

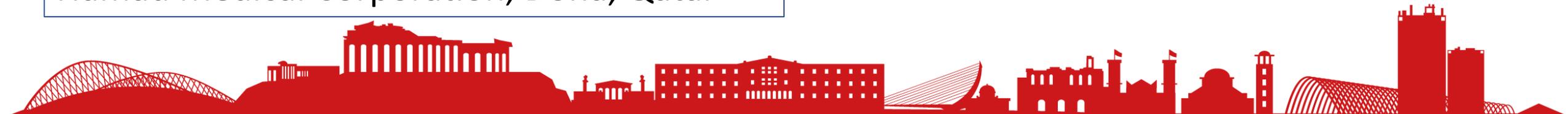
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Cyano-acrylate Securement Glue in Neonates

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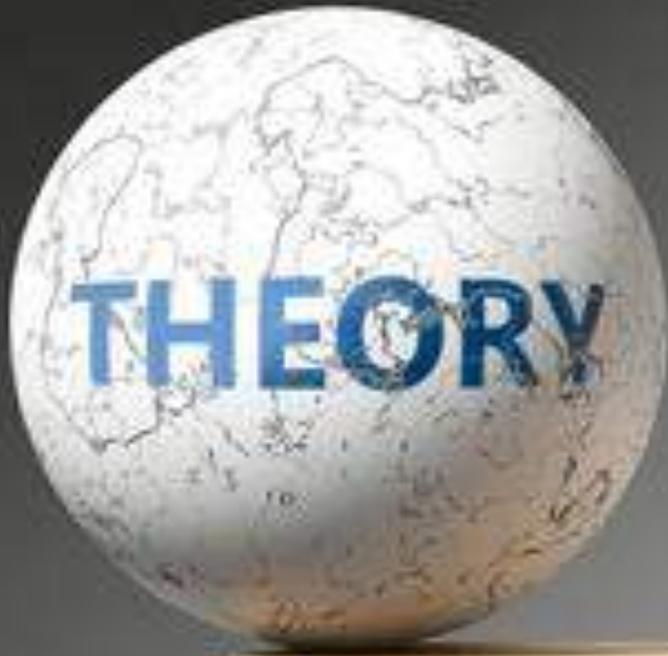
Where to start?



Marijke

DEFINITION (or.....expectations)

- The catheter securement glue studied is a medical grade cyano-acrylate, which is the only Food and Drug Administration (FDA) approved glue for securement of all VADs.
- It should reduce **catheter movement, migration, and dislodgement**. Additionally, should help to seal the insertion site, keeping the dressing cleaner and dry, and potentially reducing unnecessary **dressing changes**.
- It should also have **antimicrobial characteristics** against micro-organisms usually associated with bloodstream infections (CRBSI).
- The used glue for fixation and stabilization of catheters may potentially **mitigate the spread of micro-organisms** by immobilizing the skin flora at the insertion site and preventing subcutaneous entry of microbes.



INTRODUCTION

- Catheter securement glue is being evaluated among paediatric and adult populations, but to date, studies in neonatal settings are scant.





BACKGROUND

- Within every neonatal clinical setting, vascular access devices are considered essential for safe and reliable administration of fluids, nutrition, and medications.
- However, use of vascular access devices is not without danger of failure.
- Observational studies have found complications and device failure:
 - up to 30% of peripherally inserted central catheters (PICCs)
 - up to 78% of peripheral IV devices (PIVCs)

DEVICE FAILURE

1. Extravasation/Infiltration
2. Damage of catheter
3. Accidental removal
4. Phlebitis (3 types)
5. Leakage
6. CRBSI
7. Discoloration
8. Hematoma
9. Occlusion
10. Abscess

Fixation and stabilization related?

Role for catheter securement adhesives ?

