



# Patients in the Radiology Department May Be at an Increased Risk of Developing Critical Instability



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**ABSTRACT:** The purpose of this study was to calculate the event rate for inpatients in the radiology department (RD) developing instability leading to calls for medical emergency team (MET) assistance (MET-RD) compared with general ward (MET-W) patients. A retrospective comparison was done of MET-RD and MET-W calls in 2009 in a US tertiary hospital with a well-established MET system. MET-RD and MET-W event rates represented as MET calls/hr/1,000 admissions, adjusted for length of stay (LOS); rates also calculated for RD modalities. There were 31,320 hospital ward admissions that had 1,230 MET-Ws, and among 149,569 radiology admissions there were 56 MET-RDs. When adjusted for LOS, the MET-RD event rate was two times higher than the MET-W rate (0.48 vs. 0.24 events/hr/1,000 admissions). Event rates differed by procedure: computed tomography (CT) had 38% of MET-RDs (event rate, 0.89), and magnetic resonance imaging (MRI) accounted for 27% of MET-RDs (event rate, 1.56). Nuclear medicine had 1% of RD admissions, but these patients accounted for 5% of MET-RD (event rate, 1.53). Interventional radiology (IR) had 6% of RD admissions but 16% of MET-RD admissions (event rate, 0.61). Although general X-ray comprised 63% of RD admissions, only 11% of MET-RD involved their care (event rate, 0.09). In conclusion, the overall MET-RD event rate was twice the MET-W event rate; CT, MRI, and IR rates were 3.7 to 6.5 times higher than on wards. RD patients are at increased risk for an MET call compared with ward patients when the time at risk is considered. Increased surveillance of RD patients is warranted. (*J Radiol Nurs* 2015;34:29-34.)

**KEYWORDS:** Patient safety; Radiology; Medical emergency response teams; Event rates; Rapid response systems.

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## INTRODUCTION

Rapid response systems (RRSs) are designed to provide a system-level response for patients who become unstable in an area of the hospital where resources do not match patient needs (DeVita et al., 2006). RRSs commonly use a medical emergency team (MET) consisting of physicians, nurses, and other critical care providers to respond to calls from throughout the institution to assist in stabilizing critically unstable patients. MET calls can be initiated by anyone in any area of the hospital, including the radiology department (RD).

During hospitalization, many patients require tests or interventions that involve off-unit transport to undergo a radiologic procedure or diagnostic test (Szem et al., 1995; Voigt, Pastores, Raoof, Thaler, & Halpern, 2009; Warren et al., 2004). Prior studies indicate that one-fourth to one-half of all intensive care

unit (ICU) patients require transport outside the ICU at least once during their hospitalization (Voigt et al., 2009). However, far fewer studies have investigated risks when non-ICU patients require transport. In one statewide study (Pennsylvania), 208 near-miss or serious events, over a 4-year period, were reported while patients were away from the general wards for RD procedures (Pennsylvania Patient Safety Authority, 2009). Our earlier project examining RD events identified several risk factors for MET calls in the RD, including transport from a noncritical care unit, a greater number of comorbidities, and recent vital sign changes (Ott et al., 2012).

To further define risk for an MET compared with general wards, we proposed to compare event rates in the RD (MET-RD) with those occurring in general wards (MET-W) as well as determine the event rates for specific modalities in the RD. Because patients are in the RD for relatively short periods, a comparison of event rates for RDs versus wards must take time at risk, that is, time in the care area or dose of care, into consideration.

## METHODS

### Sample and Setting

The project was conducted in a tertiary academic medical center with a well-established MET. At the time of the project, MET criteria had been established and posted on all clinical units and the RD (Table 1). The project was approved by the hospital Patient Safety Committee in conjunction with the University of Pittsburgh Medical Center Internal Review Board.

### Variables

The following data were obtained from hospital databases for 2009: (1) number of hospital admissions; (2) number of MET-RD and MET-W calls; (3) hospital length of stay (LOS); (4) number of RD visits by RD

specialty modality (i.e., magnetic resonance imaging [MRI], computed tomography [CT], interventional radiology [IR], nuclear medicine [NM], general X-ray including fluoroscopy [XR], and ultrasound [US]); and (5) patient transport data. Because radiology LOS (LOS-RD) was not discretely recorded, we calculated LOS-RD using patient transport data and defined it as time elapsed (hours) from when the patient left the ward for the RD until ward return. For patients who experienced an MET-RD, LOS-RD was calculated as time elapsed from when the patient left the ward until the MET-RD was called. Because patient transport data were not available for February 2009, the entire analysis was conducted on 11 months of data, excluding February.

### Statistical Analysis

All data management and statistical analyses were done using SAS 9.2 (SAS Institute, Cary NC) and SPSS version 19.0 (IBM Corp. 2010, Armonk, NY). Event rates of MET-RD were calculated as the number of MET-RD calls/LOS-RD in hr/1,000 RD visits. Similarly, event rates for MET-W were calculated as MET-W calls/hospital LOS in hr/1,000 hospital admissions. Each patient encounter in the RD was considered a separate RD visit or RD admission. Results are presented as frequencies with proportions and means with standard deviations.

## RESULTS

There were 31,320 hospital admissions with an average LOS-hospital of 160.8 hr (6.7 days) and 1,230 MET-W calls. There were 149,569 RD visits by inpatients from wards with an average LOS-RD of 0.78 hr (46 min) and 56 MET-RD calls. RD visits per month remained constant throughout the year with a slight increase in July and appeared to be unaffected by fluctuations in hospital admissions (Table 2). MET-RD and MET-W

**Table 1. Study site medical emergency team call criteria in 2009**

Respiratory	Cardiovascular	Acute neurologic change
Rate <8 or >36	Heart rate <40 or >140 with new symptoms or any rate >160	Acute loss of Consciousness
New onset of difficult breathing	Blood pressure <80 or >200 systolic or 110 diastolic with symptoms (neurologic changes, angina, and dyspnea)	New onset lethargy
New pulse oximeter reading <85% for >5 min without known chronic hypoxia	Uncontrolled bleeding	Sudden collapse
New oxygen requirement to keep Saturation of Peripheral Oxygen (SpO <sub>2</sub> ) >85%	Large acute blood loss	Seizure (outside the seizure monitor unit)
Bleeding into airway	Patient complaint of chest pain (unresponsive to nitroglycerine or Medical doctor (MD) unavailable)	Sudden loss of movement or weakness in the face, arm, or leg
Other		
>1 emergency page required to assemble team needed to respond to a crisis; color change (patient or extremity): pale, dusky, gray, or blue; unexplained agitation of >10 min.; narcain use without immediate response; suicide attempt; crash cart must be used for rapid delivery of medicines		

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