Development of a tool to assess for Ifosfamide-induced neurotoxicity

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Disclosures

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Session Objectives

- To understand the need for a systematic tool to identify High Dose Ifosfamide induced neurotoxicity
- Review the daily assessment tool that was created and the implementation of its use
- Review the effectiveness of the tool for early identification of symptoms of encephalopathy

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Project Team

- Paula Aguilera, RN, BSN Nurse Director
- Teresa Mazeika, MSN, RN, OCN Senior Nurse Director
- Terri Jabaley, PhD, RN, OCN Clinical Inquiry Specialist
- Katie Fiel, MSN, RN, OCN Oncology Nurse Navigator
- Nichole Connors, BSN, RN, OCN Staff Nurse
- Priscilla Merriam, MD Clinical Director, Sarcoma Center

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Background

- Sarcoma is rare. The rate of new cases was 3.5 per 100,000 individuals per year.
- The risk factors for developing neurotoxicity are poorly understood
- Early identification and intervention of subtle signs are symptoms are critical to minimize life-threatening complications Literature supports strict monitoring for early identification of neurotoxicity
- No validated assessment tools were found in the literature.

(Szabatura et al., 2015; Tajino, Kikuchi, Yamada, Takeda, & Konno, 2010)

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Purpose

- The purpose of this project was to develop an assessment tool to promote early identification of Ifosfamide-related neurotoxicity to provide early intervention and mitigate patients' risk of severe encephalopathy.

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Intervention

- A nurse-led interdisciplinary team developed a neurotoxicity assessment tool to identifying early warning signs
- Staff feedback surveys captured feasibility and usability and the provider and nurse concordance
- Early identification of IFF-related neurotoxicity was measured by calculating:
  - number and timing of symptoms
  - signs and symptoms of neurotoxicity recorded
  - number of times an intervention was used
  - number of patient treatment holds, delays, and completions

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Ifosfamide Neurotoxicity Assessment

1. **Clock Face:**

Day 1: Instruct the patient to draw the time of ten minutes to 11 o'clock in a circle.

Day 2-5 of each cycle:

Are numbers in correct numerical order (check if YES)

Time drawn matches requested time (check if YES)

2. **Level of Consciousness**:

0 Normal

1 Drowsy (easily arousable)

2 Somnolent (difficult to arouse)

3. **Gait:** Walking is ideally assessed by at least 10 steps.

0 Normal

1 Abnormal but walks with assistance

2 Abnormal and requires assistance (companion, cane, walker, etc.)

3 Unable to walk

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Ifosfamide Neurotoxicity Assessment

4. **Ataxia (upper extremity)**:
   - 0 Able to finger to nose touch without difficulty
   - 1 Able to finger to nose touch but difficult
   - 2 Unable to finger to nose touch
5. **Naming**:
   - How many animals can you name in one minute? (time and document count)
6. **Language**:
   - 0 Normal
   - 1 Abnormal but easily coveys meaning (word finding difficulty/ word substitutions/full or broken sentences)
   - 2 Abnormal and difficulty conveying meaning (inability to form sentences < 4 words per phase/sentence)
   - 3 Abnormal. If verbal, unable to convey meaning.

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Evaluation

- Final sample consisted of 24 patient chart reviews.
- Baseline completion was 64.5% by providers & 77% by infusion nurses
- Daily use was 88.5%
- Tool captured 6 incidences of onset out of 48 patients (12.5%)
- Most successful intervention was increasing infusion length to 2 hours

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Signs and Symptoms of Neurotoxicity Recorded Through Use of the Assessment Tool

Symptom	Timing	Treatments	Referrals/ Outcomes
1. Hallucination	At home post infusion C1D3	Ifos duration increased to 2 hours	Symptoms resolved
2. Drowsy and named fewer animals	D4	Ifos held on D4	
3. Grogginess	D4	Infusion duration increased to 2 hours	Tolerated well, symptoms improved
4. Daily leg twitching	After IFF infusion	NP assessed, no intervention	Resolved
5. Pt. c/o flashing lights around treatments	D2 prior to leaving clinic	Neuro assessment repeated without noting significant change Infusion duration increased to 2 hours	Sent to Mass Eye & Ear for eval. Ifos held next cycle
6. Pt. was very sleepy at home – has little memory of leaving clinic	D2	Increased Ifos infusion duration to 3	Tolerated well

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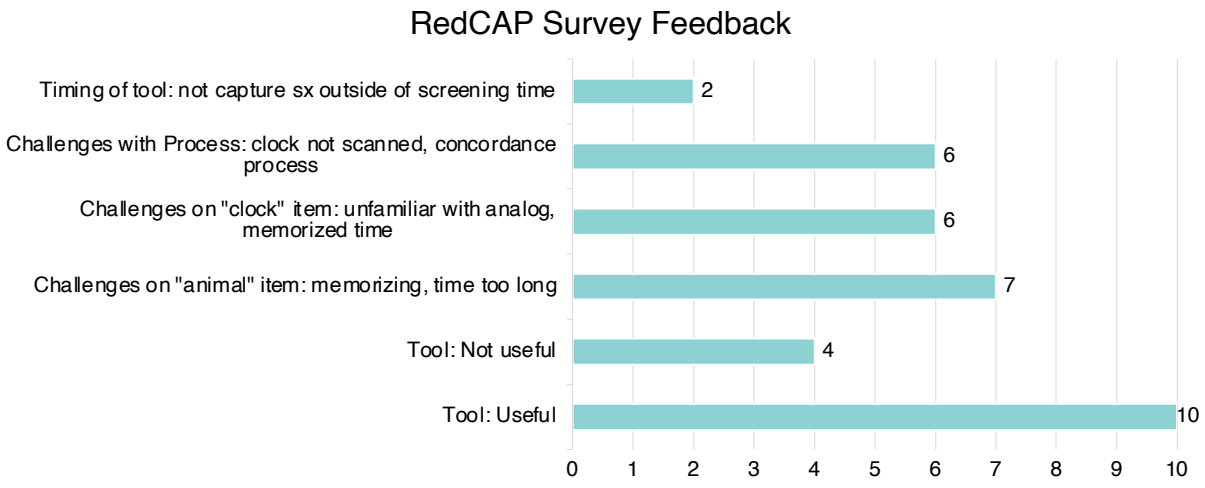
Staff Feedback



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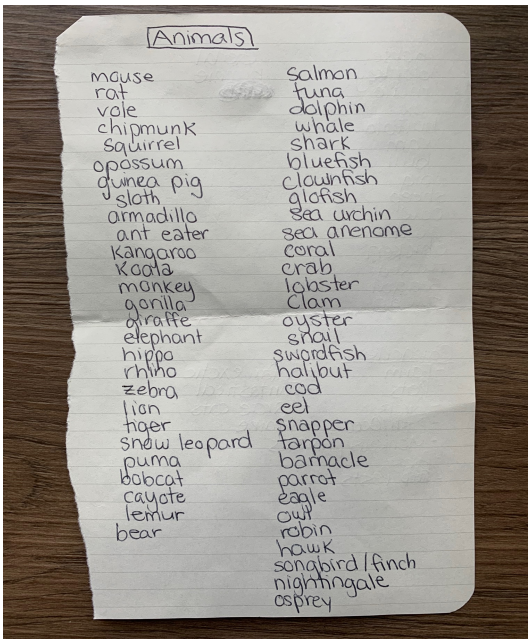

