Seasonal variation of potential bioterrorism-related incidents

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Background/Objective

- Staff that provide emergency on-call services often go through periods of heavier call volume.
- The Centers for Disease Control and Prevention (CDC) Division of Preparedness and Emerging Infections (DPEI) uses Situation Reports (SITREPs) and Incident Notices (INs) to monitor all calls received in the division.
- This study determined a statistical relationship between season and type of bioterrorism-related incident.
- In addition, this paper evaluated seasonal variation of the following potential-bioterrorism incidents:
  1) Unknown white powder/Suspicious package
  2) BioWatch issues
  3) Other incidents

Methods

- The authors reviewed all SITREPs/INs prepared by DPEI from January 2007-December 2009.
- An incident, even if it had one or more updates, was counted as one incident for purposes of this study.
- The potential bioterrorism-related incidents were grouped into the following: unknown white powder/suspicious package, BioWatch issues, and Other.
- Crosstabs and binomial logistic regression analyses were performed using SPSS 17.0. Type of incident was the dependent variable (dichotomous) and season was the independent variable (categorical).

Results

- Of the 123 incidents reported to DPEI, crosstab analysis (Number of incidents by Season) showed that there was a statistically significant relationship between season and type of potential bioterrorism-related incident (p=0.003).
- Logistic regression models indicated that:
  1) Unknown white powder issues were more likely to occur in the spring season compared to fall . (Model 1).
  2) BioWatch issues were more likely to occur in the fall season compared to summer or spring . (Model 2).
  3) Other issues were more likely to occur in the summer season compared to any season . (Model 3).

Number of incidents by Season

		Season				Total
		fall	spring	summer	winter	
Incident	Powder	9	15	14	11	49
	BioWatch	19	6	6	11	42
	Other	8	4	16	4	32
Total		36	25	36	26	123

Regression models (SPSS 17.0 output):
Potential bioterrorism-related incident (dichotomous dependent variable) and season (categorical independent variable)
Note: For easier interpretation of results, inverse of ORs and 95%CIs were calculated when appropriate.

Model 1. Powder (1,0); Reference category = Spring season

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
season_ref_spr			7.259	3	.064			
fall	-1.504	.561	7.186	1	.007	.222	.074	.667
winter	-.716	.569	1.579	1	.209	.489	.160	1.492
summer	-.857	.532	2.593	1	.107	.424	.149	1.205
Constant	.405	.408	.986	1	.321	1.500		

Model 2. BioWatch (1,0); Reference category = Fall season

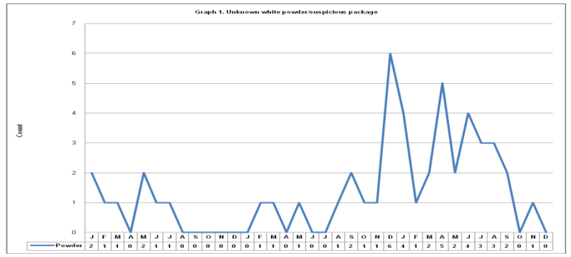
	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
season_ref_fall			11.542	3	.009			
spring	-1.264	.575	4.830	1	.028	.283	.092	.872
winter	-.421	.519	.660	1	.417	.656	.237	1.813
summer	-1.721	.558	9.506	1	.002	.179	.060	.534
Constant	.111	.334	.111	1	.739	1.118		

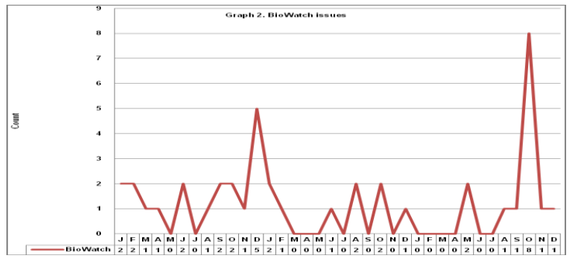
Model 3. Other (1,0); Reference category = Summer season

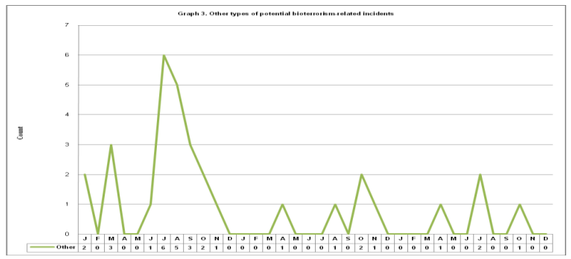
	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
season_ref_sum			8.874	3	.031			
spring	-1.435	.640	5.022	1	.025	.238	.068	.835
winter	-1.482	.639	5.381	1	.020	.227	.065	.795
fall	-1.030	.523	3.880	1	.049	.357	.128	.995
Constant	-.223	.335	.443	1	.506	.800		

Graphs – Seasonal Distribution of Potential Bioterrorism-Related Incidents

The following are graphs of the frequencies of potential bioterrorism-related incidents by month for 123 incidents reported to DPEI from Jan 1, 2007 – December 31, 2009.







Discussion

- The anthrax mailings of 2001 increased awareness of bioterrorism agents.
- Incidents involving powder/ suspicious packages are still very common post -9/11.
- BioWatch is designed to provide early warning of an aerosol pathogen release.
- Other incidents in this study included a clinical sample that tested positive for *Brucella sp.,* laboratory worker's potential exposure to *Bacillus anthracis,* smallpox vaccine adverse reaction, discovery of smallpox vaccine in a container purchased at a flea market, etc.
- Cross tabulation showed that some types of potential bioterrorism-related incidents did differ across different seasons. BioWatch environmental monitoring has required greater resource utilization in the fall.
- The models derived from the simple binomial regression predicted that certain incidents reported to DPEI are more likely to occur at a particular season compared to other seasons.
- We encourage other public health/emergency preparedness planners to examine their own seasonal variation of incidents. Such finding may be useful in planning and allocating resources, especially if seasonal variation continues to be observed.

Conclusion

- Findings of this study suggest a statistical relationship between season and type of bioterrorism-related incident, and possibly seasonal variations for types of bioterrorism-related incidents responded to by DPEI. More data should be collected and evaluated to confirm these findings.
- In order to prepare for a particular incident or seasonal response, it is imperative that health/ emergency preparedness planners ensure availability of personnel, financial and other resources.

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