: live or die)
- ▶ 1.00 is your line in the sand
- ▶ >1.00 = increased odds
- ▶ <1.00 decreased odds
- ▶ 95% Confidence Interval must not cross 1.00 for statistical significance



The computer makes it so easy

- There are many windows based statistical programs
 - SPSS, SAS, Stata, *Excel*, etc.
 - Relatively easy to run any statistical test
 - Knowing what to look for is important
- **WARNING:** computer will not say “you are doing it wrong”
 - Always produces an answer
 - $P=0.xx$



Publish and present your work!

- ▶ If it's not peer-reviewed and published, it's not accepted scientific fact!
- ▶ Start with an abstract
- ▶ Finish with a Manuscript!



How to develop a research abstract



CALL FOR ABSTRACTS
NASEMSO
Spring Meeting
New Orleans

March 6 – 9, 2017

The purpose of the NASEMSO abstract competition is to foster EMS and trauma system research and performance improvement in state EMS offices.

Accepted Topics/Components:

Abstracts must include: 1) INTRODUCTION, 2) OBJECTIVE, 3) METHODS, 4) RESULTS, and 5) CONCLUSION for a system performance improvement topic or epidemiological study related to EMS or trauma, such as: time sensitive illness or injury, investigations, inspections, education, special populations and data linkage.

Eligible Participants: A member of a state EMS office must be a listed author. EMSC staff and contracted medical directors are also eligible. Previously submitted (non-winning) abstracts are eligible if new data is incorporated and significant changes are clearly documented.

Judging Criteria: Abstracts will be judged by a team of state EMS officials on the authors' ability to **describe, analyze, intervene, measure, and implement** their idea

into the state system. Judges will also consider the **complexity** and **potential impact** of the research or initiative.

Format:

Abstract: Entries must be submitted in abstract format and be no more than one page in length, 12-point font, Times New Roman, 0.5" margins.

Display Format: If the abstract is to be displayed, it should be printed as a single 24" by 36" poster. Entrants are encouraged to display their posters at the meeting.

Due Date: February 10, 2017

Awards: The top 3 winners will be asked to briefly present their abstracts during the general session. They will also be awarded complimentary meeting registration at a future NASEMSO meeting for themselves or office member.

Submit questions and abstracts to:

Mary F Hedges
NASEMSO Program Manager
hedges@nasemso.org
(612) 669-2076

Abstracts from prior years are available at [Fall Meeting 2015](#) and [Fall Meeting 2016](#).

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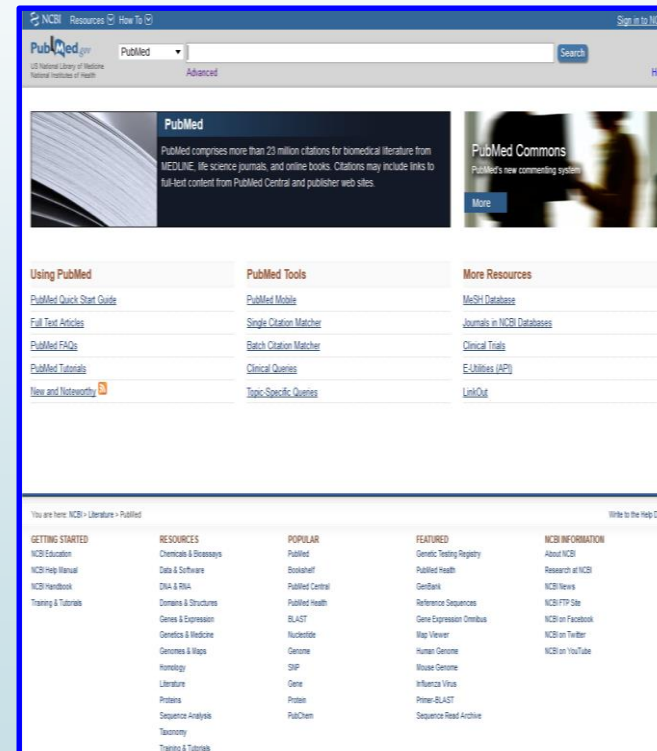
Research abstract structure

- Introduction
- Objective/hypothesis
- Methods
- Results
- Conclusion

Research abstract structure

➤ Introduction

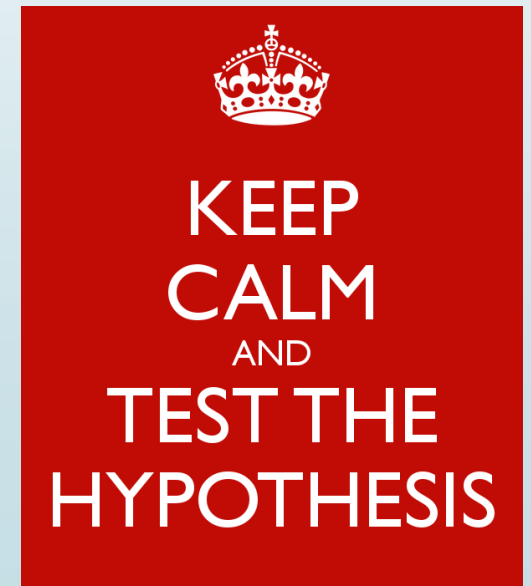
- Background
- Reason(s) for research
- Literature search →



<http://www.ncbi.nlm.nih.gov/pubmed/>

Research abstract structure

- ▶ Objective/Hypothesis
- ▶ Objective
 - ▶ Why did you do this project?
 - ▶ The objective(s) of this project were to....
- ▶ Hypothesis
 - ▶ Must be stated if you are doing hypothesis testing
 - ▶ It was hypothesized that X would be as good as y
 - ▶ It was hypothesized the x would be better than y



Research abstract structure

- Methods
 - Study population
 - What did you do?
 - Setting?
 - How did you do it?
 - What tests did you perform?
 - NOT what you found!
 - No results in your methods section!!



