A revised classification system for communication errors in radiology to facilitate implementation of preventive measures

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Introduction- Communication Errors

Communication errors are the sole cause or significant contributor to 65% of serious reportable events in healthcare (1), which increases to 80% in malpractice cases (2). A serious reportable event is a patient safety event which reaches a patient and results in death, severe harm, or permanent harm, independent of the natural course of the patient's illness (3). In our radiology department, **38%** of errors directly influence patient care (4).

Examples of types of harm cause are as follows:

- Moderate
    - Unnecessary follow-up imaging and radiation exposure
    - Increased length of hospital stay
- Severe
    - Delayed diagnosis of malignancy
    - Delayed management of urgent findings
    - Unnecessary surgical procedures and complications

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(1) The Joint Commission. Sentinel Event Data: Root Causes by Event Type 2004-June 2013 [Internet]. [cited 2024 Jan 17]. Available from: https://www.medleague.com/wp-content/uploads/2013/11/Root_Causes_by_Event_Type_2004-2Q2013.pdf
(2) Levinson W. Physician-Patient Communication: A Key to Malpractice Prevention. JAMA. 1994 Nov 23;272(20):1619–20
(3) he Joint Commission. Sentinel Event Policy and Procedures. [cited 2024 Oct 15]. Sentinel Event Policy and Procedures. Available from: https://www.jointcommission.orghttps://www.jointcommission.org/resources/sentinel-event/sentinel-event-policy-and-procedures/
(4) Siewert B, Brook OR, Hochman M, Eisenberg RL. Impact of Communication Errors in Radiology on Patient Care, Customer Satisfaction, and Work-Flow Efficiency. Am J Roentgenol. 2016 Mar;206(3):573–9.

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Introduction- Communication Errors

Serious reportable events/ adverse events require a root cause analysis (RCA). RCA aims to discover the underlying causes of incidents to develop effective countermeasures.
Lingard et al. described a classification for communication errors in the operating room (5)
We evaluated the applicability of this classification to radiology.

Failure	Definition
Audience	Gaps in the composition of the group engaged in the communication
Content	Insufficiency or inaccuracy apparent in the information being transferred
Occasion	Problems in the situation or context of the communication event
Purpose	Communication events in which purpose is unclear, not achieved, or inappropriate

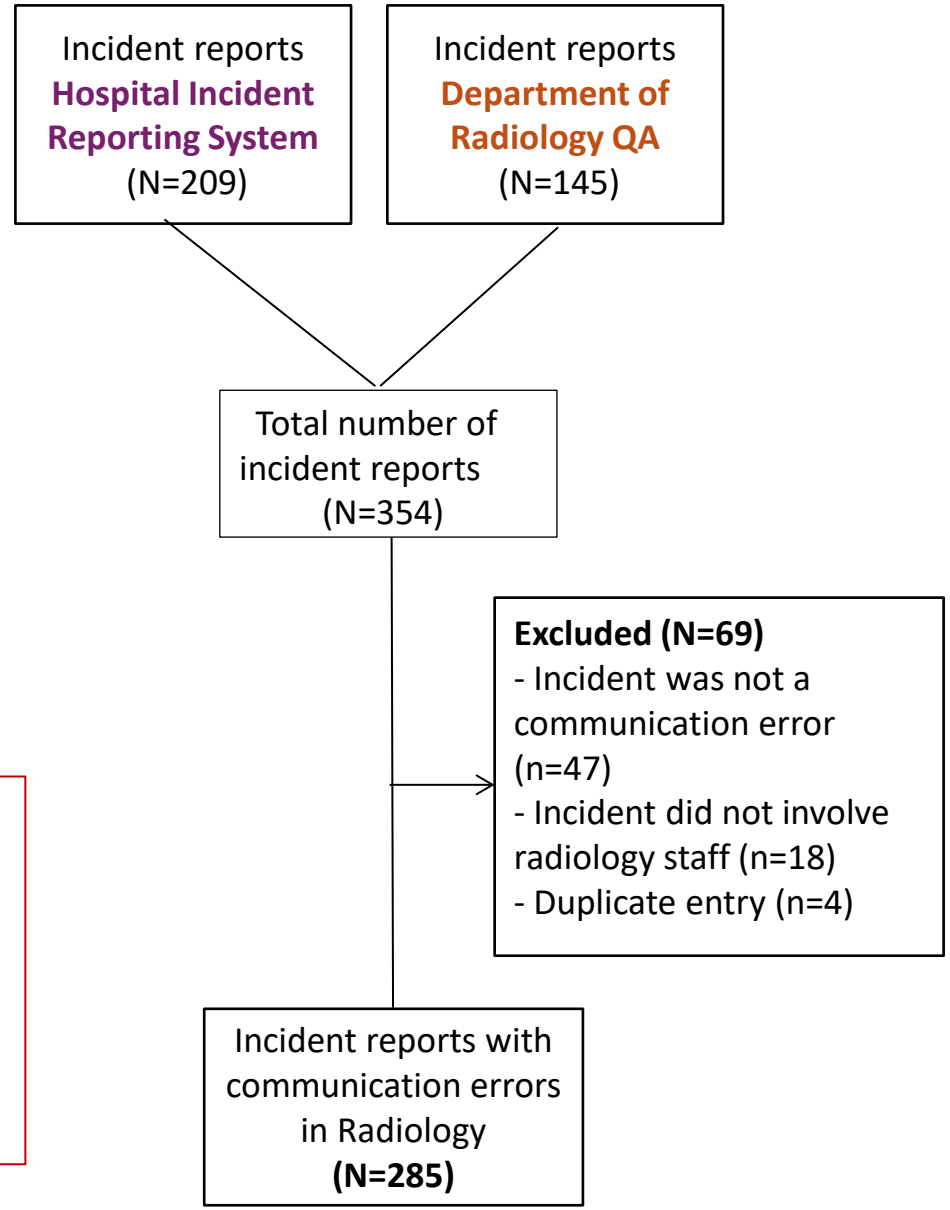
(5) Lingard L, Espin S, Whyte S, Regehr G, Baker GR, Reznick R, et al. Communication failures in the operating room: an observational classification of recurrent types and effects. Qual Saf Health Care. 2004 Oct;13(5):330–4.

