



Georgia Emerging Infections Program

Introduction

The Emerging Infections Program (EIP) is a network of CDC and select state health departments, working with partners in academics, healthcare, and other agencies to assess the public health impact of emerging infections and to evaluate methods for their prevention and control, using a platform of population-based surveillance. Nationally, there are EIP sites in 11 states: CA, CO, CT, GA, MD, MN, NM, NY, OR, TN, TX. Data from the EIP is used to generate reports to Congress and other federal agencies and to inform other state and local public health agencies of disease rates and trends.

The EIP has 3 components: Active Bacterial Core Surveillance (ABCs), FoodNet, and Respiratory Diseases Activities (RDA). ABCs focuses on invasive respiratory bacterial pathogens; FoodNet focuses on bacterial and parasitic agents that are commonly transmitted through food; and RDA focuses on influenza and other viral respiratory diseases. In addition to these 3 components, GA also includes surveillance for *Bordetella pertussis*. Please see Box 1 for a list of EIP organisms that are studied in Georgia.

History and distribution of the GA EIP

Georgia was one of the original EIP sites, beginning its formal activities in 1997. The EIP began in the 8 counties of metro Atlanta, but then grew to encompass the entire state. GA EIP activities and responsibilities are divided into 2 geographical areas (see Figure 1). Activities for the 20 county Metropolitan Statistical Area of Atlanta (MSA) are conducted through the VA Medical Center and Emory School of Medicine, while activities for the 139 counties of Georgia outside of Atlanta (GOA) are conducted by the Division of Public Health, Notifiable Disease Epidemiology Section. EIP pathogens and activities differ between the MSA and GOA.

GA EIP Active Surveillance, Audits, and Special Projects

While there are many ongoing EIP activities, the core activity is population-based active surveillance. Active surveillance is defined as ongoing, active communication with any laboratory that conducts microbiology on-site to quickly identify FoodNet and ABCs pathogens (as well as pertussis), and facilitate isolate collection. For further study, active surveillance

is separate and distinct from traditional passive notifiable disease reporting. A list of demographic, laboratory, and clinical variables are collected on all EIP case patients from either the hospital or other healthcare provider. Currently, GA has more than 100 clinical labs that are contacted for active surveillance. Most isolates of EIP pathogens are forwarded to the Georgia Public Health Laboratory (GPHL) for further testing and subtyping (see Box 1 for exclusions). In addition, selected isolates are forwarded to CDC labs for additional testing.

Another aspect of active surveillance that differs from passive reporting is periodic auditing. Audits entail the extraction of microbiology data directly from the clinical laboratories' computers or an on-site examination of laboratory log-books or worksheets to confirm that no EIP pathogens were missed. Audits ensure that the EIP has 100% reporting and can accurately assess the burden of disease for all 11 EIP sites nationally. Due to the rigorous data collection, audit standards and controlled population, EIP data is considered the gold standard for population-based data and is generalized to make national estimates of rates and trends for these infectious diseases.

In addition to the core activity of active surveillance, the EIP conducts many special projects that allow for more detailed data collection and focused evaluation of certain pathogens and conditions, such as the ABCs' Neonatal Group B Strep Surveillance and FoodNet's HUS Active Surveillance. Risk factor analyses involving extensive telephone questionnaires and medical record reviews, such as the Meningococcal Conjugate Vaccine Evaluation in adolescents and Influenza Vaccine Effectiveness in children, and FoodNet's Multi-drug Resistance *Salmonella* Study are currently being conducted. If you would like more information on GA EIP surveillance or projects, please contact Stepy Thomas (404-657-6440) in GOA and Wendy Baughman (404-321-6111x6478) in the MSA. For more information on the national EIP, ABCs, or FoodNet, please visit the following websites.

EIP: <http://www.cdc.gov/ncidod/osr/site/eip/index.htm>

ABCs: <http://www.cdc.gov/ncidod/dbmd/abcs/default.htm>

FoodNet: <http://www.cdc.gov/foodnet/>

The Georgia Epidemiology Report Via E-Mail

To better serve our readers, we would like to know if you would prefer to receive the GER by e-mail as a readable PDF file.

