


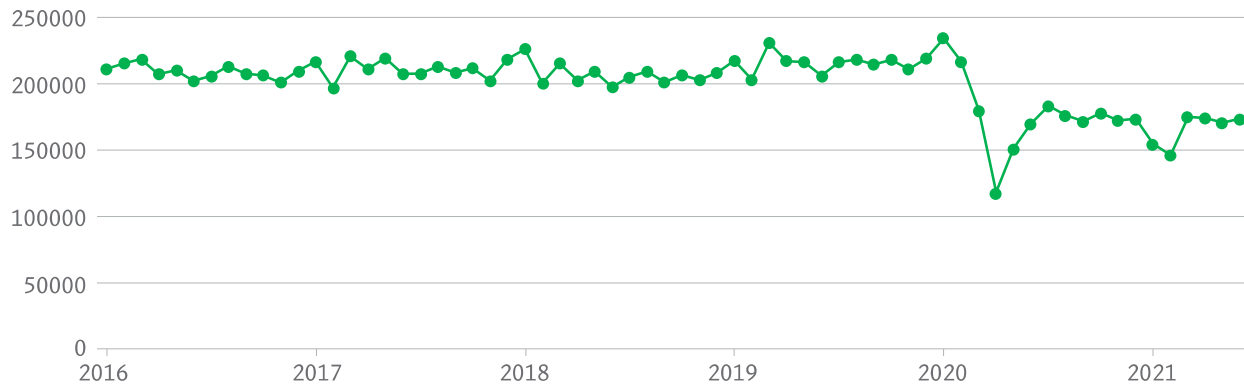
# HQI Sentinel Signal Detection Systems Report

This is the third report of findings from HQI’s sentinel signal detection systems. The systems automatically detect abnormal changes (i.e., signals) in the incidence of diagnosis codes from hospital discharge records in the Hospital Quality Improvement Platform (HQIP), as well as term frequencies from the Collaborative Healthcare Patient Safety Organization (CHPSO) safety reports. The key alerts for HQIP (December 2020-June 2021) and CHPSO (January-May 2021) are as follows:

-  Increased COVID-19 Vaccine Adverse Events
-  Increased Severe COVID-19 Related Diagnoses
-  Increased Patient Falls and Healthcare-Associated Infections
-  Increased Unsafe Staffing-Related Reports
-  Decreased COVID-19 Management Issues

To dive deeper into the HQIP and CHPSO signals driving these top alerts, the full report is available below. More details on the methodology used in the signal detection systems and prior reports of findings are also available on [HQI’s Sentinel Signal Detection Reporting page](#).

**Figure 1.** Monthly Discharges from January 2016 to June 2021 among HQIP-Participating Hospitals



*Note: Total discharge records dropped in January and February 2021.*

## UNDERSTANDING THE TABLES AND FIGURES

In the tables of results, the “ICD” column shows three-digit ICD-10 diagnosis codes for which a signal was detected for HQIP discharges. Alternatively, the “Term” column shows the word or combination of words for which a signal was detected for CHPSO safety reports. The “Signal” column indicates the maximum  $t$ -statistic value (larger values indicate stronger signals) of outlier effects from December 2020 to June 2021 for discharges and January to May 2021 for safety reports. The “%” and “#” columns illustrate the time series patterns for January 2019 to June 2021 (for discharges) or January 2019 to May 2021 (for safety reports) for proportional series and raw counts, respectively. Signal periods are highlighted with yellow bars. The

“Commentary” column presents the HQI/CHPSO clinicians’ categorical classification of each signal after further review, and the “Description/Desc” column presents the description of each signal.

The larger plots below display selected proportional time series for illustrative purposes. The “Original” line in the plots shows the actual proportion of discharges or reports each month with the three-digit ICD-10 diagnosis code or term combination. The “Adjusted” line shows the proportion each month that was expected (the fitted time series model). The “Outlier Effects” plot highlights the big differences between the reality and expectation, which is to say, the detected signal.

## SIGNAL DETECTION RESULTS: HQIP DISCHARGE RECORDS

**Table 1** shows the top 39 three-digit ICD-10 discharge diagnosis codes for which a signal was detected from December 2020 to June 2021 (inclusive). The “%” and “#” columns show the time series from January 2019 to June 2021 for the proportional series and raw counts, respectively, to provide the context of each signal.

