Catheter-Associated Bloodstream Infection Rates

Background

Catheter-associated bloodstream infections are primary bloodstream infections (BSI) that are associated with the presence of a central line within the 48-hour period before a BSI develops. A central line is an intravascular catheter (tube in a vein) that terminates at or close to the heart or in one of the great vessels. An example of a great vessel is the aorta or superior vena cava. A central line can be used to infuse fluids, withdraw blood or monitor fluid volume in patients. An umbilical catheter is a central vascular catheter inserted through the umbilical artery or vein in a neonate (i.e., a tube placed in the umbilical cord).

Central lines can be either permanent or temporary. Permanent lines are those that are tunneled and cuffed (a line that is tunneled under the skin to a separate exit site, where it emerges from underneath the skin and held in place by a cuff). Temporary lines are those that are not tunneled and not cuffed. Permanent lines are commonly used in LTACH patients and may have lower rates of infection than central lines inserted for temporary use. In Colorado, the data show that a majority of LTACHs are using temporary lines. Both types of lines are used to infuse fluids, administer medications and/or blood, or withdraw blood in patients.

Reporting central line data by facility type, central line type, and critical care unit allows for fairer comparisons between health facilities as it takes into account how differences in care and patients' risk for infection lead to differences in infection rates. Many of the central line-associated bloodstream infections that occur in these facility locations can:

- Be prevented by following established prevention techniques;
- Easily be detected and reported accurately; and
- Have a devastating impact on the patient's quality of life.

Central line-associated bloodstream infections (CLABSI) often lead to additional days in the hospital, which can be expensive for healthcare payers, healthcare organizations and patients. Evidence suggests that reporting of infections may lead to better adherence to preventive practices and decrease medical complications or death.

A new analysis in this year's report is the comparison to the "historical data". For the central line- and umbilical catheter-associated bloodstream infection data collected, there are two to three years of data. The historical comparison calculates a Standardized Infection Ratio (or SIR) based on a facility specific infection rate from the previous year(s). An expected number of infections can be calculated based on previous infection rates and compared to the current year's number of infections. This allows for the comparison

of the current data to previous years to ascertain if a facility is doing better, worse or the same. (See Appendices F and G in the complete report for more information concerning the calculation and interpretation of an SIR.)

Neonatal Critical Care Units

This section of the report focuses on central line-associated bloodstream infections (CLABSI) and umbilical catheter-associated bloodstream infections (UCABI) for Neonatal Level II/III Combined Critical Care Units and for Neonatal Level III Critical Care Units.

Level III NCCUs provide care to the sickest newborn infants while level I units would care for healthy newborn infants. Level III NCCUs are organized with personnel and equipment to provide continuous life support and comprehensive care for extremely high-risk newborn infants and those with complex critical illness. Level III NCCUs have a neonatologist on duty at all times. Neonatologists are pediatricians who have special training to deal with diseases and care of newborn infants. The designation between level III and level II/III is defined by the NHSN reporting guidelines. If a hospital is not able to separate infants in the unit that are receiving level II care and those receiving level III care, that hospital is required to report data as a level II/III combined NCCU.

Results

Tables 19 through 22 show the results of data collected in each NCCU level. The reporting period is from August 1, 2009 through July 31, 2010. The first and second tables show information on CLABSI in level II/III and level III, respectively. The third and fourth tables show data on umbilical catheter-associated bloodstream infections (UCABI) in level II/III and level III, respectively. The comparison data to the national rates is risk stratified by the following birth weight categories:

1. Less than or equal to 1.65 pounds (≤750 grams)
2. 1.66 to 2.2 pounds (751-1,000 grams)
3. 2.3 to 3.3 pounds (1,001-1,500 grams)
4. 3.4 to 5.5 pounds (1,501-2,500 grams)
5. Greater than 5.5 pounds (>2,500 grams)

The weight is that of the infant at the time of birth and does not reflect changes during the hospital stay. For example, if a newborn infant weighs 1.66 pounds at birth but remains in the NCCU for two months and has a body weight of 3.3 pounds when it develops an infection, the recorded birth weight would still be 1.66 pounds. See Appendix G for the calculation description for the NCCU infection data.

Each table lists the hospital name, the city where the hospital is located, the number of central line catheter days in the unit, the number of infections in the unit, the infection rate for the unit, the national infection rate, comparison to the national infection rate, historical infection rate, and the comparison to the historical infection rate for that unit. The number of catheter days is the total number of days a catheter was used in the NCCU during the reporting period. The infection rate is the number of infections per 1,000 catheter days. The three categories summarizing how a Colorado hospital compares to the national infection rate for that NCCU are:

1. Hospitals can have a statistically lower (**better**) infection rate than the national unit rate;
2. Hospitals can have an infection rate that is statistically the **same** as the national unit rate; or
3. Hospitals can have a statistically higher (**worse**) infection rate than the national unit rate.

