Radiology Life Support
Practical Applications

A new approach to improve radiologist and technologist response to emergencies in radiology

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Background

In the past, approaches to improve radiologist and technologist preparation for responding to emergencies have included American Red Cross CPR training, American Heart Association’s Pediatric Advanced Life Support (PALS) course, and annual radiology “life support” (RLS) lectures. Despite these interventions, a training simulation/mock code conducted in the radiology department revealed suboptimal performance by both the radiologists and technologists.
Problem

In conventional emergency training programs, much of the training is irrelevant to actual emergencies experienced in the radiology department. In PALS, the focus is typically on relatively advanced concepts such as emergency medication doses, and cardiac rhythm assessment—skills which are less relevant to the first few moments of an emergency situation. Participants in our simulated emergency lacked confidence in handling more basic aspects of care, such as connecting oxygen tubing, calling for assistance, and locating and using basic equipment such as suction catheters and oxygen delivery devices.

Purpose

A radiology life support “practical applications” program was devised to improve the confidence of the radiologists and technologists to handle the first few moments of a patient emergency.
Methods

A multidisciplinary planning team was formed consisting of two nurses, a technologist and a radiologist. Initial planning focused on keeping training concise, nonthreatening and salient to the individual’s position. A “back-to-basics”, hands-on format was agreed upon. Needed skills were identified based on the fact that, in most instances, the code team is just minutes away. Four skill stations were chosen: 1) O₂ and suction [Fig. 1], 2) crash cart/emergency equipment [Fig. 2], 3) airway management/bag-valve-mask [Fig. 3], and 4) “directing the first 5 minutes of a code” [Fig. 4]. Key teaching points for each station were developed.

Separate “RLS practical applications” exercises for radiologists and technologists were scheduled over the noon hour. Attendance was highly encouraged but not mandatory. The sessions began with a 10 minute orientation [Fig. 5] followed by small group rotation to a new station [Figs. 6 & 7] every 10 minutes. Each station involved an interactive, hands-on teaching experience taught by a nurse or technologist. Participants checked themselves off on each key teaching point.
Methods
Key teaching points: O₂ and suction [Fig. 8]

- Locate personal protective equipment: gloves, goggles, gown, mask
- Find O₂ and suction
- Make sure canister is firmly in well and red connector is securely attached
- Attach suction tubing to suction canister
- Determine appropriate size of suction catheter*
- Attach suction catheter to suction tubing
- Turn suction on to appropriate level*
- Suction the airway with suction catheter
- Suction the airway with a Yankauer suction tip
- Attach green oxygen tubing to wall O₂
- Determine appropriate O₂ mask size
- Attach green tubing to O₂ mask
- Determine appropriate O₂ flow rate*
- Turn on O₂ to appropriate flow rate and make sure O₂ is flowing

* = information found on badge cards [Fig. 11 & 12]

Methods
Key teaching points: Bag-valve-mask Ventilation [Fig. 9]

- Locate O₂ and suction
- Open small airway box, find the stethoscope
- When would you use an oral airway?
- Find appropriate size oral airway - insert oral airway – remove oral airway
- Locate appropriate size face mask for patient
- Inflate mask cuff
- Describe when to use Ambu bag vs. Mapleson
- Locate appropriate size bag for patient*
- Connect mask and bag
- Connect O₂ to bag – turn O₂ to appropriate flow rate*
- Mask bag patient at appropriate ventilation rate*

* = information found on badge cards [Fig. 11 & 12]
Methods
Key teaching points: Crash cart/emergency equipment [Fig. 10]

- On your way to this station, locate the real crash cart in Nuclear Medicine
- Now go to the Nuclear Medicine room and find practice crash cart
- Open all drawers and check what is inside. FIND:
  - Venipuncture supplies
  - Normal saline fluids
  - Intubation supplies
- Locate backboard
- Check chart on top of crash cart to find average weight for 6 year old patient
- Find medication drawer/tray
- Locate 1:10,000 Epinephrine – open and assemble
- Determine dose for 20 kg. patient (use your card)
- Locate 1:1,000 Epinephrine
- On your way to the next station — go by MRI
  - Show where you would resuscitate a patient in MR
  - Find the real crash cart

Methods
Key teaching points: “directing the first five minutes of a code” [Fig. 4]

- Turn on lights as you enter room
- Have the tech assemble O2 as you do a quick assessment of the patient (patient is unresponsive – remember your ABC’s)

Airway
- Check the airway – is it open?
- Open it using the head tilt/chin lift or jaw thrust
- Look, listen, and feel for breathing. Find a stethoscope. Re-tilt and check again. Is the patient breathing? (patient is not breathing)

Call for help
- Show how to call a nurse using the Hil Rom box
  - What hours is the nurse available?
- Show how to call a code blue on the Hil Rom box
- Show how to call a code blue on the telephone
  - How do you cancel a code if it is accidentally tripped?
- Who else could you call in case of an emergency?
Methods

Key teaching points: “directing first five minutes of a code” [Fig. 6]

Breathing
- Have someone start bag-valve-mask ventilation

Circulation
- Check for a pulse
- Say where to find monitors
- Put on the monitors. Find the O₂ saturation of a volunteer in your group
- Find out history from technologist
- Tell the nurse the appropriate medication and dose for a severe contrast reaction
- Give a brief summary to the code team when they arrive
- Show how to fill out an incident report

In order to maintain an environment conducive to learning, participants were given badge cards with pediatric resuscitation information. The badge cards contain the following information: normal vital signs, epinephrine routes/doses, suction catheter size by age, suction strength, O₂ flow rates by device, and CPR breathing and compression rates [Fig. 11 & 12].
Measures

Success of the program was measured in two ways: 1) using a “before and after” participant survey based on perceived level of confidence in performing each skill and 2) a rating of the effectiveness of the training format and content. A similar survey was used for both radiologists and technologists [Fig. 13]. The radiologist’s training was repeated again in six months to accommodate new staff and others who were unable to attend the prior session. The skill confidence survey was based on a 9-point Likert rating scale with 1 being the least confident and 9 being most confident. Statistical significance was tested using a Wilcoxon sign-rank test.
Results

A total of 31 radiologists (out of 45 staff and fellows) and 31 technologists (out of 102 technologists) attended the sessions. All attendees filled out the survey before and after the training [see table 1 for the “before and after” results on skill confidence]. The participants’ self-reported confidence levels increased by ≥ 42% for all skill areas. Before-after differences were statistically significant in all cases. Participants also rated the training for training format effectiveness, importance of training content and for overall assessment of the exercise [see table 1 for responses & table 2 for percent of participants rating training at ≥ 8]. The majority of radiologists and technologists rated the hands-on format much better than lecture, the material as extremely important, and gave an overall assessment of excellent. Comments on the survey were overwhelmingly positive (7 positive comments, 3 neutral, 0 negative) [see table 3 for examples].

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Note: All differences were statistically significant (p<0.01).
Results

Table 2. Survey responses – taken from a 1 - 9 point Likert scale

Table 3. Survey comments

“Great idea! Very helpful”

“Very good exercise, hands-on & small group format worked great, room coaches were informative, focused & non-threatening! Thanks”

“Outstanding! Thank you so much!”
Conclusions

Radiology Life Support practical applications exercises are an effective way to raise radiologist and technologist skill confidence and are well received by the participants. Additional research is needed to ascertain the frequency of practice needed to maintain skill confidence.

For the future, development of an objective measure, such as simulation, could be helpful to better determine the impact of the practical applications format on actual performance in emergency situations and to tailor the practical applications training.