Identifying the Incidence and Causes of Large Volume Contrast Extravasation during CT Exams

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PURPOSE

A single institution quality improvement (QI) workgroup was formed in an effort to...

*Decrease rates of large-volume IV infiltration (>50 mL) occurring during outpatient CT examinations*

...using DMAIC methodology without reducing imaging quality or decreasing employee satisfaction
Background

Problem Statement

• Safety reporting data indicated that 51 extravasation events out of 28,730 CT exams at MCA occurred between 4th quarter, 2017 through the 3rd quarter, 2019.

• 45% of these events (n=23) were considered large volume IV infiltrates with contrast (>50mL).

• According to the American College of Radiology Contrast & Medication Manual, IV infiltrates with contrast related to power injections occur between 0.1% and 1.7%/1000 patients, regardless of volume.

• However, for infiltrates greater than 50ml the patient safety expectation is 0% occurrence. For the large volume IV Infiltrates with contrast within the data sample, the occurrence was 0.08% or 0.8 events/1000 CT exams.

Goal

• Reduce the incidence of large volume IV contrast extravasations (>50mL) in the CT outpatient practice from 0.8 events/1000 CT exams (baseline) to less than or equal to 0.6 events/1000 CT exams (25% reduction) by May 2021, without reducing imaging quality or decreasing employee satisfaction.
DMAIC Define Phase- Identify the Gap

- Baseline data indicated large volume IV Infiltrates occurred throughout the hospital system.
- Focused on outpatient to consider process changes due to more consistent workflows and a more controlled environment.
- Utilized SIPOC to identify the key inputs and outputs of the overall processes related to patients receiving IV contrast.
DMAIC Define Phase - Identify the Gap

- Completed Stakeholder Analysis to identify concerns and level of support from key stakeholders
- Qualitative feedback from leadership and frontline staff is needed to determine sustainability of any recommended process changes

CT Techs: “Concerned about meeting protocol requirements while taking into consideration modifications made by nursing prior to handoff to CT”

Nursing “Believes there is room for improvement”

Executive Leadership- “Strong Advocate for process improvement”

Physicians “Would like the process to reflect what’s best for the patients”

Operations “Ensure workflow validates we’ve done all we can do to prevent IV infiltrates”

Stakeholder Analysis
DMAIC Measure Phase - Develop a strategy for data collection and measure current process or performance

- Continued monitoring of large volume IV Infiltrates during COVID-19/ furlough. Favorable trend but uncertain if it’s due to recent educational interventions or significantly decreased patient volume
- Developed process map to count steps and identify existing gaps in workflows using data from 15 hours of observation and discussions with staff
- Key Opportunities:
  - Handoff Communication Between CT Nursing
  - Standardizing manual flushing steps
  - Develop process for CT follow-up if protocol modifications need clarification
• Used Redcap survey tool to measure staff comprehension of existing procedures given post Kaizen education

• Key Opportunities:
  • Handoff Communication Between CT Nursing
  • Streamlining documentation practices
  • Incorporate communication plan for post Kaizen educational interventions
  • Standardize manual flushing practices
  • Develop staff scripting for giving patient instructions ‘If you experience pain/ discomfort’
DMAIC Analyze Phase - Identify Root Causes and Determine sources of variation

- Fishbone Diagram- graphical demonstration of possible causes grouped together
  - Protocol Changes prior to nursing handoff to CT
  - SOP vary for Manual Flushing
  - EPIC documentation locations regarding pertinent patient risk factors
  - Catheter Choice
  - Inconsistent changing practices (long sleeves)
  - Limited SERF report data elements
  - No standard scripting on instructing patients how to communicate pain or discomfort
- Failure Mode Effects Analysis tool used to prioritize process gaps identified during previous phase and estimate the impact of each defect on the patient
- FMEA: Process gaps related to Manual Flushing processes were identified as the greatest risk to patients
- Trending data doesn’t clearly indicate the root cause
DMAIC: Improve Phase - Implementing the process changes/improvements

- **Manual flush standardization**
  - Standardize and measure steps involved with manual flushing

- **IV Infiltrate Risk Assessment**
  - Develop risk assessment tool that can be used by frontline staff to identify patients who are most vulnerable to develop IV Infiltrates and include the appropriate follow-up process

- **Patient Prep** *(catheter, sleeve, patient education)*
  - Standardize practices for patient prep and develop method to measure compliance with procedure

**PDSA**

**PLAN**

**DO**

**STUDY**

**ACT**

**Reduced Incidence of IV Infiltrates > 50ml**

After completing PDSA cycle(s) for the proposed change - decide on the following:
- Adopt Intervention (Complete process change) or
- Adapt (Modify proposed intervention) or
- Abandon proposed intervention?
Conclusion

- DMAIC aided in determining factors which contribute to IV contrast media infiltration rates.

- Continued meetings regarding:
  - Monitoring IV extravasation events going forward
  - Standardizing workflows for IV assessment prior to contrast administration.
  - Creating protocols for reporting of IV infiltration events.
  - Testing proposed improvements using PDSA Cycle
  - Establishing communication plan for Control Phase of DMAIC

For any questions, please email Dr. Clint Jokerst at jokerst.clinton@mayo.edu