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Improving Surveillance of Injury Deaths Using Probabilistic Data Linkage

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The Centers for Disease Control and Prevention's (CDC) "Recommended Framework for Presenting Injury Mortality Data" is a commonly used format for classifying injury deaths based on the external cause of injury code (E-code) reported on the death certificate (CDC 1997). The heart of this framework is a matrix consisting of 19 categories for the mechanism of injury (e. g., drowning, fall, or firearm) and five categories for the manner of injury (unintentional, suicide, homicide, undetermined, and other). The mechanism category for motor vehicle traffic (MVT) deaths is subdivided into the following classifications: occupant, motorcyclist, pedal cyclist, pedestrian, and unspecified. When we applied this matrix to Kentucky's death certificate file for 2001 (Kentucky residents only), we obtained the result shown in Figure 1 for the MVT category.

Figure 1. Distribution of MVT Deaths Before Linkage to CRASH File*

Person Type	Number	Percent
Occupant	400	54.1
Motorcyclist	61	8.2
Pedal cyclist	5	0.7
Pedestrian	48	6.5
Other	1	0.1
Unspecified	225	30.4
Total	**740**	**100.0**

This table demonstrates a common problem encountered when using E-coded death certificates to analyze injury fatalities: for some mechanisms, a large percentage of cases are coded into non-specific categories. In this case, nearly one-third of the MVT fatalities were classified as "Unspecified."

We were able to improve this situation considerably by using probabilistic data linkage (PDL) to join the death certificate (DC) file with the state motor vehicle crash report (MVC) file. We selected all MVT cases for Kentucky residents from the 2001 DC file, and linked these cases against the entire 2001 crash file using the following variables: age, gender, date of birth, collision date (linked with injury date or death date), collision hour (linked with injury hour or death hour), collision county (linked with death county). We identified 555 total matched pairs by this process. After visually inspecting the matches, we decided to keep only those for which the police report indicated a death, of which there were 514. Among the other 41 matches for which the police report did not indicate a death (9.3%), it appeared that some were likely to be good matches, but most were clearly false positives. This result was within our expected false positive tolerance of 10%, which we specified as part of the linkage process.

Analyzing these matches, we found that 172 of them (76%) were among the 225 coded as unspecified on the death certificate. The updated table for MVT deaths, including the unspecified cases reclassified through data linkage, is shown in Figure 2.

Figure 2. Distribution of MVT Deaths After Linkage to CRASH File*

Person Type	Number	Percent
Occupant	571	77.2
Motorcyclist	61	8.2
Pedal cyclist	5	0.7
Pedestrian	49	6.6
Other	1	0.1
Unspecified	53	7.2
Total	**740**	**100.0**

We reduced the percentage of unspecified cases from 30% to 7%. As it turns out, all but one of the cases we matched through data linkage were vehicle occupants; the other was a pedestrian. The percentage of occupants increased from 54% to 77%.

The issue of non-specific coding is not limited to death certificates. We have encountered this problem when analyzing E-codes in hospital discharge files and trauma registries as well. Probabilistic data linkage provides a tool for addressing this problem, but only for injuries for which there exists a second source of data that can be

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Update: Kentucky's Smallpox Response

Vaccination

As of December 1, the Kentucky Department for Public Health's smallpox program reported that over 770 individuals had been vaccinated and are considered protected. A total of 839 had been inoculated in the state. This number reflects all those who had received the vaccine, including those whose take responses have not yet been recorded. According to Dr. Doug Thoroughman, the CDC epidemiologist assigned to Kentucky to assist with bioterrorism preparedness and planning, over 1,000 persons have been trained to vaccinate in Kentucky. Plans are in place to continue to offer vaccination to smallpox response team members, including first responders, and KDPH will be working with local health departments in the coming months to help them schedule vaccination clinics where needed.

