

Clinical Safety & Effectiveness Cohort # 20

Central Access Time Saver (CATS) project



The Team

Division

Saloni Agarwal, MD Olga Giddens, RN Syed Shah, MD Veronica Rettig, NNP Amy Quinn, MD Dana Henderson Abbie Aburizik, MBA CS&E Participant CS&E Participant Team Member Team Member Team Member Team Member Facilitator

• Sponsor Department:

Margarita Vasquez, M.D. – Associate Professor, Department of Neonatology

AIM Statement

To reduce the time from central vascular access placement to obtaining an X-ray from 30 minutes to 20 minutes in neonates until May 2017

Project Milestones

- Team Created
- AIM statement created
- Weekly Team Meetings
- Background Data, Brainstorm
 Sessions, Workflow and Fishbone
 Analyses
- Interventions implemented
- Data Analysis
- CSE presentation

March 2017 March 2017 March 2017- present October 2016-March 2017

End of March 17-April 2017 October 2016-May 2017 June 2 2017

Background-What is central vascular access?

 Central vascular access is a common occurrence in the NICU for establishing a secure and sometimes long standing access in neonates with limited access

 Currently the gold standard for confirmation of central vascular access (PICC lines, umbilical lines) in neonates is an X-ray

What the pre-intervention data showed...

• Assessment of the data in the NICU from 2016, showed that the average time to obtain an X-ray after central vascular access was 30 minutes

Why is this a problem?

- Procedure completion is marked by confirmation of central line placement on an X-ray
- Delay in obtaining an X-ray leads to a to a delay in the completion of procedure

-Parents are having to wait for completion of the procedure to visit their baby

-Another issues is staff overtime, which can lead to a waste of time and resources

Plan : Process analysis



Plan: Fish bone



Plan: Pre-intervention Data Collection

	University Health System Central Line Times																
	Date placed	PICC 💌	UAC 💌	W‴ ▼	Time Ordan pla	Time X- ra Or	Sedation Time 👿	Procedure Start Tin 🔻	Procedure End Time 💌	Total Time for Procedu 👿	X-ray Called 1st Tim: 🕎	X-ray Called 2nd Tirr 👿	X-ray Called 3rd Tim 🔻	Time X-ray Taken 💌	Total x-ray time 💌	Central Line Placed By	Comments
1	10/5/16	1				10:20				0:00				10:46	0:26	OGG	
2	10/6/16	1				13:17				0:00				13:58	0:41	OGG	
3	10/6/16	1				15:03				0:00				15:11	0:08	CDLC	
4	10/8/16	1				12:28				0:00				12:46	0:18	RH	
5	10/16/16	1				4:39				0:00				5:12	0:33	RC	
6	10/16/16	1				0:38				0:00				0:55	0:17	CR	
7	10/17/16	1				0:01				0:00				0:16	0:15	RC	
8	10/18/17	1				20:28				0:00				21:21	0:53	DY	
9	10/19/16	1				22:29				0:00				22:40	0:11	JG	
10	10/21/16	1				20:24				0:00				20:42	0:18	JE	
11	10/23/16	1				1:36				0:00				1:50	0:14	SD	
12	10/24/16	1				19:18				0:00				19:29	0:11	OGG	
13	10/24/16	1				16:14				0:00				16:15	0:01	RH	
14	10/26/16	1				5:15				0:00				5:28	0:13	SD	

Pre-intervention Data



Note: 5 samples were excluded.

Distributions (Oct2016-2017)

Total x-ray time, mins (5 values =< 0 deleted)



Quantiles			Summary Statistics		
100.0%	maximum	386	Mean	31.877778	
99.5%		386	Std Dev	52.858902	
97.5%		206	Std Err Mean	5.5718175	
90.0%		64.6	Upper 95% Mean	42.948861	
75.0%	quartile	25.25	Lower 95% Mean	20.806695	
50.0%	median	16	Ν	90	
25.0%	quartile	11			
10.0%		8			
2.5%		2.275			
0.5%		1			
0.0%	minimum	1			

Do : Implementing the Change

3 phases:

Collect data and develop protocol: October 2016- March 2017
 Lessons learnt:

- Missing/incomplete orders
- Call to X-ray dept. answered by a secretary who pages out the call(No direct contact with the available X-ray tech
- 2) Education, order checklists and instructions with the central vascular access team: End of March 2017-ongoing

Lessons learnt:

- Continuous education needed with the staff, physicians and X-ray techs

3) Weekly Quality checks: End of March 2017-ongoing

Do: Intervention



Patient Label

Date:

Central Line Placement Order Checklist

1. Placed order for central line : UAC_____ UVC____ PICC____

2. Sedation to be given: Yes_____ No___

3. Placed order for Sedation: Name of medication to be given: ____

Amount to be given: _____mg/kg/dose

4. Placed order for X-ray: Yes_____

5. Call X-ray at start of procedure to come in 30 minutes: Yes______ 7AM-3PM CAU 88 407 3PM 7AM CAU 34594 This checklist is part of a Quality Improvement project.

