

DoD Influenza Forecasting Challenge Guidance



02 October 2019

**Preface**

The Department of Defense (DoD) Influenza Forecasting Challenge Guidance, developed by the Armed Forces Health Surveillance Branch (AFHSB), aims to forecast the onset, the week when influenza-like-illnesses (ILI) peak, and peak intensity of the influenza season, in order to inform public health professionals and policy makers for more effective and targeted interventions. The guidance was adapted from the Centers for Disease Control and Prevention (CDC) Epidemic Prediction Initiative for influenza called FluSight: Flu Forecasting.

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## 

**Introduction**

Influenza places a significant disease burden on U.S. service members and their beneficiaries each year, but its magnitude and timing varies from season to season, making the annual impact difficult to forecast at the beginning of each season. Forecasting can provide insight into when the start, peak, and changes in influenza activity will occur. Unlike traditional influenza surveillance systems, which measure influenza activity after it has occurred, forecasting analysis offers the possibility to improve measures of prevention, potentially reducing the impact of influenza.

## Objectives

To improve the DoD influenza forecasting and in conjunction with the CDC, Integrated Biosurveillance (IB) section at AFHSB will undertake a collaborative comparison of forecasts to observed values for the 2019-2020 influenza season. For each week during the influenza season, participants will be asked to provide forecasts for 28 Military Treatment Facilities (MTFs, see Appendix A) for the entire season (seasonal targets) and for the next four weeks ahead (short-term targets). The seasonal targets are onset week, peak week, and peak intensity. The short-term targets are the percent of outpatient, MTF visits experiencing ILI one week, two weeks, three weeks, and four weeks ahead from the week of the most recently provided data. All forecast results will be compared to the weekly ILI percent based on data from the Defense Medical Surveillance System (DMSS).[[1]](#footnote-2)

## Eligibility

All academic or research institutions are welcome to participate in this collaborative influenza challenge if they are willing to comply with the Data Sharing Agreement (DSA) and Memorandum of Agreement (MOA) required to receive de-identified DoD ILI data.

## Forecast Period

The forecast period will begin on Monday, October 28, 2019, and will run until Monday, May 11, 2020. All participants must submit their weekly forecasts by 11:59PM Eastern Standard Time (EST) each Monday. Missed or late submissions will not preclude participation, but will affect submission scores.

## Forecasting Targets

* Seasonal Targets
  + The onset of the season is defined as the Morbidity and Mortality Weekly Report (MMWR) surveillance week (<https://wwwn.cdc.gov/nndss/document/W2019-20-508.pdf>) when the percentage of outpatient, MTF encounters (visits) for ILI for a MTF (rounded to the nearest 0.1) reaches or exceeds the baseline value for three consecutive weeks. Forecasted onset week values should be for the first week of that three week period. 2019–2020 ILI baseline values for each MTF will be provided to participants by AFHSB on Tuesday, October 15, 2019.
  + The peak week is defined as the [MMWR surveillance week](https://wwwn.cdc.gov/nndss/document/W2019-20-508.pdf) during which the percentage of outpatient, MTF ILI encounters is the highest for the 2019-2020 influenza season for each MTF.
  + The peak intensity is defined as the highest numeric value that the percentage of outpatient, MTF ILI encounters reaches during the 2019-2020 influenza season for each MTF in an MMWR surveillance week.
* Short-term Targets
  + One- to four-week ahead from date of the forecast will be defined as the percentage of outpatient, MTF ILI encounters for each target week for each MTF.
  + Percentages will be rounded to the nearest one decimal point. In the case of multiple peak weeks (i.e., there is an identical peak percentage of ILI encounters value in two or more weeks), all weeks with the identical peak value will be considered the peak week.

\* Please note that percent ILI should only include outpatient MTF encounters (i.e. where type = ‘Outpt’ and SOURCEcare = ‘MTF’).

