Retrospective Review: Duke University Medical Center's Experience with the Extravasation Detection Accessory (EDA) Technology

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Summary

In a retrospective review of 14,544 contrast media injections using CT injection systems equipped with ACIST Medical Systems' EDA™ (Extravasation Detection Accessory) technology* at Duke University Medical Center, 267 (1.8%) possible contrast media extravasations were detected by the EDA. In each instance, the injection system with EDA technology alerted the operator and paused the injection to allow for an immediate clinical evaluation of the IV site. As a result, the potential for significant actual extravasations was minimized. The staff perceives that EDA technology successfully aids in the detection of extravasations, contributing to increased patient safety, department workflow and staff satisfaction.

Background

Contrast media administered at maximum rates (10 mL/sec) via power injectors may increase the risk of extravasation. Since 1998, the Department of Radiology at Duke University Medical Center has used CT injection systems with EDA technology, a sensing patch at the contrast injection IV site that monitors skin impedance. During the imaging procedure, if the EDA technology detects variations that may be indicative of significant contrast media extravasation, the CT injection system alerts the operator and pauses the procedure.

Methods and Results

To evaluate the impact of EDA technology on clinical outcomes, EDA use and detection of possible extravasations were analyzed and are presented in this review. Duke University Medical Center's guidelines for EDA use are also presented.

EDA Utilization

To quantify EDA use, data from five EmpowerCTA® Injector Systems were selected for retrospective review. Using the IRiSCT® Data Management System, data about each injection was captured, including EDA use and extravasation detection.

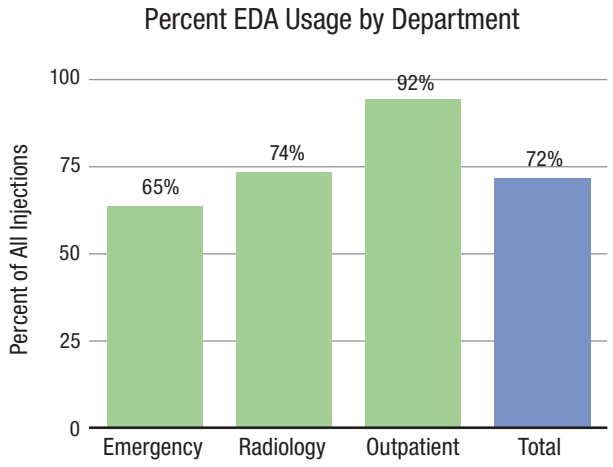
The location of the CT systems and length of data review periods are summarized in the following table.

CT Injection System Locations and Data Review Periods

Number of CT Systems	Location	Data Review Period
2	Radiology Department	15 months
1	Outpatient	6 months
1	Outpatient	15 months
1	Emergency	15 months

A total of 20,256 injection records were captured from the five CT systems. The number of injections in each area and the number of injections using EDA technology during the data review period were also recorded.

*__WARNING:__ As with all equipment that monitors a patient's physiological response, it is not intended as a substitute for observation and intervention by a trained healthcare professional. Diligence on the part of the owner/operator is an essential requirement of overall patient safety.



The data showed that the EDA was used in 14,544 contrast injections, or 72% of the total injections in the three areas. Relative usage was highest in the outpatient facilities at 92% and lowest in the emergency facility at 65%.

Detection of Possible Extravasations

During the contrast injections using EDA technology, 267 instances of possible extravasation were detected, which is an extravasation detection rate of 1.8%. Duke University Medical Center's safety reporting of extravasation incidents is not specific to the CT injector on which the extravasation occurred. Therefore, it is not possible to correlate actual extravasation incidents to possible extravasation instances detected by EDA technology.

A further analysis was possible on the 267 possible extravasation instances since the injection systems automatically capture data on how much of the injection was completed prior to the detection.

Duke University Medical Center's Clinical Guidelines for EDA Use

The development of the following guidelines for EDA use has allowed Duke University Medical Center's CT staff to maximize the benefits of this technology.

- Use EDA technology on patients whose contrast injection IV site is likely to remain relatively stable during the procedure.
- Ensure that the IV access is clear and unobstructed.
- Ensure a stable baseline acquisition on the remote display while applying the EDA sensing patch. (The baseline indication can be viewed on both the injector head and the remote control display.)
- Co-monitor IV access for the duration of the injection, including smart prep and "count down" time at the start of the injection.
- Utilize the EDA pause feature, which resumes the injection procedure once the clinician determines there is no extravasation present.

Conclusions

During Duke University Medical Center's long-term experience with EDA technology, extravasation detection provided important benefits for both patients and CT staff, including:

- Minimizing contrast media (vesicant) extravasation and resulting skin damage
- Maximizing the CT staff's ability to complete important diagnostic imaging procedures
- Quickly determining when there is no extravasation so that departmental workflow can continue unimpeded

Overall, the EDA has consistently been found to provide an additional level of patient protection. As a result, the CT staff perceives that the EDA is a valuable tool for improving clinical outcomes as part of Duke University Medical Center's commitment to best practices.

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