Pre-Analytic Specimen Error Reduction Through Standardized Specimen Management Nursing Practice in the Interventional Radiology (IR) Setting

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Introduction

- Specimen management is a complex and error-prone activity as it involves multiple steps, manual workflows, and collaboration between several disciplines. While specimen collection is a routine process, it requires precise performance to ensure high-quality patient care. However, there is limited research on nursing interventions implemented to address this problem in IR.
- Research shows up to 75% of all specimen errors occur in the pre-analytic phase. Importantly, these errors are considered fully preventable.
- Using Donabedian's framework for healthcare quality, a standardized nursing protocol was implemented to reduce the incidence of pre-analytic specimen errors in the IR setting.

Figure 1. Donabedian's SPO Model

Method

- Quasi-experimental pre-/post-implementation study design
- 43 IR RNs & 28 IR MDs
  - Pre-procedure only RNs = 3
  - Post-procedure only RNs = 1
  - Fellows/Residents = 13
  - Attendings = 15
- Setting: IR department at large urban academic center
  - Procedure suites: 10
  - Pre-procedure bays: 9
  - Post-procedure bays: 12
  - Mixed use bays: 8
- Statistics: Chi-Square Test

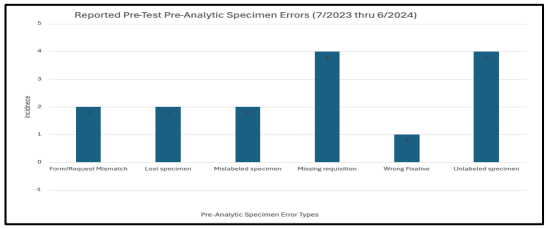

Figure 2. Reported Pre-Test Pre-Analytic Specimen Errors

Pre-Procedure	Intra-Procedure	Post-Procedure
Work up RN to review specimen requests; communicate to procedure RN during handoff and document in EHR.	At the time of specimen collection or before loss of access, RN and proceduralist to confirm all specimen requests were obtained; specimens placed in correct container; document verification in EHR.	Recovery RN and Procedure RN perform a focused 2-person check to ensure common pre-analytic errors have not occurred. Both RNs initial the requisition forms for capture.

Figure 3. Implemented Standardized Specimen Management Protocol

Procedure

1. A bespoke specimen management protocol was developed using practice recommendations from the World Health Organization (WHO) and the Association of perioperative Registered Nurses (AORN), published research, and considering local unit-based factors.
   a. Pre-procedure RN to procedure RN handoff
   b. Intra-procedure Specimen Time Out
   c. Procedure RN and Recovery RN specimen check
2. Documentation fields were built into the existing electronic health record to support practice compliance and monitoring.
3. Education was rolled out to the IR RNs and MDs about the new practice changes. 1:1 support was provided to reinforce compliance.
4. Daily and weekly audits were performed to assess practice compliance throughout the peri-procedural process. Data was shared with the RN group on a weekly and monthly basis.

Results

- Over a 6-month implementation period,1480 cases were performed and no pre-analytic specimen errors were reported.
- In comparison to the previous 12 months, p-value = 0.0015, which is statistically significant.
- Overall practice compliance with the protocol = 88.5%.
  - Generally improved month-to-month
  - December 2024 compliance rate = 96.5%

Conclusion

Standardization of care in the health care setting lends to improved quality and patient safety. For specimen management in an IR setting, the introduction of a practice protocol showed promising results in achieving the Joint Commisision's goal of achieving zero patient harm related to pre-analytic specimen errors. With expectations for uniformity in care when handling specimens, the IR RNs reported increased satisfaction with the new practice change, as it promoted a sense of meaningful interventions to improve both the quality of delivered care and patient safety.

	Errors	Case Total	Total
Pre-Test	15	2200	2215
Post-Test	0	1480	1480
Total	15	3680	3695
Chi-Squared (P)			0.0015

Figure 4: Chi-Square Contingency Table.

Significance

While both the WHO's Surgical Safety Checklist and the AORN's Comprehensive Surgical Checklist both incorporate specimen verification prior to the patient's departure from the operative room, it does not include what may prove to be vital steps in ensuring error-free specimen management. These steps include verifying all requested specimens are obtained and correctly contained at the time of specimen retrieval or prior to losing access for obtaining the necessary specimens.

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