A new analysis in this year's report is the comparison to the "historical data". For most of the data collected, there are three years of data. The historical comparison calculates a Standardized Infection Ratio (or SIR) based on a facility specific infection rate from the previous year(s). An expected number of infections can be calculated based on previous infection rates and compared to the current year's number of infections. This allows for the comparison of the current data to previous years' to ascertain if a facility is doing better, worse or the same as previous years. (See Appendices F and G for more information concerning the calculation and interpretation of an SIR.)

Cautions

There are some cautions consumers should be aware of when interpreting the data in this report. Some medical conditions in newborn infants predispose them to bloodstream infections whether they have a catheter in place or not. This means that the catheter may not be the reason the blood became infected. For example, bloodstream infections in infants with major intestinal problems are common because bacteria in the intestine can access the bloodstream very easily. The clinical picture must be looked at in its entirety to determine whether the bloodstream infection was primary or secondary to another source site.

Another limitation of the definition used to report bloodstream infections in newborn infants is that it includes a category called clinical sepsis. This requires that a patient's medical chart be checked each day for key signs and symptoms of infection. Hospitals with electronic record systems can scan their records by generating automated reports, but some facilities must complete the process manually. The results could provide more accurate data collection and higher reported infection rates.

However, as of January 1, 2010, the NHSN deleted clinical sepsis as a reporting category. There were multiple challenges identified through feedback by clinical professionals with this event type, including the arguments that the definition was too subjective and non-specific and data collection was too labor-intensive. Therefore, only five months of the data includes the clinical sepsis cases (August 2009 – December 2009).

Table 19: Neonatal Critical Care Unit Level II/III CLABSI Rates, 2009-2010

Central Line Associated Bloodstream Infections (CLABSI) in Neonatal Critical Care Level II/III Combined Units Reporting Period: August 1, 2009-July 31, 2010.

Health Facility and Region		Central Line Days	CLABSI	CLABSI Rate	National Comparison	Historical Rate	Historical Comparison
Centura Avista Adventist Hospital	Louisville	9	***	***	***	0.0	***
Centura St. Francis Medical Center	Colorado Springs	347	0	0.0	Same	0.0	***
Denver Health Medical Center	Denver	631	0	0.0	Same	1.7	Same
Exempla Lutheran Medical Center	Wheat Ridge	54	2	37.0	Worse	5.2	Same
Exempla St. Joseph Hospital	Denver	860	0	0.0	Same	2.7	Same
Medical Center of Aurora	Aurora	4	***	***	***	0.0	***
Parker Adventist Hospital	Parker	87	0	0.0	Same	0.0	***
Poudre Valley Hospital	Fort Collins	359	1	2.8	Same	0.0	***
Rose Medical Center	Denver	172	0	0.0	Same	0.0	***
Sky Ridge Medical Center	Lone Tree	75	1	13.3	Same	0.0	***
Swedish Medical Center	Englewood	215	0	0.0	Same	0.0	***
University of Colorado Hospital	Aurora	2,016	2	1.0	Same	2.6	Same

Facility CLABSI rates are per 1,000 central line-days.
National comparison based on birth weight-adjusted data collected and reported by NHSN-participating hospitals from 2006-2008.
See "National Healthcare Safety Network (NHSN) Report, Data Summary for 2006-2008, Issued December 2009" (Am J Infect Control 2009; 37:783-805).
Historical comparison based on birth weight-adjusted data collected and reported for a given facility from August 1, 2008-July 31, 2009.
*** Indicates value not shown due to suppression of infections data, or no National or historical rate, or an expected count of zero, to which to compare facility rate.
Infections data for hospitals with fewer than 50 central line-days in a twelve-month period are suppressed to protect confidential health information. These hospitals have met the reporting requirements.
Source: National Healthcare Safety Network (NHSN) Database.
Prepared By: Colorado Patient Safety Initiatives Program, Colorado Department of Public Health and Environment.

Table 20: Neonatal Critical Care Unit Level III CLABSI Rates, 2009-2010

Central Line Associated Bloodstream Infections (CLABSI) in Neonatal Critical Care Level III Units Reporting Period: August 1, 2009-July 31, 2010.							
Health Facility and Region		**Central Line Days**	**CLABSI**	**CLABSI Rate**	**National Comparison**	**Historical Rate**	**Historical Comparison**
Centura Littleton Adventist Hospital	**Littleton**	213	0	0.0	Same	0.0	***
Memorial Hospital Central	**Colorado Springs**	1,777	5	2.8	Same	4.5	Same
Presbyterian St Luke's Medical Center	**Denver**	2,726	2	0.7	Better	2.7	Better
St. Mary's Hospital	**Grand Junction**	516	0	0.0	Same	0.0	***
The Children's Hospital	**Aurora**	3,976	17	4.3	Same	5.0	Same

Facility CLABSI rates are per 1,000 central line-days.
National comparison based on birth weight-adjusted data collected and reported by NHSN-participating hospitals from 2006-2008.
See "National Healthcare Safety Network (NHSN) Report, Data Summary for 2006-2008, Issued December 2009" (Am J Infect Control 2009; 37:783-805).
Historical comparison based on birth weight-adjusted data collected and reported for a given facility from August 1, 2008-July 31, 2009.
*** Indicates value not shown due to suppression of infections data, or no National or historical rate, or an expected count of zero, to which to compare facility rate.
Infections data for hospitals with fewer than 50 central line-days in a twelve-month period are suppressed to protect confidential health information. These hospitals have met the reporting requirements.
Source: National Healthcare Safety Network (NHSN) Database.
Prepared By: Colorado Patient Safety Initiatives Program, Colorado Department of Public Health and Environment.