## Forecast Submission

All forecast submissions will provide probabilistic forecasts (i.e., 50% chance the peak will occur on week 2; 30% chance on week 3) and the point forecast for each of the three seasonal targets and four-week ahead targets. The probabilities for each forecasting target should be non-negative and sum to one. If the sum is greater than 0.9 and less than 1.1, the probabilities will be normalized to one. If any probability is negative or the sum is outside the 0.9-1.1 range, the submission will be discarded. A forecast that is later discarded does not disqualify teams from participating but will be assigned a score of -10. All forecast submissions for short-term targets should be relative to the most recent week of ILI data released. For example, ILI data for week 43 will be available for pick-up via DoD Secure Access File Exchange (SAFE) (<https://safe.apps.mil/>), by 16:00 Thursday, October 31, 2019. Each short-term forecast (1- , 2- , 3- , and 4-week ahead) submitted on Monday, November 4, 2019, should include forecasts for ILI values for epidemiological weeks 44-47.

In addition to submissions, a description of forecasting methodology should be submitted via email ([dha.ncr.health-surv.mbx.dodflucontest@mail.mil](file:///\\AMEDFSHSC03\H_Drive$\Sections\IB\Teams\Innovation%20and%20Evaluation%20(I&E)\Modeling%20and%20Forecasting\Influenza%20Forecasting%20DSA\dha.ncr.health-surv.mbx.dodflucontest@mail.mil)) to AFHSB-IB section by November 15, 2019, using the methodology form provided (see DoD section of the FluSight website). This form captures key model factors, such as data source(s) and model type(s) in a standardized way. Methodologies and data sources may be changed during the forecasting period, but participants should submit a new methodology form after the change. Please submit the completed form and forward any questions to [dha.ncr.health-surv.mbx.dodflucontest@mail.mil](file:///\\AMEDFSHSC03\H_Drive$\Sections\IB\Teams\Innovation%20and%20Evaluation%20(I&E)\Modeling%20and%20Forecasting\Influenza%20Forecasting%20DSA\dha.ncr.health-surv.mbx.dodflucontest@mail.mil).

## Submission Structure

All forecast submissions should be structured to match the submission template (named “MTF\_ILI\_Submission\_Template.csv” – see DoD section of the FluSight website). The file structure (e.g., the column or row locations) cannot modified in any way. The functions “verify\_entry” and “verify\_entry\_file” from the FluSight\_DoD R package can be used to verify that columns are named and ordered correctly and that probabilities are non-negative and sum to a value between 0.9 and 1.1. For onset, the “none” field indicates if no influenza season is forecasted (e.g., the ILI value never reaches or exceeds the baseline for at least three consecutive weeks during the season). Peak intensity and week-ahead forecasts should be given in the provided 0.1 percentage intervals labeled as “bin\_start\_incl” on the submission file. For example, the bin for 3.1% represents the probability that rounded percentage of ILI encounters equals 3.1%. The probability assigned to the final bin labeled 13.0% includes the probability of percentage of ILI encounters values greater than or equal to 13.0%.

Forecasts should be submitted online through the DoD section of the FluSight website (<https://predict.cdc.gov/>). In the event forecasts cannot be submitted online, they may be emailed to [flucontest@cdc.gov](mailto:flucontest@cdc.gov) using the provided CSV file. For an email submission, the CSV file name should be modified to the following naming convention. For example, a forecast submission using week 43 data submitted by John Doe University for prediction from a given model name on November 4, 2019, should be named “EW43-JDU\_ModelName-MTF\_ILI-2019-11-04.csv” where EW43 is the latest week of ILI data used in the forecast, JDU is the name of the participant making the submission (e.g., John Doe University), and 2019-11-04 is the date of submission.

