

## HCAI Rates

Rates of health care associated infections (S. Aureus bloodstream infection and C. Difficile infection) have been analysed and displayed using Statistical Process Control (SPC) methods. An SPC chart consists of data plotted in order, usually over time (months for the HCAI rates). It includes a centre line based on the average of the data. It also includes upper and lower control limits based on statistical calculations (3 sigma deviations from the average).

SPC charts are used internationally in healthcare to distinguish between special and common causes of variation. Common cause variation is the expected or random variation that occurs throughout the healthcare system. Special cause variation is unusual or unexpected variation that can occur because of specific circumstances, and is unlikely to have occurred by chance alone. The probability of any data point falling outside of the control limits due to random variation is very small, and is a signal of special cause or unexpected variation. In addition to a point outside of the control limits, there are four other SPC rules which suggest variation very unlikely to occur by chance alone. Identifying and examining special cause variation may provide an opportunity to learn from the cause of the variation and to take action that will lead to an improvement.

An SPC funnel plot is an SPC chart showing variation across a system (e.g. variation among hospitals). Data are ordered by denominator size rather than by time. In the case of the HCAI data hospitals are ordered by bed days used from lowest to highest. Data points that are above or below the control limits in a funnel plot are an indication of special cause variation.

## Hospital acquired new cases of S. Aureus bloodstream infection per 10,000 bed days used

Figure 1 below is a statistical process control chart showing the national rate of hospital acquired new cases of S. Aureus bloodstream infection per 10,000 bed days used between January 2017 and March 2018.

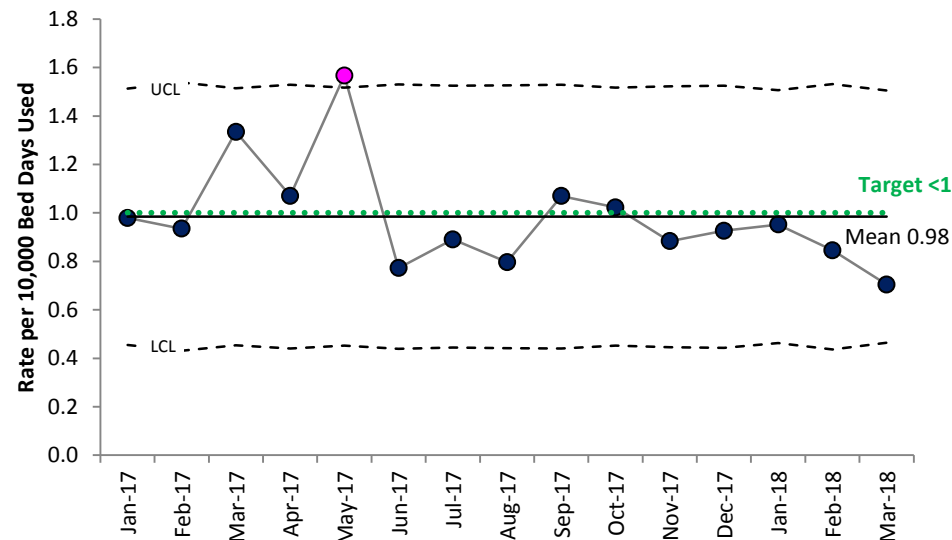
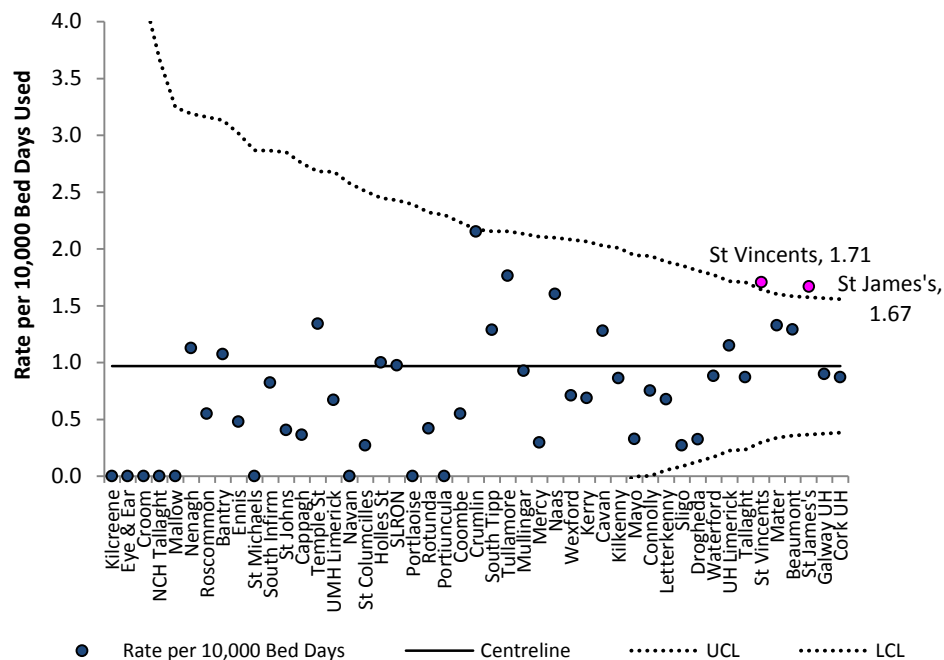


