

HQI Sentinel Signal Detection Systems Report

This is the second report from HQI’s sentinel signal detection systems. The sentinel signal detection system automatically detects 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 top alerts for HQIP (July-November 2020) and CHPSO (October-December 2020) related to increases in:



Covid-19 Surge; Covid-19 Risk Factor: Other immunodeficiencies; Covid-19 Complications; Covid-19 Treatment; Covid-19 Vaccine



Elective Exams and Breast Cancer Screening



Mental Health



Video Conferencing Tool Related Concerns

More details on the methodology used in the signal detection systems and interpretation of the trends and signals identified during the first half of 2020, are available on the [HQI website](#) and in [the first report](#).

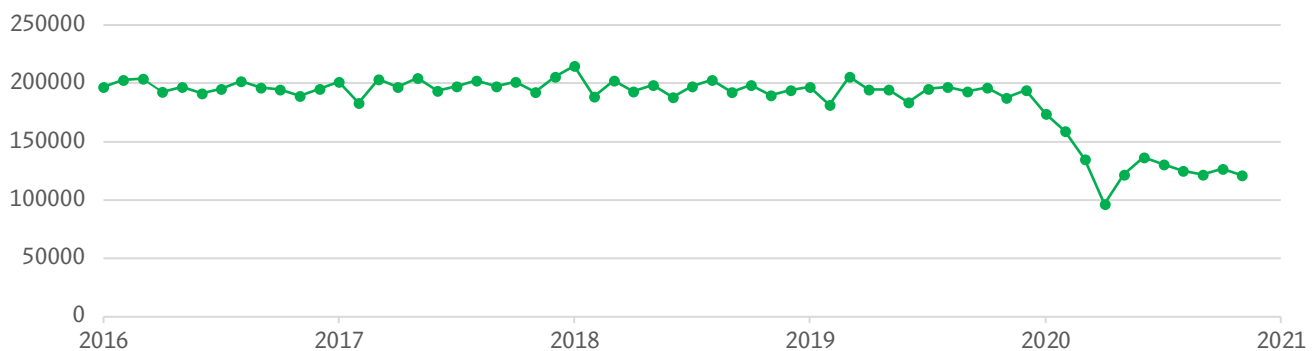


Figure 1. Monthly hospital discharges from Jan 2016-Nov 2020 among Hospital Quality Improvement Platform participants.

The monthly hospital discharge volume among Hospital Quality Improvement Platform participants was relatively stable from July to November 2020 at around 125,000 per month, which was 35.5% lower than during these same months in 2019.

UNDERSTANDING THE TABLES AND FIGURES

In the tables that follow, the “ICD” column shows three-digit ICD-10 diagnosis codes for which a signal was detected for discharges. Alternatively, the “Term” column shows the word or combination of words for which a signal was detected for safety reports. The “Signal” column indicates the maximum *t*-statistic value (the larger the value, the more significant the effect) of outlier effects from July to November 2020 for discharges and October to December 2020 for safety reports. The “%” and “#” columns show the time series for June to November 2020 (for discharges) or September to December 2020 (for safety reports) for the proportional

series and raw counts, respectively. The “Commentary” column presents the HQI/CHPSO clinicians’ categorical classification of each signal after further review.

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 FOR HOSPITAL DISCHARGE DIAGNOSIS CODES

Table 1 shows the top 39 three-digit ICD-10 diagnosis codes with a signal detected from July to November 2020 (inclusive). Data point in June 2020 is also presented to illustrate the change from June to July 2020.

KEY FINDINGS

- **COVID-19 surges** occurred in July 2020 and November 2020. The use of Z11 and Z03 for COVID-19 decreased over time, as U07 and J12 began being used instead.
- **COVID-19 complications** (B94.8) occurred after the July surge, which included *Formation of blood clots* (R77, R29) and *Other diseases of pericardium* (I31). **Pregnancies** were highly impacted by both surges (O98). Figure 2 highlights the proportional time series of *Other abnormalities of plasma proteins* (R77) for illustrative purposes.
- **Elective screening and exams** increased in September after the July COVID-19 surge, as evidenced by increased diagnoses for *Age-related cataract* (H25), *Gout* (M10), *Other disorders of binocular movement* (H51), *Breast cancer* (R92, Z17), and *Other cancers* (D47, C49).
- **COVID-19 symptoms** increased during both surges (July and November). For example, *Disturbances of smell and taste* (R43), *Acute respiratory distress syndrome* (J80), and *Abnormalities of breathing* (R06). **COVID-19 risk factors** like *Other immunodeficiencies* (D84) and *Disorders of lipoprotein metabolism and other lipidemias* (E78) had relatively large increases in October 2020 and November 2020.
- **Contact and exposure to COVID-19** (Z20) monotonically increased from June to November 2020. **Hospital-acquired COVID-19** (Y95) increased in July 2020 and remained elevated.
- **Mental health** visits increased starting in August 2020, including *Bipolar disorder* (F31), *Brief psychotic disorder* (F29), *Other anxiety disorders* (F41), *Other stimulant related disorders* (F15) and *Cannabis-related disorders* (F12).
- **Perinatal-related** diagnoses were higher from July to September 2020. *Maternal care for other conditions predominantly related to pregnancy* (O26) remained at an elevated level through November. *Other infections specific to the perinatal period* (P39) and *Pre-existing hypertension complicating pregnancy, childbirth and the puerperium* (O10) increased, then dropped back to previous levels in October, only to rise again in November.
- **Sexually transmitted disease infection** visits increased following the July 2020 surge, as shown by increased visits for *Unspecified sexually transmitted disease* (A64) and *Counseling related to sexual attitude, behavior, and orientation* (Z70), which was sustained for the former.
- **Firearm assault injury** (X94) was oddly elevated in July 2020 and *Assault by other specified means* (Y08) was higher in August and October.