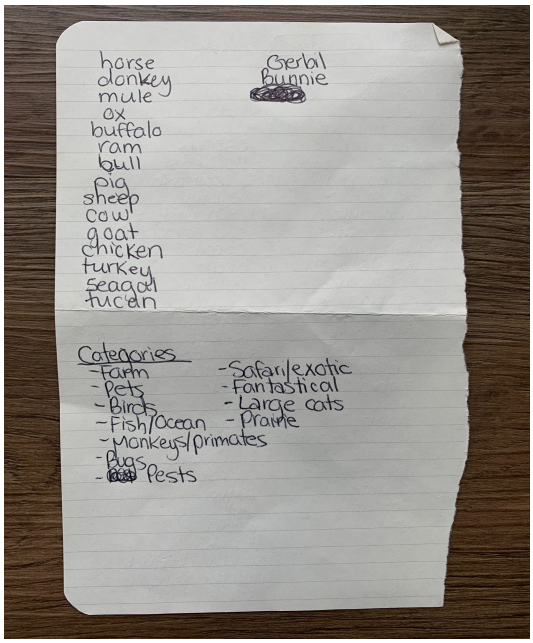

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Tool Revision

- Two minor revisions increased usability and precision of assessment.
  - Nurses could vary the time they requested the patient to draw
  - We could decrease the time interval of naming animals to 15 seconds

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Summary

- First-in-use tool to capture early onset encephalopathy related to Ifosfamide
- Improves continuity of care
- Identifies early onset neurologic changes
- Leads to earlier interventions and positive patient outcomes

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Key Takeaways

- The risk of missing subtle assessment changes was recognized as being greater for those patients seeing different nursing staff during therapy
- This assessment tool can be used daily with shown concordance between interdisciplinary team members
- Proven early identification of neurotoxicity symptoms and successfully mitigated by increasing infusion length to 2 hours

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References

- Alam, S. M., Benson, C., Jones, R. L., Thanopoulou, E., Mitchell, S., Al-Muderis, O., ... & Scurr, M. R. (2011). Creatinine clearance and serum albumin as factors for encephalopathy with ambulatory 14-day infusional ifosfamide for advanced liposarcomas. *Journal of Clinical Oncology*, *29*(15_suppl), 10087-10087.
- Lo, Y., Shen, L. J., Chen, W. H., Dong, Y. H., & Wu, F. L. L. (2016). Risk factors of ifosfamide-related encephalopathy in adult patients with cancer: a retrospective analysis. *Journal of the Formosan Medical Association*, *115*(9), 744-751.
- Szabatura, A. H., Cirrone, F., Harris, C., McDonnell, A. M., Feng, Y., Voit, D., ... & Fisher, D. C. (2015). An assessment of risk factors associated with ifosfamide-induced encephalopathy in a large academic cancer center. *Journal of Oncology Pharmacy Practice*, *21*(3), 188-193.

References Continued

- Tajino, T., Kikuchi, S. I., Yamada, H., Takeda, A., & Konno, S. I. (2010). Ifosfamide encephalopathy associated with chemotherapy for musculoskeletal sarcomas: incidence, severity, and risk factors. *Journal of Orthopaedic Science*, *15*(1), 104-111.
- *Soft Tissue Sarcoma Treatment (PDQ®)–Health Professional Version - NCI*. (2022, December 26). Www.cancer.gov. https://www.cancer.gov/types/soft-tissue-sarcoma/hp/adult-soft-tissue-treatment-pdq#_254_toc

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Evaluating Difficult Intravenous Access

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Extravasation and Infiltration

Extravasation

- Inadvertent leakage of drugs capable of causing tissue damage into the subcutaneous or subdermal tissue or other unintended sites

Infiltration

- Passage or escape of intravenously administered drugs into the tissue

ONS Chemotherapy Immunotherapy Guidelines and Recommendations for Practice (2019).

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Problem

- The organization noted an increase in the number of safety reports related to IV failure in outpatient oncology infusion
- Chemotherapy extravasation rates exceeded national benchmarks at 0.41-1.07% compared to 0.07-0.09%
- Lack of compliance with national standards from Infusion Nursing Society for pre-treatment venous evaluation
- Increased extravasation rates leads to increased cost of care and higher risk for patient harm

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Infusion Center Extravasation Events

- 71 events reported between March 2018-January 2022
  rates discussed next slide
  - 2018 - 15 events
  - 2019 - 16 events
  - 2020 - 17 events
  - 2021 - 23 events
- Agents Most Commonly Infiltrated
  - Etoposide – 10.7%
  - Doxorubicin – 8.9%
  - Docetaxel – 7.14%

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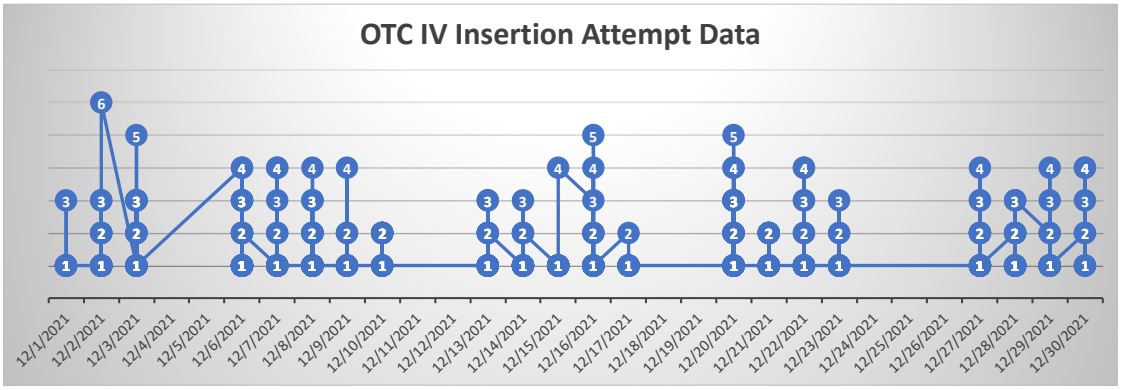
OTC Data



Average # IV attempts: 1.47
Goal: 1.235
Extravasation rate: 1.07%

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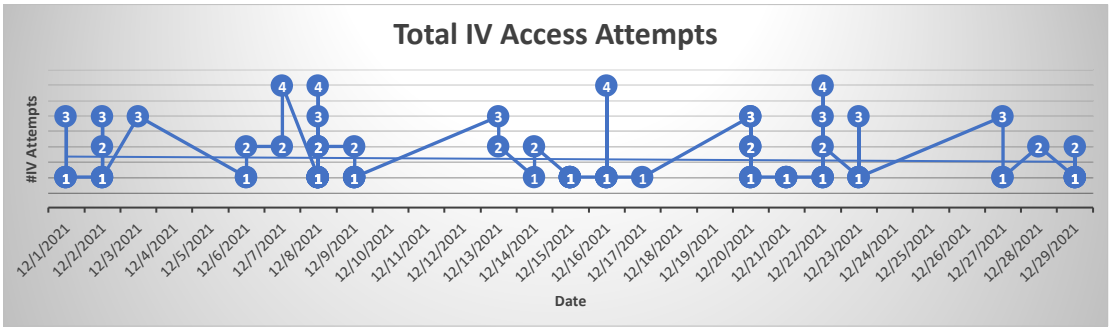
IV Access Attempt Data – Program A



Average # Attempts = 1.59
Goal = 1.30

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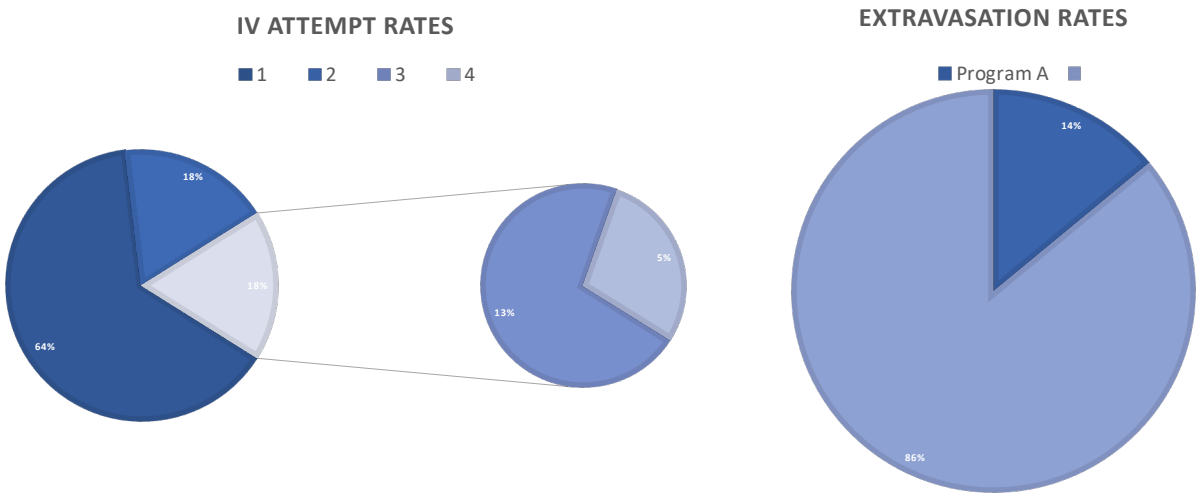
Extravasation Data – Program A



