HOSPITAL MANAGEMENT ASIA 2024 AWARDS

Category: -	Clinical Effectiveness Improvement
Project Title: -	Minimizing Extravasation Risk: A Radiology Department Initiative
Date Project Started: -	May 2023
Department Name: -	Radiology
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BACKGROUND

Radiology Department embarked on a quality improvement project aimed at enhancing clinical effectiveness and patient safety by addressing the risk of extravasation during contrast media administration. Extravasation, the unintended leakage of contrast media into surrounding tissues during intravenous administration, can cause significant patient discomfort and potential complications.

17 cases (0.13%) developed extravasation out of 13,531 in May 2021 - April 2022 and 17 cases (0.11%) out of 15,656 examinations performed in May 2022 to April 2023.

Period	Total Examinations	Extravasation Cases	Extravasation Rate
May 2021 – April 2022	13,531	17	0.13%
May 2022 - April 2023	15,656	17	0.11%

Despite a reduction in extravasation incidents from 2021 to 2023, the persistent occurrence of such events highlighted the need for a more thorough analysis and the implementation of effective, targeted interventions.

Extravasation incidents have remained a concern due to their potential to compromise patient safety and the overall quality of radiological services (Kojima et al., 2014). The ongoing occurrences underscored the necessity for a proactive and systematic approach tailored to the specific operational dynamics of the Radiology Department. Consequently, the department

undertook a detailed examination of its current practices to identify areas needing improvement and to develop a strategy that could reliably minimize these risks.

The central objective of this research was to investigate whether the establishment of a centralized peripheral venous line (PVL) insertion station could significantly reduce the incidence of extravasation. Unlike broad reviews that rely on generalized online data, this initiative aimed to provide robust, longitudinal data tailored to the localized practices of the department and to reduce errors in care delivery. By collecting detailed on-site data through a focused intervention, the project sought to bridge gaps in individual institutional practices, thereby enhancing the overall efficacy of the intervention.

The research hypothesized that a centralized approach to PVL insertion, compared to the existing practice of dispersed insertion locations, would introduce a more systematic and consistent method of patient management. This hypothesis posited that centralizing the PVL insertion process would ensure optimal placement of venous lines and reduce the risk of extravasation. To achieve this, the project necessitated the establishment of a centralized PVL insertion station and the formation of a dedicated team of senior nurses.

PROJECT GOALS and OBJECTIVES

The primary goal of this project was to investigate whether implementing a centralised peripheral venous line (PVL) insertion protocol could significantly reduce the incidence of extravasation. The research hypothesised that a centralised approach to PVL insertion, as opposed to dispersed insertion locations, would yield more consistent and optimal placement of venous lines, reducing the risk of extravasation.

To realise this aim, we undertook several key steps.

1. Establishment of a Centralised PVL Insertion Station: A thorough assessment was conducted to identify an optimal location for the centralised PVL insertion station within the department facility. We carefully considered factors such as proximity to CT and MRI suites, patient flow dynamics, and accessibility in selecting the central patient recovery bay as the designated site for PVL insertion.
2. Formation of a Dedicated Team: We meticulously assembled a team comprising six highly experienced senior nurses based on their proficiency and extensive background in PVL insertion procedures. This team took on the exclusive responsibility of conducting all PVL insertions, ensuring consistency and expertise in the procedure.
3. Implementation of Standardised Protocols: Comprehensive protocols were developed to standardise the PVL insertion process. These protocols encompassed various essential aspects, including pre-warming of contrast media, meticulous verification of intravenous location, and securement of the catheter using Tegaderm. To enhance detection and prompt

intervention in case of any complications, we clearly defined criteria for placing extravasation detectors.

By meticulously executing these steps, the study aimed to ascertain whether implementing a centralised PVL insertion protocol could yield tangible benefits to reduce extravasation incidents. Through the establishment of standardised procedures and the formation of a dedicated team, the project sought to optimise the safety and efficacy of PVL insertion practices, ultimately enhancing patient outcomes and healthcare quality.

ACTIVITY

Phase 1:Implementation

During the baseline assessment from May 2022 to April 2023, we conducted 15,656 examinations requiring intravenous contrast media administration and documented 17 cases of extravasation. Two key issues were highlighted: the lack of standardized PVL insertion protocols and the dispersion of PVL settings across various locations, exacerbated by varying nurse competencies.

The lack of standardized protocols for PVL insertion led to inconsistent practices. Without uniform guidelines (Alexander, Corrigan, and Gorski, 2016), even experienced nurses might use differing techniques (Kleidon et al., 2019), potentially compromising patient safety and care quality (Roszell et al., 2014, Dougherty and Lister, 2015).

The dispersion of PVL insertions across locations (Harwood et al., 2016), such as examination rooms and patient waiting bays, compounded the problem (Dougherty and Lamb, 200)8. Without a centralized PVL station, nurses performed insertions with varying levels of competency and experience. This inconsistency increased the risk of extravasation, as less experienced staff might struggle with complex cases or fail to follow best practices (Rangel et al., 2012).

Recognizing these issues, a centralized PVL insertion station was established in May 2023. Senior management assembled a dedicated team of six experienced nurses to standardize techniques and procedures. This initiative aimed to ensure consistency, reduce variability, and adhere to evidence-based practices, thereby enhancing patient safety and optimizing outcome (Rangel et al., 2012).