## Evaluation Criteria

*Log Score*

Once initially published, DMSS data may change as additional reports are received and revised. The weekly data feed will include weekly surveillance data as they were first published and in their most up-to-date version following backfill (see “Data Sources” section below). All forecasts will be evaluated using the ILI observations pulled from the DMSS during week 28 of 2020, and the logarithmic scoring rule will be used to measure the accuracy of the probability distribution of a forecast. If is the set of probabilities for a given forecast, and   is the probability assigned to the observed outcome, the logarithmic score is:   
For each forecast of each target,  will be set to the probability assigned to the single bin containing the observed outcome values (based on the rounded percentage of ILI encounters). If onset is never reached during the season, only the probability assigned to the bin for “none” will be scored. For the peak week target in the case of multiple peak weeks, the probability assigned to the bins containing each peak week will be summed.

Undefined natural logs (which occur when the probability assigned to the observed outcome is 0) will be assigned a value of -10. Forecasts which are not submitted (e.g., if a week is missed) or that are incomplete (e.g., sum of probabilities greater than 1.1) will also be assigned a value of -10.

In addition to the final scores, AFHSB may provide interim score reports (for season onset and short-term predictions) to participants on a semi-regular basis during the season. Interim scores will not impact final team standings.

**Example:** A forecast predicts there is a probability of 0.3 (i.e., a 30% chance) that the flu season starts on week 45, with the remaining 0.7 probability distributed across other weeks according to the forecast. Once the flu season has started, the prediction can be evaluated, and the ILINet data show that true onset was on week 45. The probability assigned to week 45, 0.3, would be derived, and the forecast would receive a score of log(0.3) = -1.20. If the season started on another week, the score would be calculated on the probability assigned to that week.

*Absolute Error*

Forecast accuracy will be measured by log score. Nonetheless, participants are requested to continue to submit their point predictions, which should aim to minimize the absolute error (AE), which is the absolute difference between a forecast  and an observation such that: . If a point forecast is not provided, AFHSB-IB will estimate the point forecast using the median of the submitted distribution. While official team rankings will only be based on log scores, AFHSB-IB may report on the accuracy of point predictions in manuscripts and analyses.

**Example:** A forecast predicts that the influenza season will start on week 45; influenza actually begins on week 46. The AE of the prediction is |45-46| = 1 [week]. For season onset, if the point forecast is for no onset, please report a point forecast of “NA” (not available).

## Overall Participant Ranking

Logarithmic scores for seasonal and short-term forecasts will be averaged across different submission time periods and MTFs to provide both specific and generalized measures of the accuracy of forecasts. The overall team rankings at the end of the season will be determined by averaging scores across all of the MTF targets over the forecasting period. Participants that do not provide all seasonal and short-term targets for 28 MTFs at least one week during the challenge will be ineligible to be named the overall top performing participant; however, they will still be ranked for the MTFs and targets they provided.

The forecasting evaluation period will vary by target, representing the weeks when the forecasts are most useful. For seasonal targets, the evaluation period will begin with the first forecast submission. The evaluation period for season onset will end six weeks after the observed onset week, while for peak week and intensity will end after ILI percentage is below baseline for the final time during the influenza season. For short-term targets, the evaluation period will begin four weeks prior to the observed onset week and will end three weeks after ILI percentage is below baseline for the final time during the influenza season. Teams are free to submit as many systems as they wish, but these systems should all be substantially different from one another, reflecting materially different approaches to the forecasting problem.

## Data Sources

All participants will sign a DSA in order to receive de-identified historical ILI data, influenza laboratory data, aggregated historical encounter data, and an MOA to receive the same de-identified data elements weekly during the forecasting period. Once the DSA and MOA are in place, AFHSB-IB will notify participants by email to download the DoD data from DoD SAFE, where it **will be available for seven days and then automatically deleted.** After initial publication, DMSS values may change as additional reports are received and revised. Participants are welcome to utilize any additional data beyond DoD ILI data to augment model performance.