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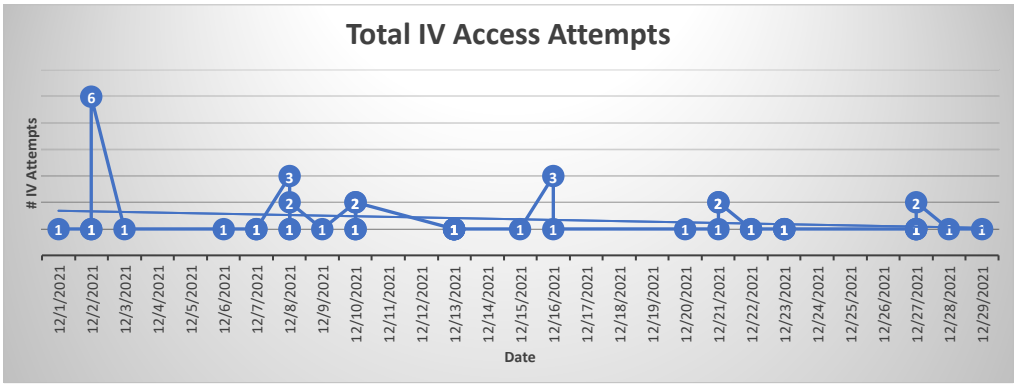
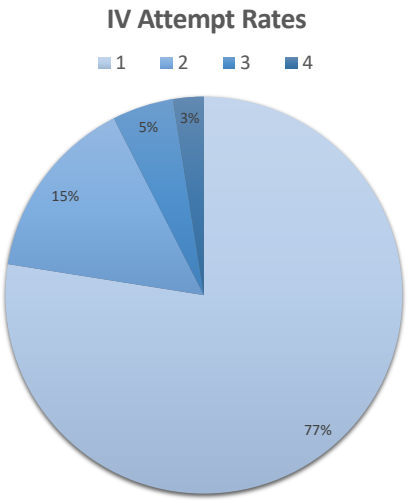
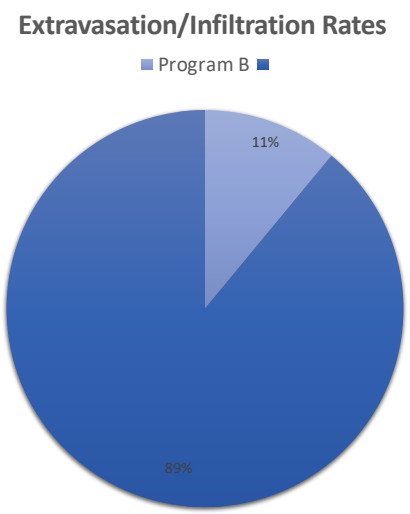
IV Access Attempt Data – Program B



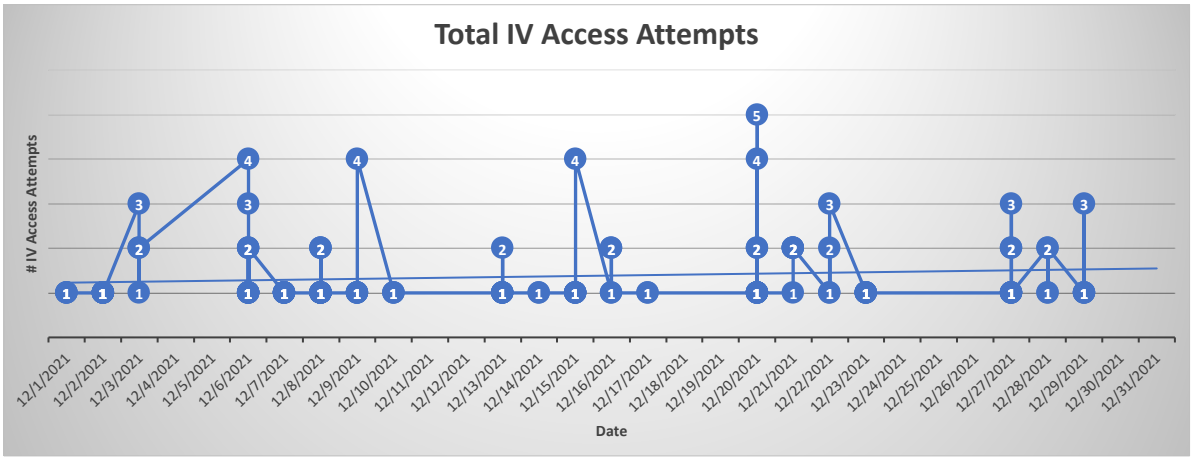
Average # Attempts = 1.375
Goal = 1.188

Extravasation Data – Program B





IV Access Attempt Data – Program C



Average # Attempts = 1.36
Goal = 1.18

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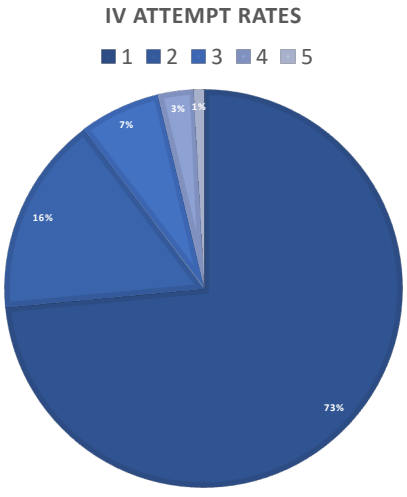
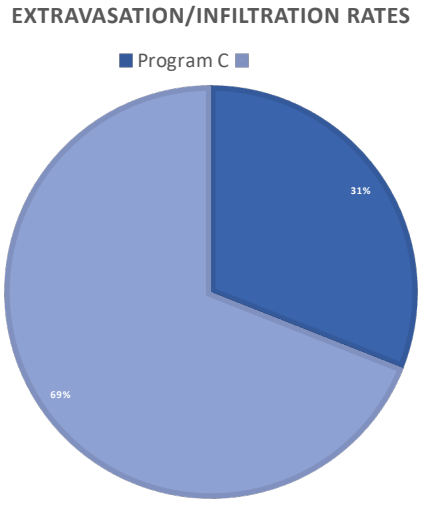
Extravasation Data – Program C





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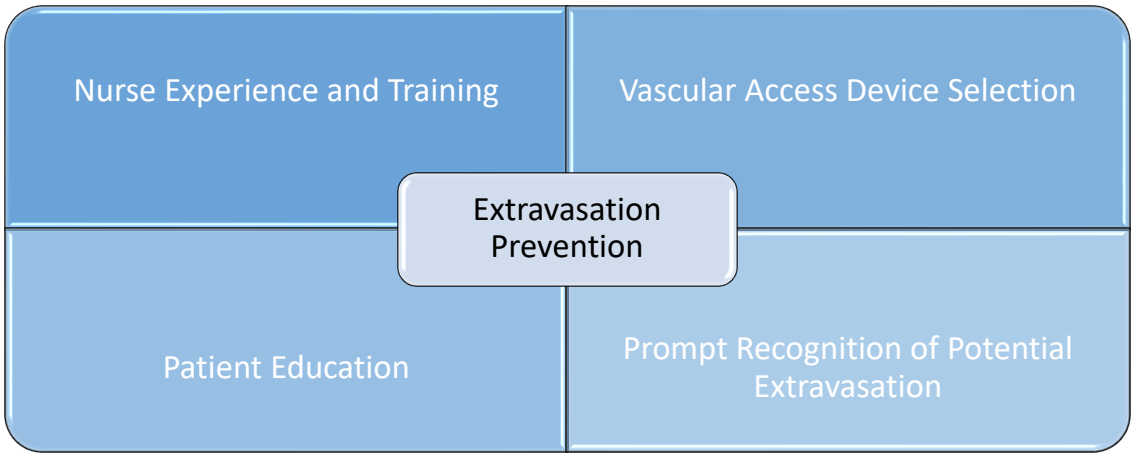
Review of the Literature



