University Hospitals
Pharmacy Services

Implementation of IV Workflow Technology for Pediatric Chemotherapy: Enhancing Safety, Compliance, and Operational Efficiency

Natalie Kuchik, PharmD, MS, BCSCP and Jacalyn Rogers, PharmD, MS, BCPS, CPEL, FASHP
University Hospitals Health Systems Cleveland, Ohio

Why was it done

Pediatric and neonatal chemotherapy preparation demands exceptional precision due to individualized dosing, high-alert medications, and high-risk administration routes. Traditional manual verification processes are vulnerable to variability and interruptions, creating opportunities for error in a clinically fragile population.

To strengthen safety, standardization, and compliance with contemporary compounding standards, our institution implemented an IV workflow technology (IVWT) system integrating barcode-driven checks, gravimetric verification, and image-based documentation. These tools support real-time accuracy, enhance pharmacist oversight through remote verification, and improve operational efficiency within sterile compounding workflows.

Safety → Compliance → Efficiency

What was done

Staff Training & Workflow Readiness
- Trained pharmacy staff on IVWT functionality, barcode verification, gravimetric checks, and image-capture review.
- Ensured workflow alignment and equipment readiness to support digital compounding processes.

Clinical Content Assessment
- Reviewed pediatric chemotherapy orders, formulations, and compounding requirements.
- Developed a standardized catalog of chemotherapy agents with key details (concentrations, diluents, stability, hazardous classification).

Logic Design & Build
- Designed IVWT logic, including workflow steps, gravimetric tolerances, barcode mapping, and verification checkpoints.
- Built and configured product files to guide safe, standardized compounding.

System Testing & Validation
- Performed full workflow testing to confirm barcode accuracy, gravimetric performance, and proper sequencing.
- Validated system functionality across diverse medication types and compounding scenarios prior to go-live.

How was it done

1. Collaborative Planning & Workflow Mapping
- A multidisciplinary team, including pharmacy leadership, medication safety, informatics, and sterile compounding staff, conducted detailed mapping of current-state workflows.

2. Standardization of Chemotherapy Data
- All chemotherapy agents used in pediatric practice were reviewed, standardized, and catalogued. This included drug concentrations, preparation techniques, diluent requirements, hazardous classifications, auxiliary labels, and stability parameters.

3. Logic Development & System Build
- Clinical and operational parameters were translated into IVWT logic, including:
- Barcode associations and verification checkpoints
- Preparation sequencing and step restrictions
- Required image-capture steps for pharmacist review

4. Product File Creation
- Each chemotherapy agent was individually constructed within IVWT as a guided product file. These files ensured that every preparation followed standardized, step-by-step workflow instructions with embedded safety checkpoints.

5. End-to-End Testing
- Simulated chemotherapy preparations were executed within IVWT to validate:
- Accuracy of barcode associations
- Clarity of step prompts and instructions

Disclosure/References

No one in a position to control the content of this educational activity have relevant financial relationships with ineligible companies.

References:
1. Greszler, Craig, et al. "Gravimetric Compounding Workflow Technology Insights for Pharmacists and Pharmacy Technicians." American Journal of Health-System Pharmacy, vol. 82, no. 22, 2025, pp. 1282–1289. Oxford Academic, https://doi.org/10.1093/ajhp/zxaf102. [academic.oup.com]
2. Intravenous Workflow Management Systems (IVWMS) Implementation Checklist. American Society of Health-System Pharmacists (ASHP), 2024, https://www.ashp.org/-/media/assets/pharmacy-practice/resource-centers/compounding/docs/IV-Workflow-Implementation-Checklist.pdf. [ashp.org]
3. Wells, Charlotte, et al. "Implement Gravimetric-Based IV Workflow Software." Pharmacy Purchasing & Products, vol. 15, no. 5, 2018, pp. 10–15, https://www.pppmag.com/article/2223. [pppmag.com]
4. Smith, Jennifer. "The THRIV Coalition's Top 5 IV Workflow Must-Haves for Patient Safety." Wolters Kluwer Health, 30 Oct. 2024, https://www.wolterskluwer.com/en/expert-insights/the-thriv-coalitions-top-5-iv-workflow-must-haves-for-patient-safety.

What was achieved

Results	
Enhanced Verification	**Key Findings**
Enhanced Verification Coverage	• 93% of IV and oral liquid medications were processed through IVWT • High-risk preparations ensured that most high-risk preparations receieved barcode scanning, and image.
Improved Error Detection & Prevention	• 14% of doses were proactively canceled duo to identified preparation errors. • 25% of captured errors involved wrn drug scans, prevented by barcode verification.
Increased Workflow Standardization	• Step-wise IVWT guidance standardized compounding across all staff and shifts. • Automated calculations based on concentration improved dosing accuracy.
Comprehensive Documentation	• Digital records captured images, weights, barcode data, and timestamps.

Targeted Reduction in Safety Events
Integrate non-IVWT preparations into the workflow improved compounding reliability

Strengthened Error Prevention Through Advanced Verification
Introduce multiple layers of automated safety checks that improved accuracy across the preparation process

Automated Volume Calculations
Eliminate manual errors, providing the precise dosing required for pediatric chemotherapy.

Differentiation Across Multiple Concentrations
Distinguishes between various concentrations of the same medication, preventing selection errors associated with look-alike/sound-alike products.

Greater Standardization and Process Reliability
Standardized reproducible preparation

Enhanced Chemotherapy Oversight
In-line and dual verification and Comprehensive electronic records

What is next

Key Initiatives

IVWT Integration
Ensures 100% of chemotherapy and hazardous drug doses undergo barcode scanning and image capture for closed-loop verification.

Gravimetric Verification
Introduces gravimetrîc checks to confirm measured mass matches expectıd values, Improving accuracy for complex admixtures.

Expanded IV Workflow Software
Extends IVWT use beyond sterile compounding to standardize documentation and streamline medication preparation workflows.

5PSQ-167