# HQIP Discharge Records

## Signal Period: December 2020-June 2021

Signal Periods are highlighted with yellow color

Show 10 entries

Search:

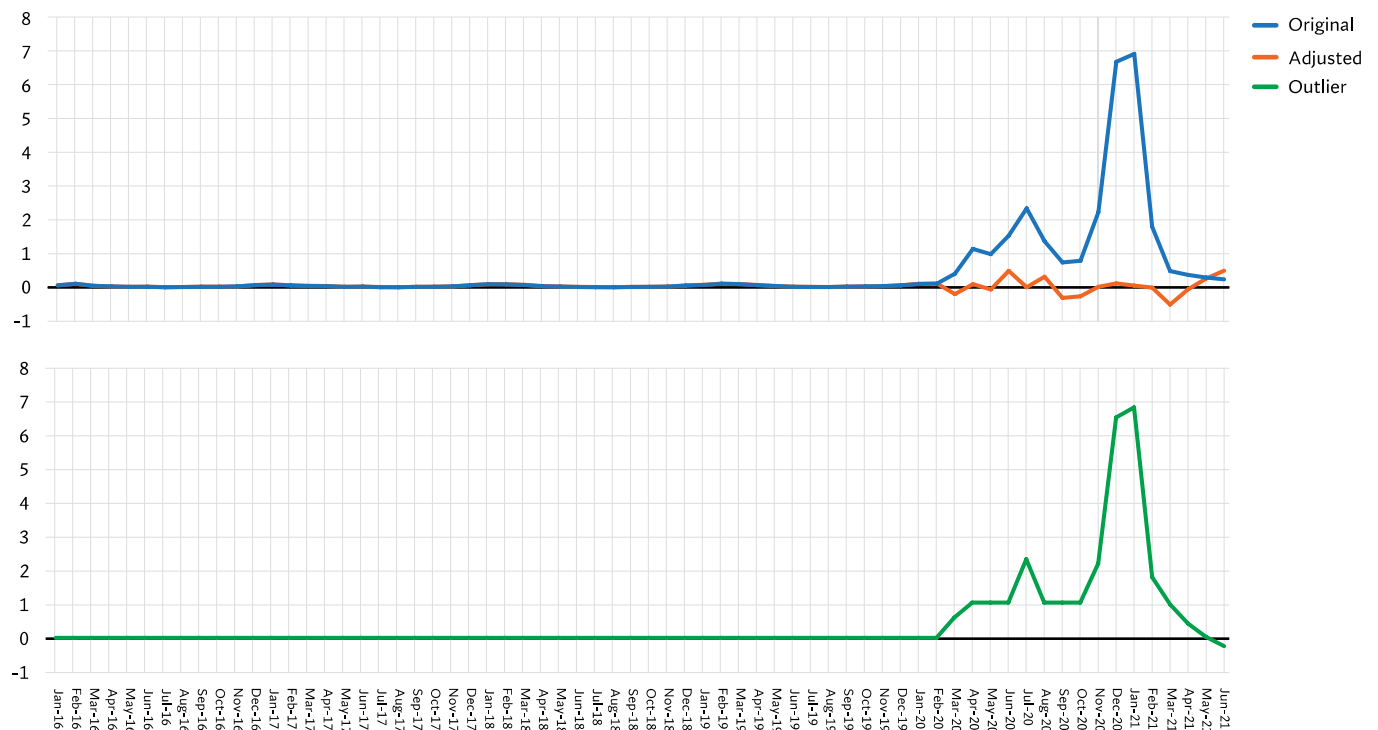
| ICD | Signal   | Desc   | Commentary | % | # |
|-----|----------|--|------------|---|---|
| U07 | 4,954.43 | Emergency use of U07   | COVID-19   |   |   |
| Z20 | 332.01   | Contact with and (suspected) exposure to communicable diseases | COVID-19   |   |   |
| Z11 | 12.00    | Encounter for screening for infectious and parasitic diseases  | COVID-19   |   |   |

Summaries and clinical interpretations of key HQIP signals are presented below, though readers are encouraged to explore the results themselves using the link above:

- COVID-19<sup>1</sup>, COVID-19 Symptom<sup>2</sup>, COVID-19 Complication<sup>3</sup>, Severe COVID-19 Related<sup>4</sup>, COVID-19 Risk Factor<sup>5</sup>, COVID-19 Pregnancy<sup>6</sup>, COVID-19 Treatment Related<sup>7</sup>, and Pressure Injuries<sup>8</sup>** all spiked from December 2020 to Jan 2021. Detailed descriptions for each signal follow, referenced by the signal subscripts:
  - Emergency use of U07*
  - Viral pneumonia, not elsewhere classified (J12 – see Figure 2); Disturbances of smell and taste; Acute respiratory distress syndrome; Abnormalities of breathing; Purpura and other hemorrhagic conditions*
  - Sequelae of other and unspecified infectious and parasitic diseases; Other abnormalities of plasma proteins; Other coagulation defects; Pneumothorax and air leak; Other disorders of brain; Symptoms and signs specifically associated with systemic inflammation and infection; Poisoning by, adverse effect of and underdosing of hormones and their synthetic substitutes and antagonists, not elsewhere classified; Abnormal serum enzyme levels; Bacterial pneumonia, not elsewhere classified; Esophageal varices; Abnormalities of heartbeat*

4. *Respiratory failure, not elsewhere classified; Cardiac arrest; Other sepsis; Acute kidney failure; Pulmonary embolism; Other venous embolism and thrombosis; Shock, not elsewhere classified*
  5. *Other immunodeficiencies*
  6. *Maternal infectious and parasitic diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium; Newborn affected by maternal conditions that may be unrelated to present pregnancy*
  7. *Do not resuscitate*
  8. *Pressure ulcers*
- **Encounter for Screening for Infectious and Parasitic Diseases (Z11)** trended downward starting September 2020, probably because of regulated use of COVID-19 codes.
  - **COVID-19 Ruled Out** (*Encounter for medical observation for suspected diseases and conditions ruled out*) continued trending downward, starting December 2020.
  - **Continuing Care** (*Long term [current] drug therapy*), **Cancer Screening** (*Other neoplasms of uncertain behavior of lymphoid, hematopoietic and related tissue*), and **Elective Exams** (*Other disorders of breast*) increased in volume from January to June 2021.
  - **Social Determinants of Health (SDoH)** trended upward starting January 2021.
  - **Handgun Discharge and Malfunction Accidents** spiked in January 2021.

**Figure 2.** HQIP Illustrative Signal: “Viral pneumonia, not elsewhere classified (J12)” Proportional Series



Note: Signal spike detected from December 2020 to January 2021.

## SIGNAL DETECTION RESULTS: CHPSO PATIENT SAFETY REPORTS

**Table 2** shows 26 selected safety report terms for which a signal was detected from January to May 2021 (inclusive). The “%” and “#” columns show the time series from January 2019 to May 2021 for the proportional series and raw counts, respectively, to provide the context of each signal.

# CHPSO Patient Safety Reports

## Signal Period: January-May 2021

Signal Periods are highlighted with yellow color

Show 10 entries

Search:

| Term               | Description   | Signal | Commentary          | % | # |
|--------------------|---|--------|---------------------|---|---|
| covid_positive     | COVID-19  | 514.06 | COVID-19 Management |   |   |
| covid_intubated    | COVID-19 intubated patients with desat or decompensating events - many reports associated with DTIs and/or PIs. | 127.79 | COVID-19 Management |   |   |
| covid_surveillance | Decreasing from a peak count in July 2020 to slight uptick in Nov 2020 and down to zero Feb-May 2021            | 51.41  | COVID-19 Management |   |   |

Summaries and clinical interpretations of key CHPSO signals are presented below, though readers are encouraged to explore the results themselves using the link above:

- **COVID-19 Management Issue** reports began trending downward starting January 2021.
- **COVID-19 Vaccine Adverse Event** reports appeared in December 2020 and remained high through May 2021.
- **Behavior-Related Issue** reports about belligerent, abusive, and non-compliant patients — often associated with patients discharged against medical advice or substance use (e.g., methamphetamine and/or alcohol) — increased from January to May 2021.
- **Skin/Pressure Injury** reports increased from December 2020 to January 2021, returned to baseline from February to April 2021, and then increased again in May 2021.
- **COVID-19 Treatment** reports for issues related to plasma transfusion, expired plasma, and consent for treatment increased from December 2020 to January 2021, then returned to baseline in February 2021.
- **Patient Fall** reports identified by keywords such as “*hear\_nurse*” and “*adult\_fall*” were higher from January to May 2021.
- **Healthcare-Associated Infection** reports — especially for catheter-associated urinary tract infections — increased in February 2021 and March 2021.
- **Unsafe Staffing-Related** reports associated with the increased volumes of COVID-19 patients — especially those who are already difficult to manage due to dementia — and reduced staffing conditions that included supplementing with travel nurses, increased around February, March, and May 2021.

**Figure 3.** CHPSO Illustrative Signal: “*covid\_vaccine*” Proportional Series