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Purpose

- To implement a collaborative approach to venous evaluation prior to initiation of anti-cancer therapy using a validated venous assessment tool, the Difficult IntraVenous Access (DIVA) tool

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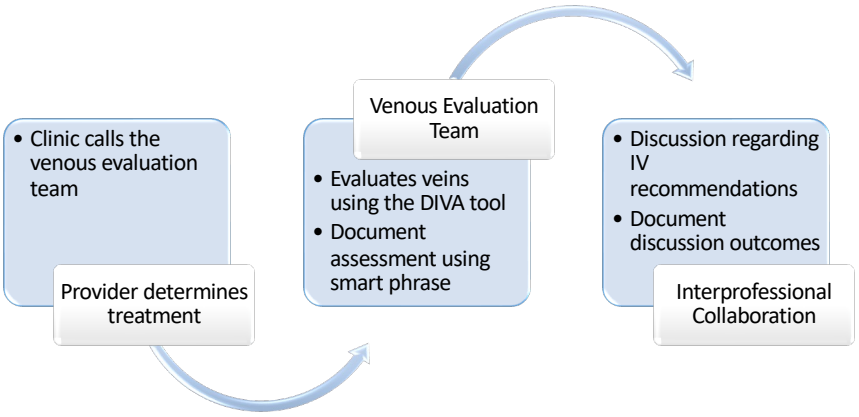
Venous Evaluation Team



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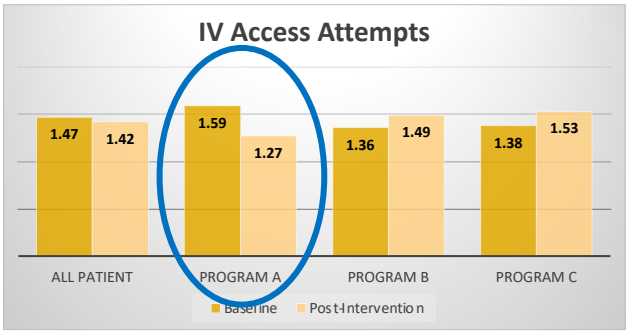
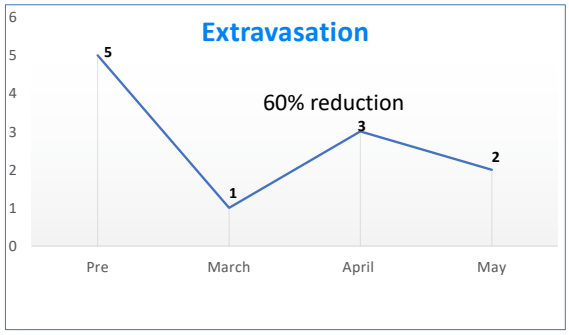
Outcomes





There was no difference in IV access attempts across all patients

- VET performed 26 formal assessments, Program A accounted for 50% of those referrals
- IV access attempt rate for patients who had a venous evaluation was 1.31
- Program A demonstrated a 54% decrease, $p < 0.0001$
- Program B demonstrated a 33% increase, $p = 0.087$
- Program C- GI demonstrated a 39% increase, $p = 0.428$

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Patient Experience

- Would have like to have seen visuals early on in treatment about implanted ports
- Would have liked the conversation early on
- Did not understand central line was an option. Was given information about infection risk and had a negative perception
- Fear that they wouldn't be able to get their chemotherapy
- Potential IV options were never discussed
- Always took multiple attempts due to dehydration. Better preparation that it may take multiple attempts
- Armor with knowledge early on

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Next Steps

Dissemination to Stakeholder Groups				
Disease Program A	Disease Program B	Disease Program C	Nursing Teams	OPAC

↓

Expanding Process	
Determine best process for clinic workflows	Expand across Duke Cancer Center

↓

Data Monitoring			
Extravasation/Infiltration rates	DIVA assessments	Line recommendation status	IV access attempt rates

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References

- Coyle, C. E., Griffie, J., & Czaplewski, L. M. (2015). Eliminating extravasation events: A multidisciplinary approach. Journal of Infusion Nursing, 38 Suppl 6S (Supplement 6S), S43-S50. https://doi.org/10.1097/NAN.0000000000000144
- Ehrhardt, B. S., Givens, K. E. A., & Lee, R. C. (2018). Making it stick: Developing and testing the difficult intravenous access (DIVA) tool. The American Journal of Nursing, 118(7), 56-62. https://doi.org/10.1097/01.NAJ.0000541440.91369.00
- Jackson-Rose, J., Del Monte, J., Groman, A., Dial, L. S., Atwell, L., Graham, J., O'Neil Semler, R., O'Sullivan, M., Truini-Pittman, L., Cunningham, T. A., Roman-Fischetti, L., Costantinou, E., Rimkus, C., Banavage, A. J., Dietz, B., Colussi, C. J., Catania, K., Wasko, M., Schreffler, K. A., . . . Rice, R. D. (2017). Chemotherapy extravasation: Establishing a national benchmark for incidence among cancer centers. Clinical Journal of Oncology Nursing, 21(4), 438-445. https://doi.org/10.1188/17.CJON.438-445
- Kreidieh, F. Y., Moukadem, H. A., & El Saghir, N. S. (2016). Overview, prevention and management of chemotherapy extravasation. World Journal of Clinical Oncology, 7(1), 87-97. https://doi.org/10.5306/wjco.v7.i1.87

References

- Larsen, E. N., Marsh, N., O'Brien, C., Monteagle, E., Friese, C., & Rickard, C. M. (2021). Inherent and modifiable risk factors for peripheral venous catheter failure during cancer treatment: A prospective cohort study. Supportive Care in Cancer, 29(3), 1487-1496. https://doi.org/10.1007/s00520-020-05643-2
- Melo, J. M. A., Oliveira, P. P. d., Rodrigues, A. B., Souza, R. S., Fonseca, D. F. d., Gontijo, T. F., & Silveira, E. A. (2020a). Bundle construction and assessment before antineoplastic extravasation: A methodological study. Acta Paulista De Enfermagem, 33(2), 1-12. https://doi.org/10.37689/acta-ape/2020AO0075
- Olsen M., LeFebevre, K, & Brassil, K. (2019). *Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice*. ONS Publishing Division
- Pagnutti, L., Bin, A., Donato, R., Di Lena, G., Fabbro, C., Fornasiero, L., Gerratana, A., Rigon, L., Gonella, S., & Palese, A. (2016). Difficult intravenous access tool in patients receiving peripheral chemotherapy: A pilot-validation study. European Journal of Oncology Nursing: The Official Journal of European Oncology Nursing Society, 20, 58-63. https://doi.org/10.1016/j.ejon.2015.06.008

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Extravasation Management & Prevention

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Session Objectives

Upon completion of this presentation, the learner will be able to:

- Identify knowledge gaps related to extravasation prevention and management
- Discuss extravasation prevention and management interventions
- Identify opportunities to improve interdisciplinary collaboration and patient education related to extravasation prevention and management

