



STATE OF WEST VIRGINIA
DEPARTMENT OF HEALTH AND HUMAN RESOURCES

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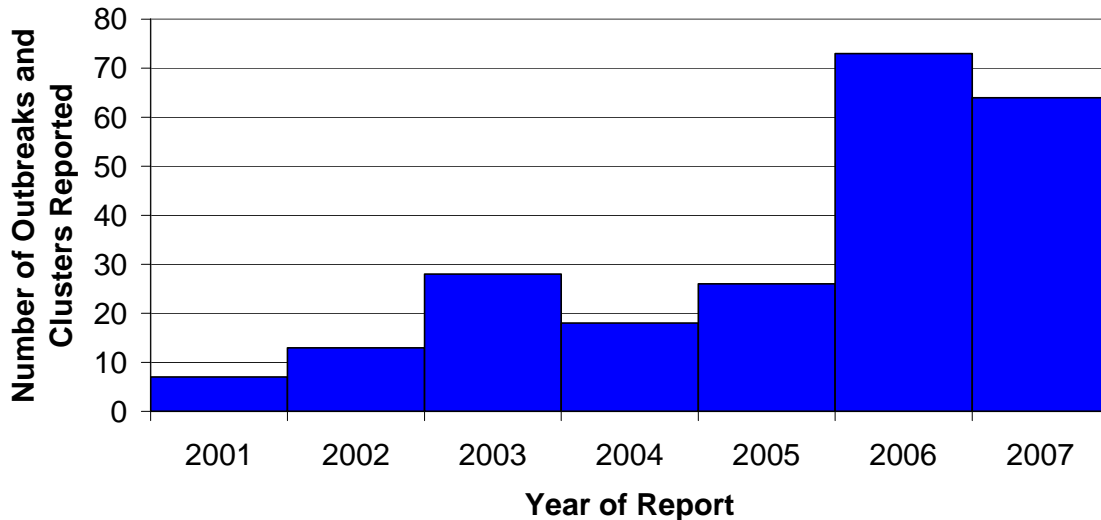
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Final Summary of Outbreaks, West Virginia, 2007

In West Virginia, outbreaks are immediately reportable from laboratories and health care providers to local health departments. Local health departments are responsible for investigating outbreaks and reporting findings to the Infectious Disease Epidemiology Program (IDEP) at the state level. IDEP is responsible for developing guidelines on outbreak reporting and investigation (1), and training and supporting local health departments in outbreak investigation. On an annual basis, IDEP summarizes outbreak investigations and lessons learned for the state of West Virginia. This summary reviews findings from confirmed outbreaks and clusters reported during the calendar year 2007.

Since 2001, the number of outbreaks reported in the state of West Virginia has increased markedly (Figure 1). The increase is attributed in part to improvements in public health infrastructure, training and communication. A change in the reported number of outbreaks also reflects changes in incidence of common viral infections such as norovirus or influenza. Improvements in defining and tracking outbreaks, as well as improvements in the availability of laboratory services have also contributed to the increase. Significant recent changes contributing to the occurrence of outbreaks include: 1) increased incidence of outbreaks due to norovirus during 2006-2007 (2); an extremely mild influenza season during 2006-2007; and use of more specific pertussis and community associated methicillin resistant *Staphylococcus aureus* (MRSA) outbreak definitions. Figure 1 shows the number of outbreaks and clusters confirmed in our state from 2001 to 2007.

Figure 1
Confirmed Outbreaks and Clusters, West Virginia, 2001 - 2007



As part of public health threat preparedness, IDEP has also placed increased emphasis on timeliness of outbreak notification. At the time that an outbreak is reported, the date and time of report to the local health department and the date and time of notification of the state health department are recorded on the outbreak intake form. During 2007, the mean (median) time for notification was 18 (1) hours with a range of 0 to 350 hours (2 weeks). However, notification time for the state or local health department or both was missing for 20 (31%) of outbreaks. Nonetheless, existing data suggest that state and local health departments notify each other of outbreaks within one hour for approximately half the outbreaks in the state.