## Publication of Forecasts

All participants will provide consent that their forecast results can be published in real-time on the CDC’s Epidemic Prediction Initiative (EPI) website (<https://predict.cdc.gov/>), CDC’s Epidemic Prediction Initiative GitHub page (<https://github.com/cdcepi>) , and after the influenza season ends, in a peer-reviewed scientific journal. The forecasts will be attributed to a participant name (e.g., John Doe University) or anonymous (e.g., Participant A) based on individual preference. Participant names should be limited to 25 characters for display online. The participant name registered with the EPI website will be displayed alongside a participant’s forecasts – those who wish to remain anonymous should contact CDC to obtain an anonymous name to use. No participant may publish the results of another participant’s model in any form without consent. The scientific manuscript describing the forecasting results across participants will be coordinated by a representative from AFHSB-IB. If discussing the forecasting challenge on social media, participants are encouraged to use the hashtag #CDCflusight to promote visibility of the challenge.

## Ensemble Model and Null Models

All participants are welcome to contribute their forecasts to the ensemble model and those interested should contact AFHSB-IB at [dha.ncr.health-surv.mbx.dodflucontest@mail.mil](file:///\\AMEDFSHSC03\H_Drive$\Sections\IB\Teams\Innovation%20and%20Evaluation%20(I&E)\Modeling%20and%20Forecasting\Influenza%20Forecasting%20DSA\dha.ncr.health-surv.mbx.dodflucontest@mail.mil). Participant forecasts will be combined by the Defense Threat Reduction Agency (DTRA) into one or more ensemble forecasts to be published along with individual participant forecasts. In addition, the participant forecasts will be displayed alongside the historic forecast (or null model)[[2]](#footnote-3) for comparison, which is based solely on the historical distribution of the value of interest (i.e., peak week, peak percentage, or ILI percentage in a given MMWR week), excluding the 2009/2010 H1N1 pandemic season.

## Contact Information

If you have any specific questions about this guidance document or questions about the DoD Influenza Forecasting Challenge please contact the persons listed below on the following group email:

[dha.ncr.health-surv.mbx.dodflucontest@mail.mil](file:///\\AMEDFSHSC03\H_Drive$\Sections\IB\Teams\Innovation%20and%20Evaluation%20(I&E)\Modeling%20and%20Forecasting\Influenza%20Forecasting%20DSA\dha.ncr.health-surv.mbx.dodflucontest@mail.mil)