RESEARCH PURPOSE

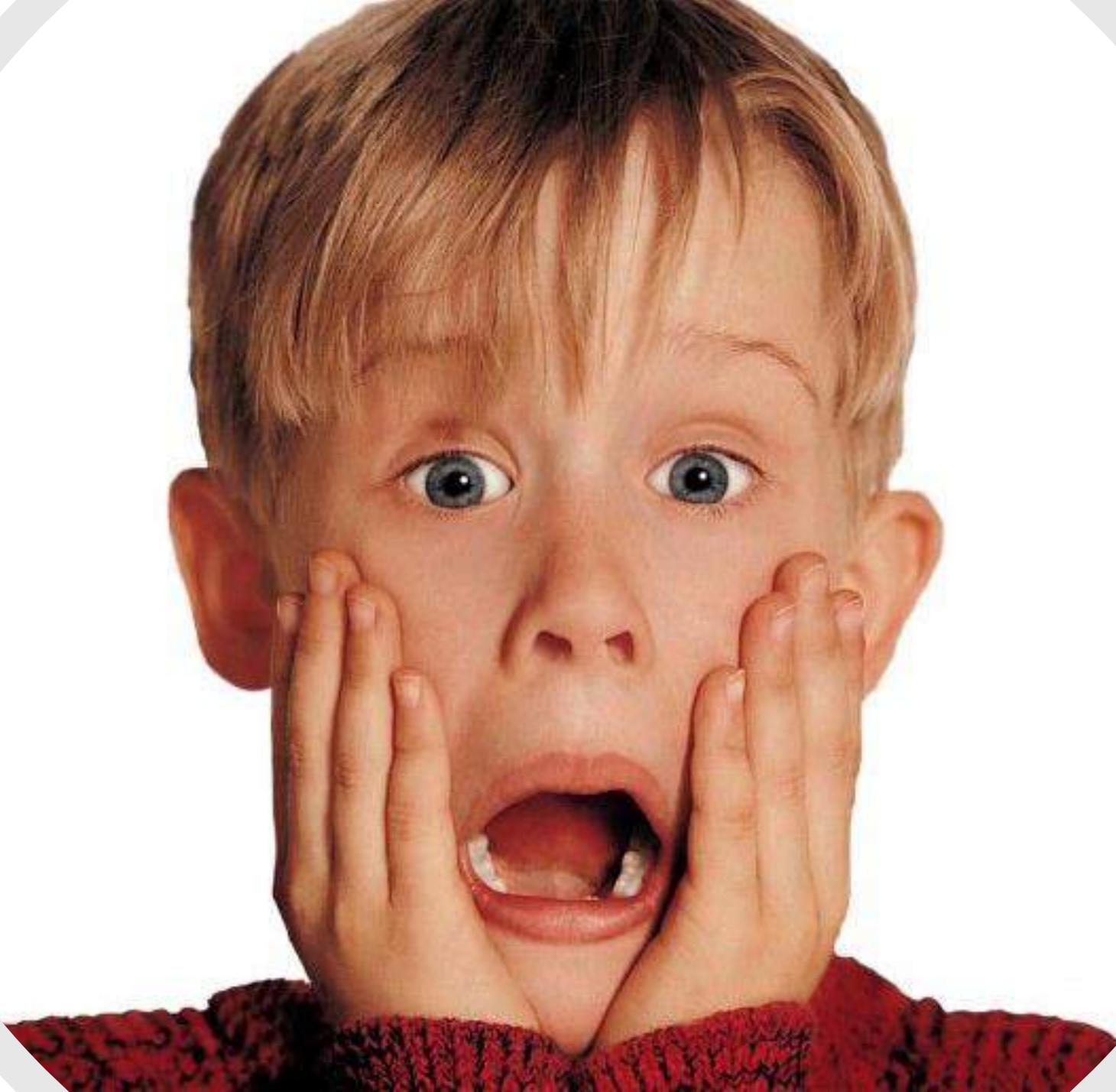
1. To describes the prevalence of vascular access catheter failure related to catheter securement before and after the introduction of the glue.
2. To identify modifiable risks that might be used to evaluate efficacy, to innovate neonatal practice and support future policy developments.

METHOD AND SETTING

- This was a retrospective observational analysis of routinely collected anonymized intravenous therapy-related data.
- The study was carried out at the tertiary neonatal intensive care unit of the Women's Wellness and Research Center of Hamad Medical Corporation, Doha, Qatar.
- 112 bed unit with more than 3500 admissions a year.

PROCEDURE

- In the patient vascular assessment stage, the team follows a locally developed mnemonic, the “**5 RIGHTS** for vascular access” ie, the Right device, for the Right vein, with the Right therapy, for the Right duration, for the Right patient.
- IV cannulation (PICC and PIVC) is performed according to the hospital policy, based on current international guidelines and recommendations.
- Cannulation is routinely performed only by selected and trained physicians and nurses from the neonatal vascular access team (neoVAT).
- Prior to the application of glue, a non-alcoholic, liquid skin barrier (Cavilon) is applied to form a protective layer between the epidermis and glue, as well as minimizing irritation from any potentially caustic substances.