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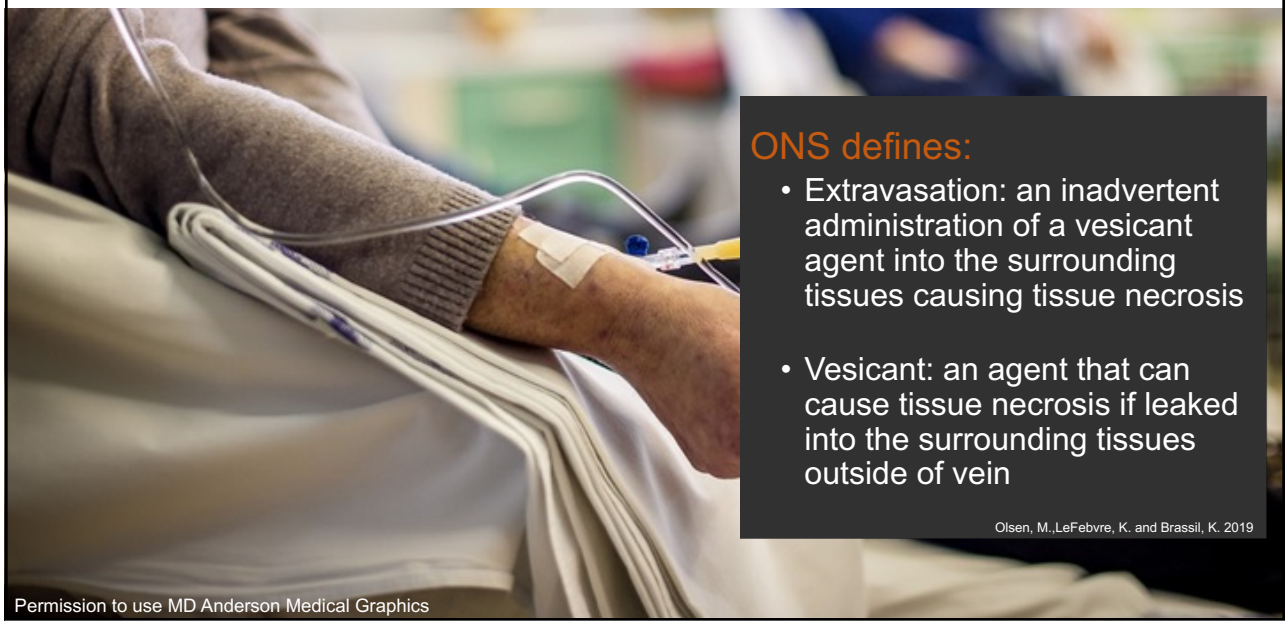
Extravasation



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Background

In 2020, a Root Cause Analysis (RCA) regarding an extravasation event occurred

Further investigation of safety data after the RCA indicated a lack of standardization in extravasation prevention and management

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Interventions

- A review of the current institutional extravasation policies and procedures identified knowledge and system gaps.
- Evidence-based practice guidelines and recommendations state institutions should provide the following related to extravasation prevention and management:
  - Patient education
  - Policy and Procedure
  - Licensed Healthcare Provider (LHP) education
  - Electronic Health Record (EHR) documentation

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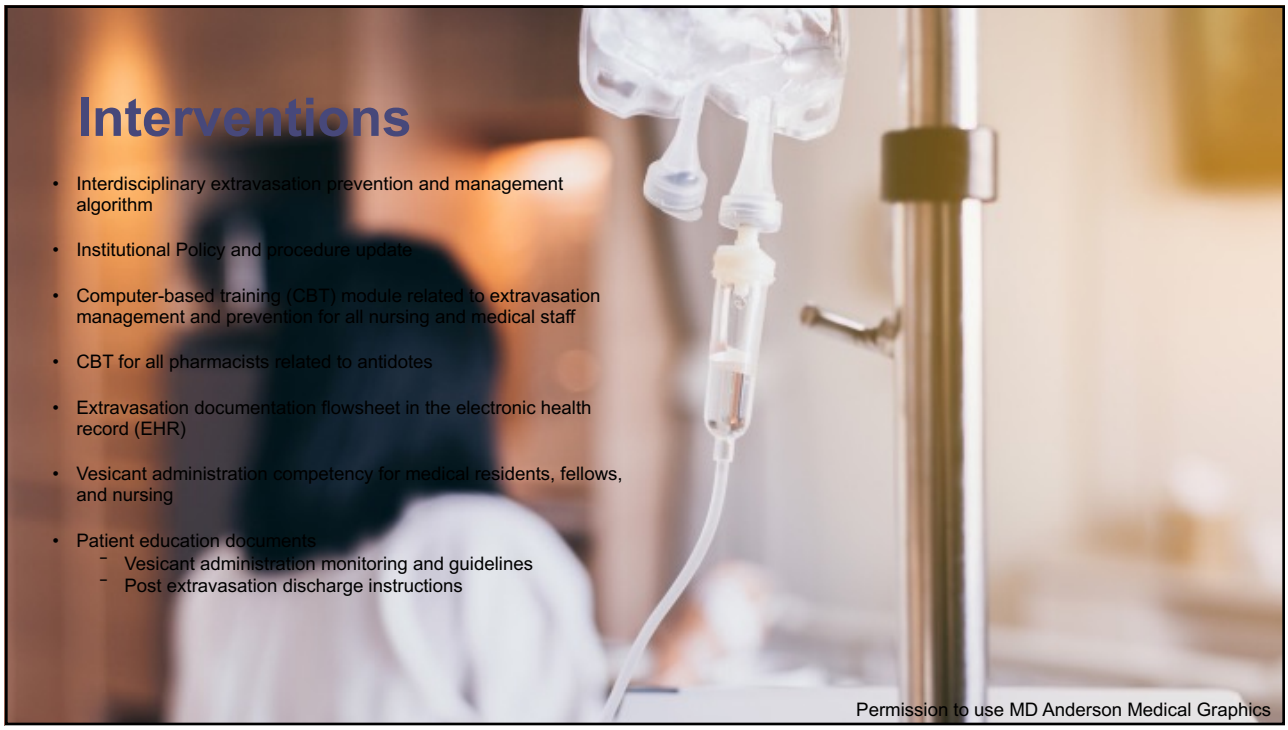
Interventions
• Interdisciplinary extravasation prevention and management algorithm
• Institutional Policy and procedure update
• Computer-based training (CBT) module related to extravasation management and prevention for all nursing and medical staff
• CBT for all pharmacists related to antidotes
• Extravasation documentation flowsheet in the electronic health record (EHR)
• Vesicant administration competency for medical residents, fellows, and nursing
• Patient education documents
– Vesicant administration monitoring and guidelines
– Post extravasation discharge instructions
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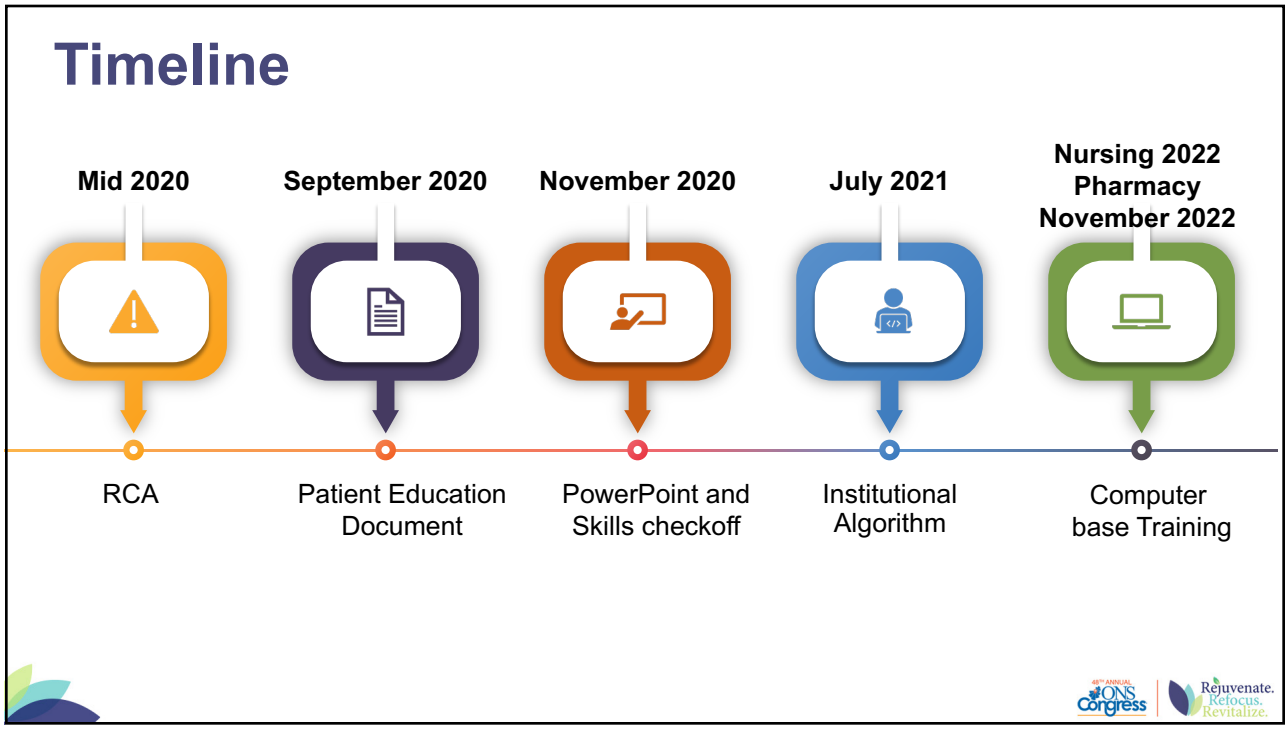
Timeline
Mid 2020
RCA
September 2020
Patient Education Document
November 2020
PowerPoint and Skills checkoff
July 2021
Institutional Algorithm
Nursing 2022 Pharmacy November 2022
Computer base Training

