The Economic and Patient Benefit of Better IV Line and Feeding Tube Management with Yewtwist

Revision number: 1.1

Revision date: June 4, 2024

Yewtwist

Background

Yewtwist was designed in Canada by Maria Plummer, a registered nurse with extensive experience in pediatric and adult oncology. In her time in oncology, Maria witnessed nurses experiencing the same challenges with removing stuck IV and feeding connections over and over again. So, with the help of an engineering team, Maria created Yewtwist: an affordable, non-damaging, lightweight tool to undo tight connections safely and efficiently to reduce lost time and improve patient care. The Yewtwist tool is adaptable to almost any needleless connector or IV line and was shown to withstand Accelerated Hydrogen Peroxide®, CaviWipes® and CloroxPro® Clorox® Disinfecting Wipes during safety testing[1].

The case for Yewtwist

In a survey of 153 nurses, 152 had experienced a stuck connection point at least 1-4 times a month with most estimating that approximately 15% - 30% of connections were difficult to remove[2]. Over 50% of nurses reported relying on metal forceps, with almost 30% relying on grip modifiers such as tourniquets, rubber gloves, or their own uniform[3]. As well, over 30% of nurses reported stuck connections taking 3-5 minutes[4,5] per patient to resolve.

In a 2024 survey of 121 nurses conducted at the National Teaching Institute conference for the American Association of Critical-Care Nurses, 79% of respondents reported cracking or damaging either a central line or peripheral line[6] due to a stuck connection. Connections can become stuck due to coagulated blood, the type of connection, or the nature of the administered solution (glucose solutions and feed tubes are often mentioned as a pain point), but surveys also revealed that occupational health plays a significant role in disconnecting stuck IVs.

According to Occupational Health and Safety at a leading hospital in Toronto, Ontario, 7.5% of employed nurses reported hand, wrist, and shoulder injuries between 2010 and 2015.

In 2004, musculoskeletal disorders, including repetitive strain, were the most frequently reported injury type in the Ontario health care sector, accounting for 54% of all lost-time injuries[7]. In a recent product evaluation survey of the Yewtwist tool at a leading hospital in Toronto, Ontario, 37% of the comments remarked on the benefits of Yewtwist for older nurses and nurses with hand pain and arthritis[8].

On average, gerontologists estimate grip strength decreases at 3.5 Newtons per year for men and 2.5 Newtons a year for women, with the rate of reduction accelerating over time[9]. The latest Work and Wellbeing Survey conducted by the Registered Nurses Association of Ontario (RNAO), reported that over 1/3 of the nurses who provide direct patient care in Ontario are over the age of 50[10].

With a rapidly aging population and 80-90% of hospitalized patients receiving some form of IV therapy[11] we foresee Yewtwist becoming an invaluable tool not only from an occupational health standpoint, but from an infection control and patient-safety standpoint as well.

The CDC estimates the cost of central line-associated bloodstream infections at close to 3 billion per year[12] or $46,000 per case[13]. These infections are concomitant with increased length in hospital stays and carry a mortality rate of 12-15%[14]. With antibiotic-resistant infections on the rise[15], many leading healthcare organizations have adopted the Aseptic Non-Touch Technique (ANTT®)[16] clinical practice framework for maintenance of indwelling medical devices. This framework stipulates the use of the “non-touch” technique on defined aseptic fields such as IV access ports[17] (meaning that the any part of a defined aseptic field is not directly or indirectly touched).

The Yewtwist tool not only allows healthcare professionals to eliminate direct contact with IV access ports, but according to 83% of nurses who participated in a Yewtwist product

evaluation trial, it makes the removal of connections faster and more efficient with 89% of nurses reporting that they prefer the Yewtwist tool over their current methods for disconnecting stuck IVs[18]. When connections can be removed quickly and efficiently, it not only decreases repetitive physical strain for nurses, but reduces cannula movement which is paramount to preventing patient discomfort as well as cannula fractures; a life-threatening, but underreported complication intravascular cannulation[19].