Federal Grant Cycles

The state was awarded $1.4 million for smallpox activities by CDC in the 2004 funding cycle, Dr. Thoroughman reported. Kentucky's 2004 bioterrorism cooperative agreement with the CDC, which funds the preparedness program, contains 19 smallpox-specific items spread through six of the program's focus areas.

Areas of Focus in the Coming Year

Three major activities are being highlighted in the in new grant cycle, which began August 31, 2003. These activities include:

Completion of all smallpox response plans

All local health departments and acute care hospitals will be asked to submit *workable* smallpox response plans during this grant cycle. Draft plans will be reviewed by DPH Focus Area staff members and written feedback provided for completion of the plans. Smallpox plans will be integrated into "all-hazards disaster response and recovery plans" across the state and will be coordinated with local plans for the Strategic National Stockpile (SNS—formerly the National Pharmaceutical Stockpile) and those of emergency management agencies. Local plans will identify smallpox response team members and sites for mass vaccination, and be designed to address both small and large scale outbreaks.

Training

Training sessions for all aspects of smallpox response will continue and expand in the new grant cycle. Clinicians will receive training on properly identifying and diagnosing rash illnesses while smallpox response team members will be trained through a variety of media (e.g.hands-on, distance learning, web-based) in crucial aspects of responding to a true smallpox outbreak.

Exercises

Plans are to conduct at least two exercises—one in a rural area and a second in a statewide setting—to test vaccine delivery issues. These will be coordinated with the Kentucky Division of Emergency Management and other local and statewide agencies within Kentucky. Additionally, most LHDs will be conducting independent smallpox tabletop exercises with their local Emergency Management Office throughout the year.

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joined to the primary file. To the authors' knowledge, MVT injuries are the only type for which this is currently the case.

For those interested in learning more about probabilistic data linkage and its applications in public health and surveillance, visit the KIPRC web site: http://www.kiprc.uky.edu/projects/codes/links.htm

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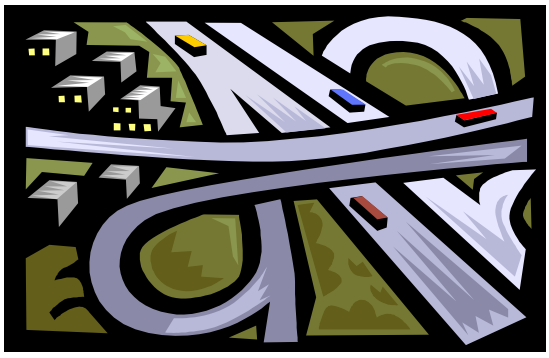
* Deaths that occurred in 2001 but were entered into the death certificate file for 2002 because they were reported to the Vital Statistics department after January 1, 2002, were not included in the data set used for this analysis. Therefore, the numbers presented here slightly undercount the MTV deaths for 2001.



Acknowledgement

We thank George Robertson for his ongoing assistance with our efforts to make use of the state death certificate files for injury surveillance.

References

Centers for Disease Control and Prevention. *Recommended framework for presenting injury mortality data*. MMWR 1997; 46 (No. RR-14).

Vital Statistics to Introduce New Electronic Application

Yvonne Fernandez, Project Manager, Vital Statistics, Cabinet for Health Services

The Vital Statistics (VS) branch office at Frankfort is scheduled to put a new electronic application into production on January 1, 2004. The objective of this system is to reduce the time it takes from the time a birth occurs to the time the VS branch receives the birth certificate information, and to automate and improve on procedures and the current mainframe system. Other objectives are to replace the current VAX Vital Statistics accounting system and IBM mainframe birth information system with one integrated VS system. The new Vital Statistics system will manage vital records accounting, electronic birth transference from the hospitals, amendments, and printing of certified copies. The name of the application system is QSTVRS. This system will also have the ability to incorporate processing for deaths, marriages, and divorces, as well as possess the future capability to securely print certified copies at remote regional offices. The demonstration of these capabilities of other life events and remote printing will be present but will not be implemented until sometime in the future.

