The Use of Midline Intravenous Access to Achieve Three Years CLABSI Free in an Adult Level 1 Trauma Intensive Care Unit

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Background

Central line-associated bloodstream infections (CLABSIs) can be prevalent in trauma centers in which venous access must be achieved in a timely and often high stress manner. Between the years of 2015-2017 our trauma center averaged 3-4 CLABSIs in our trauma-specific ICU per calendar year. In order to reduce the use of central lines which carry the potential for infection, a process was needed to be in put place offering alternative intravenous (IV) access options allowing patients to safely receive the life-saving medications they require.

Goals

- To achieve the highest quality of care with a 100% CLABSI-free environment in the Trauma ICU.
- Reduce central line days through the increased utilization of midline catheter intravenous access.

Setting

SSM Health Saint Louis University Hospital – an urban academic ACS Level 1 Adult Trauma Center. This project took place in the Trauma ICU which included 11 patient beds until Sept 2020 and increased to 20 patient beds following hospital relocation.

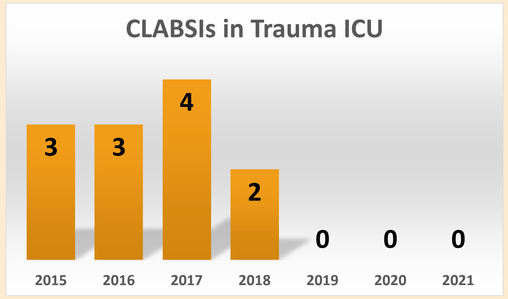
Sample

Data was collected on total number of device days rather than total number of patients. There were 7,523 total device days for central venous catheters (CVCs) between 2015-2020. Total number of midlines placed is unknown since they are classified as a peripheral IV.

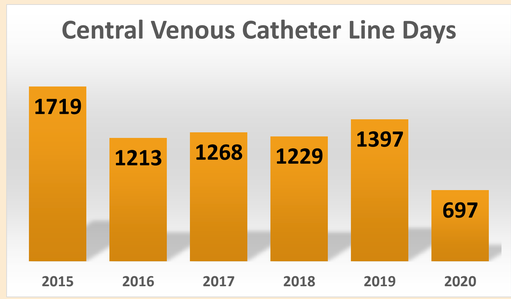
SSMHealth Saint Louis University Hospital

Study Design - Process in Action

- Implementation – Charge nurses in the Trauma ICU received specialized training and completed competencies to enable them to place midline peripheral intravenous lines. Midlines are peripheral IVs that are up to 3 inches in length, do not require physician placement or CVC orders, and can remain in place for up to 29 days. The trial of these midlines began in 2016.
    - After rollout in 2018, charge nurses began placing midlines under an order for peripheral IV.
    - Once these lines are placed, the physician is notified to reevaluate any previously placed central venous catheters that they may have received during the resuscitation phase for criteria for removal.
    - If the patient is not being actively resuscitated, these lines may also be considered as an alternative to placing central venous catheters initially.
    - Midline catheters not recommended for vasopressors or 3% hypertonic saline due to delayed signs of extravasation.
    - Pharmacy revised their guidelines for administration of vasopressors and 3% hypertonic saline through peripheral IVs in September 2019 to include:
        - Administration of single vasopressors without escalating doses for up to 48 hours.
        - Administration of 3% hypertonic saline through a proximal large bore IV for up to 48 hours not exceeding a rate of 75 mL/hr.
- Project Expansion – Additional nursing staff throughout the hospital including rapid response float pool nurses were selected to complete midline training to increase the use midline IVs.
    - Continuous data collection on total CVC days in the Trauma ICU.
    - System policy created and approved for the use of midlines in August 2021.



*2021 value includes January-October when project submitted



*Trauma ICU bed increase from 11 to 20 in Sept 2020

References – Pharmacy Vasopressor Guideline Update

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Results

Retrospective data collection from January 2015-December 2017 showed a total of 10 CLABSI infections in the Trauma ICU.

During the rollout phase in early 2018 there was an additional 2 recorded CLABSI infections from January-May 2018.
From May 2018-October 2021 there have been 0 CLABSI infections in the Trauma ICU.

From the years 2015-2017 there were 4,200 central line days in the Trauma ICU. During the implementation period from 2018-2020 there was a reduction in total line days to 3,323 (20.9%).

The most significant reduction occurred from 2019-2020. In 2019 there was a total of 1,397 device days which was reduced to 697 (49.9%) by year end 2020.

The previous value is significant to note in that the total number of Trauma ICU beds increased from 11 to 20 in September 2020 while continuing to see a large device day reduction with 45% more patient beds.

Conclusions

The project met its goal with achievement of a 100% CLABSI free environment from May 2018 through October 2021 and counting.

The project also met the second goal of central line day reduction from a pre-implementation (2015-2018) average of 1,400 days to 697 days per year by 2020.

As a result of the increased use of midlines a system policy went into effect in 2021.

The success of this project shows that a CLABSI-free environment is sustainable at high volume urban adult ACS Level 1 trauma centers.