The three orders (line placement, sedation and x-ray) should be placed at same time. We cannot make them into one order set at this time.

The nurse should call x-ray at the time the procedure is started and ask them to come after 30 minutes. We have already spoken with radiology.

Person doing the procedure needs to make sure that the orders are in the patient's chart prior to starting the procedure.

Start of the procedure is considered:

- 1. UAC/UVC: When person doing procedure states they are ready to cut cord.
- 2. PICC: When person doing the procedure states they are ready to do the stick.

End of procedure is considered: When person placing central line views x-ray and states it is in good placement.

The nurse should record the items stated on the "Central Line Placement Times" sheet.

Thank You very much for your participation in this quality improvement project and the positive outcome that it will bring to our small patients!

OGG 3/24/17

Do: Protocol education- Checklist

Important highlights:

- Ensure placement of orders in the patient chart
- Call X-ray techs ahead of time via a DIRECT contact number
- Request an X-ray within 30 minutes of start of procedure

Do: Protocol education- Data collection sheet

Patient Label Date:
Central Line Placement Times
Procedure being done: UAC UVC PICC
Was sedation given: Yes No
Time of sedation:
Time procedure started:
Time procedure finished:
Time X-ray called: 1st, 2 nd , 3 rd
Time X-ray taken:
Who performed procedure:



Central Access Time Saver (CATS) Protocol



Neonate needs a central line
Ensure checklist is completed

Request X-ray tech to arrive in 30 min after START of procedure

Ensure recording of information on the data collection sheet

Do: Interventions based on issues/drivers from fish diagram

Environment	 Ensure there is adequate space for free movement while obtaining an X-ray by clearing the area around the patient Ensure there is sedation readily available if extra doses are needed
People	 Protocol developed Educational in-services for nurses and physicians Weekly quality checks
Measurement	 Ensure correct orders are placed and correct X-ray film is obtained Administer post implementation survey a month after implementation of interventions
Machines	 Perform weekly quality checks on the machine Discuss the possibility of provision of 2 machines in the future
Material	 Checklists and protocol algorithms readily available with the staff Lack of accountability will be addressed by nurse managers as needed
Process	 New employee orientation to include presentation on protocol

CHECK: Results/Impact

Distributions Phase=Baseline (05Oct2016-15Mar2017)

Total x-ray time



Distributions Phase=Intervention (25Mar2017-18May2017)

Total x-ray time

Quantiles		Summary Sta	tistics
100.0% maximum 99.5% 97.5% 97.5% quartile 90.0% quartile 50.0% median 25.0% quartile 10.0% 10.0% 2.5% 0.5% 0.0% minimum	49 49 37.6 20.5 15 11 8.8 7 7 7	Mean Std Dev Std Err Mean Upper 95% Mean Lower 95% Mean N	18.0 10.4 2.1 22.3 13.7 25.0

Individuals Chart: Total x-ray time (05Oct206-18May2017)



Phase Limits						
Phase	LCL	Avg	UCL			
Baseline	-32.8	26.7	86.2			
Intervention	-6.3	18.0	42.3			



are significantly different \rightarrow Intervention data variation is significantly less – a good thing.

Neither Baseline nor Intervention data are Normally distributed

Test and CI for Two Variances: Total X-ray Time vs Phase Ratio = 1 vs Ratio > 1



ACT: Sustaining the Results

- Short term audits
 Daily to weekly
- Long-term audits

-Quarterly review of patients where X-ray response time was more than 20 minutes

- Education
 - -PRN based on compliance
 - -Yearly competency for nurses
 - -Part of new employee orientation to the NICU

Return on Investment

• UHS 2017

Average hourly salary of a vascular access specialist= \$25-35/ hour

Not making parents wait to see their baby = <u>PRICELESS</u>

Conclusion/What's Next

Individuals Chart: Intervention Total Procedure Time (25Mar2017-18May2017)



Phase	LCL	Avg	UCL
1st half	5.0	21.0	37.0
2nd half	-20.5	35.4	91.2

Significant increase in variation and average in 2nd half of Intervention period

Conclusion/What's Next

- Barriers to sustaining the results
- -Some staff 'forget' to follow the protocol
- Plan
- -Continue audits
- -Relay audit data to nursing staff at daily huddles
- -One on one counseling with staff who is not compliant
- Future plans
- -Work with IT to make a 'Central Line order set'



Questions

University Health System Central Line Times

Wayne G. Fischer, PhD

30May2017

Distributions Phase=Baseline (05Oct2016-15Mar2017)

Total x-ray time



Distributions Phase=Intervention (25Mar2017-18May2017)

Total x-ray time

Quantiles		Summary Sta	tistics
100.0% maximum 99.5% 97.5% 97.5% quartile 90.0% quartile 50.0% median 25.0% quartile 10.0% 10.0% 2.5% 0.5% 0.0% minimum	49 49 37.6 20.5 15 11 8.8 7 7 7	Mean Std Dev Std Err Mean Upper 95% Mean Lower 95% Mean N	18.0 10.4 2.1 22.3 13.7 25.0

Individuals Chart: Total x-ray time = (Time X-ray taken) - (X-ray Called Time2)



Phase Limits						
Phase	LCL	Avg	UCL			
Baseline	-44.6	30.5	105.7			
Intervention	-6.3	18.0	42.3			

Individuals Chart: Total x-ray time (05Oct206-18May2017)



Note: 1 sample was excluded.

