CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS OVERVIEW

BACKGROUND

Central line associated bloodstream infections (CLABSI) are associated with specific intravascular catheters or central lines that must be in place at the time of, or within 48 hours before the onset of the infection. A central line is an intravascular catheter (tube in a vein or artery) that terminates at or close to the heart or in one of the great vessels (e.g., aorta, superior vena cava). A peripheral line is a similar tube in a vein or artery that does not enter a great vessel, is a smaller diameter tube, and is typically used for shorter periods of intravenous access. Both central lines and peripheral lines can be used to infuse fluids or medications, withdraw blood or monitor fluid volume in patients. However, central lines are typically placed when intravenous access is needed for longer time periods, larger volumes of fluids, or access for dialysis is needed. An umbilical catheter (i.e., a tube placed in the umbilical cord) is a central vascular catheter inserted through the umbilical artery or vein in a neonate (infant $\leq$ 30 days old). Central lines can be either permanent or temporary. Permanent lines are those that are tunneled under the skin before entering a great vessel. These can include certain dialysis lines and implanted catheters such as a port. Temporary lines are those that are not tunneled.

All patients with central lines are at risk for CLABSI. However, certain groups are at higher risk for infection: elderly, neonates, dialysis patients, patients with weak immune systems (e.g., cancer patients, transplant patients), diabetics and patients with burn injuries[10-12].

Colorado requires that all adult critical care units, neonatal critical care units Level II/III and III, long-term acute care hospitals (LTAC), and inpatient rehabilitation hospitals and wards report CLABSI data into NHSN.

Every CLABSI data table below lists all Colorado hospitals and hospital unit(s) reporting central line use, their cities, number of central line days per year, number of infections, SIRs, and comparisons to national infection rates. The number of central line days is the total number of days a central line was in place for patients in the unit during the reporting period (for example, if three patients each had a central line for 10 days, the number of central line days is 30). The three categories summarizing how a Colorado facility compares to the national infection rate for that unit are:

1. Statistically lower infection rate than the national rate (**better**);
2. Statistically similar infection rate as the national rate (**same)**; or
3. Statistically higher infection rate than the national rate (**worse**).

NEONATAL CRITICAL CARE UNITS

Neonatal critical care units (NCCU) provide intensive medical care for premature and ill newborn babies. Neonatal care is classified into four levels of care, and since Level 1 and II units care for healthy newborns, they are not required to report HAI. Colorado requires only level III and level II/III units to report CLABSI data. Level III NCCU provide personnel and equipment to ensure continuous life support and comprehensive care for extremely high-risk newborns with complex critical conditions. The designation between Level III and Level II/III is defined by the NHSN reporting guidelines. If a hospital unit does not separate infants receiving Level II care from those receiving Level III care, that NCCU is reported as a Level II/III.

NCCU infants will often have a central line inserted for several reasons: 1) their stay in the critical care unit can be prolonged; 2) they require intravenous nutrition and fluid replacement until their gastrointestinal system has matured or they can tolerate feedings by mouth; 3) their peripheral veins (those in the arms and legs) and scalp veins are small and unable to be used for fluids and medications for long periods of time; and 4) changing peripheral lines frequently can cause additional pain and stress for the infant and does not promote health. See above CLABSI section for descriptions of central lines versus peripheral lines. An umbilical catheter (i.e., a tube placed in the umbilical cord) is often inserted at birth as a means to provide nutrition while monitoring fluid balance. These catheters are a type of central line inserted through the umbilical artery or vein in a neonate (infant ≤ 30 days old). In general, catheters have been associated with higher infection rates than any other central lines.

RESULTS

Two NCCUs had CLABSI rates worse than the national average, and all others' rates were similar to national rates. This past year, the statewide NCCU CLABSI rate was worse than the national average.

Table 21 shows the results of data collected in each NCCU from Aug. 1, 2012 through July 31, 2015.