Table 21: Neonatal Critical Care Unit Level II/III UCABI Rates, 2009-2010

Umbilical Catheter-Associated Bloodstream Infections (UCABI) in Neonatal Critical Care Level II/III Combined Units Reporting Period: August 1, 2009-July 31, 2010.							
Health Facility and Region		**Umbilical Line Days**	**UCABI**	**UCABI Rate**	**National Comparison**	**Historical Rate**	**Historical Comparison**
Centura Avista Adventist Hospital	**Louisville**	81	0	0.0	Same	6.9	Same
Centura St Francis Medical Center	**Colorado Springs**	421	0	0.0	Same	0.0	***
Denver Health Medical Center	**Denver**	348	0	0.0	Same	1.8	Same
Exempla Lutheran Medical Center	**Wheat Ridge**	364	0	0.0	Same	1.7	Same
Exempla St Joseph Hospital	**Denver**	478	2	4.2	Same	2.5	Same
Medical Center of Aurora	**Aurora**	82	0	0.0	Same	0.0	***
Parker Adventist Hospital	**Parker**	193	0	0.0	Same	0.0	***
Poudre Valley Hospital	**Fort Collins**	1,104	3	2.7	Same	2.5	Same
Rose Medical Center	**Denver**	348	0	0.0	Same	0.0	***

Health Facility and Region		Umbilical Line Days	UCABI	UCABI Rate	National Comparison	Historical Rate	Historical Comparison
Sky Ridge Medical Center	**Lone Tree**	95	1	10.5	Same	0.0	***
Swedish Medical Center	**Englewood**	165	0	0.0	Same	3.4	Same
University of Colorado Hospital	**Aurora**	1,201	2	1.7	Same	2.3	Same

Facility UCABI rates are per 1,000 umbilical catheter-days.
National comparison based on birth weight-adjusted data collected and reported by NHSN-participating hospitals from 2006-2008.
See "National Healthcare Safety Network (NHSN) Report, Data Summary for 2006-2008, Issued December 2009" (Am J Infect Control 2009; 37:783-805).
Historical comparison based on birth weight-adjusted data collected and reported for a given facility from August 1, 2008-July 31, 2009.
*** Indicates value not shown due to suppression of infections data, or no National or historical rate, or an expected count of zero, to which to compare facility rate.
Infections data for hospitals with fewer than 50 umbilical catheter-days in a twelve-month period are suppressed to protect confidential health information. These hospitals have met the reporting requirements.
Source: National Healthcare Safety Network (NHSN) Database.
Prepared By: Colorado Patient Safety Initiatives Program, Colorado Department of Public Health and Environment.

Table 22: Neonatal Critical Care Unit Level III UCABI Rates, 2009-2010

Umbilical Catheter-Associated Bloodstream Infections (UCABI) in Neonatal Critical Care Level III Units Reporting Period: August 1, 2009-July 31, 2010.

Health Facility and Region		Umbilical Line Days	UCABI	UCABI Rate	National Comparison	Historical Rate	Historical Comparison
Centura Littleton Adventist Hospital	**Littleton**	123	0	0.0	Same	0.0	***
Memorial Hospital Central	**Colorado Springs**	1,036	5	4.8	Same	1.7	Same
Presbyterian St. Luke's Medical Center	**Denver**	1,410	0	0.0	Same	0.7	Same
St. Mary's Hospital	**Grand Junction**	369	0	0.0	Same	0.0	***
The Children's Hospital	**Aurora**	1,068	2	1.9	Same	1.4	Same

Facility UCABI rates are per 1,000 umbilical catheter-days.
National comparison based on birth weight-adjusted data collected and reported by NHSN-participating hospitals from 2006-2008.
See "National Healthcare Safety Network (NHSN) Report, Data Summary for 2006-2008, Issued December 2009" (Am J Infect Control 2009; 37:783-805).
Historical comparison based on birth weight-adjusted data collected and reported for a given facility from August 1, 2007-July 31, 2009.
*** Indicates value not shown due to suppression of infections data, or no National or historical rate, or an expected count of zero, to which to compare facility rate.
Infections data for hospitals with fewer than 50 umbilical catheter-days in a twelve-month period are suppressed to protect confidential health information. These hospitals have met the reporting requirements.
Source: National Healthcare Safety Network (NHSN) Database.
Prepared By: Colorado Patient Safety Initiatives Program, Colorado Department of Public Health and Environment.