pennsylvania
DEPARTMENT OF HEALTH
Bureau of Epidemiology

Pennsylvania Epi Notes

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Response to a Cluster of Carbapenem-resistant *Klebsiella pneumoniae* in a Philadelphia Long-Term Care Facility

The Philadelphia Department of Public Health (PDPH) was informed by a Philadelphia Hospital Infection Control Practitioner (ICP) on Oct. 16, 2012, of a cluster of four patients with Carbapenem-resistant *Klebsiella pneumoniae* (CRKP) at a long-term skilled nursing facility (SNF). Resistance to *Klebsiella pneumonia* and other Enterobacteriaceae is a growing problem across the country, with marked increased rates in the Northeast, including Pennsylvania.[1]

Enterobacteriaceae are a family of gram-negative bacteria, which includes *Klebsiella pneumoniae* and *E. coli*, normally found in the digestive tract. Enterobacteriaceae that have developed high levels of resistance to last-resort antibiotics called carbapenems are known as carbapenem-resistant enterobacteriacea (CRE). The most common mechanism of resistance is *Klebsiella pneumoniae* carbapenemase (KPC); however, the Centers for Disease Control and Prevention (CDC) has noted an increase in unusual forms of CRE traditionally found internationally. Some CRE strains have been found to be pan-resistant to all antimicrobials tested and can have mortality rates of 40-50 percent. Methods of CRE prevention include hand washing and contact precautions (see box).

Upon notification of the CRKP cluster, PDPH contacted the SNF infection control nurse to investigate the cases and discuss prevention. An initial site visit was conducted on Oct. 22, 2012, to complete chart review and educate the facility. This was followed by a point prevalence study of the entire second floor (60 residents) using a contract laboratory and an infection prevention observational survey by PDPH on Nov. 1, 2012. The observational survey focused on handwashing, use of contact precautions, and environmental cleaning on each wing. PDPH in-serviced all staff on standard precautions, bloodbore pathogens and special precautions such as contact precautions.

The four cases had positive isolates collected between 9/13/12 and 10/13/12. All cases had several underlying conditions, and one was deceased at the time of investigation. Another case passed away after being transferred to a second facility, which also was unaware of CRKP, highlighting the need for city-wide education. It was discovered that the four patients were on all three of the SNF's floors, with two cases on the third floor.

During the initial site visit, it was found that patients with positive CRKP isolates were not placed under contact precautions. The point prevalence survey completed during the second visit did not find additional cases. The observational survey noted minor deficiencies in hand hygiene and contact precautions. In November 2012, two additional cases in the SNF's residents were reported by the hospital. The facility did a second randomized

CRE Prevention Methods

- Hand hygiene
- Contact precautions
- Education of healthcare personnel
- Minimizing use of invasive devices
- Patient and staff cohorting
- Laboratory protocol for notification
- Antimicrobial stewardship
- CRE screening

(Carbapenem-resistant *Klebsiella pneumoniae* Cluster continued)

point prevalence survey and one resident was found to be colonized with CRE. Contact precautions were reviewed with the facility, and no additional cases were seen until January 2013, when one additional case was detected again by the reporting hospital.

Figure 1: *Klebsiella pneumonaie* bacterium

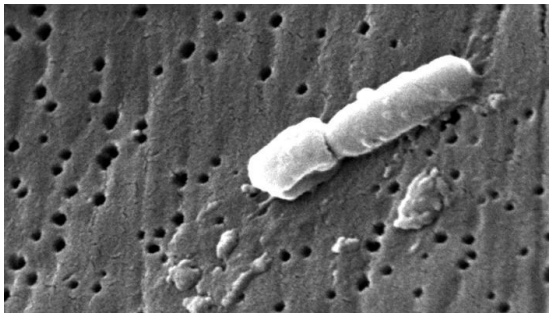

Figure courtesy of CDC/Janice Carr

In Philadelphia, CRE incidence is not well understood due to a lack of surveillance, which provided an early challenge in investigating the cluster at the SNF. A survey was created based on the survey included in the CDC CRE Toolkit and was distributed to ICPs in December 2012, to better understand CRE prevalence, hospital interventions and interest in making CRE a reportable condition. Results are still pending, as we hope to increase the response rate. However, early indications suggest that CRE is already prevalent in the majority of Philadelphia hospitals. Another challenge of the investigation was determining which residents should be placed on strict contact precautions, because guidance does not exist on discontinuing contact precautions, an important consideration in a 'home setting' like long-term care.

