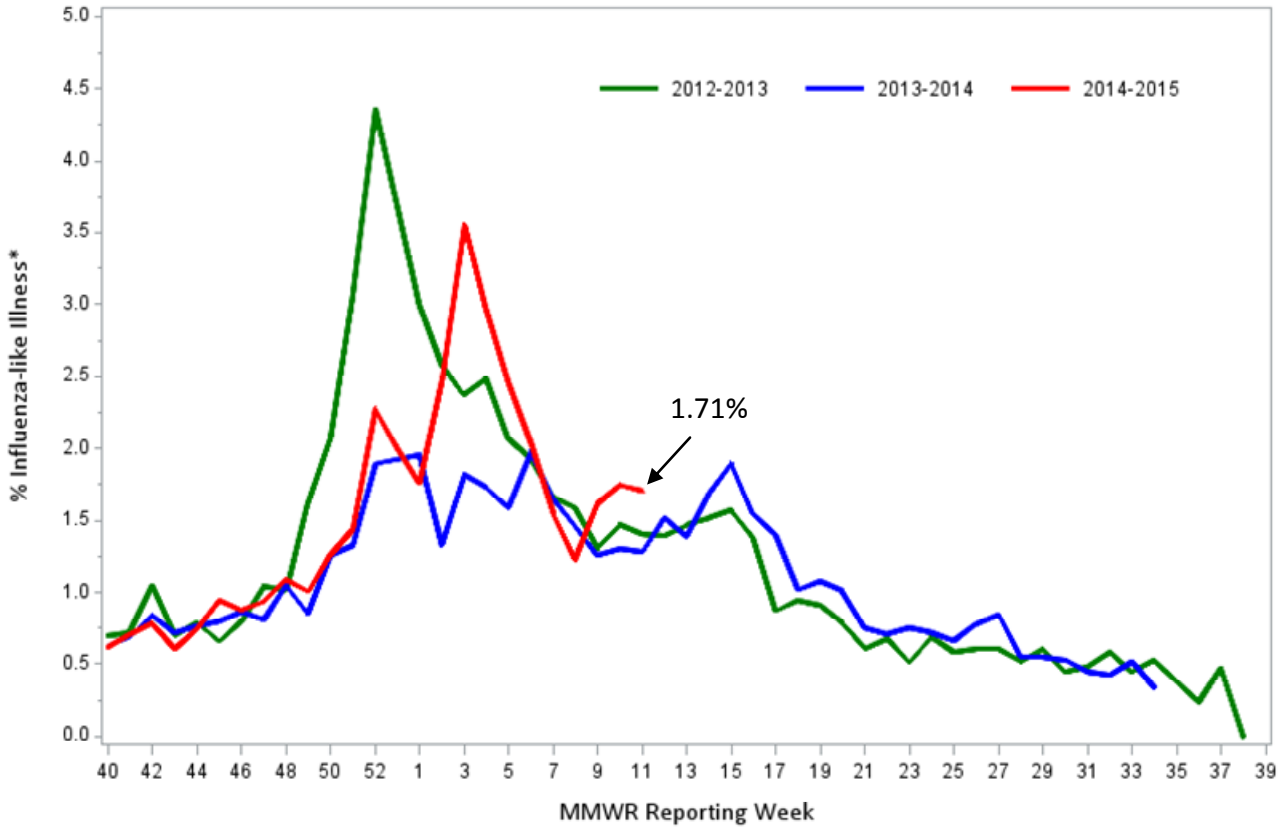
MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH
WEEKLY INFLUENZA UPDATE
March 27, 2015

All data in this report are preliminary and subject to change as more information is received.

Sentinel Provider Surveillance: Influenza-like illness activity

Week 11 Activity[1] (representing geographic distribution): Widespread
Week 11 ILI Activity[2] (representing intensity of ILI activity): 4 (Low)
Provider offices across the US report the amount of influenza-like illness (ILI) they see in their patients each week during regular flu season. These outpatient providers' offices, which include doctors' offices, school health services, and community health centers, are called 'sentinel sites.' Here we present Massachusetts sentinel site data. Please note that the data represent not only confirmed influenza cases, but also those just with ILI, which may be caused by other viruses. ILI is defined as fever above 100.0[1] in addition to either cough or sore throat. ILI is a marker of influenza and is used throughout the regular influenza season to monitor influenza since most people are not tested for influenza. Figure 1 shows that ILI activity is consistent with expected activity for this time of year. For more information, see CDC's influenza surveillance website at www.cdc.gov/flu/weekly/fluactivitysurv.htm.