Methods

Single large academic institution
Searched the

- Department of Radiology quality assurance database for incidents reported under “communication”
- The hospital QA database under “communication/coordination/ handoff”

RCA performed for each incident as part of normal QA processes.



- **Time of communication** was documented
  - Ordering
  - Scheduling
  - Performance of examination
  - Post-procedural care
  - Reporting

- **Communication partners** were documented
  - Physician/radiologist
  - Radiologist/technologist
  - Technologist/floor nurse
  - Patient/technologist
  - Other dyads

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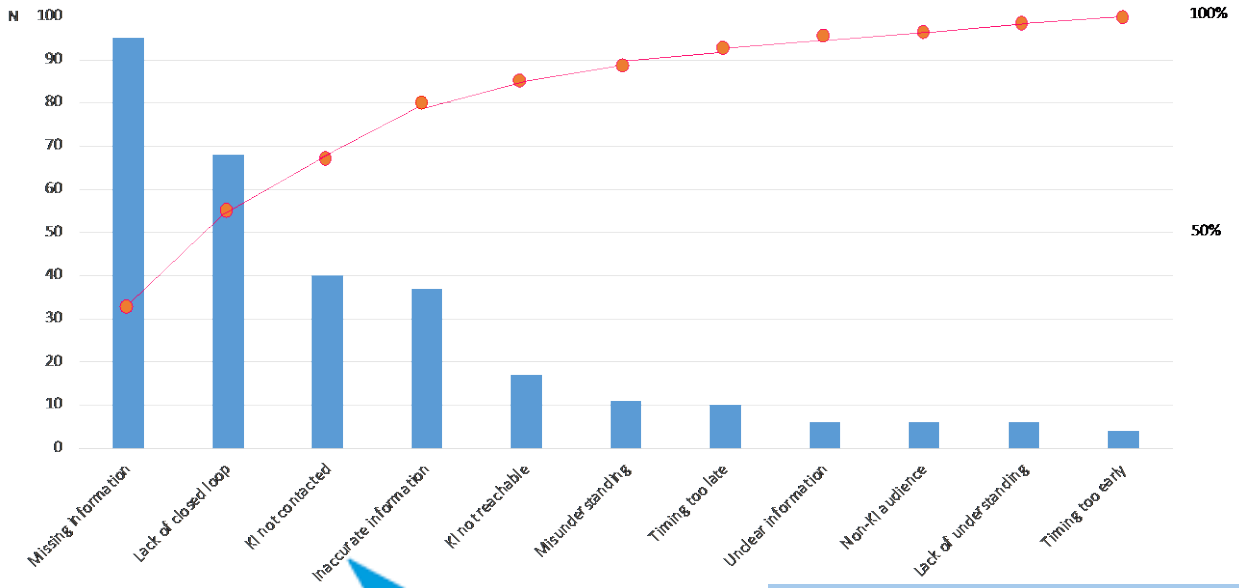
Methods

