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Outcomes of Establishing a Peripheral Neonatal Vascular Access team

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STRAIGHT TO THE POINT



SETTING

- Large level 3 NICU in the Middle East
- 112 beds with >3500 admissions a year
- 350 nursing staff
- 70 medical staff

BACKGROUND

- <2017 all NICU nurses (≈ 350) were privileged to insert a PIVC
- Not successful after two attempts the patient was referred to a more experienced nurse => high incidence of first attempt failures and unnecessary damage to blood vessels.
- In 2017 a decision was taken to abandon this model and restrict vascular access to a smaller team of nurses with demonstrable VA ability.
- In late 2018 a Neonatal Vascular Access Nursing Team (NeoVAT) was formally established, and all peripheral VA activities fully transitioned to this team by 1st January 2019.
- The team comprised of 28 nurses and available 24/7.

**LET'S
ZOOM IN**



PARTICIPANTS

- All infants who were admitted to the NICU between 01 January 2018 and 31 December 2020 and required peripheral intravenous therapy were included in this study sample (10,416 infants).
- Those that received a non-peripheral device (e.g., central line) alone were excluded.
- The sample size amounted to 43,551 inserted PIVCs over the three years.

OBJECTIVES

The intention of this study was to examine the effects of introducing a neonatal peripheral VA team on key clinical and organization VA quality measures. These measures included:

1. First insertion attempt success rates
2. Overall insertion success rates
3. VAD dwell time duration
4. Peripheral line associated blood stream infections (PLABSI) rates
5. Peripheral intravenous infiltration/extravasation (PIVIE) scores

A secondary objective was to preliminary determine the economic and cost effectiveness impacts of introducing this team.

RESULTS (1)

First insertion attempt and overall success rate

- The first attempt success rate, the overall PIVC insertion success rate significantly increased. The average attempts to successfully insert a PIVC significantly improved.

Factor	2018	2019	2020	RR	P value
Overall insertion success	81%	82%	96%	0.84 (0.83 – 0.85)	<0.001
1 st attempt success	-	60%	68%	0.88 (0.85 – 0.91)	<0.001
Average attempts	1.7	1.5	1.4		<0.001

RESULTS (2)

PIVC usage

- Over the three years, annual NICU admission showed an upward trend, but annualized PIVC use significantly declined. Consequently, there was an associated reduction in the number of PIVCs used per admission.

Years	Admissions (N=events)	Inserted catheters	Insertions per patient
2018	2897	16,301	5.6
2019	3918	14,426	3.7
2020	3601	12,824	3.6

RESULTS (3)

PLABSI rates

- The total number of PLABSI in the NICU were reduced from 58 out of 13,220 successful PIVC insertions in 2018 (0.44%), to 25 out of 11,837 in 2019 (0.21%) and to 19 out of 12,337 in 2020 (0.15%) ($P < 0.001$).

Years	PLABSI (N=events)	CL Days	PLABSI Rate Per 1000/days
2018	58	34,535	1.68
2019	25	31,906	0.78
2020	19	34,753	0.55

RESULTS (4)

PIVC dwell time

- Annualized figures show a statistically measurable increase ($P < 0.001$).

Factor	2018	2019	2020
*Time of the device in situ	32 hours	34 hours	36 hours

*Dwell time is calculated from date and time of insertion to date and time of removal.

RESULTS (5)

PIVC complication rates

- The primary reasons for premature unplanned PIVC removal are complications like leakage, occlusion and PIVIE, all resulting in failure of therapy.

Factor	2018	2019	2020	RR	P value
Failure of therapy	58.5%	55.0%	49.6%	0.85 (0.83 – 0.87)	<0.001
Occurrence Phlebitis	47.0%	41.0%	32.0%	0.68 (0.65 – 0.71)	<0.001
PIVIE Severity Score	21	15	13		<0.001