PDPH has recognized the need for education and increased communication between transfer facilities. A multi-drug resistant organism (MDRO) initiative has been created by PDPH in response to growing levels of antimicrobial resistance. Future efforts include creation of a toolkit for long-term care facilities, an inter-facility transfer form, and an advisory group of healthcare professionals to determine city MDRO needs. Additional information about CRE can be found at http://www.cdc.gov/hai/organisms/cre/ and https://hip.phila.gov/xv/DiseaseInformation/CRE/tabid/305/Default.aspx.

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1. CDC. Making Health Care Safer: Stop Infections from Lethal CRE Germs Now. Vital Signs. March 5 2013. http://www.cdc.gov/vitalsigns/HAI/CRE/index.html.

Traumatic Brain Injury Hospitalizations and Deaths in Pennsylvania, 2000-2010

According to the CDC, an estimated 1.7 million individuals sustain a traumatic brain injury (TBI) annually.[1] "A TBI is caused by a bump, blow or jolt to the head or a penetrating head injury that disrupts the normal function of the brain. Not all blows or jolts to the head result in a TBI. The severity of a TBI may range from 'mild,' i.e., a brief change in mental status or consciousness to 'severe,' i.e., an extended period of unconsciousness or amnesia after the injury. The majority of TBIs that occur each year are concussions or other forms of mild TBI."[2]

TBI is a contributing factor for one-third of all injury-related deaths in the United States.[3] The annual economic cost of TBI in the United States is estimated to be $60 billion.[4]

Hospital discharge data for this report were collected from the Pennsylvania Health Care Cost Containment Council. This agency is responsible for collecting patient data on all hospital discharges in Pennsylvania. Death data were obtained from the Pennsylvania Department of Health, Bureau of Health Statistics and Research, Division of Vital Statistics.

TBI-Related Hospitalizations

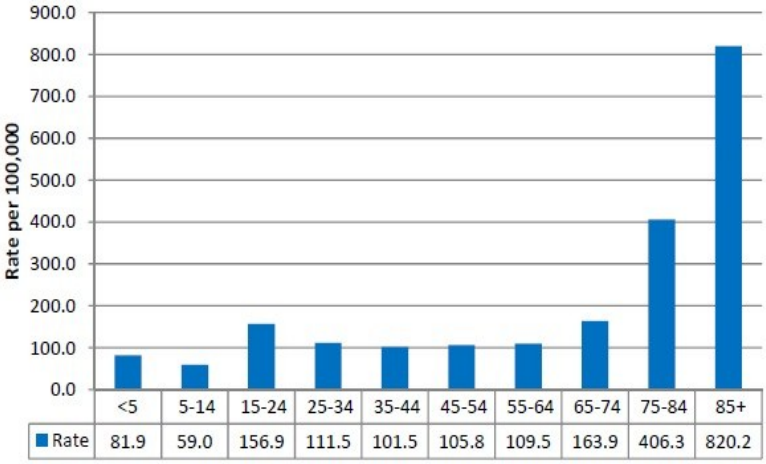
From 2000 to 2010, there were 194,298 patients hospitalized with a diagnosis of traumatic brain injury. From 2000 to 2006, the number of hospitalizations increased by 23.9 percent (from 15,564 to 19,281),

(Traumatic Brain Injury continued)

before declining to 17,857 hospitalizations in 2010 (a decrease of 7.4 percent from 2006). The rates of hospitalizations due to traumatic brain injury also increased from a low of 121.8 per 100,000 persons in 2000 to a high of 147 per 100,000 persons in 2006, before decreasing to a rate of 126.5 in 2010.

The distribution of TBI-related hospitalizations varies by age group, with the rate of hospitalizations consistently highest in the elderly (Figure 1). From 2000 to 2010, the age group with the highest age-specific rate for TBI-related hospital discharges was the 85+ age group (820.2 per 100,000). The lowest age-specific rate was 5 to 14 year age group (59 per 100,000). The age-specific rates began to increase in the 65 to 74 year age group.

Figure 1: TBI Hospital Related Discharge Rates by Age Group



The mean and median age of patients hospitalized with a traumatic brain injury has steadily increased over the last eleven years (Figure 2). From 2000 to 2010 the mean age increased by 18.7 percent from 46.6 years of age to 55.3 years of age, while the median age increased by 34.9 percent from 43 years of age to 58 years of age.