Early this year, five hospitals were contacted for their interest in participation in a parallel test of the system before it goes live. The hospitals selected to be contacted were based on those that had the largest volume of births each year. The hospitals that agreed to participate in the parallel test later this year are Central Baptist Hospital, Frankfort Regional Medical Center, Mary Chiles Hospital, Inc., Georgetown Community Hospital, and Norton Hospital Suburban.

The application QSTVRS will have a centralized Microsoft SQL Server database housed on a server located at the Vital Statistics branch office. Users will have the ability to access the application through a web site, and logins will be assigned to approximately two staff identified by the hospital.

The current route a birth certificate takes is from being filled out at a hospital, then to the local health department in the county in which the hospital is located, and finally to the VS branch office. Kentucky law legislates that hardcopy birth certificates will continue to go this route. However the VS branch will not need to wait for the birth certificate to arrive there in order to get all the information on a birth. It will be entered into the centralized database immediately. Hospitals will be able to print (uncertified) birth certificates from the system, which will be sent to local health departments. Once a birth record is saved in the centralized database the hospitals will no longer have access to this record due to the confidential nature of amendments that might be made to birth records at the VS branch.

The plan is to bring approximately five hospitals online with this system each month. This will depend on the volume of births of the hospitals. More hospitals may be brought at a quicker pace, if manageable, or fewer may be brought online if necessary. Ultimately, most or all hospitals would be brought online. It is the responsibility of the hospitals to prepare for the new system in terms of having computers with the minimum system requirements and internet access of 256K or higher to access the system.

Youth Survey Shows Decrease in Tobacco Use

The 2002 Kentucky Youth Tobacco Survey (KYTS) was conducted by the Kentucky Department for Public Health from March to June 2002. The survey gathers information on the prevalence of tobacco use among young people and numerous other tobacco related issues. The completed survey of Kentucky middle and high school students shows a decrease in current tobacco use. However, tobacco use among Kentucky's young people is still high when compared to the national average. Like the first survey in 2000, the results will be used to develop youth smoking prevention efforts.

"This is really encouraging news," said Dr. Rice C. Leach, Public Health Commissioner. "While the changes are not big, they are clearly in the right direction. I congratulate those young people and the adults in their lives who are helping them stay away from tobacco products. They are taking steps to keep the next generation healthy and prevent some of the unrelenting increases in health care costs."

Among the findings in the 2002 survey were:

- Current tobacco use among high school students dropped from 37% in 2000 to 34% in 2002. For middle school students, usage declined from 22% to 15%. There was a significant drop for seventh graders—from 28% in 2000 to 17% in 2002. (Current tobacco use is defined as using a tobacco product one or more days in the 30 days prior to the survey.)

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Youth Survey Shows Decrease In Tobacco Use

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- Approximately one in four eleventh and twelfth graders are frequent smokers. (Frequent smokers are defined as persons smoking cigarettes on 20 or more of the 30 days prior to the survey.

- Smoking rates increase for each grade level from sixth grade through the twelfth grade. One in five students are smoking by the time they reach the eighth grade. Current smoking rates are 27% and 42% for students in ninth and twelfth grades respectively.

Each year, 20,000 Kentucky children become new daily smokers. At current rates, almost 114,000 Kentucky young people will die prematurely from smoking. The state's high school smoking rate in 2002 was 34% compared to the national average of 22.9% reported in the 2002 National Youth Tobacco Survey (NYTS).

Evidence points to two major factors that will reduce tobacco consumption: higher prices and a sustained statewide media campaign, according to the American Journal of Preventive Medicine (February 2001) and the Centers for Disease Control and Prevention's Office of Smoking and Health. Until these two strategies are put in place, it will continue to be a struggle to significantly reduce youth initiation.