- Errors were classified with existing Lingard et. al observational classification by **both QA nurse** and **QA director**
- Given radiology involves asynchronous and written communication, the existing classification system was **modified with the addition of new subcategories**
- **We renamed one category**

Failure	Type of Error
Audience	Non-Key individual (KI) audience resulting in lack of information transfer
Content	**Missing Information**
	Inaccurate information
	Unclear information (multiple meanings)
Occasion	**Communication occurred** - **Too early to be effective**
	- **Too late to be effective**
Transfer (Originally Purpose)	**KI not contacted**
	KI could not be reached
	Misunderstanding
	Lack of understanding
	Lack of closed loop

Results

- 285 incidents, with 302 communication errors
  - 1 error (n=268), 2 errors (n=17)
- 80% of errors fall within one of these subcategories:
  - Missing information (94 (31.12%))
  - Lack of closed loop communication (69 (22.84%))
  - Lack of contacting key individuals (43 (14.23%))
  - Inaccurate information (37 (12.25%))



Failure	Type of Error	Number of errors (N=302)
Audience	Non-Key individual (KI) audience resulting in lack of information transfer	5 (1.65%)
Content	**Missing Information**	**94 (31.12%)**
	Inaccurate information	**37 (12.25%)**
	Unclear information (multiple meanings)	6 (1.98%)
Occasion	**Communication occurred** - **Too early to be effective**	4 (1.32%)
	- **Too late to be effective**	10 (3.31%)
Transfer (Originally Purpose)	**KI not contacted**	**43 (14.23%)**
	KI could not be reached	17 (5.62%)
	Misunderstanding	11 (3.64%)
	Lack of understanding	6 (1.98%)
	Lack of closed loop	**69 (22.84%)**

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Results- New Classification Examples

Failure	Type of Error	Examples
Audience	Non-Key individual (KI) audience resulting in lack of information transfer	Ordering inpatient provider (Hospitalist) contacted with CT result done as outpatient, instead of PCP
Content	**Missing Information**	In exam request, adenoma not specified as hepatic, CT incorrectly protocolled as adrenal exam
	Inaccurate information	PET/CT for sarcoma was incorrectly protocolled as to the knees and not to toes.
	Unclear information (multiple meanings)	Ultrasound requested for chest wall lesion, when breast lesion was meant to be evaluated
Occasion	**Communication occurred** - **Too early to be effective**	Order placed as stat for patient not yet admitted to PACU
	- **Too late to be effective**	IR orders not placed in time for post-procedure observation
Transfer (Originally Purpose)	**KI not contacted**	MRI did not call nurse to mention examination was running late, nurse was waiting in the hallway with ICU infant
	KI could not be reached	Resident could not reach provider to inform them of urgent finding after hours. Covering provider not familiar with patient, 2 hour delay caused.
	Misunderstanding	Technologist presumed patient knew to remove cap to insert vaginal gel. Patient inserted vaginal gel but did not realize they needed to remove cap resulting in retained foreign body.
	Lack of understanding	Cardiology team required an urgent bedside ultrasound for pseudoaneurysm, technologist did not understand need for bedside location despite clear message
	Lack of closed loop	Patient supposed to be returned to ED after interventional radiology procedure but there was a lack of hand-off between nursing team and transport staff

Results

WHEN

Most errors occurred (254/302, 84%)

- At the time of performing the examination (195/302)
- In the radiology report (59/302)

Time Point	N(%)
Ordering	21 (7%)
Scheduling	10 (3%)
Performance of examination	**195 (65%)**
Post-procedural care	17 (6%)
Report	**59 (19%)**