The majority of patients hospitalized with TBI are male, comprising nearly 60 percent of all cases and almost 70 percent of traumatic brain injury-related hospitalizations under the age of 65 years. However, females represent almost 57 percent of all traumatic brain injury-related hospitalizations in those individuals 65 years of age and older. The overall age-adjusted rate for males was 1.9 times higher than for females (175.4/100,000 versus 93.4/100,000). The rates for males are higher than for females in all age groups.

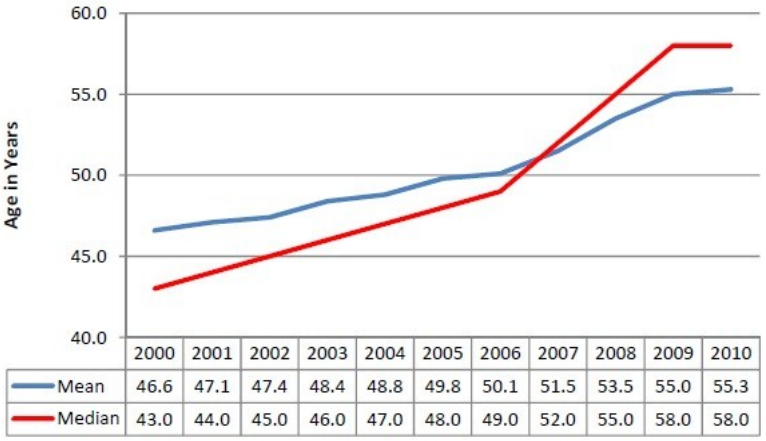
Whites accounted for the majority (78.3 percent) of traumatic brain injury hospitalization from 2000-2010. Blacks accounted for 10.8 percent. Compared to whites, blacks had the highest rates of traumatic brain injury hospitalizations for every age group from birth through age 64, while whites had higher rates in patients 65 years of age and older. The majority of patients had Medicare (33.8 percent), private (33 percent), or Medicaid (15 percent) insurance coverage. Uninsured patients represented 5.4 percent of TBI-related hospital discharges. The average length of stay was 5.4 days (range was from 1-1093 days), and the median length of stay was three days.

Causes of TBI

Falls, motor vehicle traffic incidents and assaults were the leading contributors to TBI-associated hospitalizations. Falls are the leading cause of TBI in Pennsylvania (46.7 percent). Falls account for 76.9 percent of all TBIs among adults 65 years of age and older.

The rates for TBI-related hospitalizations associated with motor vehicle-related incidents were higher in males in all age categories compared to females. The overall rate for males was 60.4 per 100,000 persons compared to 32.7 per 100,000 persons for females.

Figure 2: Mean and Median Age of TBI by Year



(Traumatic Brain Injury continued)

Among males, the rates of TBI-related hospitalizations associated with assault were highest in the 15 to 24 year, 25 to 34 year, 35 to 44 year, and 45 to 54 year age groups. Rates for males in each of these age groups was between 4.5 and eight times higher than females. For females, rates of TBI-related hospitalizations associated with assault were highest in the under 5 years of age category.

Disparities were also found among racial groups. Among blacks, the rate of TBI–related hospitalizations associated with assault was 5.4 times higher than whites. Among blacks, 23.9 percent of TBI-associated hospitalizations were attributable to assaults compared to 4.8 percent among whites. The age groups with the highest rates for blacks were the same as those for male assault victims.