Lead, Innovation, and Evaluation team: Lt Col Paul Lewis, MD, USAF

Epidemiologist: Ms. Amelia Johnson, CTR

Epidemiologist: Mr. William Hoffman, CTR

Data Scientist/Epidemiologist : Dr. Jason Bailey, CTR

Program Scientist and Technical Lead: Dr. Christian Bautista, CTR

Appendix A

|  |  |
| --- | --- |
| **SELECTED MILITARY TREATMENT FACILITIES (MTF)** | |
| **MTF NAME** | **LOCATION**  **(DMISID)\*** |
| KELLER ACH-WEST POINT | 0086 |
| KELLER ACH-WEST POINT | 1815 |
| LEONARD WOOD ACH-FT LEONARD WOOD | 0075 |
| LEONARD WOOD ACH-FT LEONARD WOOD | 1511 |
| JAMES A LOVELL FHCC | 0056 |
| JAMES A LOVELL FHCC | 0518 |
| JAMES A LOVELL FHCC | 1660 |
| JAMES A LOVELL FHCC | 1959 |
| 28th MED GRP-ELLSWORTH AFB | 0106 |
| WOMACK AMC-FT BRAGG | 0089 |
| WOMACK AMC-FT BRAGG | 0570 |
| WOMACK AMC-FT BRAGG | 7143 |
| WOMACK AMC-FT BRAGG | 7286 |
| WOMACK AMC-FT BRAGG | 7294 |
| BLANCHFIELD ACH- FT CAMPBELL | 0060 |
| BLANCHFIELD ACH- FT CAMPBELL | 6093 |
| BLANCHFIELD ACH- FT CAMPBELL | 7307 |
| BLANCHFIELD ACH- FT CAMPBELL | 7341 |
| 99TH MED GRP-NELLIS AFB | 0079 |
| BLISS AHC-FT HUACHUCA | 0008 |
| 56TH MED GRP-LUKE AFB | 0009 |
| NMC PORTSMOUTH | 0124 |
| NMC PORTSMOUTH | 0378 |
| NMC PORTSMOUTH | 0380 |
| NMC PORTSMOUTH | 0382 |
| NMC PORTSMOUTH | 0387 |
| NMC PORTSMOUTH | 0508 |
| NMC PORTSMOUTH | 6214 |
| NMC PORTSMOUTH | 6221 |
| NMC PORTSMOUTH | 6240 |
| FT BELVOIR-NCR | 0123 |
| FT BELVOIR-NCR | 0256 |
| FT BELVOIR-NCR | 6200 |
| FT BELVOIR-NCR | 6201 |
| FT BELVOIR-NCR | 0067 |
| FT BELVOIR-NCR | 0522 |
| 88th MED GRP-WRIGHT-PATTERSON AFB | 0095 |
| EVANS ACH-FT CARSON | 0032 |
| EVANS ACH-FT CARSON | 7293 |
| EVANS ACH-FT CARSON | 7300 |
| EVANS ACH-FT CARSON | 0033 |
| MADIGAN AMC-JB LEWIS-MCCHORD | 0125 |
| MADIGAN AMC-JB LEWIS-MCCHORD | 1480 |
| MADIGAN AMC-JB LEWIS-MCCHORD | 1485 |
| MADIGAN AMC-JB LEWIS-MCCHORD | 1646 |
| MADIGAN AMC-JB LEWIS-MCCHORD | 1649 |
| MADIGAN AMC-JB LEWIS-MCCHORD | 6094 |
| NH JACKSONVILLE | 0039 |
| NH JACKSONVILLE | 0266 |
| 96TH MED GRP-EGLIN AFB | 0042 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0029 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0230 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0231 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0232 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0233 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0407 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0701 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0208 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0024 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 0210 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1406 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1407 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1408 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1409 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1412 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1657 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1659 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 1974 |
| NMC SAN DIEGO -NAV HOSP PENDLETON | 6225 |
| 75th MED GRP-HILL AFB | 0119 |
| 55th MED GRP-OFFUTT | 0078 |
| 341st MED GRP-MALMSTROM | 0077 |
| MARTIN ACH-FT BENNING | 0048 |
| MARTIN ACH-FT BENNING | 1315 |
| MARTIN ACH-FT BENNING | 1316 |
| MARTIN ACH-FT BENNING | 1330 |
| MARTIN ACH-FT BENNING | 1553 |
| MARTIN ACH-FT BENNING | 1555 |
| MARTIN ACH-FT BENNING | 1939 |
| 60TH MED GRP-TRAVIS AFB | 0014 |
| GUTHRIE AHC-FT DRUM | 0330 |
| GUTHRIE AHC-FT DRUM | 1478 |
| GUTHRIE AHC-FT DRUM | 7113 |
| REYNOLDS AHC-FT SILL | 0098 |
| REYNOLDS AHC-FT SILL | 1625 |
| NH BEAUFORT | 0104 |
| NH BEAUFORT | 0358 |
| NH BEAUFORT | 0360 |
| MUNSON AHC-FT LEAVENWORTH | 0058 |
| MUNSON AHC-FT LEAVENWORTH | 1488 |
| MUNSON AHC-FT LEAVENWORTH | 1530 |
| BROOKE AMC-FT SAM HOUSTON | 0109 |
| BROOKE AMC-FT SAM HOUSTON | 1587 |
| BROOKE AMC-FT SAM HOUSTON | 6095 |
| DARNALL AMC-FT HOOD | 0110 |
| DARNALL AMC-FT HOOD | 1592 |
| DARNALL AMC-FT HOOD | 1599 |
| DARNALL AMC-FT HOOD | 1601 |
| DARNALL AMC-FT HOOD | 6014 |
| DARNALL AMC-FT HOOD | 6076 |
| DARNALL AMC-FT HOOD | 7236 |
| DARNALL AMC-FT HOOD | 7347 |
| *\** Defense Medical Information System (DMIS) identifiers |  |