06Jan2017 = 386 min

Phase Limits						
Phase	LCL	Avg	UCL			
Baseline	-32.8	26.7	86.2			
Intervention	-6.3	18.0	42.3			



Mann-Whitney: BL X-ray Time, Intvn X-ray Time

Method

η₁: median of BL X-ray Time η₂: median of Intvn X-ray Time Difference: η₁ - η₂

Descriptive Statistics

Sample	N	Median
BL X-ray Time	93	16
Intvn X-ray Time	25	15

Estimation for Difference

	Lower Bound	
	for	Achieved
Difference	Difference	Confidence
1	-3	95.02%

Test

Null hypothesis	Н₀:η₁-	η ₂ = 0
Alternative hypothesis	Н₁: η₁ -	η ₂ > 0
Method	W-Value	P-Value
Not adjusted for ties	5580.00	0.381
Adjusted for ties	5580.00	0.381

Baseline and Intervention medians **not** significantly different.

Two-Sample T-Test and CI: Total X-ray Time, Phase

Method

 μ_1 : mean of Total X-ray Time when Phase = Baseline μ_2 : mean of Total X-ray Time when Phase = Intervention Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics: Total X-ray Time

Phase	N	Mean	StDev	SE Mean
Baseline	93	26.7	36.8	3.8
Intervention	25	18.0	10.4	2.1

Estimation for Difference

	95% Lower Bound
Difference	for Difference
8.70	1.49

Test

Null hypo	othesis	Η₀:μ₁ - μ₂ = 0	
Alternativ	e hypo	othesis	$H_1: \mu_1 - \mu_2 > 0$
	21		
T-Value	DF	P-Value	2
2.00	115	0.024	1

Intervention mean **significantly less** than Baseline mean.

Intervention Distribution (25Mar2017-18May2017)

Total Procedure Time (mins)



Quantiles			Summary Statistics		
100.0%	maximum	65	Mean	28.730769	
99.5%		65	Std Dev	14.763625	
97.5%		65	Std Err Mean	2.895385	
90.0%		58.9	Upper 95% Mean	34.693926	
75.0%	quartile	37	Lower 95% Mean	22.767612	
50.0%	median	24	Ν	26	
25.0%	quartile	18.75			
10.0%		14.1			
2.5%		11			
0.5%		11			
0.0%	minimum	11			

Individuals Chart: Intervention Total Procedure Time (25Mar2017-18May2017)



From March 25th through the first April 17th, very consistent times...then **something changed**.

Individuals Chart: Intervention Total Procedure Time (25Mar2017-18May2017)



Phase	LCL	Avg	UCL
1st half	5.0	21.0	37.0
2nd half	-20.5	35.4	91.2

Significant increase in variation and average in 2nd half of Intervention period



Probability Plot of Intervention Procedure Time

Two-Sample T-Test and CI: Proc Time, Intvn Period

Method

 μ_1 : mean of Proc Time when Intvn Period = 1st half μ_2 : mean of Proc Time when Intvn Period = 2nd half Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics: Proc Time

Intvn Period	N	Mean	StDev	SE Mean
1st half	12	21.00	4.61	1.3
2nd half	14	35.4	17.3	4.6

Estimation for Difference

	95% Upper Bound
Difference	for Difference
-14.36	-5.93

Test

Null hypo	othesi	$H_0: \mu_1 - \mu_2 = 0$	
Alternativ	e hyp	$H_1: \mu_1 - \mu_2 < 0$	
T-Value	DF	P-Value	_
-2.99	15	0.005	

2nf half Intervention Procedure Time mean **significantly greater** than 1st half mean.

Procedure End to X-ray Taken – Intervention Period

03/25/2017	0.0
03/25/2017	0.0
03/26/2017	0.0
04/01/2017	-3.0
04/02/2017	0.0
04/04/2017	0.0
04/04/2017	0.0
04/07/2017	0.0
04/07/2017	0.0
04/08/2017	0.0
04/11/2017	0.0
04/17/2017	0.0
04/14/2017	0.0
04/17/2017	0.0
04/19/2017	-5.0
04/23/2017	-4.0
04/24/2017	-3.0
05/01/2017	-3.0
05/01/2017	0.0
05/02/2017	-1.0
05/03/2017	0.0
05/03/2017	0.0
05/08/2017	-15.0
05/15/2017	0.0
05/18/2017	10.0
05/18/2017	18.0