46

Safety Report Data Analysis

Earlier detection of potential and actual extravasation through updated assessment, monitoring and documentation

Enhanced interdisciplinary response for management and follow up of extravasation

Patient education improved earlier reporting of site related complications

Identified need for additional education on other site related complications

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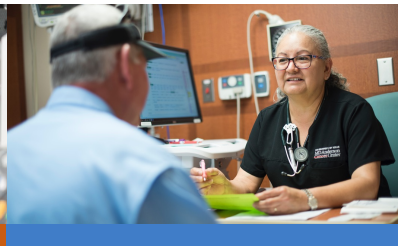
Discussion



Standardization of extravasation prevention and management was established and sustained with ongoing education

Safety event reports indicated adherence to extravasation prevention and management processes, which increased patient outcomes

With standardization of practice, nurses are empowered to implement and advocate for interventions to promote patient safety

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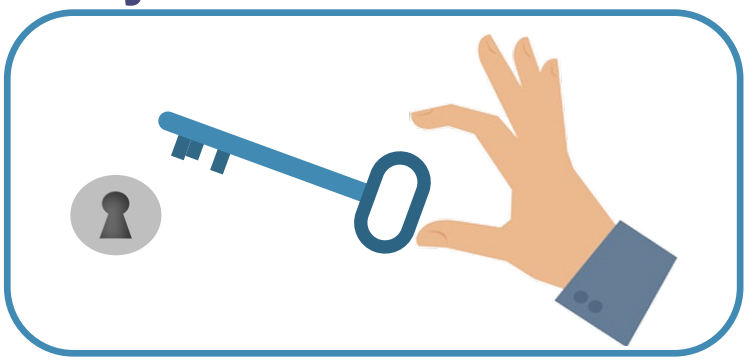
Key Takeaways



- Assess extravasation related safety data and unit needs
- Review your institution's extravasation management policy, procedure and resources
- Collaborate with your interdisciplinary teams to discuss extravasation prevention and management practices
- Evaluate and update patient education documents

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References

- Gorski, L. A., Hadaway, L., Hagle, M. E., Broadhurst, D., Clare, S., Kleidon, T., & Alexander, M. (2021). Infusion therapy standards of practice, (8th ed). Journal of Infusion Nursing, 44(1S), S1–S224. https://doi.org/10.1097/NAN.0000000000000396
- Jackson-Rose, J., Del Monte, J., Groman, A., Dial, L., Atwell, L., Graham, J., … Rice, R. (2017). Chemotherapy Extravasation: establishing a national benchmark for incidence among cancer centers. *Clinical Journal of Oncology Nursing, 21* (4), 438-445. https://doi.org/10.1188/17.CJON.438-445
- Olsen M, LeFebvre K and Brassil K. (2019). Chemotherapy and Immunotherapy Guidelines and Recommendations for Practice. Pittsburgh: Oncology Nursing Society.

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References

- U.S. Pharmacopeial Convention. (2017). USP General Chapter <800> Hazardous drugs: Handling in healthcare settings. The United States Pharmacopeia-National Formulary (USP 40-NF 35, Second Supplement). Retrieved from http://www.usp.org/sites/default/files/usp/document/our-work/healthcare-quality-safety/general-chapter-800.pdf.
- U.S. Department of Health and Human Services. (2020). Common terminology criteria for adverse events. Version 5.0. Published November 27,2017. Retrieved from https://ctep.cancer.gov/protocoldevelopment/electronic_applications/docs/CTCAE_v5_Quick_Reference_5x7.pdf

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Thank you.

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Q&A

What's on your mind?

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Improving Nursing Assessment and Early Identification of Ifosfamide-Related Toxicity in Cancer Patients

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Session Objectives

- Review a nursing led clinical practice project around early identification of ifosfamide toxicity
- Describe the new Ifosfamide Toxicity Nursing Assessment tool and outline patient outcomes

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Significance

- Ifosfamide is an alkylating chemotherapeutic agent
- Treats various tumors
- Complications can include:
  - Myelosuppression
  - Hemorrhagic cystitis
  - CNS toxicity
    - (Gusdon et at, 2019)

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Toxicity Rates in Literature

- Incidence of toxicity varies:
  - Nephrotoxicity
    - Range between 1.4% - 60%
  - Neurotoxicity
    - Range between 10% - 30% (mean 18%)
      - (Dalton, 2022; Mashhadi et al, 2011)

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Background

- In 2020, our NCI designated Comprehensive Cancer Center administered ifosfamide to 18 patients in our inpatient area
  - A review of those charts determined that 6 patients (30%) had ifosfamide toxicity with acute mental status changes

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Problem

- Oncology nurses were concerned about:
  - Frequency of severe ifosfamide toxicity
  - Lack of current nursing assessment and documentation practices
  - Unfamiliarity with a patient's baseline shift to shift

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Purpose

- The purpose of this clinical practice project was to implement an evidenced-based nursing assessment tool to provide early identification of symptoms related to ifosfamide toxicity.

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Intervention

- Interdisciplinary group convened
- Reviewed literature
  - Found no available nursing assessment tool for ifosfamide toxicity
  - Outlined potential and relevant symptoms
- Tool developed
  - Included relevant symptoms
  - Utilized the Common Terminology Criteria for Adverse Events (CTCAE) to grade changes for each symptom
  - Included the Mini-Cog Quick Screening to assess for changes in memory and concentration

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Date _____ **Ifosfamide Toxicity Assessment Tool** Patient Sticker