Figure 1: Percentage of ILI visits reported by sentinel provider sites



*Influenza-like illness (ILI, defined by fever >100F and cough and/or sore throat),as reported by Massachusetts sentinel surveillance sites

[1] CDC activity indicator – indicates how widespread influenza activity level is in the state.
[2] CDC ILI activity indicator – more quantitative indicator of the level of ILI activity across the state.

Table 1 below shows a geographical distribution of reported ILI in Massachusetts. Table 1 shows that sentinel sites in five of the seven regions of the state are experiencing elevated ILI activity.

Table 1: Percent ILI reported weekly by Massachusetts sentinel sites

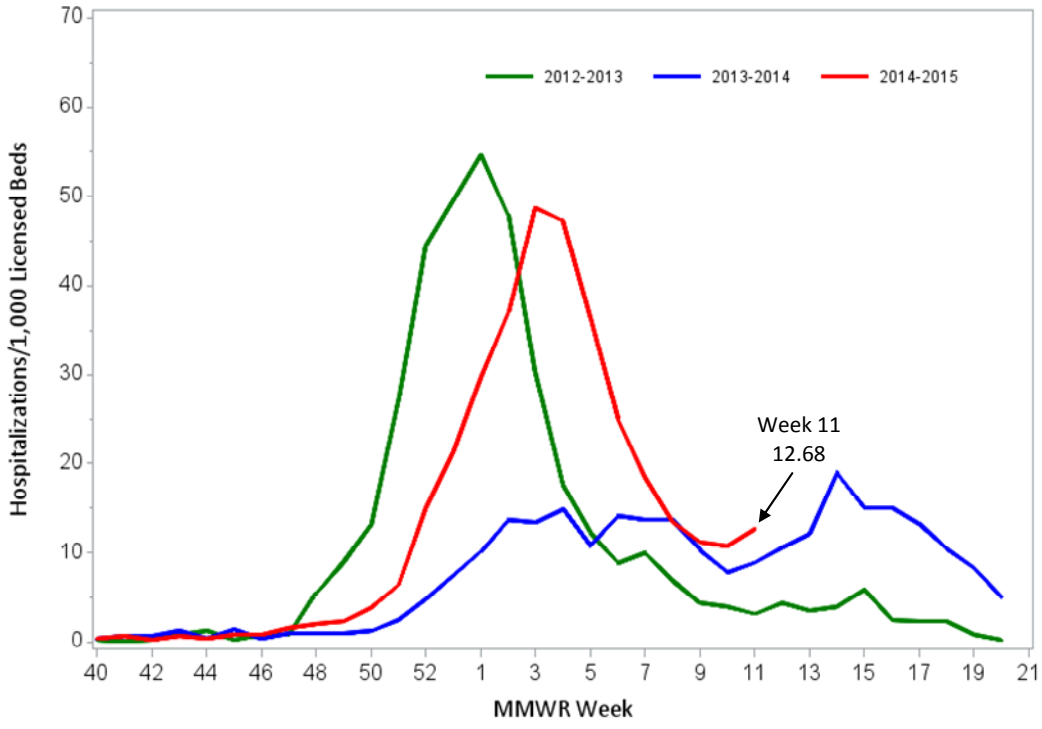
	Regional Baseline % ILI*	2014-2015			2013-2014		
		% ILI	Report. Sites	Total enroll.	% ILI	Report. Sites	Total enroll.
Boston	0.97	0.90	2	6	0.93	5	6
Central	1.53	1.92	7	10	0.68	9	12
Inner Metro Boston	0.85	1.66	7	12	1.09	10	13
Northeast	1.04	1.80	8	9	1.44	9	11
Outer Metro Boston	1.20	2.09	3	5	2.28	5	5
Southeast	1.27	1.67	2	4	1.04	6	6
West	1.41	1.21	5	7	1.23	6	7

*Regional baseline % ILI is calculated weekly using reporting providers' baseline % ILI estimates.

Influenza-Associated Hospitalizations

In 2010, MDPH began to request voluntary reporting of all laboratory-confirmed influenza hospitalizations from hospitals in Massachusetts. As many as 50 acute care hospitals from across the state report these data to MDPH on a weekly basis during flu season. The graph below shows the number of laboratory-confirmed hospitalizations per 1,000 licensed beds represented by reporting hospitals for the current season and two previous seasons.