WHO

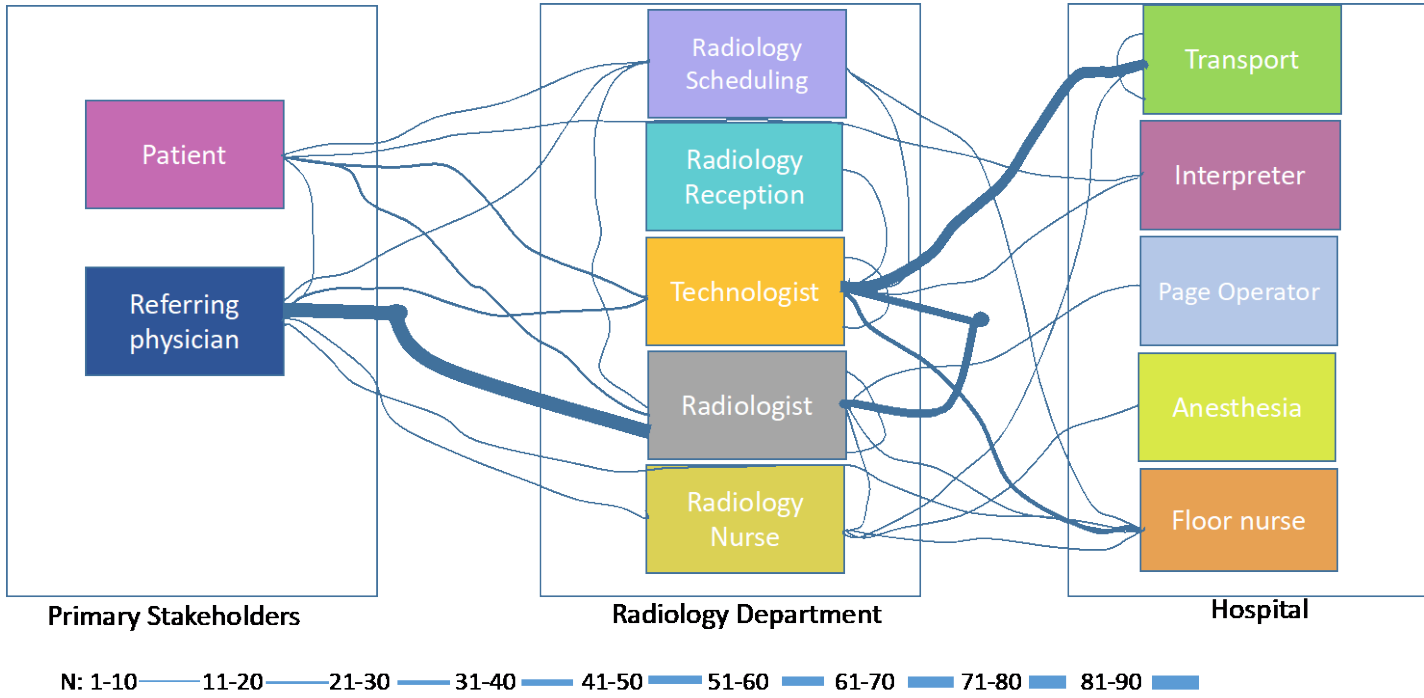
Between radiology staff and staff from other departments (237/302, 78%)

- Radiologist and referring physician (82/237, 35%)
- Technologists and transport staff (63/237, 27%)
- Technologists and floor nursing staff

WHERE

Within the department of radiology 65/302 (22%)

- Radiologist/technologist communication (48/65, 74%).



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Limitations

Incident reports only included from these categories of submission “communication/coordination/hand-off” in the hospital system and “communication issue” .

Our subcategories may be institution specific and different institutions may need different countermeasures

Classification of errors was decided by two individuals with any areas of disagreement dealt with by consensus → No interobserver agreement

Discussion

The Lingard et al. classification does not sufficiently capture the complexity and asynchronous nature of communication in radiology

- Thus a revised classification system was created with multiple **subcategories to facilitate implementation of countermeasures.**

80% of communication errors are due to missing information, lack of closed loop communication, KI not contacted inaccurate information

Countermeasures include

- Pre-procedural checklists, improved visual display of information on EMR (missing information)
- Standardized communication protocols, teams chats (lack of closed loop communication)
- Clear policies and protocols with electronic notification (KI not contacted)
- AI tools may be beneficial to fix errors in radiology reports (inaccurate information)