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## Recommended Citation

Saeed, S. A., Masroor, I., Shafqat, G. (2013). Learning from errors in radiology to improve patient safety. *Journal of the College of Physicians and Surgeons Pakistan*, 23(10), 691-694.

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# Learning from Errors in Radiology to Improve Patient Safety

Shaista Afzal Saeed, Imrana Masroor and Gulnaz Shafqat

## ABSTRACT

**Objective:** To determine the views and practices of trainees and consultant radiologists about error reporting.

**Study Design:** Cross-sectional survey.

**Place and Duration of Study:** Radiology trainees and consultant radiologists in four tertiary care hospitals in Karachi approached in the second quarter of 2011.

**Methodology:** Participants were enquired as to their grade, sub-specialty interest, whether they kept a record/log of their errors (defined as a mistake that has management implications for the patient), number of errors they made in the last 12 months and the predominant type of error. They were also asked about the details of their department error meetings. All duly completed questionnaires were included in the study while the ones with incomplete information were excluded.

**Results:** A total of 100 radiologists participated in the survey. Of them, 34 were consultants and 66 were trainees. They had a wide range of sub-specialty interest like CT, Ultrasound, etc. Out of the 100 responders, 49 kept a personal record/log of their errors. In response to the recall of approximate errors they made in the last 12 months, 73 (73%) of participants recorded a varied response with 1 – 5 errors mentioned by majority i.e. 47 (64.5%). Most of the radiologists (97%) claimed receiving information about their errors through multiple sources like morbidity/mortality meetings, patients' follow-up, through colleagues and consultants. Perceptual error 66 (66%) were the predominant error type reported. Regular occurrence of error meetings and attending three or more error meetings in the last 12 months was reported by 35% participants. Majority among these described the atmosphere of these error meetings as informative and comfortable (n = 22, 62.8%).

**Conclusion:** It is of utmost importance to develop a culture of learning from mistakes by conducting error meetings and improving the process of recording and addressing errors to enhance patient safety.

**Key Words:** Radiological errors. Morbidity and mortality meetings. Perceptual errors.

## INTRODUCTION

Some technologies e.g. nuclear defense system, military aviation operations, medicine etc. are intrinsically dangerous because their intricacy makes accidents inevitable. Recognition of causes of accidents in these complex systems is imperative to enhance and improve safety of the systems and for the development of preventive measures to alleviate the occurrence of similar prospective mishaps.<sup>1</sup>

Errors are an unintentional effect of planned action. Medical errors are unavoidable because of the complexity of the system due to many inter-related actions where the interactions are difficult to predict. In United States of America, medical errors are reported as the eight leading cause of death in patients with medication errors alone accounting for death of 7,000 people.<sup>2</sup> The major concern for most healthcare services is to ensure patient safety and well-being. The foundation of clinical governance is learning from mistakes to prevent future repetitions and to reduce number of claims and litigation cost. The intention is to

improve patient care and enhance confidence in the integrity of medical profession.<sup>3</sup>

The estimated incidence of errors in radiology is in the order of 10 – 20% for X-rays and plain radiographs and for cross-sectional imaging may be even higher.<sup>4</sup> The four main type of radiological errors are: observer error, interpretation errors, failure to suggest next suitable procedure and failure to communicate timely and appropriately.<sup>5</sup> It is a general agreement that reporting of errors enhances patient safety and quality of care.<sup>6</sup> Recording of medical errors and regular attendance of error meetings is also a requirement of the medical councils. There is a need for practice based learning. This is also urged in the publication by Royal College of Radiologist which also requires that radiologist should attend at least three error meetings per year. Formal discussion of errors in medicine traditionally takes place in morbidity and mortality (M/M) conferences and these provide a forum for post-hoc accident analysis. The issue of error analysis is infrequently investigated in radiology. There is a need to identify measures that foster individual and departments to learn from errors without a punitive blame culture.

The present study was undertaken to determine the views and practices of trainees and consultant radiologists from four tertiary care centres in Karachi about reporting and processing of errors in their institutions. No similar work has been reported in Pakistani literature.

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*Received: September 25, 2012; Accepted: May 24, 2013.*

## METHODOLOGY

This cross-sectional KAP survey was completed in the second quarter of 2011. Radiology trainees and consultant radiologists from tertiary care hospitals in Karachi were invited to complete a self-administered paper based survey. The participation was voluntary and the questionnaires were completed in an anonymous manner. All duly completed questionnaires were included in the study while proforma with incomplete information were excluded.

The questionnaire included some basic demographic data including their level of experience and sub-specialty interest. They were asked whether they kept a record/log of their errors (defined as a mistake/ fault that have management implications for the patient), approximate number of errors they made in the last 12 months and the type of error which included perceptual error, communication error and procedural errors. Perceptual error comprised of false negative, false positive and interpretation error. Communication errors included radiological examination done on wrong patient or carrying out wrong radiological examination, delayed reporting and lack of information to the referring physician in cases of unsuspected or life threatening situations. It also included failure to suggest next appropriate investigation. They were inquired about the source through which they received the information about their errors like through morbidity and mortality (M/M) meeting, follow-up of cases, through colleagues and referring physicians or a combination.

They were also asked the number of morbidity/mortality (M/M) meeting they attended last year and atmosphere of their department error meetings with options ranging from un-comfortable and non-informative to comfortable and informative.