Figure 3: Age-adjusted Rate of TBI Related Deaths by Year

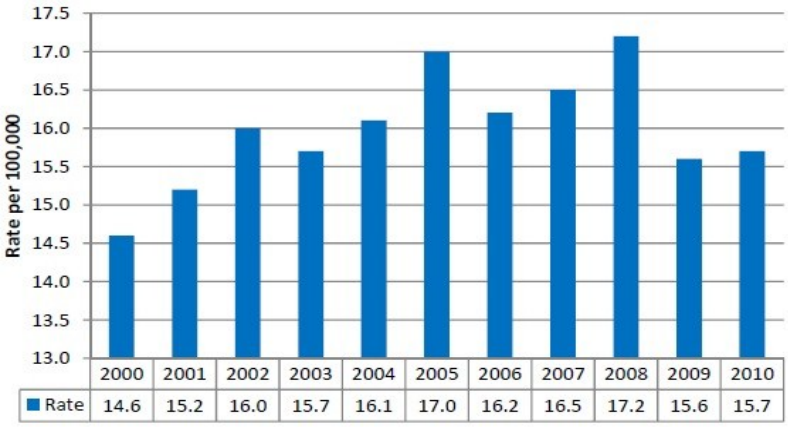
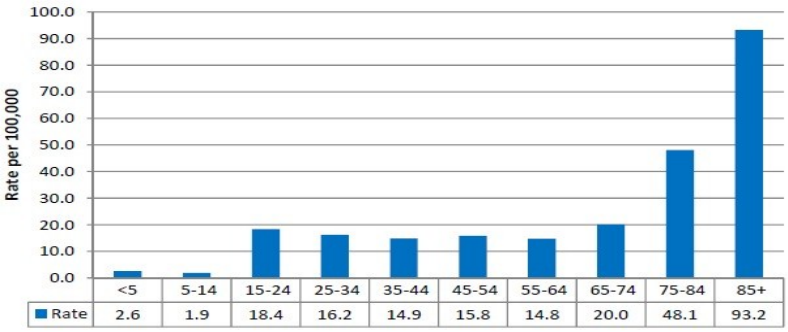


Figure 4: TBI Related Death Rates by Age Group



TBI-Related Deaths

Age-adjusted deaths rates for traumatic brain injury has varied between 2000 and 2010 (Figure 3). In 2000, the death rate was at a low of 14.6/100,000. By 2005, it had risen to 17/100,000, an increase of 17.8 percent. It dropped in 2006 before rising again to a new high of 17.2/100,000 in 2008. Since that time the death rate has decreased to 15.7/100,000 in 2010.

Age-specific death rates were the lowest in the 5 to14 year age group (1.9/100,000) and highest in the 65+ years of age group, peaking at 93.2/100,000 in the 85+ age group (Figure 4). Overall, males have a higher death rate related to TBI than females. This is consistent across all age groups.

Up until 2007, blacks had a higher death rate due to TBI than whites did. After a rise in death rates among blacks who have sustained a TBI to 20.1/100,000 in 2004, the death rates have shown a steady decrease to a low of 14.2/100,000 in 2010. Whites have had a fairly consistent TBI death rate with minor fluctuations. The rate for whites in 2010 was 15.9/100,000.

These findings suggest there are age, gender and racial disparities among those hospitalized in Pennsylvania with a diagnosis of traumatic brain injury. Preventive measures should focus on those at highest risk of TBI.

Data Sources

Pennsylvania Health Care Cost Containment Council (PHC4)
Pennsylvania Department of Health : Bureau of Health Statistics and Research

References

1,2.Faul M, Xu L, Wald MM, Coronado VG. Traumatic brain injury in the United States: emergency department visits, hospitalizations, and deaths. Atlanta (GA): Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010.
3. CDC. QuickStats: Injury and traumatic brain injury-related death rates by age—United States, 2006. MMWR 2010;59:303.
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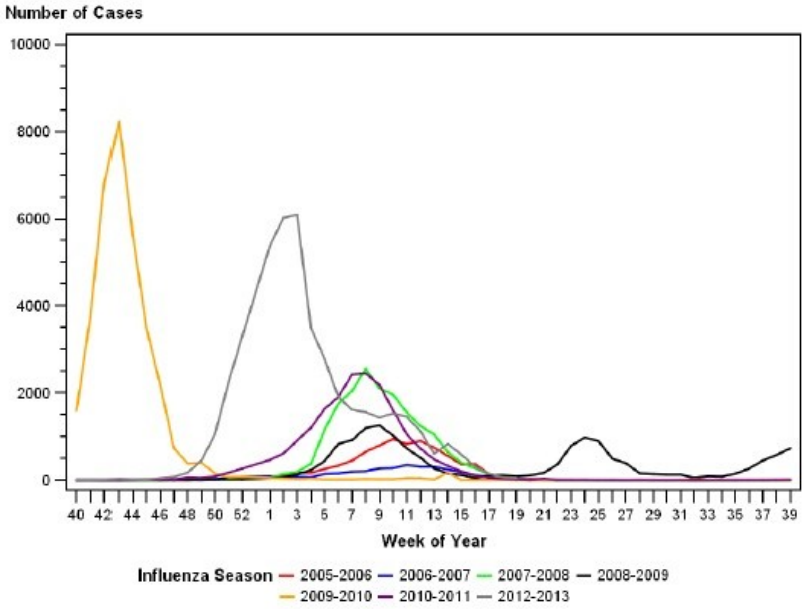
Influenza Update, Pennsylvania, 2012-2013