RABBIT'S
HOUSE

RESULTS PICC (1)

- During the 4-year study period, we recorded a total of 1842 successful insertions (2017-449 (24.4%), 2018-431 (23.4%), 2019-432 (23.5%), and 2020-530 (28.8%)).
- There was no use of glue for securement in 2017 and 2018 while 90.1% of all insertions were secured with glue in 2019 and 2020.

RESULTS PICC (2)

- The main reason for device removal was successful completion of therapy (78.0% in the glue group vs 65.3% in the non-glue group; $P < .001$)
- Therapy failures due to a complication or death were significantly lower in the glue group (11.7% vs 27.9%, $P < .001$).
- Main contributing factors to device failure were infiltration, accidental removal, phlebitis, suspected sepsis, and death by CLABSI.
- The risk for therapy failure in the glue group was 0.42 times as less likely compared with the non-glue group.

RESULTS PICC (3)

- For CLABSI with incidence rates of 2.76/1000 days versus 0.99/1000 days there was a demonstrated statistical significance ($P < .001$) in the non-glue versus the glue group.
- This study determined a significant reduction in the risk for CLABSI (65%) in the glue group, which was attenuated when adjusted for significant newborn characteristics.
- Regression analysis for type of catheter (antimicrobial/conventional) shows no significant benefit in favor of the antimicrobial catheters related to suspected sepsis and/or CLABSI.

CONCLUSION PICC Securement

- The risk for the development of a PICC related complication leading to premature removal of the device increased significantly if no glue for catheter securement was used.
- The number of events for suspected sepsis and the CLABSI rate were significantly reduced in the glue group compared with the non-glue group.
- In parallel with currently published international literature, this study's findings support catheter securement with an octyl-based tissue adhesive in use with central venous catheters.
- Securement with glue is a safe and effective method for long-term vascular access among the neonatal population.



PERIPHERAL IV CATHETER SECUREMENT

parallel

RESEARCH

- BACKGROUND
- RESEARCH PURPOSE
- METHOD AND SETTING
- PROCEDURE



RESULTS PIVC (1)

- A 6-month historical cohort was compared with a 6-month cohort after the introduction of Cyano-acrylate glue.
- A total of 8330 peripheral IV catheters (PIVC) were recorded.
- All PIVCs were inserted and monitored by members of the NeoVAT team only.
- 4457 (53.5%) were secured with just a semi-permeable transparent dressing.
- 3873 (46.5%) were secured a semi-permeable transparent dressing with the addition of the glue.

RESULTS PIVC (2)

- Mean dwell time per inserted PIVC:
 - 31 hours for the non-glue group,
 - 37 hours for the glue group.
- The risk for the development of device-related phlebitis, which leads to premature device removal, increased significantly if glue was **not** used for catheter securement.

RESULTS PIVC (3)

- The odds ratio for premature failure after securement with glue was 0.59 when compared to the catheters secured with only a semi-permeable transparent dressing, which was statistically significant ($P<.001$).
- The correlation between the occurrence of a complication and the use of glue for device securement was significant ($P<.001$).

CONCLUSION PIVC SECUREMENT

- The risk for the development of a PIVC related complication leading to premature removal of the device increased significantly if no glue for catheter securement was used.
- Securement with tissue adhesive is a safe and effective method for short-term vascular access among the neonatal population.
- No published international literature available, this study would be the first of its kind in a neonatal population.

SUMMARY - WHAT DO WE KNOW

- The support and management of neonatal conditions rely upon safe and reliable vascular access.
- Adopting an effective and safe catheter fixation and stabilization method is critical to reducing complication rates.
- Evidence on catheter securement and tissue adhesives in the neonatal setting is still scant (or absent) and requires ongoing investigation.

SUMMARY - WHAT NEEDS TO BE STUDIED

- Future research should focus on the introduction of new and clinically beneficial strategies (and devices like ivWatch) to help improve successful therapy and patient outcomes.
- Additional studies are required on the (protective) benefits of tissue adhesives against medical adhesive-related skin injuries (MARSI).
- The use and combination of tissue adhesives with semi-permeable transparent dressings and external stabilization devices for neonates requires further clinical investigation.

SUMMARY – WHAT CAN WE DO TODAY

- Use the “5 RIGHTS for vascular access” (ie, the Right device, for the Right vein, with the Right therapy, for the Right duration, for the Right patient.....by the Right clinician?).
- Aim to optimize catheter securement, fixation, and stabilization of **all** vascular access devices.
- Consider the application of medically approved tissue adhesives for all vascular device securement in future practices.