Figure 1 shows that the average rate of hospital acquired new cases of S. Aureus bloodstream infection since January 2017 is 0.98 cases per 10,000 bed days used. This equates to an average of 30 cases per month. The target for 2017 is less than 1 case per 10,000 bed days.

The variation in the rate of hospital acquired new cases of S. Aureus bloodstream infection from month to month is within the expected range with the exception of May 2017 where the rate of 1.57 cases per 10,000 bed days was above the upper control limit. This is a signal of special cause variation and indicates an unexpectedly high number of cases in that month. It is expected that the monthly rate will fluctuate between 0.45 and 1.5 cases per 10,000 bed days by chance alone.

Figure 2 below is a funnel plot showing the variation in the rate of hospital acquired new cases of S. Aureus bloodstream infection among hospitals for the past 12 months (April 2017 – March 2018).



Note: Data for Louth County Hospital is not displayed due to the low number of bed days used.

The rates for all hospitals were within the expected range of variation for this indicator, with the exception of St Vincent's Hospital and St James's Hospital where the total rates of hospital acquired cases of S. Aureus bloodstream infection over the past 12 months were above the upper control limit. This is unlikely to have occurred by chance alone and is an indicator of unexpected variation. The rates for all other hospitals were within the control limits.

**Hospital acquired new cases of C. Difficile infection per 10,000 bed days used**

Figure 3 below is a statistical process control chart showing the national rate of hospital acquired new cases of C. Difficile infection per 10,000 bed days used between January 2017 and March 2018.