Grade	0	1	2	3	4	Baseline Grade/Initials		Time___ Grade/Initials		Time___ Grade/Initials		Time___ Grade/Initials	
Orientation	A&Ox4*	A&Ox3	A&Ox2	A&Ox1	A&Ox0								
Headache	None	Mild	Moderate	Severe									
Depressed Level of Consciousness	Alert	Decreased alertness; somnolent	Slow to respond to stimuli; lethargic	Difficult to arouse; stupor	Coma								
Changes in Thought	Calm; clearheaded	Agitation; irritability	**Confusion**	Hallucination	Delirium								
Changes in Personality – new onset	Lucid; rational	Mild personality change and/or anxiety	Moderate personality change	Moderate psychotic symptoms (e.g. impaired reality, disorganized speech)	Severe psychotic symptoms (e.g. paranoid, extreme disorganization)								
Changes in Memory or Concentration (Administer Mini-Cog Exam)**	**Mini-Cog = 5** No deficits in concentration or memory	**Mini-Cog = 4** Mild inattention or decreased level of concentration; mild memory impairment	**Mini-Cog = 3-2** Moderate memory impairment or impairment in attention or concentration	**Mini-Cog = 1-0** Severe memory impairment or impairment in attention or concentration									
Seizure (Sz) activity	No seizures or history of Sz controlled with medication			New onset seizures	Prolonged repetitive seizures								
Changes in Speech (dysarthria) **or Coordination** [muscle tremors, ataxia, akathisia]	Speech clear; motor activity coordinated	Mild slurred speech or mild involuntary movements or restlessness	Moderate impairment of articulation or slurred speech or involuntary movement	Severe impairment of articulation or slurred speech or involuntary movement	Loss or ability to speak or swallow								
Eye Changes	No nystagmus or change in visual acuity	Mild blurred vision	Nystagmus or moderate change in visual acuity	Severe Nystagmus or decrease in visual acuity									
Urinary Incontinence	Continent	Occasional (e.g. with coughing	Spontaneous; pads indicated										
Hematuria	None	Clinical or diagnostic observation	Bladder irrigation indicated	Gross hematuria, invasive elective procedure needed	Life-threatening								
Creatinine Increase	Normal range	> upper limit of normal - 1.5xULN	>1.5-3.0x baseline	>3.0x baseline	>6.0x baseline								
Urine Output Decreased **	>240ml/8hrs	160-240ml/8hrs	80-160ml/8hrs	Oliguria (<80 ml/8hr)	Anuria (<240 ml/ 24 hr)								

RN Initials	Print Name	Signature	Time	Date

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Mini-Cog Exam

- Assessment for changes in memory/concentration
- RN states 3 words and asks the patient to repeat the words back
- Ask the patient to "Draw a clock" with a specified time
- Ask the patient to recall the 3 words

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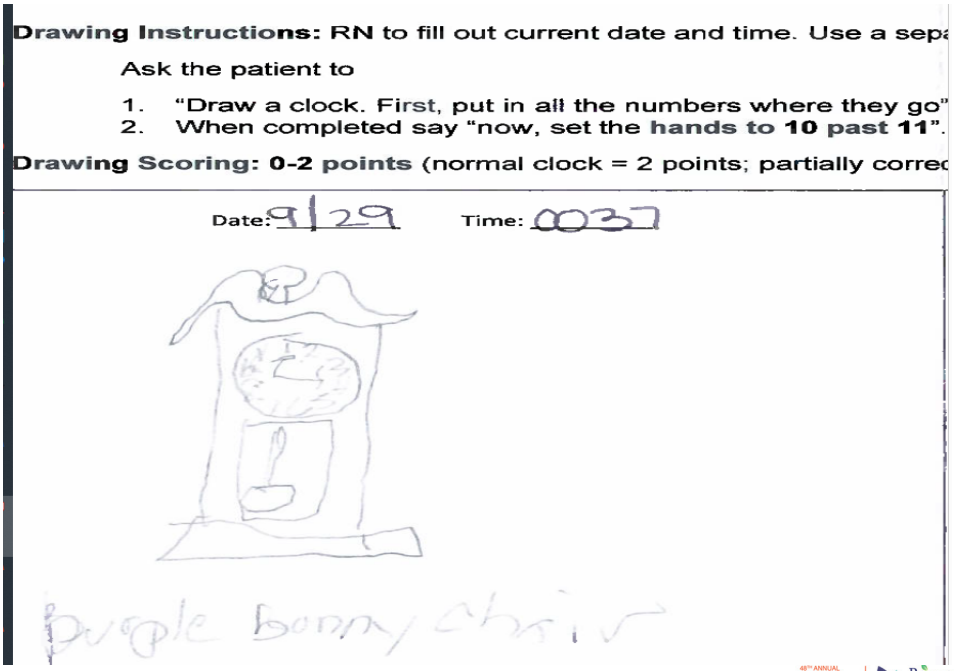
Patient example using Ifosfamide Toxicity Tool



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Ifosfamide Toxicity Assessment Tool

- Instruction Sheet:
  - RNs complete a **baseline assessment**
  - Completed **during the infusion** and for **24hrs after infusion**
  - Each parameter is **assessed every 8 hours** and with **every change of caregiver**
    - Assessment should be preformed together at handoff
  - RNs compare and report any changes from baseline and previous shift assessment

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Go-Live

- This Quality Improvement Initiative was reviewed and determined to not meet the criteria for human subjects research by the University Hospitals Cleveland Medical Center Institutional Review Board.
- Nursing and provider education completed
- Rolled out in Feb 2021
  - Implemented on our two inpatient medical oncology floors
  - Includes all inpatients receiving ifosfamide
- Data collection continues

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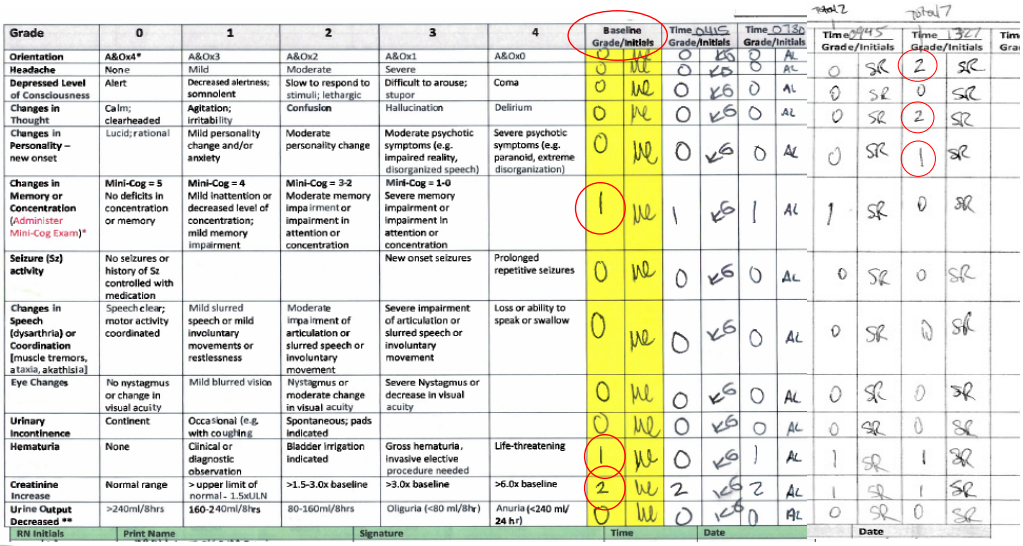
Tool in Practice

