EPOSTERBOARDS TEMPLATE

Abbas S. Tavakoli[1], DrPH, MPH, ME; Joan Culley[1] PhD, MPH, RN, CWOCN; Jane Richter[1], DrPH, RN; Sara Donevant[1], RN, MSN, CCRN, PhD Student; Jean Craig[2], PhD

[1] College of Nursing, University of South Carolina. [2] Medical University of South Carolina

ABSTRACT

Chemical incidents involving irritant chemicals such as chlorine pose a significant threat to life and require rapid assessment. This paper used data from the Validating Triage for Chemical Mass Casualty Incidents – A First Step R01 grant to determine the most predictive signs and symptoms (S/S) for a chlorine mass casualty incident. SAS® 9.4 was used to estimate sensitivity, specificity, positive and negative predictive values, and other statistics of irritant gas syndrome agent S/S for two exiting systems designed to assist emergency responders in hazardous material incidents (Wireless Information System for Emergency Responders [WISER] and CHEMM Intelligent Syndromes Tool [CHEMM-IST]). The result for WISER showed the sensitivity was .72 to1.0; specificity .25 to .47; and the positive predictive value and negative predictive value were .04 to .87, and .33 to 1.0; respectively. The results for CHEMM-IST showed the sensitivity was .84 to.97; specificity .29 to .45; and the positive predictive value and negative predictive value were .18 to 42, and .86 to .97; respectively.

INTRODUCTION

Disasters happen in the world every day. Disasters can be categorized into two categories: natural and unnatural. One of the greatest challenges is effective disaster response to all hazards events. Chemical incidents involving irritant chemicals such as chlorine pose a significant threat to life and require rapid assessment and triage. None of the current hospital-based triage systems are effective in establishing a triage priority for victims exposed to chlorine, an irritant gas syndrome agent.

PURPOSE

This paper used the SAS® 9.4 procedure to estimate sensitivity, specificity, positive and negative predictive values, and other statistics to determine the most predictive signs and symptoms (S/S) from two exiting systems designed to assist emergency responders in hazardous material incidents (WISER and CHEMMIST).

METHODOLOGY

This paper used data from the Validating Triage for Chemical Mass Casualty Incidents – A First Step RO1 grant. The data included 147 victims of a chlorine disaster and 150 patients that were not exposed to the chlorine disaster. All patients were treated at the same medical facility. Proc FREQ was used to estimate sensitivity, specificity, positive and negative predictive values, and other statistics with the 95% confidence interval and test both asymptotic and exact. The option BINOMIAL used in the exact statement provided all of the exact tests of the proportion. Macro was used to reduce coding.

RESULTS

Table 1 showed the sensitivity was from .72 to1.0. The specificity was from, .25 to .47. The positive predictive value and negative predictive value were from .04 to .87, and .33 to 1.0; respectively.

Table 2 showed the sensitivity was from .84 to .97. The specificity was from, .29 to .45. The positive predictive value and negative predictive value were from .18 to 42, and .86 to .97; respectively.

Table 3 showed the false positive probability was from .53 to .89. The false negative probability was from .06 to .28.

Table 4 showed the false positive probability was from .55 to .71. The false negative probability was from, .03 to .08

Table 1: Sensitivity, Specificity, Positive Predictive Value, and Negative Predictive Value (WISER)

Variables	SE	SP	PPV	NPV
Cough	.86	.32	.60	.67
Mouth Irritation	1.0	.23	.04	1.0
Cardiovascular	.76	.27	.36	.68
Shortness of Breath	.94	.47	.68	.86
Wheezing	.92	.34	.45	.88
Burning Irritation	.87	.33	.87	.33
Chest Discomfort	.84	.36	.55	.71
Choking	.87	.31	.59	.67
Hypoxia	1.0	.11	.61	1.0
Nausea	.74	.28	.32	.71
Vomiting	.72	.25	.19	.78

Table 3: False Positive Probability, and False Negative Probability (WISER)