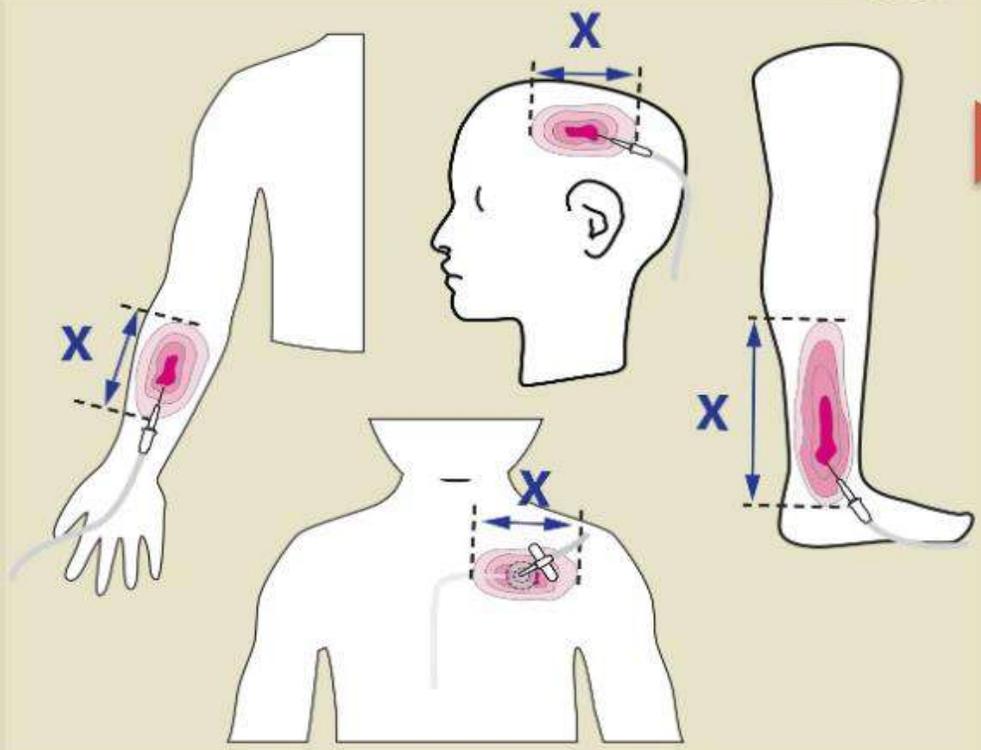
STEP 1:

Assess Extravasation

Volume

STEP 1a: Measure Swelling

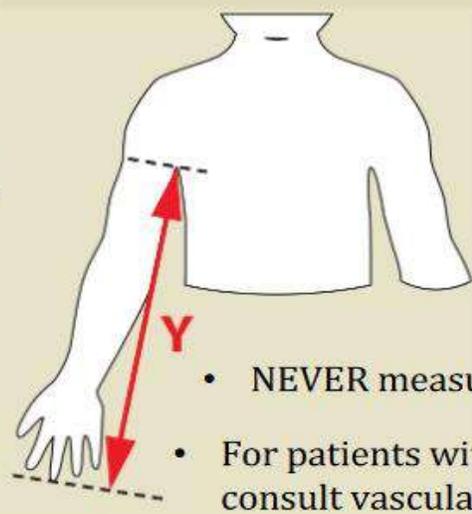
X



- Notes:**
- Define edges of swelling by palpation/visual observation.
 - Measure longest dimension.

STEP 1b: Measure ARM Length

Y



- Y = Axilla to tip of longest finger
- For Y measure arm length regardless of site of extravasation.
 - NEVER measure leg or other body part.
 - For patients with casts or limb deficiency, consult vascular access team.

STEP 1c: Calculate

$$\left(\frac{X}{Y} \right) \cdot 100 = \square \%$$

RESULTS (secondary objective)

Cost effectiveness measures

- Greater first attempt success, increased catheter dwell time and the associated reduction in PIVC use led to cost savings estimated at US\$3,581.31.

Years	Admissions (N=events)	Total cost US\$1.03*
2018	2897	16,790.03
2019	3918	14,858.78
2020	3601	13,208.72

* cost per single peripheral intravenous catheter US\$1.03 (QAR4,52

- The estimated total cost for treatment of one PLABSI has been estimated to range from US\$10,000 up to \$40,000 [*]. With a total reduction of 33 PLABSIs the cost saving can be estimated within the range of US\$330,000 to US\$1,320,000 per annum.

CONCLUSION

- A strength of this study is the inclusion of all peripheral IV insertion attempts and the large data set.
- Our results support the contention that a dedicated peripheral vascular access team can positively impact clinically important vascular access quality measures.
- We believe this information can be used to support new ways of organising IV access workflows in other units.

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