

Abstract

International infusion therapy standards highlight the potential benefits for patient safety and more effective infusion therapy from establishing dedicated vascular access and infusion therapy teams. Neonatal patients are a unique population, one that presents considerable challenges for establishing and maintaining vascular access.

In the Neonatal Intensive Care Unit (NICU) of the Women's Wellness and Research Center (WWRC) in Qatar, a specialized nurse led vascular access team, the Neonatal Vascular Access Team (NeoVAT) was formed in late 2018. This team consists of 30 nurses with proven vascular related competence and who received additional education and training to address the complex needs of neonates around vascular access and infusion therapy. NeoVAT member's duties and responsibilities included assessing vascular access needs, deciding on the appropriate vascular access using an algorithm jointly developed with physicians, inserting peripheral intravenous catheters (PIVC), managing intravenous (IV) complications and undertaking audit of vascular access-related data.

In 2019 in the NICU, 10,467 PIVCs were inserted by the team in 3,918 babies. The overall success rate of insertions was 82%. First attempt success rate was 60% with an average of 1.45 attempt per insertion. This is an improvement on historical data when all NICU nurses were inserting PIVCs. The overall IV infusion complication rate which included infiltration, extravasation and infection was 45%; this compares favorably with published international rates in NICUs as high as 64%.

Our findings report improved patient safety and wellbeing though fewer painful procedures and complications. In part, this is because of focused and targeted education provided to a highly motivated team ensuring that evidence-based standardized vascular practice changes are readily implemented. In summary: establishing a dedicated nurse led neonatal vascular accessing team supports the delivery of improved safety, effective infusion therapy and greater patient wellbeing.

Introduction

The need for a nursing vascular access team has been identified in WWRC – NICU. Primary nurses were allowed at least 2 attempts of IV insertion before referring difficult insertions to the IV Nurses. Several practice changes have been introduced but it was only in the fourth quarter of 2018 that the new team of neonatal vascular access nurses was formed. A dedicated team of nurses were responsible for assessing, inserting, maintaining, monitoring, removing and educating for vascular access devices, especially the peripheral intravenous cannulas (PIVC). Team members were chosen based on interviews, observation of clinical practice and recommendations from nursing leaders. They were trained through monthly education sessions, competency checks, simulations and bedside trainings.

Roles and Responsibilities



Methods and Materials

The NeoVAT supported a number of initiatives, such as quality improvement and research projects that contributed to these results. These include:

EARLY DETECTION AND MONITORING

- Adaptation of Touch, Look and Compare (TLC) observation tool for early detection of VAD related complications.
- Objective assessment of extravasation injuries using the Cincinnati Pediatric Intravenous Extravasation Assessment System.
- Introduction of the ivWatch for early detection of extravasation injuries.

RESEARCH

- Assess Better Before Access (ABBA): comparison between peripheral and central vascular access devices. Focus on the best VAD for the required therapy in the right patient for the duration of the therapy.
- Evaluation of factors affecting peripheral intravenous device-related complications and severity in a neonatal population.
- Comparison of two different designs of a closed IV system and their effects on the incidence of central line associated blood stream infections (CLABSI) in a neonatal population.

METHODS AND MATERIALS

- Approval of "Management of Neonates with PIVC" guideline.
- Proactive use and choices for vascular devices (vascular access device decision algorithm) was introduced.
- Vascular assessment using vein visualization technology was made mandatory for all VAD insertions.
- Introduction of Extended-dwell Peripherally Inserted Catheter (EPIC).
- PIVCs changed from polytetrafluor ethane to polyurethane.
- Use of catheter securement adhesive for all VAD.
- Formal and bite-sized education sessions for all NeoVAT members on the essentials of vascular access. A workshop entitled "Care of Newborns with Infusion Therapy" is organized to ensure standardization of vascular access in the unit.

Results

A total of 10,467 PIVCs have been inserted in 2019. The overall success rate for PIVC insertions increased from 84% in January 2019 to 98% in August 2020.

In January 2019, the first attempt success rate was 63%, where it grew steadily to 73% in August 2020.

Average attempts for successful PIVC insertion was at 2.4 before the formation of NeoVAT. Currently, it is at an average of 1.2 attempts per insertion.

The significance of these improvements tells us that there is less skin damage, less invasive procedures resulting in less pain inflicted on neonates. Consequently, this decreases the risk for infections caused by integumentary compromise by multiple attempts, decreased hospital stay and reduction in the overall cost.

The IV complications rate (45%) is lower than a published data from multiple hospital in the Netherlands (64%).



Photo 1. NeoVAT Nurses after shift handover.