Appendix B

|  |  |  |  |
| --- | --- | --- | --- |
| **INTERNATIONAL CLASSIFICATION OF DISEASES CODES FOR INFLUENZA-LIKE ILLNESS (ILI)\*** | | | |
| ICD-10 CODE | DESCRIPTION | ICD-9† CODE | DESCRIPTION |
| B97.89 | other viral agents as the cause of diseases classified elsewhere | 79.99 | Unspecified viral infection |
| H66.9 | Otitis media, unspecified | 382.9 | Unspecified otitis media |
| H66.90 | Otitis media, unspecified, unspecified ear |  |  |
| H66.91 | Otitis media, unspecified, right ear |  |  |
| H66.92 | Otitis media, unspecified, left ear |  |  |
| H66.93 | Otitis media, unspecified, bilateral |  |  |
| J00 | Acute nasopharyngitis [common cold] | 460 | Acute nasopharyngitis |
| J01.9 | Acute sinusitis, unspecified | 461.9 | Acute sinusitis, unspecified |
| J01.90 | Acute sinusitis, unspecified |  |  |
| J06.9 | Acute upper respiratory infection, unspecified | 465.8 | Acute upper respiratory infections, other multiple sites |
|  |  | 465.9 | Acute upper respiratory infections, unspecified sites |
| J09 | Influenza due to certain identified influenza viruses |  |  |
| J09.X | Influenza due to identified novel influenza A virus |  |  |
| J09.X1 | Influenza due to identified novel influenza A virus with pneumonia | 488.0 | Influenza due to identified avian influenza virus |
|  |  | 488.01 | Influenza due to identified avian influenza virus with pneumonia |
|  |  | 488.8 | Influenza due to novel influenza A |
|  |  | 488.81 | Influenza due novel influenza A with pneumonia |
| J09.X2 | Influenza due to identified novel influenza A virus with other respiratory manifestations | 488.02 | Influenza due to identified avian influenza virus with other respiratory manifestations |
|  |  | 488.82 | Influenza due to novel influenza A with other respiratory manifestations |
| J09.X3 | influenza due to identified novel influenza A virus with gastrointestinal manifestations | 488.09 | Influenza due to identified avian influenza virus with other manifestations |
| J09.X9 | Influenza due to identified novel influenza A virus with other manifestations | 488.1 | Influenza due to 2009 H1N1 influenza virus |
|  |  | 488.19 | Influenza due to identified 2009 H1N1 influenza virus with other manifestations |
|  |  | 488.89 | Influenza due to novel influenza A with other manifestations |
| J10 | Influenza due to other identified influenza virus |  |  |
| J10.0 | Influenza due to other identified influenza virus with pneumonia |  |  |
| J10.00 | Influenza due to other identified influenza virus with unspecified type of pneumonia | 487.0 | Influenza with pneumonia |
| J10.01 | Influenza due to other identified influenza virus with the same other identified influenza virus pneumonia | 487.1 | Influenza with other respiratory manifestations |
| J10.08 | Influenza due to other identified influenza virus with other specified pneumonia | 487.0 | Influenza with pneumonia |
|  |  | 488.11 | Influenza due to identified novel H1N1 influenza virus with pneumonia |
| J10.1 | Influenza due to other identified influenza virus with other respiratory manifestations | 487.1 | Influenza with other respiratory manifestations |
|  |  | 488.12 | Influenza due to identified novel H1N1 influenza virus with other respiratory manifestations |
| J10.2 | influenza due to other identified influenza virus with gastrointestinal manifestations | 487.8 | Influenza with other manifestations |
| J10.8 | Influenza due to other identified influenza virus with other manifestations |  |  |
| J10.81 | Influenza due to other identified influenza virus with other manifestations with encephalopathy |  |  |
| J10.82 | Influenza due to other identified influenza virus with other manifestations with myocarditis |  |  |
| J10.83 | Influenza due to other identified influenza virus with otitis media |  |  |