Variables	FPP	FNP
Cough	.68	.14
Mouth Irritation	.77	*
Cardiovascular	.73	.23
Shortness of Breath	.53	.06
Wheezing	.65	.08
Burning Irritation	.67	.13
Chest Discomfort	.64	.16
Chocking	.69	.13
Hypoxia	.89	*
Nausea	.71	.26
Vomiting	.75	.28

Table 2: Sensitivity, Specificity, Positive Predictive Value, and Negative Predictive Value (CHEMM-IST)

Variables	SE	SP	PPV	NPV
Burning Throat	.97	.29	.24	.97
Wheezing	.92	.33	.42	.88
Shortness of Breath	.92	.45	.61	.86
Wet Lungs	.95	.30	.18	.97
Eye Irritation	.94	.32	.37	.93

Table 4: False Positive Probability, and False Negative Probability (CHEMM-IST)

Variables	FPP	FNP
Burning Throat	.71	.03
Wheezing	.67	.08
Shortness of Breath	.55	.08
Wet Lungs	.70	.05
Eye Irritation	.68	.06

CONCLUSION

The results indicated good sensitivity for both WISER and CHMESIT. However, the specificity was very poor for both WISER and CHEMM-IST. The results show very poor false positive probability for both WISER and CHEMSIT. The results for negative false positive were better for CHEMM-IST as compared to WISER. PROC FREQ in SAS provided all of these estimates with 95 % confidence interval.

EPOSTERBOARDS TEMPLATE

Abbas S. Tavakoli[1], DrPH, MPH, ME; Joan Culley[1] PhD, MPH, RN, CWOCN; Jane Richter[1], DrPH, RN; Sara Donevant[1], RN, MSN, CCRN, PhD Student; Jean Craig[2], PhD

[1] College of Nursing, University of South Carolina. [2] Medical University of South Carolina

SAS SYNTAX

SAS Syntax

*** Calculate Sensitivity **;

```
ods rtf; ods listing close;
%macro se (q);  proc freq data=three order= formatted;        where &q =1;
 tables  dei_chlorineexposure / binomial(level="A-Yes");    exact binomial;
      title 'Sensitivity/ exposure as test/variables as response' &q; run;
 %mend se;
%se (r01_WISER_mouth_coughchk );
run; ods rtf close;  ods listing;  quit; run;
```

*** Calculate Specificity **;

```
ods rtf; ods listing close;
%macro sp (q);
    proc freq data=three order= formatted;        where &q =0;
    tables  dei_chlorineexposure / binomial(level="B-No");  exact binomial;
     title 'Specificity / exposure as test/variables as response' &q;  run;
 %mend sp;
%sp (r01_WISER_mouth_coughchk );
run;   ods rtf close; ods listing;  quit; run;
```

SAS SYNTAX (Continue)

*** Calculate Positive Predictive Value **;

```
ods rtf; ods listing close;
%macro PPV(q);
  proc freq data=three order= formatted;    where  dei_chlorineexposure =1;
      tables  &q / binomial(level="A-Yes");        exact binomial;  title 'PPV/exposure as test/variables as
response' &q;          run;
%mend PPV;
%ppv(r01_WISER_mouth_coughchk );
Run;  ods rtf close; ods listing; quit; run;
```

*** Calculate Negative Predictive Value **;

```
ods rtf; ods listing close;
%macro NPV(q);
  proc freq data=three order= formatted;    where  dei_chlorineexposure =0;
      tables   &q/ binomial(level="B-No");    exact binomial;
      title 'NPV/exposure as test/variables as response' &q;   run;
%mend NPV;
%Npv(r01_WISER_mouth_coughchk );
 Run; ods listing; quit; run;
```

ACKNOWLEDGEMENTS/CONTACT

 Abbas S Tavakoli, DrPH, MPH, ME

Clinical Associate Professor

USC, College of Nursing

Email: abbas.tavakoli@sc.edu

Website: http://www.sc.edu/nursing/faculty-staff/tavakolia.php

SAS® GLOBAL FORUM 2017

April 2 – 5 | Orlando, FL