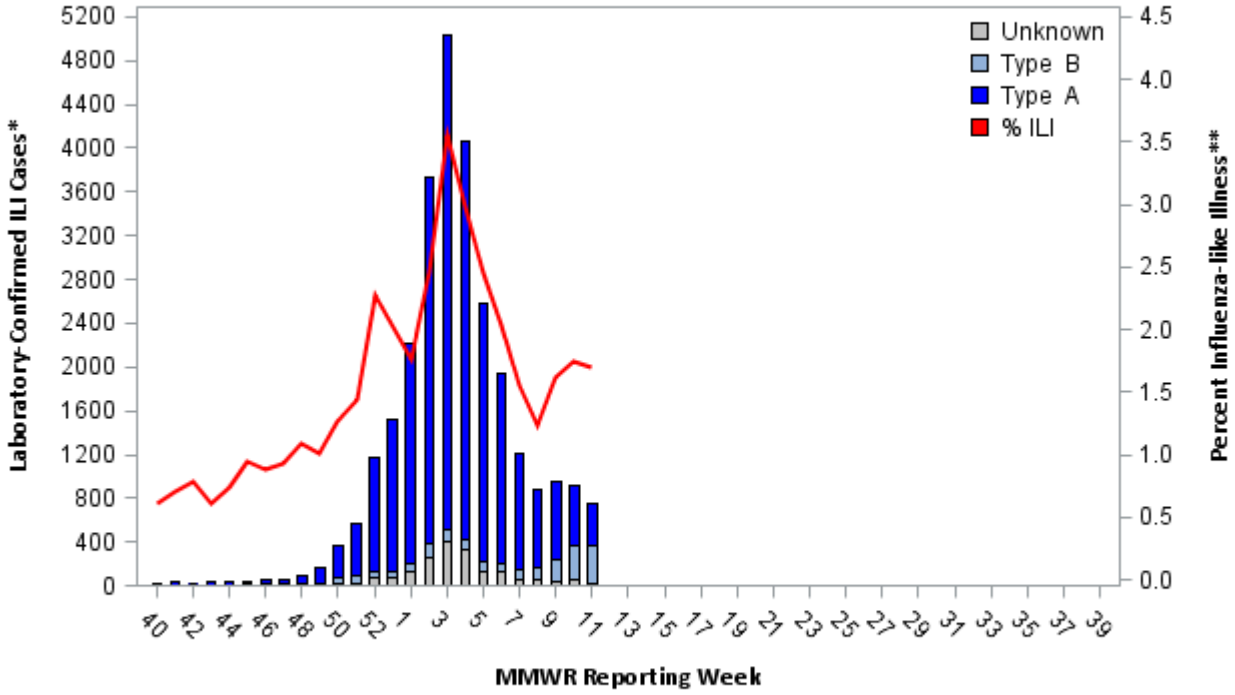
Figure 2: Massachusetts laboratory-confirmed influenza hospitalizations



Laboratory testing for influenza

Laboratories in Massachusetts report all positive influenza laboratory tests to MDPH, including viral culture, polymerase chain reaction (PCR) and rapid influenza diagnostic tests. Because the majority of cases are not tested, the number of 'confirmed' cases does not reflect the overall incidence of influenza; however, this information is essential to track the types of influenza circulating in Massachusetts and can be a useful indicator of the presence and distribution of influenza in the state. Figure 3 illustrates the number of laboratory confirmed cases in Massachusetts by week, shown along with Massachusetts ILI. Table 2 reflects the number of laboratory-confirmed influenza cases by region and influenza type.

Figure 3: Laboratory-confirmed Influenza Cases and Influenza-like Illness Massachusetts, September 28, 2014 – March 21, 2015



*Influenza cases confirmed via viral culture, PCR or rapid test by specimen collection date.

**Influenza-like illness (ILI, defined as fever>100F and cough and/or sore throat), as reported by Massachusetts sentinel surveillance sites by CDC week date.