| J10.89 | Influenza due to other identified influenza virus with other manifestations |  |  |
| J11 | Influenza due to unidentified influenza virus |  |  |
| J11.0 | Influenza due to unidentified influenza virus with pneumonia |  |  |
| J11.00 | Influenza due to unidentified influenza virus with unspecified type of pneumonia | 487.0 | Influenza with pneumonia |
| J11.08 | Influenza due to unidentified influenza virus with specified pneumonia |  |  |
| J11.1 | Influenza due to unidentified influenza virus with other respiratory manifestations | 487.1 | Influenza with other manifestations |
| J11.2 | Influenza due to unidentified influenza virus with gastrointestinal manifestations | 487.8 | Influenza with other manifestations |
| J11.8 | Influenza due to unidentified influenza virus with other manifestations |  |  |
| J11.81 | Influenza due to unidentified influenza virus with encephalopathy |  |  |
| J11.82 | Influenza due to unidentified influenza virus with myocarditis |  |  |
| J11.83 | Influenza due to unidentified influenza virus with otitis media |  |  |
| J11.89 | Influenza due to unidentified influenza virus with other manifestations |  |  |
| J12.89 | Other viral pneumonia | 487.0 | Influenza with pneumonia |
| J12.9 | Viral pneumonia, unspecified |  |  |
| J18 | Pneumonia, unspecified organism | 486 | Pneumonia, organism unspecified |
| J18.1 | Lobar pneumonia, unspecified organism |  |  |
| J18.8 | Other pneumonia, unspecified organism |  |  |
| J18.9 | Pneumonia, unspecified organism |  |  |
| J20.9 | Acute bronchitis, unspecified | 466.0 | Acute bronchitis |
| J22 | Unspecified acute lower respiratory infection |  |  |
| J40 | Bronchitis, not specified as acute or chronic | 490 | Bronchitis, not specified as acute or chronic |
| R05 | Cough | 786.2 | cough |
|  |  | 780.6 | Fever and other physiologic disturbances of temperature regulation |
| R50.9 | Fever, unspecified | 780.60 | Fever, unspecified |
| \* Case Definition and Incidence Rules: Influenza-like Illness (ILI) is a category of nonspecific respiratory illness defined by the presence of fever (temperature of 100°F [37.8°C] or greater) and a cough or a sore throat in the absence of a known cause other than influenza. Synonyms include Acute Respiratory Infection (ARI). Any clinical diagnosis of influenza is considered a diagnosis of ILI, not of influenza, until confirmed by laboratory testing. | | | |
| For surveillance purposes, a case of influenza-like illness is defined as:  · One hospitalization with any of the defining diagnoses of “influenza-like illness” (see ICD codes lists above) in any diagnostic position; or · One outpatient medical encounter with any of the defining diagnoses of “influenza-like illness” (see ICD codes lists above) in any diagnostic position.  Incidence rules: For individuals who meet the case definition: · The incidence date is considered the date of the first hospitalization or outpatient medical encounter that includes a defining diagnosis of influenza-like illness. · An individual can be an incident case only once per week. Exclusions: · None  † ICD-9 codes were used to query historical ILI data. | | | |

Appendix C

Double click on the embedded link below to open the data dictionary data\_dictionary\_01OCT2019.xlsx file.



1. Rubertone MV, Brundage JF, [*The Defense Medical Surveillance System and the Department of Defense serum repository: glimpses of the future of public health surveillance.*](https://www.ncbi.nlm.nih.gov/pubmed/12453804) Am J Public Health. 2002 Dec; 92(12):1900-4. [↑](#footnote-ref-2)
2. Craig J. McGowan, Matthew Biggerstaff, Michael Johansson, et al. *Collaborative efforts to forecast*

   *seasonal influenza in the United States, 2015–2016* Scientific Reports (2019) 9:683 DOI:10.1038/s41598-018-36361-9 [↑](#footnote-ref-3)