Recommendation for single-patient use

The Yewtwist tool is designed to be used by frontline nurses working with some of our most vulnerable population who have central or peripheral lines or feeder connections. Infection control experts have recommended that:

- Yewtwist is disinfected between uses to prevent IV access port contamination
- Yewtwist is for **single-patient use** to prevent cross-contamination between patients

In a survey of nurses and nursing students, 94% of respondents recognized tourniquets as potential vehicle of infection, but only 19.5% of respondents reported disinfecting tourniquets after use, indicating that there is awareness of the risk of infection, but that it is not sufficient to systematically adopt preventive hygiene measures (Paduret et al, 2021).

Hospital-acquired, antibiotic resistent infections such as methicillin-resistant S. aureus (MRSA) pose a significant public health concern, particularly in hospitals,[20] with colonized patients (patients who are asymptomatic carriers)[21] being identified as potential vectors for environmental contamination via reusable medical equipment[22].

For example, research on non-invasive, reusable medical equipment, such as tourniquets, has found that 36% of reusable tourniquets were positive for Staphylococcus aureus (S. aurus) and of these, 12% were MRSA positive[23]. As well, an audit of cleaning habits revealed that 77% of healthcare professionals did not clean reusable tourniquets between patients[24], revealing the

underestimation of the danger posed by reusable medical equipment in patient-to-patient contamination[25]. To this end, the Public Health Agency of Canada recommends dedicating non-critical medical equipment such as tourniquets to single-patient use when cleaning cannot be performed in a centralized, supervised location[26].

Additionally, the lack of adequate storage places for equipment has been cited as a key logistical problem leading to non-compliance with infection control measures for medical equipment[27]. These logistical challenges mean that portable, reusable equipment may be kept in uniform pockets or in central, non-sterile locations such as intravenous carts or cabinet drawers, which not only poses an infection risk if the device is not cleaned adequately between patients but can also constitute an occupational health risk to healthcare professionals themselves[28]. For this reason, each Yewtwist comes packaged in a resealable polyethylene bag with a pre-etched patient name field so that the Yewtwist can be labeled and stored alongside the patient in a way that reduces exposure to environmental contamination and ensures the Yewtwist is designated to a specific patient.

Protocols in practice

As with any piece of healthcare equipment, each hospital is responsible for developing their own handling protocols in accordance with the manufacturer's recommendation. One major children's hospital in Ontario has mandated that the Yewtwist device is cleaned between uses, used for a single patient only, and that between uses, the device is stored beside the patient's bed in a polyethylene bag labelled with the patient's name.

References

[1] Yewtwist Validation Testing Summary Report, Inertia. September 25, 2023.

[2] Survey: New Intravenous Tools for Nurses at American Vascular Access Association Scientific meeting, 2022.

[3] Ibid.

[4] Ibid.

[5] Survey: Yewtist Product Evaluation Trial, 2024.

[6] Survey: National Teaching Institute Conference for American Association of Critical-Care Nurses, May 20-24, 2024.

[7] Ibid.

[8] Survey: Yewtwist Product Evaluation Trial, 2024.

[9] Sari Stenholm, Tommi Härkänen, Päivi Sainio, Markku Heliövaara, Seppo Koskinen, Long-term Changes in Handgrip Strength in Men and Women—Accounting the Effect of Right Censoring Due to Death, *The Journals of Gerontology: Series A*, Volume 67, Issue 10, October 2012, Pages 1068–1074, https://doi.org/10.1093/gerona/gls064

[10] RNAO: Work and Wellbeing Survey Results, March 2021. [Accessed May 1, 2024] https://rnao.ca/sites/rnao-ca/files/Nurses_Wellbeing_Survey_Results_-_March_31.pdf

[11] Puolitaival A, Savola M, Tuomainen P, Asseburg C, Lundström T, Soini E. Advantages in Management and Remote Monitoring of Intravenous Therapy: Exploratory Survey and Economic Evaluation of Gravity-Based Infusions in Finland. Adv Ther. 2022 May;39(5):2096-2108. doi: 10.1007/s12325-022-02093-6. Epub 2022 Mar 14. PMID: 35287232; PMCID: PMC8919170.

[12] Haddadin Y, Annamaraju P, Regunath H. Central Line–Associated Blood Stream Infections. [Updated 2022 Nov 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430891/

[13] Ibid.