Influenza, or the flu, is a respiratory virus which is easily spread from person to person. Common symptoms include fever, cough, sore throat, runny nose, body or muscle aches, headache, and fatigue. Although some persons may experience vomiting and diarrhea, the flu is unrelated to gastrointestinal viruses, mistakenly referred to as the "stomach flu," which cause vomiting and diarrhea.[1]

Most persons with the flu will recover in a few days to a couple of weeks with rest; however, some persons may experience complications. Complications may include pneumonia, bronchitis, sinus infections, ear infections and even death. Complications are more common in small children, persons with certain chronic conditions like asthma, diabetes or heart disease, pregnant women, and the elderly.[1]

Figure 1: Cases Reported in the Last Seven Pennsylvania Influenza Seasons

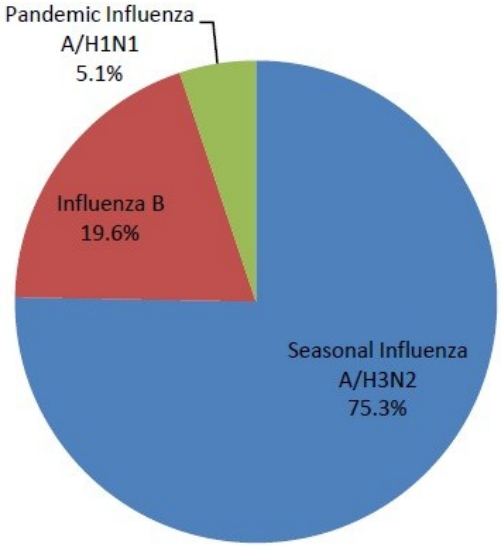


The flu season typically begins around October of each year and lasts until May of the following year. The 2012-2013 season started early and resulted in more cases than other recent seasons, with the exception of the H1N1 pandemic in 2009 (Figure 1). The large initial peak of the 2012-2013 season was primarily due to influenza A, and it occurred about five weeks earlier than normal. Because of the early influenza A season, influenza B, which typically peaks in early spring, appears as a small second peak.

Through April 6, 2013, over 43,000 cases of flu have been reported in Pennsylvania. However, the reported flu cases are only a fraction of the total flu cases in the population, as many persons do not see a physician when ill. If care is sought, flu tests are not always performed. Therefore, the total number of flu cases is likely much higher than the number of reported cases.

The dominant flu strain at the beginning of this season was the influenza A/H3N2 subtype, but influenza B became predominant towards the end of the season (Figure 2). About 8 percent of persons with flu were reported as having been hospitalized, and 190 deaths have been reported to date (about 0.4 percent of all flu cases). Four hundred ninety flu outbreaks have been reported this season, primarily in long-term care facilities. This is a sharp increase from last year's mild flu season in which just 29 flu outbreaks were reported.

Figure 2: Circulating Flu Strains, Pennsylvania, 2012-2013



Although this season's vaccine was reported to be a good match to the strains circulating this year, vaccine effectiveness was lower than expected, particularly in the older population. As reported in *Morbidity and Mortality Weekly Report* (MMWR), the overall vaccine effectiveness (VE) for the 2012-2013 season was 56 percent. For persons 65 and older, the VE was 9 percent. Although it is not known why the VE for older adults was lower than expected, it is possible older persons were unable to mount a sufficient immune response to the H3N2 strain in this season's vaccine.[2]

(Influenza continued)

Vaccination is still an important component in flu prevention, even for older adults. Even with low VE, vaccination still provides some protection against infection, and there is some evidence that the course of illness in vaccinated persons is less severe than in unvaccinated persons.[3] Other flu prevention strategies include hand washing, limiting contact with ill persons, limiting contact with others if you are ill and taking antivirals if prescribed.[4]