Twenty hospitals, including five Level III and 15 Level II/III NCCU, reported 19,429 central line days this past year. Of the 20 hospitals, eight reported zero CLABSI. Two NCCUs had CLABSI rates worse than the national average, and all others had rates similar to national rates. This past year, the statewide NCCU CLABSI rate was worse than the national average.

TABLE 21: Number of Central Line Associated Bloodstream Infections in Neonatal Critical Care Units – Colorado, August 1, 2012 – July 31, 2015

Central Line Associated Blood Stream Infections (CLABSI) in Neonatal Critical Care Units: August 1, 2012 – July 31, 2015															
Health Facility, City, NCCU Type/Level			August 2012 – July 2013				August 2013 – July 2014				August 2014 – July 2015				
			No. of CL Days	No. of Infections	SIR	National Comparison	No. of CL Days	No. of Infections	SIR	National Comparison	No. of CL Days	No. of Infections	SIR	National Comparison	
Castle Rock Adventist	Castle Rock	II/III	Not yet operating				3	***	***	***	2	***	***	***	
Centura Avista Adventist Hospital	Louisville	II/III	165	0	0	Same	110	0	0	Same	197	0	0	Same	
Centura Littleton Adventist Hospital	Littleton	III	156	0	0	Same	169	0	0	Same	61	0	0	Same	
Centura St Francis MC	CO Springs	II/III	1,496	1	0.6	Same	1,431	1	0.6	Same	1,511	1	0.5	Same	
Children's Hospital Colorado	Aurora	III	4,430	5	1.2	Same	4,894	4	0.9	Same	4,863	11	2.5	Worse	
Children's Hospital Memorial	CO Springs	II/III	751	3	3.1	Same	2,216	1	0.4	Same	1,421	1	0.6	Same	
Denver Health MC	Denver	II/III	896	0	0	Same	1,036	4	4.8	Worse	1,297	6	5.1	Worse	
Exempla Good Samaritan MC	Lafayette	II/III	NCCU not yet operating				NCCU not yet operating				36	***	***	***	
Exempla Lutheran MC	Wheat Ridge	II/III	227	0	0	Same	226	0	0	Same	144	1	7.9	Same	
Exempla St Joseph	Denver	II/III	585	0	0	Same	1,126	3	2.1	Same	1,243	1	0.7	Same	
MC of Aurora	Aurora	II/III	75	0	0	Same	58	0	0	Same	47	***	***	***	
Memorial Hospital Central	CO Springs	III	1,405	2	1.3	Same	***	***	***	***	319	0	0	Same	
Parker Adventist Hospital	Parker	II/III	133	0	0	Same	85	0	0	Same	74	0	0	Same	
Poudre Valley Hospital	Fort Collins	II/III	963	0	0	Same	755	0	0	Same	859	0	0	Same	
Presbyterian St Luke's MC	Denver	III	4,434	4	0.8	Same	4,311	3	0.6	Same	4,439	8	1.6	Same	
Rose MC	Denver	II/III	351	0	0	Same	269	1	3	Same	242	0	0	Same	
Sky Ridge MC	Lone Tree	II/III	115	0	0	Same	188	0	0	Same	195	0	0	Same	
St Mary's Hospital	Grand Junction	III	828	2	2.1	Same	622	0	0	Same	592	1	2	Same	
Swedish MC	Englewood	II/III	296	0	0	Same	107	0	0	Same	291	0	0	Same	
University of Colorado Hospital	Aurora	II/III	1,931	3	1.2	Same	1,778	0	0	Same	1,596	3	1.4	Same	

Note: CL=Central Line; SIR=standardized infection ratio, the ratio of observed to expected infections adjusted for procedure risk factors.
Infections for facilities with fewer than 50 central line days per year are suppressed to protect confidential health information. These facilities fulfilled reporting requirements.
*** Indicates value not shown due to suppression of infection data, no national or historical rate available, or an expected infection count of less than 1.
National comparison based on data collected and reported by NHSN-participating hospitals from January-December, 2013.
Source: National Health Care Safety Network (NHSN) Database.