Photo 2. NeoVAT Nurses after "Care for Newborns with Infusion Therapy" workshop

WWRC-NICU NeoVAT PIVC Insertion Attempt

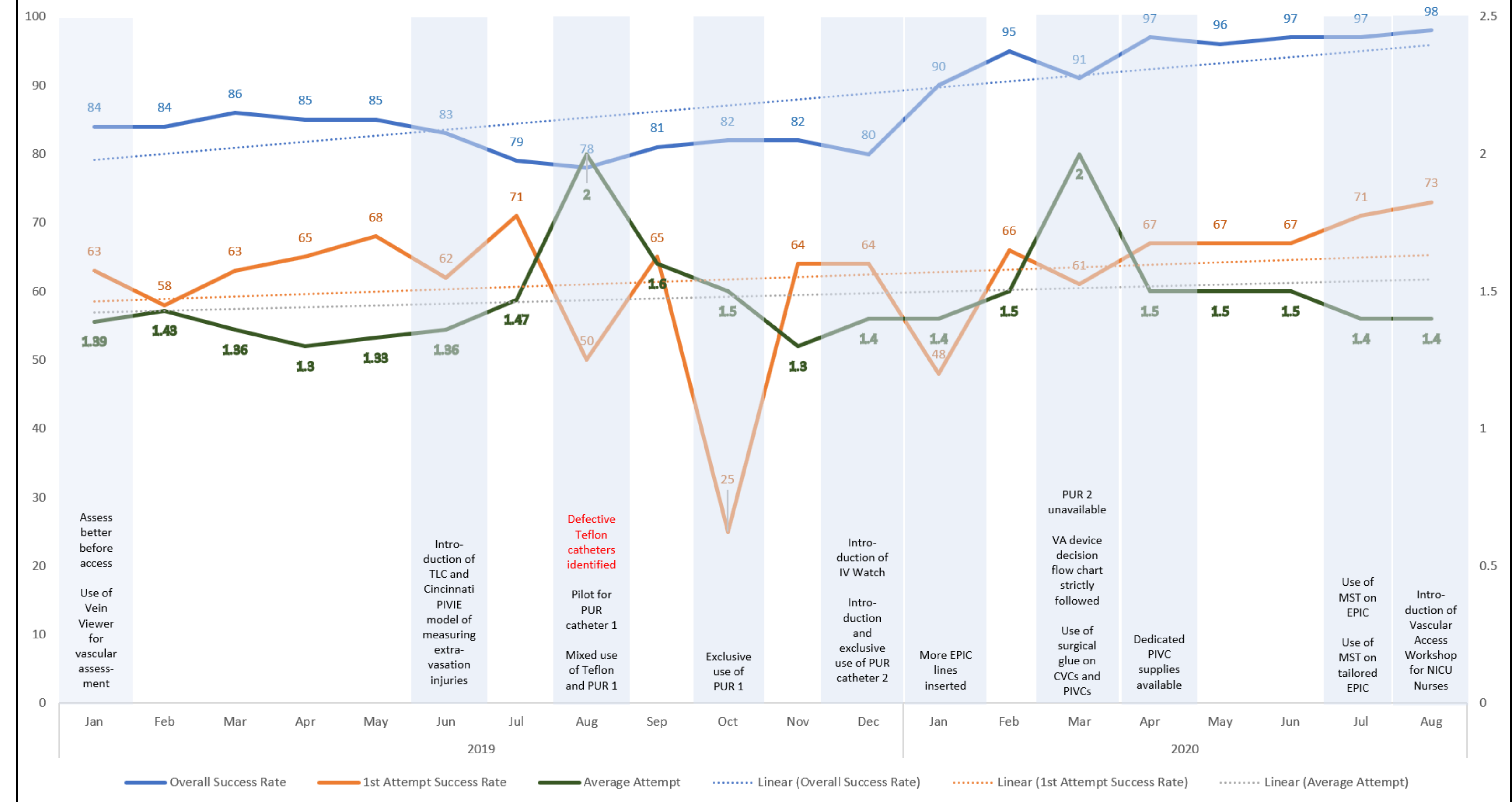


Chart 1. Women's Wellness and Research Center – Neonatal Intensive Care Unit Peripheral Intravenous Catheter Insertion Success Rate and Attempt Success Rate

Discussion

Although there are positive outcomes due to the improvements in vascular access care in the NICU through NeoVAT, nurses may become dependent on the new available technology (Vein Viewer, ivWatch) and might not be able to function without. These new technologies may give a sense of false security to the nurse and forget that it only offers an extra layer of safety and should not be used in replacing clinical judgement and observations for decision-making.

High complication rates for PIVCs pose a question if these catheters are the best of all the choices. Although it is convenient to insert PIVCs, the goal should always be to choose the right type of catheter, right therapy, right duration and right fluids for the right patient.

Another consideration is the parental role in vascular access care. Family-Integrated Care (FIC) strongly recommends the involvement in the decision-making of their child's care. In order to achieve this, parents should be given thorough education on neonatal infusion therapy, on their level of understanding.

Conclusions

The creation of a nursing vascular access team has proven to be beneficial to critically ill neonates admitted in WWRC-NICU.

Vascular access care can be standardized among all patients as the NeoVAT team members are specialized and dedicated to the role. This cultivates a safe and quality patient care as evidence-based practice changes are easily implemented as the team is highly motivated.

Establishing a nursing vascular access team is cost-effective and will increase patient satisfaction.

The creation of a NeoVAT across Hamad Medical Corporation through the Qatar Neonatal Nursing Network is also being discussed and planned to ensure that standardized vascular access management is practiced among all facilities to deliver safe and effective vascular access care to neonates.

References

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Contact

Krishna Leigh P. Garcia, BSN, RN
Hamad Medical Corporation
Women's Wellness and Research Center
Doha, Qatar
Email: KGarcia@hamad.qa