Day 1 Day 3



Grade	0	1	2	3	4	Baseline Grade/Initials	Time 0445 Grade/Initials	Time 0730 Grade/Initials	Time 0945 Grade/Initials	Time 1327 Grade/Initials
Orientation	A&Ox4*	A&Ox3	A&Ox2	A&Ox1	A&Ox0	0 ME	0 KG	0 AL	0 SR	2 SR
Headache	None	Mild	Moderate	Severe		0 ME	0 KG	0 AL	0 SR	0 SR
Depressed Level of Consciousness	Alert	Decreased alertness; somnolent	Slow to respond to stimuli; lethargic	Difficult to arouse; stupor	Coma	0 ME	0 KG	0 AL	0 SR	2 SR
Changes in Thought	Calm; clearheaded	Agitation; irritability	Confusion	Hallucination	Delirium	0 ME	0 KG	0 AL	0 SR	1 SR
Changes in Personality – new onset	Lucid; rational	Mild personality change and/or anxiety	Moderate personality change	Moderate psychotic symptoms (e.g. impaired reality, disorganized speech)	Severe psychotic symptoms (e.g. paranoid, extreme disorganization)	1 ME	1 KG	1 AL	1 SR	0 SR
Changes in Memory or Concentration (Administer Mini-Cog Exam)*	Mini-Cog = 5 No deficits in concentration or memory	Mini-Cog = 4 Mild inattention or decreased level of concentration; mild memory impairment	Mini-Cog = 3-2 Moderate memory impairment or impairment in attention or concentration	Mini-Cog = 1-0 Severe memory impairment or impairment in attention or concentration		0 ME	0 KG	0 AL	0 SR	0 SR
Seizure (Sz) activity	No seizures or history of Sz controlled with medication			New onset seizures	Prolonged repetitive seizures	0 ME	0 KG	0 AL	0 SR	0 SR
Changes in Speech (dysarthria) or Coordination [muscle tremors, ataxia, akathisia]	Speech clear; motor activity coordinated	Mild slurred speech or mild involuntary movements or restlessness	Moderate impairment of articulation or slurred speech or involuntary movement	Severe impairment of articulation or slurred speech or involuntary movement	Loss or ability to speak or swallow	0 ME	0 KG	0 AL	0 SR	0 SR
Eye Changes	No nystagmus or change in visual acuity	Mild blurred vision	Nystagmus or moderate change in visual acuity	Severe Nystagmus or decrease in visual acuity		0 ME	0 KG	0 AL	0 SR	0 SR
Urinary Incontinence	Continent	Occasional (e.g. with coughing	Spontaneous; pads indicated			0 ME	0 KG	0 AL	0 SR	0 SR
Hematuria	None	Clinical or diagnostic observation	Bladder irrigation indicated	Gross hematuria, invasive elective procedure needed	Life-threatening	1 ME	0 KG	1 AL	1 SR	1 SR
Creatinine Increase	Normal range	> upper limit of normal - 1.5xULN	>1.5-3.0x baseline	>3.0x baseline	>6.0x baseline	2 ME	2 KG	2 AL	1 SR	1 SR
Urine Output Decreased **	>240ml/8hrs	160-240ml/8hrs	80-160ml/8hrs	Oliguria (<80 ml/8hr)	Anuria (<240 ml/24 hr)	0 ME	0 KG	0 AL	0 SR	0 SR
RN Initials	Print Name			Signature		Time	Date		Date	

Baseline Showed: Deviation in memory, hematuria & elevated creatinine

After 3rd dose: Changes in orientation, LOC, & personality

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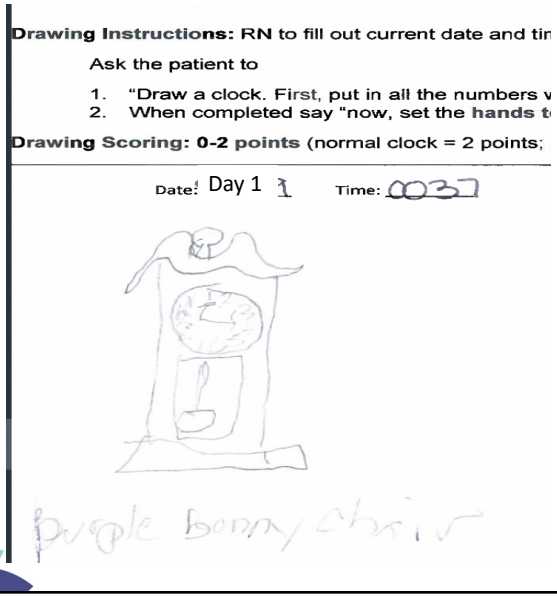
Clock Drawing



Drawing Instructions: RN to fill out current date and tir

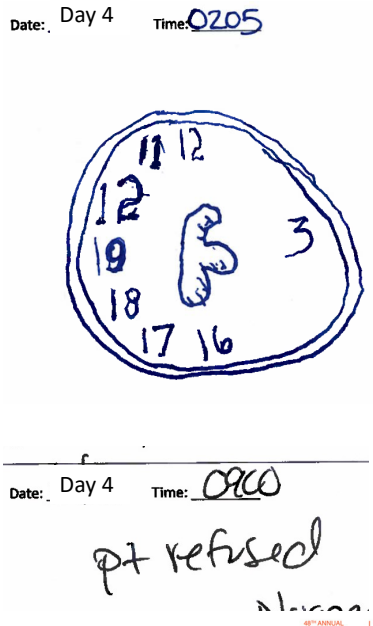
Ask the patient to

1. "Draw a clock. First, put in all the numbers v
2. When completed say "now, set the **hands** t

Drawing Scoring: 0-2 points (normal clock = 2 points;

Date: Day 1 Time: 0037

purple bunny chair



Date: Day 4 Time: 0205

Date: Day 4 Time: 0900

pt refused

Nurse

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Evaluation

- Since implemented
  - Nurses assessed 20 patients
    - Eleven patients (55%) had documented CNS changes indicating toxicity
    - Changes ranged from mild deviation from baseline (4 patients) to significant neurological changes (6 patients)

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Outcomes

Year	Total # of Patients to Receive Ifos	# of Patients with Severe Neurologic Changes	# of Patients with Mild Neurologic Changes	Pt Outcomes
2021	9	2	2	2 – held doses; 2 – completed cycle
2022	7	4	0	3 – held doses; 1 – regimen changed
2023	4	0	3	3 – completed cycle
Totals	**20**	**6**	**5**	

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Key Takeaways

- Historically, cases of ifosfamide toxicity has lead to severe encephalopathy and even death
- Bedside oncology nurses need tools to accurately assess and document subtle changes in patient symptoms over time related to ifosfamide toxicity
- Use of a tool such as the Ifosfamide Toxicity Assessment Form, helps empower oncology nurses to report subtle but critical changes to providers

Thank you

- Deborah Virant, BSN, RN, RN-BS
- Erica Bauer, BSN, RN
- Prateek Mendiratta, MD
- Inpatient oncology nurses at UH Seidman Cancer Center who work every day to improve nursing practice and keep patients safe!

References

- Ajithkumar, T., Parkinson, C., Shamshad, F., & Murray, P. (2007). Ifosfamide Encephalopathy. *Clinical Oncology, 19(2)*, 108-114.
- David, K. A. & Picus, J. (2005). Evaluating risk factors for the development of Ifosfamide encephalopathy. *American Journal of Clinical Oncology, 28(3)*, 277-280.
- Dalton, K. L. (2022). Ifosfamide-induced neurotoxicity in children with solid tumors: A seven year retrospective analysis of incidence and risk factors. *Journal of Pediatric Hematology/Oncology Nursing, 39*(6), 379-385
- Gusdon, A. M., Malani, R., & Chen, X. (2019). Clinical and electroencephalographic characteristics of ifosfamide-related encephalopathy. *Journal of Clinical Neurophysiology, 36*(2), 150-154.
- Mashhadi, M. & Khosravi, A. (2010). Neuropsychiatric toxicity of ifosfamide in patients admitted for chemotherapy. *International Journal of Hematology Oncology and Stem Cell Research*, 19-22.

References

- National Institute of Health & National Cancer Institute. (2017). Common Terminology Criteria for Adverse Events, Version 5.0. Available at: https://ctep.cancer.gov/protocoldevelopment/electronic_applications/docs/ctcae_v5_quick_reference_5x7.pdf
- National Institute of Neurological Disorders and Stroke (March 2019). Encephalopathy Information Page. Retrieved November 18, 2020 from: https://www.ninds.nih.gov/Disorders/All-Disorders/Encephalopathy-information-Page
- Shin, Y. J., Kim, J. Y., Moon, J. W., You, R. M., Park, J. Y., & Nam, J. H. (2011). Fatal Ifosfamide-induced metabolic encephalopathy in patients with recurrent epithelial ovarian cancer: report of two cases. *Cancer research and treatment: official journal of Korean Cancer Association*, *43*(4), 260–263. https://doi.org/10.4143/crt.2011.43.4.260
- Sweiss, K. I., Beri, R., & Shord, S. S. (2008) Encephalopathy after High-dose Ifosfamide: A Retrospective cohort study and review of the literature. *Drug Safety 31(1)*, 989-996.