Most outbreaks in 2007 were outbreaks of enteric illness; followed by rash illness and respiratory illness (Table 1). Local health departments in West Virginia reported 1 outbreak of aseptic meningitis and 3 outbreaks of skin infections due to CA-MRSA and / or *Staphylococcus aureus* in school sports teams. An additional small cluster of CA-MRSA consisting of 3 cases appeared to have been transmitted between family members and at school. Harrison County Health Department investigated an unusual cluster of illness with symptoms suggestive of gastroesophageal reflux following ingestion of caffeine and chocolate followed by vigorous exercise. Another cluster of poorly characterized illness occurred at a hospital in a rural county. In the latter outbreak, illness appeared to have some elements of mass sociogenic illness, including rapid

onset and recovery from symptoms, transient and benign illness, occurrence in a segregated group, apparent transmission by sight, and female preponderance among victims of illness (3).

Table 1 West Virginia Outbreaks by Type of Clinical Presentation, 2007

Type of Outbreak	Number	Percent
Enteric Illness	36	56.30%
Rash Illness	12	18.80%
Respiratory Illness	8	12.50%
Skin Infection	4	6.30%
Other Illness	3	4.70%
Central Nervous System Illness	1	1.60%
Total	64	100.00%

Most enteric outbreaks (Table 2) were attributed to Novovirus, if laboratory testing was done; or acute gastroenteritis, if testing was not performed. Of 25 outbreaks due to norovirus or acute gastroenteritis, 22 (88%) were identified from nursing homes or other health care facilities and 19 (76%) were identified in the months of January and February 2007. In 12 (48%) of these outbreaks, sufficient information (i.e., a line listing) was available to establish that the outbreak was due to person-to-person transmission; for all remaining outbreaks mode of transmission was unknown.

West Virginia contributed cases to four multistate foodborne outbreaks during 2007. Ten West Virginia cases of *Salmonella tennessee* were attributed to consumption of contaminated peanut butter that was distributed nationally. One case of *Salmonella typhimurium* was attributed to consumption of contaminated turkey pot pie, and one case of E coli O157:H7 occurred in association with an outbreak due to an out-of-state restaurant. In all these outbreaks, West Virginia cases were recognized by posting pulsed field gel electrophoresis (PFGE) patterns to Pulse Net. However, Mid Ohio Valley Health Department also recognized and investigated an outbreak of *Salmonella enteritidis* due to consumption of homemade ice cream that caused an outbreak of enteric illness in residents of West Virginia and Florida.

Mercer and Fayette counties investigated three outbreaks of shigellosis in the fall of 2007. All outbreaks were transmitted person-to-person; one outbreak occurred in association with an elementary school; one occurred at a daycare and one occurred in an extended family. Isolates from all 3 outbreaks were identical by pulsed field gel electrophoresis.

Table 2 Etiology of Enteric Outbreaks Reported in West Virginia, 2007

Etiology	Number of Outbreaks	Percent of Outbreaks
Acute gastroenteritis	14	38.90%
Norovirus	11	30.60%
Salmonellosis	3	8.40%
Shigellosis	3	8.40%
Campylobacteriosis	1	2.80%
Cryptosporidiosis	1	2.80%
Escherichia coli O157:H7	1	2.80%
Food poisoning; likely <i>Staphylococcus aureus</i> or <i>Bacillus cereus</i>	1	2.80%
Rotavirus	1	2.80%
Total	36	100.00%

During 2007, most rash illness outbreaks were due to varicella (Table 3). Local health departments typically handle these outbreaks by notifying parents and physicians of the availability of chickenpox vaccine for exposed and susceptible children. Two folliculitis outbreaks were identified in users of a swimming pool and a hot tub. Local health departments worked with pool and hot tub operators to assure safe and hygienic operation of bathing facilities.

Table 3 Etiology of Rash Illness Outbreaks, 2007, West Virginia

Etiology	Number of Outbreaks	Percent of Outbreaks
Varicella	8	66.70%
Folliculitis	2	16.70%
Dermatitis, etiology unknown	1	8.30%
Scabies	1	8.30%
Total	12	100.00%

West Virginia had a very mild influenza season during 2006-2007, and as a result, only one culture-confirmed outbreak of influenza B was identified in the state during 2007. Of 8 respiratory outbreaks, 5 (63%) were identified in nursing homes, and 2 (25%) were identified in schools. The single pertussis outbreak was transmitted person-to-person in the community. Culture confirmation of outbreaks of influenza-like illness is important for influenza surveillance because

influenza virus subtypes are contributed to World Health Organization and used in formulation of the strains in the influenza vaccine for the coming year. Etiology of respiratory outbreaks is outlined in Table 4.