Kentucky's Tobacco Prevention and Cessation Program allocates tobacco settlement funds to local health departments to promote community interventions to decrease youth initiation. Local interventions include working with schools to teach prevention curricula for alcohol, tobacco, and other drugs (such as LifeSkills®). The program also promotes peer education programs such as Teens Against Tobacco Use and encourages schools to adopt 100% tobacco-free policies. The Tobacco Use Prevention and Cessation program receives funds from the Master Settlement Agreement and the Centers for Disease Control and Prevention.

The full report on the 2002 Kentucky Youth Tobacco Survey may be found at http://chs.ky.gov/publichealth/tobacco.htm. The NYTS is summarized in the November 14, 2003 MMWR, 52(45);1096-1098.

For a copy of the executive summary, contact Irene Centers, Program Manager, Tobacco Prevention and Cessation Program at irene.centers@mail.state.ky.us mailto:irene.centers@mail.state.ky.us. (or 502-564-7996, ext 3808)

2003 West Nile Virus Activity in Kentucky

West Nile virus season in Kentucky for 2003 was mild compared to the state's experience in 2002, according to Department for Public Health surveillance data reported to the Centers for Disease Control and Prevention (CDC) in Atlanta.

Kentucky reported 14 human cases of West Nile for 2003, including one death. The median age for Kentucky's cases in 2003 was 66.5 years, with half of the patients being female and half male. These cases were located in the following counties: Barren (2), Campbell (1), Clark (1), Clinton (1), Daviess (2), Fayette (1), Grant (1), Greenup (1), Hart (1), Kenton (1), Laurel (1), and Marion (1). The latest onset date for a positive human case was September 26, 2003.

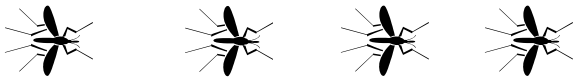
During the 2003 season in Kentucky, 102 horses tested positive, as well as 111 birds and 10 mosquito pools. Kentucky's surveillance and laboratory efforts for the year were extensive-with over 47,000 mosquitoes trapped, approximately 600 birds tested by the state's animal diagnostic laboratories and nearly 400 human specimens tested by the State Public Health Laboratory.

"Although we reported less West Nile activity this year, it would be premature to draw conclusions about what our experience will be in future seasons. We hope that Kentuckians will continue to take precautions to prevent mosquito breeding grounds by reducing standing water on their property and to protect themselves by wearing insect repellent and long sleeved clothing when they are outside during West Nile season," said Dr. Sue Billings, a veterinarian and epidemiologist coordinating West Nile activities for the Department for Public Health.

The peak of Kentucky's 2003 West Nile season occurred in September, approximately two to three weeks later than the peak period of activity for 2002.

Nationally 8,912 cases and 211 deaths have been reported from 45 states and the District of Columbia.

More information on West Nile virus is available at www.westnile.ky.gov.



Cases of Selected Reportable Diseases in Kentucky
(YTD Through November for each Year)

Disease	2003	2002	5 year median
AIDS	178	258	251
Chlamydia	7381	8124	7420
Gonorrhea	3298	3476	3298
Syphilis *(Prim. & Sec.)*	32	85	80
Group A Streptococcus	43	19	26
Meningococcal Infections	19	15	24
Haemophilus influenzae, invasive	6	7	7
Hepatitis A	31	42	46
Hepatitis B	71	50	50
E.coli O157H7	26	33	40
Salmonella	368	366	366
Shigella	124	185	229
Tuberculosis	113	122	121
Animal Rabies	37	26	30
Motor Vehicle Injury Deaths	855	829	770