Table 2: Laboratory-confirmed Influenza by Region – 2014-2015 and 2013-2014 Influenza Seasons

	2014-2015						2013-2014					
	A		B		Untyped		A		B		Untyped	
Region	Week	YTD	Week	YTD	Week	YTD	Week	YTD	Week	YTD	Week	YTD
Boston	53	2097	34	176	0	165	53	743	2	47	0	4
Central	38	1951	33	267	3	191	58	716	15	192	8	69
Inner Metro Boston	72	3715	41	257	2	236	72	924	4	37	0	5
Northeast	54	5751	65	431	2	407	119	1253	27	305	9	76
Outer Metro Boston	45	3196	50	226	2	245	42	638	2	32	0	3
Southeast	42	4648	39	310	9	467	107	1355	6	92	0	3
Unknown	22	1200	26	115	0	30	27	374	1	34	0	0
West	57	1732	50	192	0	67	59	1119	0	19	0	2
Total	383	24,290	338	1,974	18	1,808	537	7,122	57	758	17	162

Testing at the Hinton State Laboratory Institute

As part of a more comprehensive respiratory surveillance initiative, MDPH's Bureau of Laboratory Sciences (MDPH-BLS) performs testing to confirm typing and subtyping of circulating influenza viruses followed by testing of influenza-negative samples for the evidence of adenovirus, respiratory syncytial virus (RSV) A/B, parainfluenza virus (PIV) types 1-4 , coronavirus (HCoV) HKU1, OC43, NL63, 229E, human metapneumovirus (HMPV), and rhinovirus/enterovirus (RHV/ENT) using a multiplex PCR respiratory viral panel. Samples are submitted by ~60 outpatient healthcare providers (ILINet) and include early influenza positives, as well as specimens and isolates from clinical hospital diagnostic laboratories across Massachusetts. For the 2014-2015 season, Figure 4 and Tables 3 and 4 summarize virologic surveillance testing conducted by MDPH-BLS beginning MMWR week 40 (week ending October 4, 2014). MDPH-BLS performs influenza surveillance testing year round. For the 2014-2015 season to date, nine cases of influenza B, three cases of A/2009 H1N1, and 233 cases of A/H3N2 influenza have been confirmed in 406 cases tested.

Figure 4: Influenza positive tests reported to CDC by MDPH-BLS, September 28, 2014 – March 21, 2015