Table 4 Etiology of Respiratory Outbreaks, West Virginia, 2007

Etiology	Number of Outbreaks	Percent of Outbreaks
Upper respiratory infection	4	50.00%
Influenza B	1	12.50%
Influenza, type unknown	1	12.50%
Influenza-like illness	1	12.50%
Pertussis	1	12.50%
Total	8	100.00%

Vaccine preventable disease outbreaks are shown in Table 5. The most common type of vaccine preventable disease outbreak during 2007 was varicella, followed by influenza. Nine (75%) of vaccine preventable disease outbreaks were identified in schools and daycares, and 2 (17%) were reported from health care facilities, emphasizing the importance of immunization in those settings. All vaccine preventable disease outbreaks were transmitted person-to-person. The number of confirmed influenza outbreaks was low in 2007 in part because the season was mild. In a normal year, the proportion of respiratory and vaccine preventable disease outbreaks due to influenza is expected to be greater.

Table 5 Etiology of Vaccine Preventable Disease Outbreaks, West Virginia, 2007

Disease	Frequency	Percent
Varicella	8	66.70%
Influenza B	1	8.30%
Influenza, type unknown	1	8.30%
Pertussis	1	8.30%
Rotavirus	1	8.30%
Total	12	100.00%

A complete line listing of all 2007 outbreaks and clusters is found in Table 6 at the end of this document.

Lessons Learned, 2007

Outbreak response is an excellent test of public health preparedness, testing the ability to recognize and respond to an emergency, notify partners in a timely fashion, utilize basic epidemiology skills, and educate citizens about the disease or health condition and appropriate prevention and control measures. The following ‘lessons learned’ are suggested for investigators in subsequent years (Table 7):

Table 7 Observations and “Lessons Learned” from 2007 Outbreak Investigations, West Virginia

Observation	Lesson(s) Learned or Suggested Action Steps	Suggested Responsibility
1. Date and time of notification is missing for 31% of outbreaks.	1. Record date and time of notification of state and local health departments for all outbreaks	1. IDEP
2. Notification is substantially delayed for some outbreaks	2a) Improve notification time by promptly notifying partners when an outbreak is suspected or confirmed. 2b) Emphasize the importance of prompt reporting of outbreaks in IDEP trainings	2a) IDEP and local health departments 2b) IDEP
3. Culture results are lacking for some outbreaks, especially outbreaks of folliculitis and respiratory outbreaks.	3a) Improved notification time between local health department and IDEP. 3b) Improve guidance and support to local health departments to obtain cultures in a timely fashion when the outbreak is reported and during training.	3a) Local health departments 3b) IDEP
4. Multistate outbreaks were frequently recognized through pulsed field gel electrophoresis (PFGE) of bacterial enteric	4a) Assure that enteric isolates are referred to Office of Laboratory Services in a timely fashion 4b) Assure that isolates	4a) local health departments and IDEP 4b) Office of Laboratory

Observation	Lesson(s) Learned or Suggested Action Steps	Suggested Responsibility
isolates after posting PFGE results to Pulse Net.	undergo PFGE and results are uploaded to PulseNet in a timely fashion.	Services

During 2007, IDEP developed improved outbreak management guidance for several of the more common outbreaks that are reported in our state. Use of these tools should continue to result in improvements in investigations:

1. The norovirus toolkit (4) includes outbreak definitions, information on control measures and references to laboratory collection instructions and a model line list. Although designed for outbreaks in nursing homes, the toolkit is adaptable to outbreaks in other settings as well.
2. The influenza toolkit (5), similar to the norovirus toolkit, is designed for use in nursing homes and contains guidance on laboratory confirmation and control measures, including antiviral prophylaxis.
3. The chickenpox protocol (6) has been updated to reflect guidance for management of outbreaks in schools and daycares. An outbreak line listing is also available (7).
4. A new Shigella protocol is available for local health departments to use in managing cases and outbreaks (8).