Figure 3: Influenza Incidence by Age Group, Pennsylvania, 2012-2013

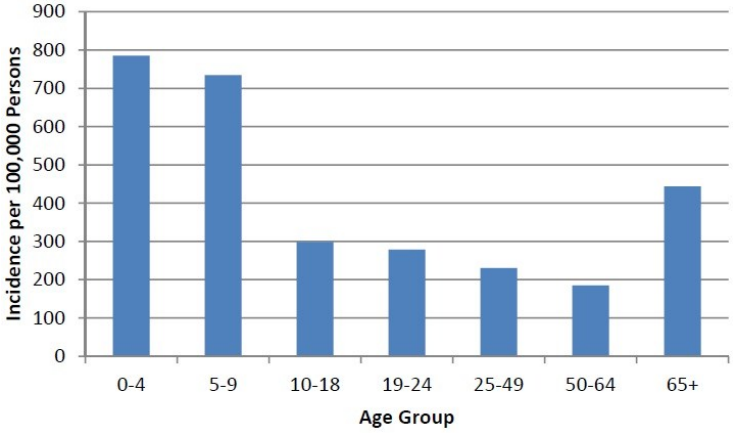
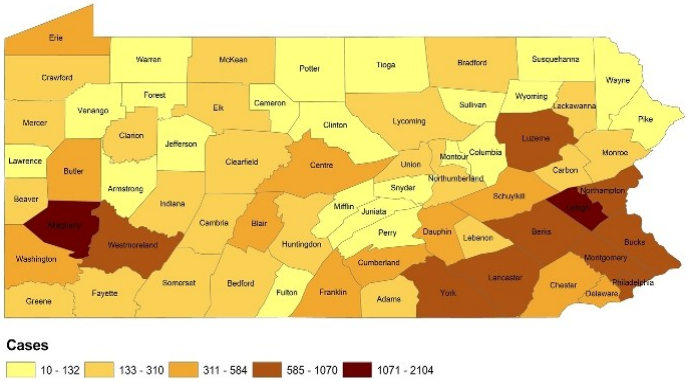


Figure 4: Geographic Distribution of Influenza Cases, Pennsylvania, 2012-2013



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1. http://www.cdc.gov/flu/about/disease/symptoms.htm
2. "Interim Adjusted Estimates of Seasonal Influenza Vaccine Effectiveness — United States, February 2013." *Morbidity and Mortality Weekly Report*, Feb 22, 2013, 62(07);119-123. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6207a2.htm?s_cid=mm6207a2_w
3. http://www.cdc.gov/flu/about/season/flu-season-2012-2013.htm#activity
4. http://www.cdc.gov/flu/protect/preventing.htm

Cases of select notifiable diseases in Pennsylvania*

(as of 5/18/2013)

	Total cases reported for previous 5 years				
Disease	2013 †	2012 †	2011	2010	2009
Chlamydia	20,217	54,993	52,884	47,518	43,068
Gonorrhea	5,000	15,390	13,770	12,883	10,138
Campylobacter	383	1,427	1,762	1,622	1,542
Salmonella	352	1,663	1,844	1,802	1,701
Giardia	187	651	792	783	837
Pertussis (whooping cough)	173	1,631	547	762	468
Varicella (chicken pox)	106	294	337	403	461
Cryptosporidiosis	60	287	457	484	465
Legionella	54	300	502	324	383
Shigella	25	126	121	634	1,201

* Confirmed cases only
† Case counts for 2012 and 2013 are provisional and subject to change. Counts

Disease Reporting

Healthcare practitioners, healthcare facilities and clinical laboratories are required to report certain diseases to the Pennsylvania Department of Health. In addition to the diseases on the list, all disease outbreaks and/or unusual occurrences of disease are reportable within the commonwealth. In most cases, reporting must be done electronically via Pennsylvania's version of the National Electronic Disease Surveillance System (PA-NEDSS). To request a PA-NEDSS account, healthcare providers may email PA-NEDSS@pa.gov; please include your contact information and the name and address of the facility for which you will be reporting.

Employment Opportunities

The State Civil Service Commission is currently accepting applications for the following Pennsylvania Department of Health positions:

Epidemiologist
Epidemiology Program Specialist
Epidemiology Research Associate
Public Health Physician

To apply, click on the links above or visit the Pennsylvania State Civil Service Commission website and click on Job Seekers.

Complete a civil service application for each position for which you are interested. Some positions also require an application supplement. The commission will send you the results of your examination or rating. If you meet the minimum requirements, your name will be placed on the list of eligible candidates (eligible list) for that job title according to your score. Positions in the merit system are filled from this pool of eligible candidates. When a job vacancy occurs, the hiring agency requests an eligible list from which to interview for that job title. If you are ranked high enough on the eligible list, you will be contacted for a job interview. See How to Get a Civil Service Job for more information.

Pennsylvania Epi Notes

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