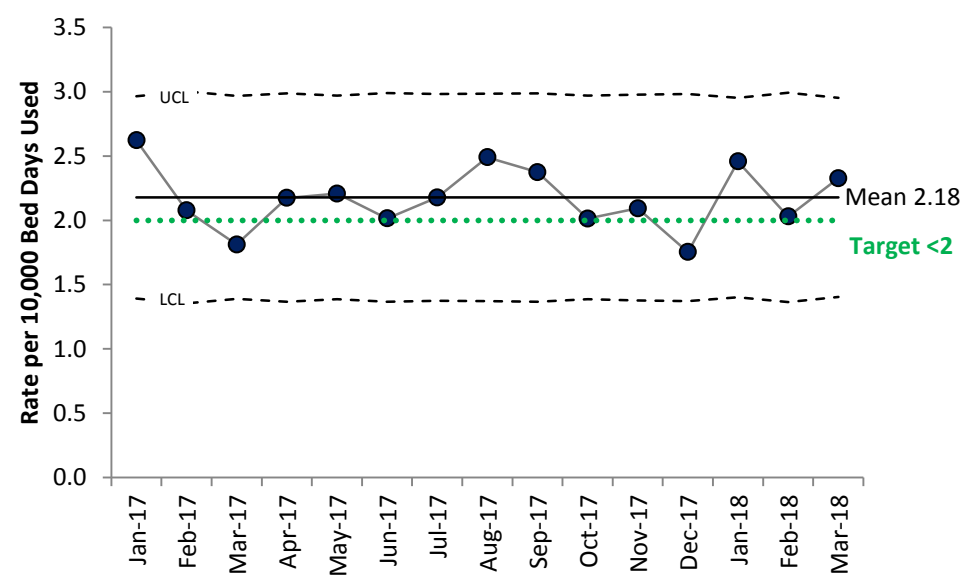
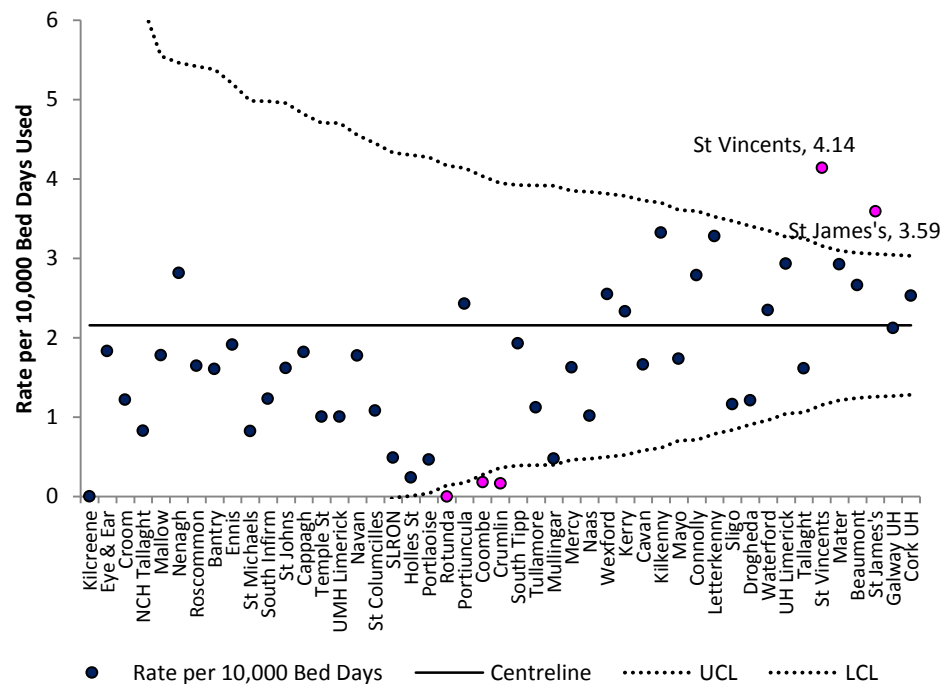


Figure 3 shows that the average rate of hospital acquired new cases of C. Difficile infection since January 2017 is 2.18 cases per 10,000 bed days used. This equates to an average of 67 cases per month. The target for 2017 is less than 2 cases per 10,000 bed days.

The variation in the rate of hospital acquired new cases of C. Difficile infection from month to month is within the expected range; i.e. the rate is stable. No data points fall outside the control limits. It is expected that the monthly rate will fluctuate between 1.4 and 3 cases per 10,000 bed days by chance alone.

Figure 4 below is a funnel plot showing the variation in the rate of hospital acquired new cases of C. Difficile infection among hospitals for the past 12 months (April 2017 – March 2018).



Note: Data for Louth County Hospital is not displayed due to the low number of bed days used.

Figure 4 shows that the total rates of hospital acquired new cases of C. Difficile infection over the past 12 months for St Vincent's Hospital and St James's Hospital were above the upper control limit, indicating an unexpectedly high number of cases. The rates for the Rotunda Hospital, the Coombe Women and Infants University Hospital, and Our Lady's Children's Hospital, Crumlin were below the lower control limit. The rates for all other hospitals were within the expected range of variation for this indicator.