During 2008, IDEP will release a Food / waterborne Outbreak manual for use by local health departments in investigation of outbreaks. Training for and evaluation of outbreak response will continue on an ongoing basis, reflecting the high priority IDEP places on prompt and effective investigation of disease outbreaks.

References and Resources

1. IDEP. *General Outbreak Investigation / Notification Protocol*. Accessed at: http://www.wvdhhr.org/idep/pdfs/idep/Outbreaks/Outbreak_Investigation_Protocol.pdf on February 5, 2008.
2. CDC. *Norovirus activity – United States, 2006-2007*. MMWR, 2007; 56:842-846.
3. Weir E. *Mass sociogenic illness*. CMAJ, 2005; 172:36.
4. IDEP. *Guidelines for suspected norovirus outbreaks*. Accessed at: http://www.wvdhhr.org/idep/pdfs/idep/norovirus/Norovirus_Outbreak_Toolkit2_1.pdf on February 6, 2008.
5. IDEP. *Guidelines for suspected influenza outbreaks in nursing homes*. Accessed at: <http://www.wvdhhr.org/idep/pdfs/idep/Influenza/flutookit.pdf> on February 6, 2008.

6. IDEP. *Varicella (chickenpox) surveillance protocol*. Accessed at: http://www.wvdhhr.org/idep/pdfs/idep/varicella/Updated_Chickenpox_Protocol_Oct_2007.pdf on February 6, 2008.
7. IDEP. *Chickenpox outbreak investigation line listing*. Accessed at: http://www.wvdhhr.org/idep/DOCs/Varicella/Chickenpox_Outbreak_Investigation_LineListing.doc on February 6, 2008.
8. IDEP. *Shigellosis surveillance protocol*. Accessed at: http://www.wvdhhr.org/idep/pdfs/idep/Shigellosis/Shigella_Protocol_07.pdf on February 6, 2008.

Table 6 Line Listing of Confirmed Outbreaks and Clusters Reported in the State of West Virginia During Calendar Year 2007

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
1	1/2/2007	Norovirus	laboratory confirmed	35	Person-to-person	West Virginia	Fayette	Nursing home
2	1/3/2007	Acute gastroenteritis	laboratory test not done	57 of 107 patients	Person-to-person	West Virginia	Wetzel	Nursing home
3	1/3/2007	Norovirus	laboratory confirmed	22	Person-to-person	West Virginia	Ohio	Nursing Home
4	1/4/2007	Acute gastroenteritis	laboratory test not done	8	unknown	West Virginia	Marshall, Ohio	Daycare
5	1/4/2007	Norovirus	laboratory confirmed	19 of 120 patients	unknown	West Virginia	Berkeley	Nursing home
6	1/4/2007	Acute gastroenteritis	laboratory test not done	4 of 120 patients	unknown	West Virginia	Cabell	Nursing home
7	1/5/2007	Norovirus	laboratory confirmed	8 of 65 residents and 3 of 80 staff	unknown	West Virginia	Berkeley	Nursing home
8	1/8/2007	Acute gastroenteritis	laboratory test not done	78 of 124 patients and 15 staff	unknown	West Virginia	Kanawha	Nursing home
9	1/8/2007	Norovirus	laboratory confirmed	Unknown	Unknown	West Virginia	Pendleton	Nursing home
10	1/8/2007	Norovirus	laboratory confirmed	14 of 52 residents	unknown	West Virginia	Ohio	Assisted living facility
11	1/10/2007	Acute gastroenteritis	laboratory test not done	15 of 20	unknown	West Virginia	Monongalia	Sorority house

