

Structured Training of Radiology Residents in the Management of Acute Intravascular Contrast Reactions

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1. Introduction

- The current study was a quality improvement initiative that included observation of resident physicians performing emergency safety protocols and related documentation.
- We then assessed the resident knowledge of contrast media complications, availability of emergency kits, safety protocols, and awareness of the clinic support staff.

2. Methods

- Residents completed a survey before and after the training session.
- Topics included knowledge of contrast media complications, availability of emergency kits, safety protocols, and awareness of the clinic support staff.
- During the session, residents were tested on their knowledge of the ACR Manual safety card (Fig 1)

3. Results

- Overall confidence levels increased from pre to post survey responses (Fig 2).
- Although all categories increased only one was found to be statistically significant.
- Study limited by low number of residents surveyed (<10).

Variable (Question)	Pre-Survey (n=6)	Post-Survey (n=4)	p-value
How confident are you performing baseline life support (IV access, administration of medication, CPR)? (Q1)	3.83 ± 0.983	4.5 ± 0.5774	0.261*
How confident are you in recognizing the signs and symptoms of an acute intravascular reaction necessitating immediate medical treatment? (Q2)	4.17 ± 0.753	4.8 ± 0.447	0.1341*
How confident are you in correctly responding once an allergic or physiologic event has taken place? (Q3)	4.0 ± 0.633	4.5 ± 1	0.3559*
How confident are you in applying the correct dosage (both pediatric and adult) of medication when responding to an acute intravascular event? (Q4)	3.33 ± 1.211	4.4 ± 0.894	0.1379*
When performing imaging procedures, how confident are you that extravasation is not occurring? (Q5)	3.83 ± 0.753	4.6 ± 0.5487	0.0911*
How confident are you identifying the location of your institution's crash cart items? (Q6)	4.2 ± 0.837	4.4 ± 0.894	0.7245*
How confident are you identifying the potential comorbidities (i.e. asthma) that increase the risk for adverse events related to the administration of oral agents? (Q7)	4.0 ± 0.633	4.6 ± 0.894	0.2247*
How confident are you in evaluating and treating the rare adverse events related to the administration of oral contrast agents? (Q8)	3.33 ± 1.211	4.6 ± 0.548	0.0602*
How confident are you in taking the first steps necessary to mitigate a life-threatening event? (Q9)	4.33 ± 0.516	4.6 ± 0.894	0.5503*
How confident do you feel in implementing the emergency protocol if an intravascular event occurs? (Q10)	4.17 ± 0.408	4.8 ± 0.447	0.0364*

4. Discussion

- We identified knowledge and practice gaps in contrast reaction emergency preparedness training.
- We propose a model of structured training and evidence-based practices to ensure the highest safety levels during procedures employing contrast media.



Participants are more confident in implementing the emergency protocol if an intravascular event occurs.



References
 1. https://www.acr.org/-/media/ACR/Files/Clinical-Resources/Contrast_Media.pdf

2. 2022-NIS-Study-Guide-v2.
 3. <https://www.acr.org/-/media/ACR/Files/Radiology-Safety/MR-Safety/Manual-on-MR-Safety.pdf>

ADULT
CODE BLUE 1

EXAMPLE PREMEDICATION REGIMENS

Methylprednisolone 32 mg PO 12, 2 hrs prior +/- Benadryl 50 mg PO 1 hr prior.
OR
 Prednisone 50 mg PO 13.7, 1 hours prior +/- Benadryl 50 mg PO 1 hr prior.
OR
 Hydrocortisone 200 mg IV 5 hrs and 1 hr prior and Benadryl 50 mg IV 1 hr prior. (urgent, NPO only, ER, inpatient)

CONTRAST EXTRAVASATION

Elevate arm (if level), apply cool compress, remove rings. Observe. Consider surgical consultation for decreased perfusion, sensation, strength, active range of motion, or increasing pain.

Document reaction & monitor for return of symptoms post-treatment

HIVES/DIFFUSE ERYTHEMA

1. Observation; monitor vitals q 15 min. Preserve IV access.
2. If associated with hypotension or respiratory distress then considered **Anaphylaxis**.
 - O₂ 6-10 L/min by face mask
 - IV 0.9% NS wide open; elevate legs > 40°
 - Epinephrine 0.3 mL of 1mg/mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/mL IV with slow flush or IV fluids
 - Call 911 or CODE BLUE
3. If ONLY skin findings but severe or progressive may consider Benadryl 50 mg PO, IM, IV but may cause or worsen hypotension.

HYPOTENSION WITH TACHYCARDIA (ANAPHYLAXIS)

1. Preserve IV access, monitor vitals q 15m
2. O₂ 6-10 L/min by face mask
3. Elevate legs > 40°
4. IV 0.9% NS wide open
5. Epinephrine 0.3 mL of 1mg/mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/mL IV with slow flush or IV fluids
6. Call 911 or CODE BLUE

HYPOTENSION WITH BRADYCARDIA

1. Preserve IV access; monitor vitals
2. O₂ 6-10 L/min by face mask
3. Elevate legs > 40°
4. IV 0.9% NS wide open
5. Atropine 0.5-1.0 mg IV if refractory
6. Consider calling 911 or CODE BLUE
5. Call 911 or CODE BLUE

LARYNGEAL EDEMA (INSPIRATORY STRIDOR)

1. Preserve IV access, monitor vitals
2. O₂ 6-10 L/min by face mask
3. Epinephrine 0.3 mL of 1mg/mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/mL IV with slow flush or IV fluids
4. Call 911 or CODE BLUE

BRONCHOSPASM (EXPIRATORY WHEEZE)

1. Preserve IV access, monitor vitals
2. O₂ 6-10 L/min by face mask
3. Beta-2 agonist inhaler 2 puffs; repeat x 3
4. If not responding or improving, then use Epinephrine 0.3 mL of 1mg/mL IM (or auto-injector) OR Epinephrine 1 mL of 1mg/mL IV with slow flush or IV fluids
5. Call 911 or CODE BLUE

The content of this card is for reference purposes only and is not intended to substitute for the judgment and expertise of the physician or other user. User is responsible for verifying currency and applicability of content to clinical situation and assumes all risk of use.

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Fig 1: Adult Safety Card from ACR Contrast Media Manual.