Research abstract structure

► Results

► What did you find?

- Do not include methods, introduction, or objective information in the results section

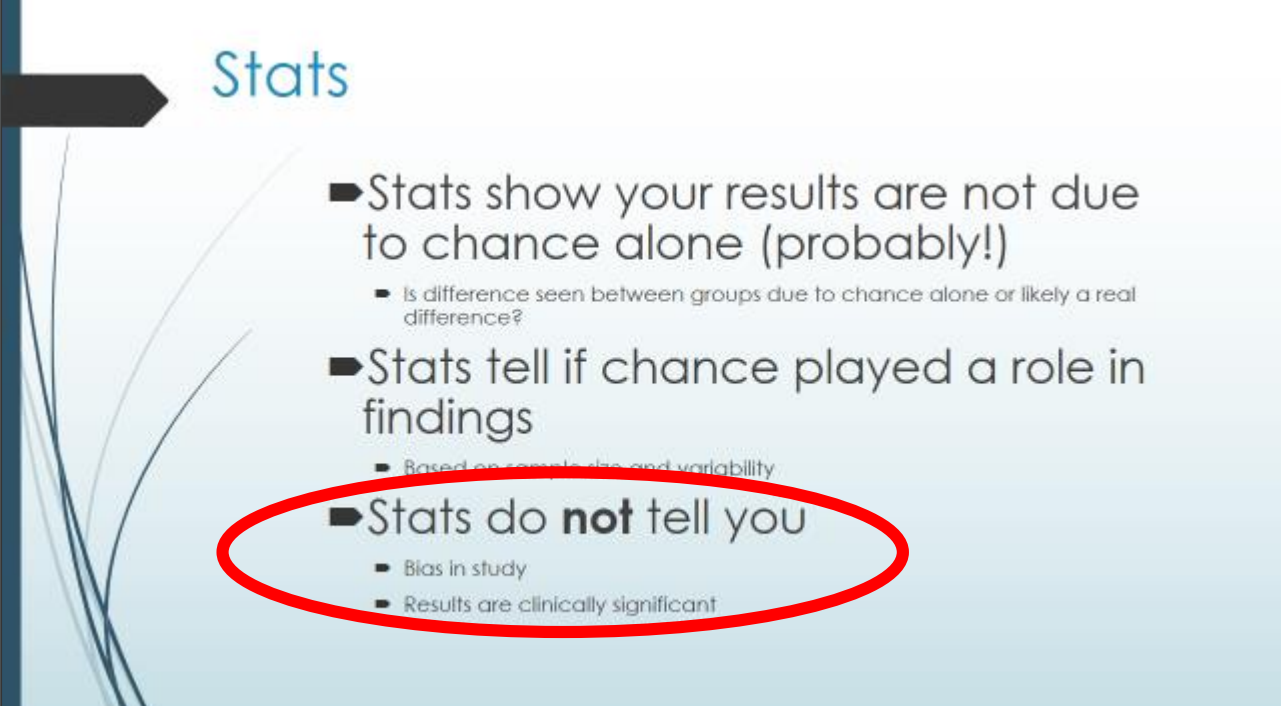
- In year X there were Y patients who we included in the study. Of these, Z patients had the outcome of interest.....



Research abstract structure

- Conclusion

- Summarize what you found



The inset slide is titled "Stats" and contains three main bullet points. The third bullet point, "Stats do **not** tell you", is circled in red. Each main bullet point has a sub-bullet point below it.

- Stats show your results are not due to chance alone (probably!)
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Research abstract structure



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Submit Abstract

- To submit an abstract online, please fill out the form below, and click "submit" at bottom.
- Abstracts in the category of *clinical*, *systems*, *management* and *personnel* will be presented at the Annual EMS Today conference. Abstracts in the category of *education* will be presented at the Annual National Association of EMS Educators Symposium and Trade Show.
- **Deadline for Submissions for EMS Today is October 31.**
- **Deadline for Submissions for NAEMSE is March 31.**

If you have any difficulty submitting your abstract, please contact David Skibo at (310) 312-9315 or by email at dskibo@mednet.ucla.edu

* = required information.

* Please choose one: Oral or poster presentation ▼

* Abstract Title:

* Category: Other ▼

This research has been approved by an institutional review board or animal/human subjects protection committee where appropriate.

This abstract is original and will not have appeared in a journal or have been presented at a meeting prior to the conference for which the abstract is being submitted.

* Abstract Text: Maximum length is 350 words if no chart/graph is associated with the abstract, or 250 words if a chart, graph or other image is provided.

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Submit Abstract



What is an IRB?

- ▶ The Institutional Review Board (**IRB**) is an administrative body established to protect the rights and welfare of human research subjects recruited to participate in research activities conducted under the auspices of the institution with which it is affiliated.

<http://research.oregonstate.edu/irb/frequently-asked-questions/what-institutional-review-board-irb>

Manuscripts

- Much longer!
- Discussion section
 - Put your results into context
 - How do your results compare to previous research
- Limitations section
 - What were the issues with your study?
 - What biases could be present?

Published, Peer-reviewed Literature



<http://www.ncbi.nlm.nih.gov/pubmed/>



Thank You

Questions?





Contact Info

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afernandez@emspic.org