Yale NewHaven Health
Yale New Haven Hospital

Laboratory Updates: Clinical Virology and Microbiology

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Influenza and Other Respiratory Viruses: Test Recommendations 2019-20 Season

Influenza causes annual epidemics affecting all ages, with substantial morbidity and mortality. In recent years, four influenza viruses have co-circulated: two influenza A subtypes (A/H3N2, A/H1N1), and two B lineages (B/Victoria and B/Yamagata). The 2018-19 season was A/H3N2 predominant and was high severity in all age groups. The 2018-19 season was A/pdmH1 predominant and prolonged. In general, most at risk for serious disease are the very young, the elderly and those with underlying disease. Other respiratory viruses, especially respiratory syncytial virus (RSV), can also lead to hospitalization.

Indications for Laboratory Testing for Influenza: 1) To identify influenza-infected patients for continuation of **antiviral therapy**. Treatment does NOT require laboratory confirmation, and treatment should not be delayed since early therapy confers the greatest benefit. **2)** To facilitate bed management and **infection control** in hospitalized patients. **3)** To investigate **outbreaks** in institutional or closed settings. **4)** For **public health** surveillance, and to evaluate efficacy of the vaccine. Note: All influenza positives at YNHH are reported to CT DPH, the Emerging Infections Program and CDC.

Indications for Laboratory Testing for non-influenza respiratory viruses: 1) To facilitate **infection control** for hospitalized patients. 2) To assist management of **severe disease** especially in **compromised hosts**. 3) To establish a viral diagnosis and **avert unnecessary antibiotic therapy**.

Tests available at YNHH: **Rapid Influenza A & B PCR** is available for the rapid identification of ED admitted patients with influenza to ensure proper isolation precautions, bed placement, and initiation of antiviral therapy. Rapid influenza A and B PCR is performed **24/7** to provide rapid turnaround times (TAT) for **all three YNHH EDs**, in the laboratories at the York Street campus, St. Raphael's campus, and Shoreline Medical Center. A version of this test is available for L&D as well.

Respiratory Virus PCR Panel [15 viruses] is available only when the Virology Lab is open to diagnose other respiratory viruses when needed for infection control or patient management. Samples are **batch-tested** usually 3 times a day in peak season. Note: **Testing for individual viruses (e.g. rhinovirus) is no longer available.**

Test	Sample	Result	Availability	Sensitivity
Influenza A/B PCR, rapid [LAB3978] (commercial kit) *ED admissions. Outpatient offices, clinics.*	NP swab	1 hr* (in flu season)	On demand, 24/7*	Highest
Respiratory virus PCR panel [LAB3444] (15 viruses, CDC assays, not a kit) *For Inpatients with suspected viral respiratory illness. Most comprehensive. For outpatients, if result will change management.*	NP, throat, aspirates, sputum, BAL, tissue	hrs	1-3 times a day, 7 AM- 7 PM	Highest
Respiratory virus DFA [LAB3440] (7 viruses) *Outpatient only. Less sensitive than PCR.*	NP swab, aspirate	2 -12 hrs	May be batched, 7 AM-10 PM	Moderate
Viral culture, Lower Respiratory [LAB9019] Viral culture, Lower Respiratory w/CMV [LAB8517] *Lower respiratory tract samples only*	BAL, tissue	1-10 days	Daily	Moderate-High
Flu RT-PCR (LABOR AND DELIVERY) [LAB8936] *Labor and Delivery only*	NP swab	1-2 hrs	On demand, 24/7	Highest

*Once received in the testing Laboratory. Priority is ED Admissions for bed assignment during flu season. Other outpatient locations may have longer TAT. At YSC, rapid influenza A/B PCR is performed by Microbiology staff when Virology is closed.

Note: Last season, four coronaviruses and parainfluenza type 4 were included in the **Respiratory Virus PCR Panel**, bringing the total number of viruses to 15: **Influenza A & B, RSV A & B, HMPV, parainfluenza types 1-4, adenoviruses, coronaviruses (229E, OC43, NL63, HKU1), rhinoviruses**. For public health purposes, all influenza A viruses on inpatients are subsequently subtyped as H1 or H3, and the lineage is also determined for a subset of influenza B viruses since recently two B lineages have co-circulated.

Respiratory Virus DFA (direct fluorescent antibody stain of respiratory cells) is available for outpatient testing only. DFA does not "amplify" the target and thus is less sensitive than PCR. However, DFA is lower cost, has **reasonable performance in pediatric patients**, and can detect 7 viruses: influenza A & B, RSV, PIV 1-3 and adenovirus. Well-collected samples are essential.

Viral culture is confined to lower respiratory tract samples.

Sample collection: Nasopharynx or mid-turbinate swab: Poorly collected samples can result in falsely negative results. Best results are obtained within 1-3 days of symptom onset when shedding is maximal. Insert swabs deep into nasopharynx to level of ear and gently rotate to collect cells, or swab the mid-turbinate region.
NEJM video: https://www.youtube.com/watch?feature=player_detailpage&v=DVJNWefmHjE
Pneumatic tubing of samples: To obtain a rapid turnaround, **ED should tube directly to Microbiology Lab, Station 176** .

Reporting: Results are not routinely telephoned, but are entered into EPIC as soon as available.

Infection Prevention: Respiratory virus testing is used to guide infection prevention measures on inpatients.

Viruses	**Isolation Precaution** (in addition to standard precautions)
Adenovirus	Contact + Droplet
Coronavirus	Contact + Droplet
hMPV	Contact
Influenza	Droplet
Parainfluenza	Contact
RSV	Contact
Respiratory virus testing pending	Contact + Droplet, revise isolation orders based on test results

Respiratory Virus Inpatient Cases at YNHH in the 2018-2019 season:
In 7 months, **4815 virus infections were detected on inpatients**. Of these, 2214 (46%) were influenza.

Respiratory Virus Cases in INPATIENTS (IP) at YNHH [October 2018-April 2019]				
Virus	**Total inpatient cases**	**Adult %**	**Pediatric %**	**Peak months**
Adenovirus	**138**	28	72	December-March
HMPV	**283**	81	19	February-April
Influenza A	**2149**	65	35	January-February
Influenza B	**65**	63	27	January-March
Parainfluenza	**221**	66	34	October-November, and May-June
Rhinovirus	**957**	72	28	September-December, and March-June
RSV	**516**	51	49	December-February
Coronavirus 229E/OC43	**399**	Not available	Not available	January-February
Coronavirus NL63/HKU1	**87**	Not available	Not available	January-February

For table of virus-positives by week see: https://medicine.yale.edu/labmed/sections/virology/seasonaltests.aspx

References: Refer to CDC website for the latest updates during the year.
https://www.cdc.gov/flu/pastseasons/index.htm
https://www.cdc.gov/flu/professionals/classifies-flu-severity.htm
https://www.cdc.gov/flu/about/season/index.html
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