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
12	1/17/2007	Upper respiratory infection	laboratory test negative or noncontributory	18 of 60 residents	Likely person to person	West Virginia	Fayette	Nursing home
13	1/22/2007	Norovirus	laboratory confirmed	23 of 60 residents and 11 of 80 employees	unknown	West Virginia	Greenbrier	Nursing home
14	1/23/2007	Norovirus	laboratory confirmed	13 of 225 residents and 8 staff	unknown	West Virginia	Monongalia	Nursing home
15	1/18/2007	Varicella	laboratory test not done	34	Person-to-person	West Virginia	Berkeley	Daycare
16	1/25/2007	Rotavirus	laboratory confirmed	13 of 16 patients and 3 staff	Person-to-person	West Virginia	Cabell	Hospital unit
17	1/31/2007	Norovirus	laboratory confirmed	30 of 135 residents and 15 staff	Person-to-person	West Virginia	Monongalia	Residential assisted living facility
18	2/2/2007	Acute gastroenteritis	laboratory test not done	17 of 102 children	Person-to-person	West Virginia	Jefferson	Daycare
19	2/6/2007	Acute gastroenteritis	laboratory test negative or noncontributory	18 patients and staff	Person-to-person	West Virginia	Kanawha	Nursing home

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
20	2/7/2007	Acute gastroenteritis	laboratory test not done	10 of 26 patients	unknown	West Virginia	Hancock	Skilled care unit
21	2/9/2007	Varicella	laboratory test not done	6 of 98 (6%)	Person-to-person	West Virginia	Monongalia	School
22	2/9/2007	Influenza-like illness	laboratory test negative or noncontributory	13 of 120 residents and 4 staff	Person-to-person	West Virginia	Monongalia	Nursing home
23	2/12/2007	Norovirus	laboratory confirmed	5	unknown	West Virginia	Pendleton	Nursing home
24	2/15/2007	<i>Salmonella tennessee</i>	laboratory confirmed	10	Foodborne - peanut butter	Multistate	multiple	Community, multistate
25	2/22/2007	Influenza B	laboratory confirmed	10 of 60 patients	Person-to-person	West Virginia	Fayette	Nursing home
26	2/28/2007	Acute gastroenteritis	laboratory test not done	Approx 41 of 154 (27%)	Person-to-person	West Virginia	Kanawha	Nursing home
27	2/28/2007	Gastroesophageal reflux	laboratory test negative or noncontributory	Approx 16	multifactorial, including chocolate, caffeine and exercise	West Virginia	Harrison	High school
28	3/12/2007	Varicella	laboratory test not done	15 of 353 students	Person-to-person	West Virginia	Marshall	School
29	3/14/2007	Influenza, type unknown	rapid test positive but not culture confirmed	11/284	person-to-person	West Virginia	Marshall	School

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
30	3/13/2007	Upper respiratory infection	laboratory test not done	29 / 276 students	Likely person-to-person	West Virginia	Marshall	School
31	3/23/2007	Acute gastroenteritis	laboratory test not done	29 of 86 patients and 4 staff	Person-to-person	West Virginia	Kanawha	Nursing home
32	7/28/2007	Varicella	laboratory test not done	18 of 160 students	Person-to-person	West Virginia	Harrison	School
33	4/2/2007	Varicella	laboratory test not done	7	Person-to-person	West Virginia	Upshur	School
34	4/10/2007	Norovirus	laboratory confirmed	55	Person-to-person	West Virginia	Jefferson	Nursing home
35	4/4/2007	Folliculitis	laboratory test not done	16 of 22 children	Waterborne	West Virginia	Preston	Community swimming pool
36	4/2/2007	Acanthamoeba	laboratory confirmed	1	Contact lens solution and inappropriate contact hygiene	Multistate	Fayette	Community
37	4/26/2007	Acute gastroenteritis	laboratory test negative or noncontributory	9 of 11 patients and 1 of 23 staff	Unknown	West Virginia	Cabell	Hospital
38	5/2/2007	Acute gastroenteritis	laboratory test not done	17 staff; 18 of 50 residents	Person-to-person	West Virginia	Taylor	Nursing home
39	5/4/2007	Varicella	laboratory test not done	12	Person-to-person	West Virginia	Mineral	Schools