If yes, please send your name and e-mail address to Gaepinfo@dhr.state.ga.us. | Please visit, <http://health.state.ga.us/epi/manuals/ger.asp> for all current and past pdf issues of the GER.

Figure 1: County Distribution for the Metropolitan Statistical Area of Atlanta (MSA) versus Georgia Outside Atlanta (GOA)



Box 1: EIP Pathogens - (please forward all EIP isolates to GPHL unless otherwise specified.)

ABCs – invasive sites only

- Group A Streptococcus*
- Group B Streptococcus*
- Haemophilus influenzae*
- Neisseria meningitidis*
- Streptococcus pneumoniae**
- Methicillin Resistant *Staph Aureus* – (conducted only in 8 county MSA)
- *Streptococcal isolates are only collected in the 20 county MSA

FoodNet – all body sites

- Campylobacter***
- Cryptosporidium***
- Cyclospora*
- Listeria*
- Salmonella*
- Shiga toxin producing *E. coli* (including O157)
- Shigella*
- Vibrio*
- Yersinia*
- **Campy and Crypto isolates/samples are not required to be sent to GPHL, but are requested.

RDA - NO samples/isolates are needed

- Hospitalized lab-confirmed Influenza cases –(conducted only in 8 county MSA)

Pertussis Study – nasopharyngeal swabs only

- Bordetella pertussis*

E. coli* O157 and Other Shiga-toxin Producing *E. coli

Introduction

E. coli is a bacterium found normally in the intestines of humans and some animals. *E. coli* O157 is a specific kind of *E. coli* that produces a toxin (Shiga-toxin) that causes severe infections in humans. In addition to *E. coli* O157, many other types of shiga-toxin producing *E. coli* (STEC) have been identified as human pathogens. Symptoms of *E. coli* O157 infection include bloody diarrhea, abdominal cramping and vomiting, and in some instances, hemolytic uremic syndrome (HUS). HUS is characterized by hemolytic anemia, thrombocytopenia and acute renal failure. It is the most common cause of kidney failure in children. In the United States, 2-7% of *E. coli* O157 infections result in HUS (http://www.cdc.gov/ncidod/dbmd/diseaseinfo/escherichiacoli_g.htm, accessed 5-16-06). *E. coli* infections are usually diagnosed by stool culture. Since most laboratories do not routinely test for *E. coli* O157 and other STEC, submitting clinicians should specifically request this test when submitting stool specimens.

Sources and outbreaks of STEC

E. coli O157 has often been associated with the consumption of undercooked ground beef, which can be contaminated during the

slaughtering process. In recent years, it has also been linked to consuming alfalfa sprouts, unpasteurized milk and juices, as well as swimming in contaminated waters and visiting petting farms. For example, during 2000, an outbreak of *E. coli* O157 infections among 56 school-aged children occurred in the northern United States. The children had visited petting farms and had direct contact with various farm animals including cattle, pigs, goats and sheep (MMWR 50(15); 293-7).

Although the epidemiology of *E. coli* O157 has been well described, non-O157 STECs are still being discovered and described. Similar to *E. coli* O157, infections with other STECs also result in bloody diarrhea, vomiting, cramps and even HUS. In Connecticut, non-O157 STEC were found to be almost as common as *E. coli* O157, and food sources and other exposures were similar (Phan Q. et al. International Conference on Emerging Infectious Diseases. Atlanta, GA, March 2002). Outbreaks of non-O157 STEC have been associated with consumption of ground beef, milk, salad, and recreational water exposure (Kehl, S. J Clin Microbiol. 2002 August; 40(8): 2711–2715).