[14] Toor H, Farr S, Savla P, Kashyap S, Wang S, Miulli DE. Prevalence of Central Line-Associated Bloodstream Infections (CLABSI) in Intensive Care and Medical-Surgical Units. Cureus. 2022 Mar 3;14(3):e22809. doi: 10.7759/cureus.22809. PMID: 35382174; PMCID: PMC8976505.

[15] Canadian Antimicrobial Resistance Surveillance System (CARSS) [Referenced on April 30, 2024] https://health-infobase.canada.ca/carss/amr/results.html?ind=14#furtherReading

[16] Clare S, Rowley S. Implementing the Aseptic Non Touch Technique (ANTT®) clinical practice framework for aseptic technique: a pragmatic evaluation using a mixed methods approach in two London hospitals. J Infect Prev. 2018 Jan;19(1):6-15. doi: 10.1177/1757177417720996. Epub 2017 Aug 4. PMID: 29317909; PMCID: PMC5753945.

[17] Peripheral intravenous (IV) device management: The Royal Children's Hospital Melbourne. [Accessed May 1, 2024]

https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/peripheral_intravenous_iv_device_management/

[18] Survey: Yewtwist Product Evaluation Trial, 2024.

[19] Kumar RR, Ranjan P. Case report: Iatrogenic fracture of intravenous cannula during removal with proximal migration. Int J Surg Case Rep. 2020;76:562-565. doi: 10.1016/j.ijscr.2020.09.037. Epub 2020 Sep 11. PMID: 33109488; PMCID: PMC7653458.

[20] Samuel P, Kumar Y, Suthakar B, et al. (October 16, 2023) Methicillin-Resistant Staphylococcus aureus Colonization in Intensive Care and Burn Units: A Narrative Review. Cureus 15(10): e47139. doi:10.7759/cureus.47139

[21] Collins AS. Preventing Health Care–Associated Infections. In: Hughes RG, editor. Patient Safety and Quality: An Evidence-Based Handbook for Nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); 2008 Apr. Chapter 41. Available from: https://www.ncbi.nlm.nih.gov/books/NBK2683/

[22] Routine practices and additional precautions for the transmission of infection in healthcare settings: Public Health Agency of Canada. 2016 [Accessed May 21, 2024] https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseases-conditions/routine-practices-precautions-healthcare-associated-infections/routine-practices-precautions-healthcare-associated-infections-2016-FINAL-eng.pdf

[23] Elhassan HA, Dixon T. MRSA contaminated venepuncture tourniquets in clinical practice. Postgrad Med J. 2012 Apr;88(1038):194-7. doi: 10.1136/postgradmedj-2011-130411. Epub 2012 Jan 31. PMID: 22298685.

[24] Ibid.

[25]Paduret G, Primosa F, Bujdos MJ, Artioli G, Sarli L, La Sala R, Dicembrino RB, Marra SL, Marletta G. The Nursing Management of Tourniquet: the infective risk related to its use. Acta Biomed. 2021 Dec 22;92(S2):e2021361. doi: 10.23750/abm.v92iS2.12190. PMID: 35037641.

[26] Routine practices and additional precautions for the transmission of infection in healthcare settings: Public Health Agency of Canada. 2016 [Accessed May 21, 2024] https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/diseases-conditions/routine-practices-precautions-healthcare-associated-infections/routine-practices-precautions-healthcare-associated-infections-2016-FINAL-eng.pdf

[27] Chassin MR, Mayer C, Nether K. Improving hand hygiene at eight hospitals in the United States by targeting specific causes of noncompliance. Jt Comm J Qual Patient Saf. 2015 Jan;41(1):4-12. doi: 10.1016/s1553-7250(15)41002-5. PMID: 25976719.

[28] Salgueiro-Oliveira AS, Costa PJDS, Braga LM, Graveto JMGN, Oliveira VS, Parreira PMSD. Health professionals' practices related with tourniquet use during peripheral venipuncture: a scoping review. Rev Lat Am Enfermagem. 2019 Apr 29;27:e3125. doi: 10.1590/1518-8345.2743-3125. PMID: 31038627; PMCID: PMC6528630.