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
40	5/7/2007	Varicella	laboratory test not done	8	Person-to-person	West Virginia	Upshur	School
41	5/7/2007	Scabies	laboratory confirmed	1 confirmed; 12 epi-linked	Person-to-person	West Virginia	Putnam	Hospital
42	6/1/2007	Acute gastroenteritis	laboratory test not done	12 residents and 9 staff	Person-to-person	West Virginia	Monongalia	Nursing home
43	6/6/2007	Acute illness; etiology unknown	laboratory test negative or noncontributory	12	unknown; possibly line-of-sight transmission	West Virginia	Braxton	Health Care Facility
44	7/9/2007	<i>Salmonella enteritidis</i> (Group D1)	laboratory confirmed	2 confirmed and 6 probable of 18 exposed (44%)	Foodborne (ice cream)	Multistate	Wood, Ritchie, State of Florida	Private residence
45	7/16/2007	<i>Shigella sonnei</i> , Group D, TMP-SMX resistant	laboratory confirmed	1 confirmed; 5 probable of 9 exposed (67%)	Person-to-person	West Virginia	Mercer	Family / community

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
46	7/24/2007	<i>Escherichia coli</i> O157:H7	laboratory confirmed	1	foodborne, vehicle unknown	Multistate	Ohio	Multistate foodborne outbreak associated with out of state restaurant
47	8/28/2007	Aseptic meningitis	laboratory test negative or noncontributory	3	Likely person-to-person	West Virginia	Marion	School athletic team
48	8/29/2007	Upper respiratory infection	laboratory test negative or noncontributory	37	Person-to-person	West Virginia	Fayette	Nursing home
49	8/30/2007	Cryptosporidium	laboratory confirmed	2 confirmed; 1 probable	unknown	West Virginia	Mercer	Community
50	9/3/2007	Likely <i>Staphylococcus aureus</i> or <i>Bacillus cereus</i> food poisoning	laboratory test negative or noncontributory	7	Foodborne	West Virginia	Monongalia	Church
51	9/10/2007	<i>Shigella sonnei</i>	laboratory confirmed	69 confirmed cases	Person-to-person	West Virginia	Mercer	Community
52	9/10/2007	Pertussis	laboratory confirmed	5 confirmed and 9 probable	Person-to-person	West Virginia	Hampshire, Grant	Community

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
53	9/24/2007	Upper respiratory illness	laboratory test negative or noncontributory	6 of 184 (3.3%)	unknown; likely person-to-person	West Virginia	Kanawha	Nursing home
54	9/28/2007	Methicillin resistant <i>Staphylococcus aureus</i>	laboratory confirmed	3	Person-to-person	West Virginia	Monongalia	Family and school
55	9/28/2007	Benign dermatitis, etiology unknown	laboratory test not done	30	Unknown	West Virginia	Mercer	School
56	10/3/2007	Methicillin resistant <i>Staphylococcus aureus</i>	laboratory confirmed	6	Person-to-person	West Virginia	Jackson	Football team
57	Missing	<i>Salmonella typhimurium</i>	laboratory confirmed	1	foodborne related to pot pies	Multistate	Hardy	Multi-state
58	10/16/2007	<i>Staphylococcus aureus</i> , including methicillin resistant <i>Staphylococcus aureus</i>	laboratory confirmed	13, including 4 MRSA and 1 <i>Staphylococcus aureus</i>	person to person	West Virginia	Kanawha	Football team
59	10/24/2007	<i>Campylobacter</i> species	laboratory confirmed	1 confirmed and 3 probable	likely waterborne	West Virginia	Preston	Community

Outbreak Number	Date of State Notification	Name of Etiologic Agent or Clinical Syndrome	Laboratory Confirmation	Final Case Count	Modes of Transmission or Source	Jurisdiction	West Virginia counties with cases	Transmission setting(s)
60	Missing	methicillin resistant <i>Staphylococcus aureus</i>	laboratory confirmed	4	likely person-to-person	West Virginia	Randolph	School football team
61	11/13/2007	folliculitis	laboratory test not done	7 of 8 exposed	waterborne (hot tub)	West Virginia	Mercer, Raleigh	Community
62	11/26/2007	<i>Shigella sonnei</i>	laboratory confirmed	3 confirmed, 14 probable	person to person	West Virginia	Fayette, Raleigh	Daycare
63	12/3/2007	Varicella	laboratory test not done	40 of 339 students	person-to-person	West Virginia	Mingo	Elementary school
64	12/28/2007	Acute gastroenteritis	laboratory test not done	6	likely person to person	West Virginia	Kanawha	Nursing home