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Thank you

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REFERENCES (1)

- Baillie CT. Neonatal vascular access. In: Rintala R, ed. *Rickham's Neonatal Surgery*. London, England: Springer; 2018:213-225. doi:10.1007/978-1-4471-4721-3_9.
- Rocha G, Soares P, Pissarra S, et al. Vascular access in neonates. *Minerva Pediatr*. 2017;69(1):72-82. doi:10.23736/s0026-4946.16.04348-6.
- Legemaat M, Carr P, van Rens R, van Dijk M, Poslawsky I, van den Hoogen A. Peripheral intravenous cannulation: complication rates in the neonatal population: a multicenter observational study. *J Vasc Access*. 2016;17(4):360-365. doi:10.5301/jva.5000558.
- Pettit J. Assessment of the infant with a peripheral intravenous device. *Adv Neonatal Care*. 2003;3(5):230-240. doi:10.1016/j.adnc.2003.08.006.
- Soares B, Pissarra S, Rouxinol-Dias A, Costa S, Guimarães H. Complications of central lines in neonates admitted to a level III neonatal intensive care unit. *J Matern Fetal Neonatal Med*. 2017;31(20):2770-2776. doi:10.1080/14767058.2017.1355902.
- van den Berg J, Lööf Åström J, Olofsson J, Fridlund M, Farooqi A. Peripherally inserted central catheter in extremely preterm infants: characteristics and influencing factors. *J Neonatal Perinatal Med*. 2017;10(1):63-70. doi:10.3233/npm-16105.
- Sharpe E, Kuhn L, Ratz D, Krein SL, Chopra V. Neonatal peripherally inserted central catheter practices and providers: results from the neonatal PICC1 survey. *Adv Neonatal Care*. 2017;17(3):209-221. doi:10.1097/ANC.0000000000000376.
- Pettit J. Assessment of infants with peripherally inserted central catheters: part 2. Detecting less frequently occurring complications. *Adv Neonatal Care*. 2003;3(1):14-26. doi:10.1053/adnc.2003.50011.
- Pettit J. Assessment of infants with peripherally inserted central catheters: part 1. Detecting the most frequently occurring complications. *Adv Neonatal Care*. 2002;2(6):304-315. doi:10.1053/adnc.2002.36826.
- Gorski LA, Hadaway L, Hagle ME, et al. *Infusion therapy standards of practice*, 8th edition. *J Infus Nurs*. 2021;44(1S, suppl 1):S1-S224. doi:10.1097/NAN.0000000000000396.
- Hugill K, van Rens M. Inserting central lines via the peripheral circulation in neonates. *Br J Nurs*. 2020;29(19):S12-S18. doi:10.12968/bjon.2020.29.19.S12.
- Dumpa V, Adler B, Allen D, et al. Reduction in central line-associated bloodstream infection rates after implementations of infection control measures at a level 3 neonatal intensive care unit. *Am J Med Qual*. 2019;34(5):488-493. doi:10.1177/1062860619873777.
- Short KL. Implementation of a central line maintenance bundle for dislodgement and infection prevention in the NICU. *Adv Neonatal Care*. 2019;19(2):145-150. doi:10.1097/ANC.0000000000000566.
- Yu X, Yue S, Wang M, et al. Risk factors related to peripherally inserted central venous catheter nonselective removal in neonates. *Biomed Res Int*. 2018;2018:3769376. doi:10.1155/2018/3769376.
- Hugill K. Vascular access in neonatal care settings: selecting the appropriate device. *Br J Nurs*. 2016;25(3):171-176. doi:10.12968/bjon.2016.25.3.171.
- Spencer TR. Securing vascular access devices. *Am Nurse Today*. 2018;13(9):29-31.
- Barone G, Pittiruti M. Epicutaneo-caval catheters in neonates: new insights and new suggestions from the recent literature. *J Vasc Access*. 2020;21(6):805-809. doi:10.1177/1129729819891546.