Table 1

Show 10 entries

Search:

ICD	Description	Signal	Commentary	%	#
Z11	Encounter for screening for infectious and parasitic diseases	392.46	COVID-19		
U07	Emergency use of U07	121.17	COVID-19		
J12	Viral pneumonia, not elsewhere classified	40.49	COVID-19		

Table 1: [Signal-Table.html](#)

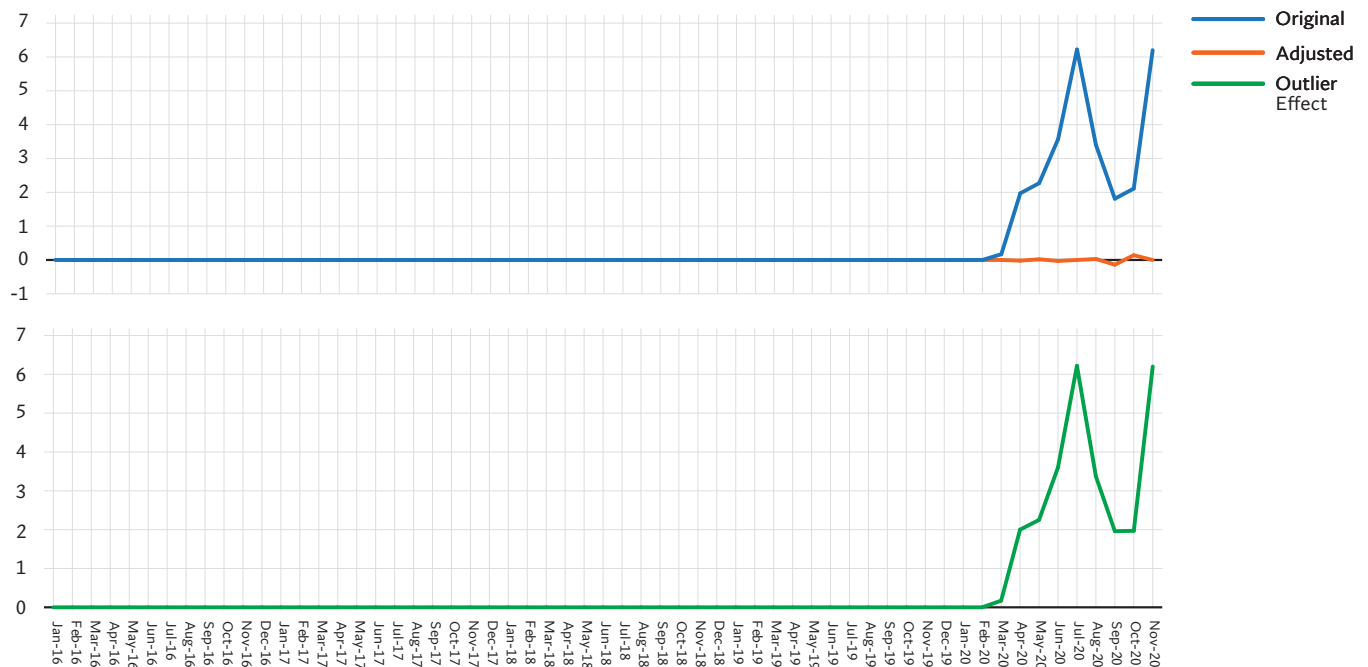


Figure 2. Proportional series of *Other abnormalities of plasma proteins (R77)*.

SIGNAL DETECTION RESULTS FOR SAFETY REPORTS

Table 2 shows selected safety report terms with a signal detected from October to December 2020 (inclusive). Data point in September 2020 is also presented to illustrate the change from September to October 2020.