Surveillance

The FoodNet component of the Emerging Infections Program conducts active surveillance for *E. coli* O157 and other STECs (see

previous article for details). In addition, clinicians and laboratories report cases directly to Public Health. In 2005, 619 cases of STEC (including *E. coli* O157 and non-O157 STEC) were reported in FoodNet sites (MMWR 55(14); 392-395). After a decrease in numbers of cases in 2003-2004, which was consistent with improving ground beef surveillance data from the USDA (MMWR 54(14);352-356), STEC cases increased in 2005; additional evaluation is needed to see why the decreases did not persist. Similar to national trends, numbers of STEC cases in Georgia decreased in 2003-2004, then increased in 2005 (Figure 2). A total of 49 STEC cases were reported in 2005 and 32 have been reported this year as of July 7, 2006. More than half of case patients had eaten ground beef or had other beef exposure. Eight of the cases were non-O157 STEC cases.

FoodNet conducts HUS active surveillance through a network of pediatric nephrologists and infection control practitioners. They are contacted at least once per month via email or telephone to ascertain any new HUS cases. Hospital discharge data are reviewed to validate surveillance results. In FoodNet sites, during 2004 (lag time in surveillance data due to hospital discharge data review), 44 cases of HUS were reported in children younger than 15 years of age. Of those 44 cases, 30 were under the age of 5 years. In 2005, 8 HUS case-patients were treated in Georgia hospitals. Of these, four were associated with *E. coli* O157 infections. Six of the eight cases were in children. As of July 7, three cases have been reported in 2006.

STEC laboratory testing

Shiga toxins (multiple types have been identified) are produced by *E. coli* O157 and other STEC, and have primary action on endothelial cells, leading to hemorrhagic colitis and HUS. Occasionally, clinicians may interpret a positive shiga toxin test result to imply infection caused by *Shigella*. Although shiga toxins are also produced by *Shigella dysenteriae*, infections with this type of *Shigella* are very rare in the United States. Therefore, a positive shiga toxin report is much more likely to represent an STEC infection.

Accurate laboratory diagnosis of STEC is important because STEC infections are important clinically and epidemiologically. Culture-based methods most easily detect O157 strains. *E. coli* O157 is unique in being unable to ferment sorbitol, so on agar that contains this sugar (Sorbitol-MacConkey agar), the colonies will look different from the other *E. coli* bacteria normally in the stool. Unfortunately, this test is only 50-60% sensitive. Sensitivity can be increased by using selective broth enrichment before plating. The low sensitivity of culture, combined with the fact that non-O157 STEC cannot be detected in this way have led to multiple types of non-culture based tests. These are generally tests for the shiga toxins, and include enzyme immunoassays (EIA), latex agglutination, and, more recently, polymerase chain reaction. Un-

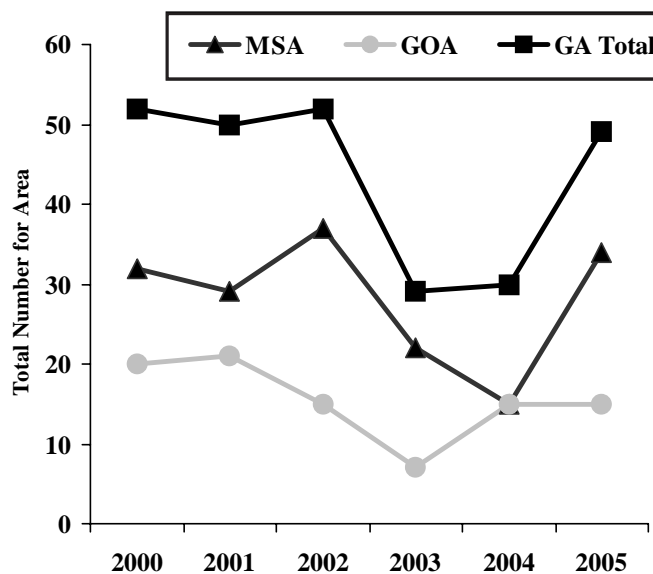
fortunately, false positives (up to 30% with EIA) are common (Kehl J. Clin Microbiol 1997).

Recent reductions in use of culture-based detection methods by clinical laboratories prevents characterization of disease-causing strains, with resulting problems for public health follow-up of individual cases, outbreak detection, investigation, and trend evaluation for different types of STEC, including *E. coli* O157.