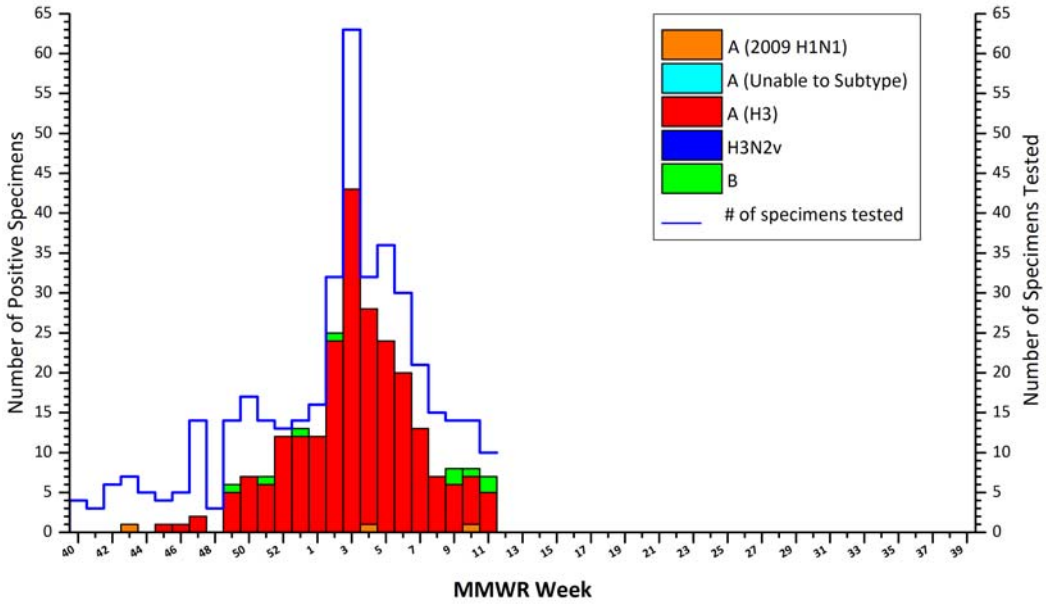


Table 3: Weekly Summary of MDPH-BLS Influenza Surveillance Test Results

2014-2015 Season: Influenza Surveillance MA Department of Public Health's Bureau of Laboratory Sciences (MDPH-BLS)									
MMWR Week: (Specimen Collected)	2009 H1N1	seasonal A/H3N2	B	H3N2v	A unsub	No. Flu Pos (%)	Unsat	Total Tested	Total Rec'd
08 (2/22- 2/28/2015)	0	7	0	0	0	**7(47%)**	0	**15**	**15**
09 (3/01- 3/07/2015)	0	6	2	0	0	**8(57%)**	1	**14**	**15**
10 (3/08- 3/14/2015)	1	6	1	0	0	**8(57%)**	1	**14**	**15**
11 (3/015- 3/21/2015)	0	5	2	0	0	**7(70%)**	0	**10**	**10**
Prior 4 wk Total	**1**	**24**	**5**	**0**	**0**	**30(57%)**	**2**	**53**	**55**
Cumulative Season total	**3**	**233**	**9**	**0**	**0**	**245(60%)**	**28**	**406**	**434**

All data are subject to change as test results become finalized. The 2014 -2015 influenza season began MMWR 40 (09/28- 10/04/2014).

Table 4: Weekly Summary of MDPH-BLS non-Influenza Respiratory Surveillance Test Results

2014-2015 Season: Influenza Like Illness Surveillance MA Department of Public Health's Bureau of Laboratory Sciences (MDPH-BLS)											
MMWR Week: (Specimen Collected)	RSV	RHV/ ENT	PIV	HMPV	HCV	ADV	# Co-Infection	No. Pos (%)	Unsat	Total Tested	Total Rec'd
08 (2/22- 2/28/2015)	0	0	1	0	0	1	0	**2(33%)**	0	**6**	**6**
09 (3/01- 3/07/2015)	1	0	0	1	1	0	0	**3(50%)**	0	**6**	**6**
10 (3/08- 3/14/2015)	0	0	1	1	0	2	0	**4(80%)**	0	**5**	**5**
11 (3/15- 3/21/2015)	0	0	0	0	0	1	0	**1(50%)**	0	**2**	**2**
Prior 4 wk Total	**1**	**0**	**2**	**2**	**1**	**4**	**0**	**10(53%)**	**0**	**19**	**19**
Cumulative Season total	**3**	**20**	**6**	**5**	**9**	**12**	**3**	**52(37%)**	**9**	**141**	**150**

All data are subject to change as test results become finalized. The 2014 -2015 influenza season began MMWR 40 (09/28- 10/04/2014).

At the start of the 2014-2015 season, the first 10 influenza virus isolates and thereafter 5 representative isolates every two weeks will be sent by MDPH-BLS to a CDC contract laboratory performing National Influenza Virus Surveillance to include antigenic characterization by hemagglutination inhibition (HI), genetic analysis (sequencing) and sensitivity to FDA-approved drugs for identification of resistance. Eleven influenza A (H3N2) specimens, one A (2009 H1N1), and two B have been characterized for the 2014-2015 season. The influenza A (2009 H1N1), two B, and four of the A (H3N2) specimens were consistent with strains in the 2014-2015 seasonal influenza vaccine. Seven A (H3N2) specimens showed evidence of antigenic drift in laboratory (HI) testing at CDC, suggesting a lower likelihood of protection from this year's vaccine.

As samples are received, MDPH-BLS will screen additional samples every two weeks to detect point mutations within the neuraminidase gene of influenza A/H3N2 viruses (E119, R292, and N294) and influenza A/2009 H1N1 viruses (H275 and I223) to assess resistance trends. This information will be reported locally and captured nationally in FluView (http://www.cdc.gov/flu/weekly/). There were three influenza A/2009 H1N1 isolates from MA during the 2009-2010 season with a mutation conferring oseltamivir-resistance (H275Y) and none during the following four seasons.

Table 5: DPH-BLS Influenza Antiviral Resistance Screening: 2014-2015 Season

Virus Collection Period: September 28, 2014- ongoing				
	Oseltamivir		**Zanamivir**	
	Samples Tested	**Resistant Viruses, Number (%)**	**Samples Tested**	**Resistant Viruses, Number (%)**
Influenza A (H3N2) [i]	185	0 (0)	185	0 (0)
Influenza A (H1N1)pdm09 [ii]	2	0 (0)	0	0 (0)

[i] Samples tested by pyrosequencing at position E119, R292, and N294 within the neuraminidase (NA) gene.
[ii] Samples tested by pyrosequencing at position H275 and I223 within the NA gene.

Additional information on national antiviral resistance testing including recommendations for antiviral treatment and chemoprophylaxis of influenza virus infection can be found at http://www.cdc.gov/flu/weekly/.