Phase 2:Longitudinal Study

After implementing the centralized PVL insertion protocol, a longitudinal study was conducted from May 2023 to April 2024. During this period, 17,969 patients underwent diagnostic examinations with intravenous contrast media. The data underscored the efficacy of the centralized approach, demonstrating significant reduction in extravasation cases and improved patient safety and care quality. Continuous monitoring provided real-time feedback for timely adjustments, ensuring ongoing effectiveness. The findings offer a replicable model for other departments to enhance clinical practices and patient outcomes.

RESULT

Implementing a centralised peripheral venous line (PVL) insertion protocol has markedly enhanced the quality and safety of radiological services at our hospital. This initiative significantly reduced the incidence of contrast media extravasation during CT and MRI procedures, improving patient safety and care quality.

Percentage Improvement:

Reduction in Extravasation Rate: 73%

Impact Analysis:

Period	Total Examinations	Extravasation Cases	Extravasation Rate
May 2021 – April 2022	13,531	17	0.13%
May 2022 - April 2023	15,656	17	0.11%
May 2023 - April 2024	17,969	6	0.03%

The data collected from May 2023 to April 2024 demonstrate a significant reduction in the extravasation rate, 0.03% from 0.11% (May 2022 – April 2023) following the intervention. This 73% reduction is a clear indicator of the intervention's success, validating our hypothesis that a centralised PVL insertion approach would enhance patient safety by ensuring more consistent and optimal PVL placement.

The centralised PVL insertion protocol involved several key changes: the establishment of a dedicated PVL insertion station, the formation of a specialised team of six experienced nurses, and implementing standardised procedures for PVL insertion. These measures standardised care and reduce variability in insertion practices, which minimised the risk of extravasation.

This initiative not only reduced errors in care delivery, but also set a new benchmark for patient safety in radiology. The project underscored the importance of targeted, evidence-based interventions in achieving significant improvements in healthcare outcomes. The rigorous approach to data collection and continuous monitoring provided real-time feedback, allowing for timely adjustments and ensuring the ongoing effectiveness and relevance of the protocol.

In summary, the centralised PVL insertion protocol has proven to be a highly effective strategy for reducing extravasation rates, enhancing patient safety and improving the quality of radiological services. This project highlights the critical role of systematic, evidence-based practices in setting new standards for patient care and optimising clinical outcomes.

CLOSING ARGUMENT

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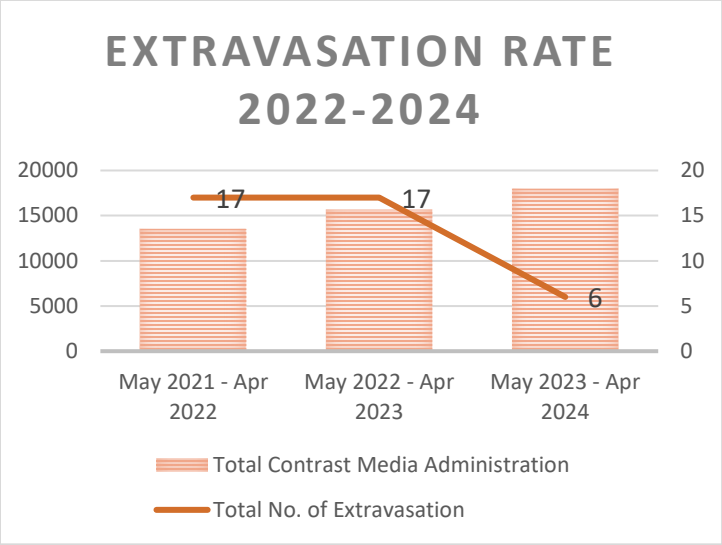

Graph: Incidents of Extravasation and Examination Totals Pre- and Post-Intervention

The data highlights the significant impact of implementing a centralized PVL insertion protocol. Despite an increase in contrast-enhanced examinations, there is a remarkable 73% reduction in extravasation incidents, underscoring the protocol's effectiveness in enhancing patient safety.

Sustainability

Monthly Stability: Several months (August, September, November 2023, and January, February, March 2024) recorded zero extravasation incidents.
Increasing Volume: Despite the increased number of examinations, the extravasation rate remained low, showcasing the approach's robustness and adaptability.

The consistently low rates of extravasation incidents validate the intervention's sustainability, even amid increased examination volumes. This enduring success underscores the protocol's capacity to maintain high safety standards, significantly enhancing patient care and reducing the risk of complications in radiological procedures.

However, the six extravasation incidents documented in the post-study period (May 2023 – April 2024) revealed a common factor: the PVL lines were set by referral departments rather than by the Radiology nurse at the dedicated station. This finding highlights the need for a second stage of the

intervention; patients referred for contrast media administration will be advised to have their PVL lines set by the Radiology nurse at the dedicated station, subject to patient consent.

The centralized PVL insertion initiative has proven to be a highly effective and sustainable strategy in reducing extravasation rates, improving the quality and safety of radiological services. This evidence-based intervention sets a new benchmark for patient care, emphasizing the critical role of systematic approaches in achieving superior clinical outcomes.

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