REFERENCES (2)

- Kleidon T, Ullman A, Gibson V, et al. A pilot randomized controlled trial of novel dressing and securement techniques in 101 pediatric patients. *J Vasc Interv Radiol.* 2017;28(11):1548-1556.e1. doi:10.1016/j.jvir.2017.07.012.
- Ullman A, Kleidon T, Gibson V, et al. Innovative dressing and securement of tunneled central venous access devices in pediatrics: a pilot randomized controlled trial. *BMC Cancer.* 2017;17(1):595. doi:10.1186/s12885-017-3606-9.
- Pabon DF, Yost MJ, Melendez GC, et al. Novel bacterial immobilization compound effectively decreases bacterial counts in healthy volunteers. *Am Surg.* 2010;76(1):15-19. doi:10.1177%2F000313481007600104.
- Prince D, Kohan K, Solanki Z, et al. Immobilization and death of bacteria by Flora Seal® microbial sealant. *Int J Pharm Sci Invent.* 2017;6(6):45-49.
- D'Andrea V, Pezza L, Barone G, Prontera G, Pittiruti M, Vento G. Use of cyanoacrylate glue for the sutureless securement of epicutaneo-caval catheters in neonates [published online ahead of print April 8, 2012]. *J Vasc Access.* doi:10.1177/11297298211008103.
- Beekman K, Steward D. Chlorhexidine gluconate utilization for infection prevention in the NICU: a survey of current practice. *Adv Neonatal Care.* 2020;20(1):38- 47. doi:10.1097/ANC.0000000000000658.
- Macmillan T, Pennington M, Summers J, et al. SecurAcath for securing peripherally inserted central catheters: a NICE medical technology guidance. *Appl Health Econ Health Policy.* 2018;16(6):779-791. doi:10.1007/s40258-018-0427-1.
- Ullman AJ, Cooke ML, Mitchell M, et al. Dressings and securement devices for central venous catheters (CVC). *Cochrane Database Syst Rev.* 2015;2015(9):CD010367. doi:10.1002/14651858.cd010367.pub2.
- Steere L, Ficara C, Davis M, et al. Reaching one peripheral intravenous catheter (PIVC) per patient visit with lean multimodal strategy: the PIV5Rights TM Bundle. *J Assoc Vasc Access.* 2019;24(3):31-43. doi:10.2309/j.java.2019.003.004.
- Dean AG, Sullivan KM, Soe MM. OpenEpi: open source epidemiologic statistics for public health, version 3.01. <https://www.openepi.com/PersonTime2/PersonTime2.htm>. Published April 6, 2013.
- IBM Corp. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp; 2019.

REFERENCES (3)

- Gilbert R, Brown M, Faria R, et al. Antimicrobial-impregnated central venous catheters for preventing neonatal bloodstream infection: the PREVAIL RCT Health Technol Assess. 2020;24(57):1-190. doi:10.3310/hta24570.
- Ge L, Chen S. Recent advances in tissue adhesives for clinical medicine. *Polymers*. 2020;12(4):939. doi:10.3390/polym12040939.
- Simonova G, Rickard CM, Dunster KR, Smyth DJ, McMillan D, Fraser JF. Cyanoacrylate tissue adhesives—effective securement technique for intravascular catheters: in vitro testing of safety and feasibility. *Anaesth Intensive Care*. 2012;40(3):460-466. doi:10.1177/0310057x1204000311.
- Reynolds H, Taraporewalla K, Tower M, et al. Novel technologies can provide effective dressing and securement for peripheral arterial catheters: a pilot randomised controlled trial in the operating theatre and the intensive care unit. *Aust Crit Care*. 2015;28(3):140-148. doi:10.1016/j.aucc.2014.12.001.
- Marsh N, Webster J, Flynn J, et al. Securement methods for peripheral venous catheters to prevent failure: a randomised controlled pilot trial. *J Vasc Access*. 2015;16(3):237-44. doi:10.5301%2Fjva.5000348.
- Rickard CM, Marsh N, Webster J, et al. Dressings and securements for the prevention of peripheral intravenous catheter failure in adults (SAVE): a pragmatic, randomised controlled, superiority trial. *Lancet North Am Ed*. 2018;392(10145):419-430. doi:10.1016/s0140-6736(18)31380-1.
- Ostroff M, Zauk A, Chowdhury S, Moureau N, Mobley C. A retrospective analysis of the clinical effectiveness of subcutaneously tunneled femoral vein cannulations at the bedside: a low risk central venous access approach in the neonatal intensive care unit [published online ahead of print November 5, 2020]. *J Vasc Access*. doi:10.1177%2F1129729820969291.
- Ullman AJ, Bernstein SJ, Brown E, et al. The Michigan appropriateness guide for intravenous catheters in pediatrics: miniMAGIC. *Pediatrics*. 2020;145 (suppl 3):S269-S284. doi:10.1542/peds.2019-3474l.
- Fumarola S, Allaway R, Callaghan R, et al. Overlooked and underestimated: medical adhesive-related skin injuries. *J Wound Care*. 2020;29(sup 3c):S1-S24. doi:10.12968/jowc.2020.29.sup3c.s1.