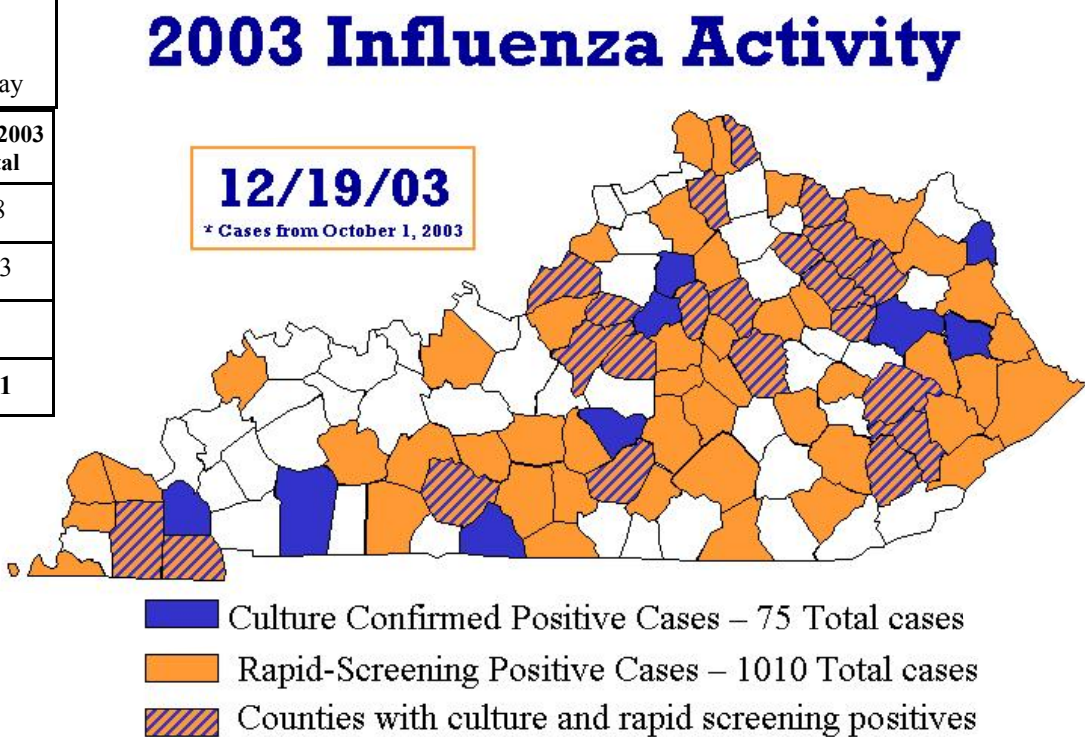
Vector-Borne	2003 YTD	Total in 2002
Rocky Mountain Spotted Fever	3	5
Lyme Disease	15	25
Ehrlichiosis	4	2
Tularemia	2	2
Arboviral Encephalitis	14	44
Malaria	9	8

Vaccine Preventable	2003 YTD	Total in 2002
Diphtheria	0	0
Measles	0	0
Mumps	0	3
Pertussis	45	103
Polio	0	0
Rubella	0	0
Streptococcus pneumoniae	17	19
Tetanus	0	0

Influenza Statistics for Confirmed Isolates

Influenza Season = Oct-May

Type	2003-2004 Thru Nov	2002-2003 Total
A	23	38
B	0	203
Unk	0	0
Total	**23**	**241**



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Dear Reader,

You may have noticed that you didn't find your copy of *Epidemiologic Notes and Reports* in your monthly mail. We haven't lost your address. Due to illness of our editor, Molly Cone, we have not been able to produce *Reports* on its regular monthly basis. Unfortunately, Molly is unable to continue her work on *Reports* or with the Division of Epidemiology and Health Planning. Her outstanding editorial skills will be missed and we hope her health returns.

A special thank you goes to Dr. Sue Billings and the staff in the Surveillance and Health Data Branch who completed this issue in their "spare time", and will continue to produce *Reports* until another editor can be found. We will do our best to resume regular publication with existing staff and appreciate your patience. As always, we will try to bring important information to you on a timely basis.

Sincerely,

Steven J. Englender, MD, MPH
Director, Epidemiology and Health Planning.

Fall-Winter Notes & Reports