KEY FINDINGS

- **COVID-19 treatment** issues increased, as shown by signals for *convalescent_plasma*, *dose_remedesivir* and *bamlanivimab* (monoclonal antibodies). Figure 3 highlights the proportional time series for *convalescent_plasma* for illustrative purposes.
- **Medication-related adverse drug events** increased, as evidenced by signals for *naranjo_scale* and *icu_suspect*, which are two terms related to overdose, glycemic events and adverse drug events involving anticoagulants and opioids and glycemic control.
- **COVID-19 vaccine** and **COVID-19 pneumonia** reports increased, especially in December 2020, as shown by signals for *clinic_vaccine* and *covid_failure*, respectively.

- **COVID-19 exposure** reports increased in November and December 2020 (signals included *covid_isolation*, *day_quarantine* and *quality_send*).
- **COVID-19 screening deception** reports (patients intentionally denying to screeners they have no COVID-19 symptoms so they can be seen by providers) peaked in November 2020 per a signal for *behavioral_send*.
- **Contraband surrenders** to hospital security increased for the month of July 2020 as shown by a signal for *contraband_receive*.
- **COVID-19 prone** reports increased in December 2020 per a signal for *manually_prone*.
- **Zoom**-related reports steadily increased from October to December 2020, related to telehealth, monitoring patients in isolation, staff training, etc.
- **Pressure injury** reports increased, including deep tissue injuries from proning and nasal cannulas, as evidenced by signaling for *bundle_intervention*, *ear_helix* and *ear_posterior*.

Table 2

Show 10 entries

Search:

Term	Description	Signal	Commentary	%	#
convalescent_plasma	Plasma given/not given, ADE, consent not signed	1,076.57	Covid Treatment		
dose_remedesivir	Remdesivir given/not given, ADE	94.58	Covid Treatment		
receive_remedesivir	Remdesivir administration	73.80	Covid Treatment		

Table2: [CHPSO Signal Table](#)

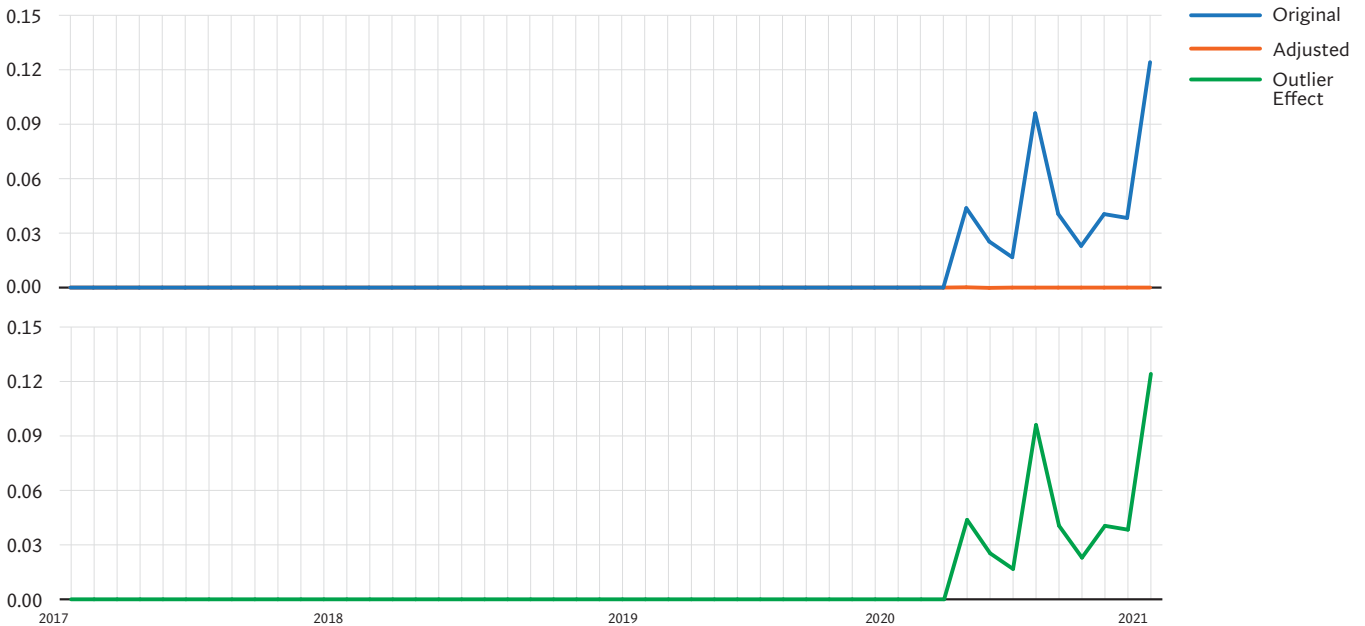


Figure 3: Proportional Series of *convalescent_plasma*.