Infectious Disease Society of America guidelines suggest that in all patients with HUS or bloody diarrhea, broth enrichment of stool, then EIA should be done (Guerrant RL et. al, Clinical Infectious Diseases 2001;32:331-351). Then serotype should be confirmed by culture on Sorbitol MacConkey agar (O157) or broths should be sent to state laboratories for serotype confirmation.

All clinical and reference laboratories in Georgia should submit their STEC isolates and broths to the Georgia Public Health Laboratory (GPHL). This provides confirmation for the submitting lab and also allows more information, such as DNA fingerprinting results, to be gathered for surveillance and disease prevention purposes. As a result of isolate submission to GPHL, outbreaks have been detected and investigated, and Georgia has been able to monitor the epidemiology of STEC. If you have questions about *E. coli* O157, STEC, or HUS please call the Epidemiology Branch (404-657-2588).

Figure 2 STEC Numbers by Year in GA



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Reported Cases of Selected Notifiable Diseases in Georgia Profile* for March 2006

Selected Notifiable Diseases	Total Reported for March 2006	Previous 3 Months Total Ending in March			Previous 12 Months Total Ending in March		
	2006	2004	2005	2006	2004	2005	2006
Campylobacteriosis	41	118	100	122	622	570	607
<i>Chlamydia trachomatis</i>	2322	8609	8356	8473	35252	34224	33370
Cryptosporidiosis	5	40	25	40	136	165	168
<i>E. coli</i> O157:H7	4	2	6	8	25	27	33
Giardiasis	37	172	163	98	830	893	685
Gonorrhea	984	3757	3779	3801	17036	16086	15713
<i>Haemophilus influenzae</i> (invasive)	7	36	44	29	97	125	98
Hepatitis A (acute)	3	100	24	11	725	243	111
Hepatitis B (acute)	14	125	72	31	596	417	162
Legionellosis	0	4	4	1	33	43	36
Lyme Disease	0	5	1	0	12	8	5
Meningococcal Disease (invasive)	3	5	7	5	30	17	16
Mumps	0	0	1	0	3	3	1
Pertussis	0	4	11	6	34	36	43
Rubella	0	1	0	0	1	0	0
Salmonellosis	64	204	192	219	2041	1929	1954
Shigellosis	67	147	103	184	960	613	752
Syphilis - Primary	5	36	34	15	137	115	115
Syphilis - Secondary	11	117	118	60	485	480	455
Syphilis - Early Latent	8	146	91	53	673	346	347
Syphilis - Other**	28	183	240	134	844	909	789
Syphilis - Congenital	0	1	0	1	8	5	3
Tuberculosis	34	122	113	82	530	530	473

* The cumulative numbers in the above table reflect the date the disease was first diagnosed rather than the date the report was received at the state office, and therefore are subject to change over time due to late reporting. The 3 month delay in the disease profile for a given month is designed to minimize any changes that may occur. This method of summarizing data is expected to provide a better overall measure of disease trends and patterns in Georgia.

** Other syphilis includes latent (unknown duration), late latent, late with symptomatic manifestations, and neurosyphilis.

AIDS Profile Update

Report Period	Total Cases Reported*			Percent Female	Risk Group Distribution (%)					Race Distribution (%)			
	<13yrs	>=13yrs	Total		MSM	IDU	MSM&IDU	HS	Blood	Unknown	White	Black	Other
Latest 12 Months: 06/05-05/06	3	1,755	1,758	25.4	32.5	5.9	2.3	8.2	1.2	49.9	23.0	75.0	2.0
Five Years Ago: 06/01-05/02	2	1,706	1,708	26.2	37.5	8.0	2.9	18.5	2.2	30.8	18.8	76.5	4.7
Cumulative: 07/81-05/06	228	29,862	30,090	19.6	45.0	15.5	4.9	14.1	1.8	18.7	31.5	66.0	2.5

MSM - Men having sex with men IDU - Injection drug users HS - Heterosexual

* Case totals are accumulated by date of report to the Epidemiology Section