The data was entered using Statistical Package for Social Sciences (SPSS) version 19.0 and frequencies were tabulated for each response.

## RESULTS

A total of 100 radiologists completed the survey, out of which 34 were consultants and 66 were residents or fellows. Out of the 100 responders, 49 (49%) kept a record of their errors and among these 22 (45%) were consultants and 27 (55%) were trainees.

In response to recall of approximate errors they made in the last 12 months, 73 (73%) of participants recorded a varied response ranging from 1 – 5 errors by 47 (64.5%), 6 – 10 errors by 14 (19.1%) and more than 10 by 12 (16.4%). The radiologists having no idea or record of the approximate number of errors committed in the preceding year was 27 (27%). Majority of responders i.e. 97 (97%) were informed about their errors through a combination of sources like patient follow-up, through

**Table I:** Participants' characteristics and responses.

Characteristics / responses	n (%)
Grade	
Faculty	34 (34%)
Trainees (residents / fellows)	66 (66%)
Kept a record of errors	
Yes	49 (49%)
Faculty	22 (45%)
Trainees	27 (55%)
No	51 (51%)
Faculty	12 (23.5%)
Trainees	39 (76.5%)
Approximate number of errors last year	
Participants responding	73 (73%)
1 – 5	47 (64.5%)
6 – 10	14 (19%)
More than 10	12 (16.4%)
Do not remember/no response	27 (27%)
Attended 3 or more error meetings	
No	65 (65%)
Yes	35 (35%)
Atmosphere of error meetings	
Uncomfortable and non-informative	3 (8.6 %)
Uncomfortable but informative	8 (22.9%)
Comfortable but non-informative	2 (5.7%)
Comfortable and informative	22 (62.8%)

colleagues, referring physicians and M/M meetings. Error meeting was the only source of information about the mistakes for only 3 (3%) radiologists.

Perceptual error 66% (interpretation errors 34%, false negative 17% and false positive 15%) were the predominant error type followed by errors of communication 25%. Procedural errors comprised a minority of 9%.

In an inquiry about the regular occurrence of error meetings in their radiology department and attending three or more error meetings, 35 (35%) of participants responded positively. The rest of the responders reported lack of error meetings in their departments and not attending any such meeting.

The atmosphere of the department error meetings was described as uncomfortable and non-informative by 3 (8.6%), uncomfortable but informative by 8 (22.9%), comfortable and non-informative by 2 (5.7%) and comfortable and informative by 22 (62.8%).

## DISCUSSION

With the release of the institute of medicine "To error is human" in 1999, occurrence of medical errors gained extensive attention. In radiology, there has been a significant progress in disease diagnosis in addition to minimally invasive therapeutic options, however, error analysis is a subject not frequently explored. Diagnostic errors are comparatively common and as a consequence results in delay in diagnosis, non-commencement of appropriate treatment, non-recognition of a

complication, performance of an inappropriate examination etc.<sup>7</sup> This survey was conducted to document the viewpoint of the radiologists about the perception of radiology errors at both individual and institutional level. Radiology organizations need to become more proficient at learning from experience and errors, since it is from mistakes they learn the most.<sup>8</sup> As quoted by Carl Jung, "knowledge rests not on truth alone, but also on error". Error is an inadvertent outcome of a purposive act and a close connection exist between professionalism and error in a setting of a complex task. One of the defining competencies of professionals in any field is their ability to elude, manage and alleviate errors and their social consequences.<sup>9</sup> For the present survey, error was defined as a mistake that had management implications for the patient.

Keeping a record of personal errors is challenging due to reasons like absence of practice of keeping personal log, undefined and unidentified errors and absence of a quality assurance body. In this study, 49% of radiologists stated to keep a record of their errors, this is higher than reported in a study by Mankad *et al.* when 20% of respondents kept a personal record of their errors.<sup>10</sup> The reason for this might be attributed to the institutions included in the survey i.e. University-affiliated tertiary care hospitals with comprehensive residency programmes where error reporting and processing are considered a teaching / learning strategy. Since a follow-up on reports is a valuable approach for learning, it explains why more trainees -27 (55%) than consultants -22 (45%) kept a personal record of errors.

In response to approximate errors they made in the last 12 months, 73% participants recorded an approximate number with a varied response ranging from 1 – 5 errors by 47%, 6 – 10 errors by 14% and more than 10 by 12%. The last range was selected by trainees only and that reveals the enthusiasm and interest of trainees towards learning, improvement and perfection.

For the survey, the errors were classified as perceptual error comprising of false negative, false positive and interpretation error, communication error and procedural errors. The predominant error type was perceptual and is in line with the study by Renfrew *et al.*<sup>11</sup> Mistakes in interpretation were 34% among the perceptual errors and are in contrast with study by Mankad *et al.* where over call was the commonest error.<sup>10</sup> Perceptual errors are due to failure to detect an abnormality in film reading and are related to multiple psycho-physiological factors like observer alertness and fatigue, distracting and disturbing factors, duration of the observation session and conspicuity of the abnormality etc.<sup>12</sup>

The concept of morbidity and mortality meetings is not new and was initially implemented in the fields of surgery and anaesthesia.<sup>13</sup> This provided a platform to discuss adverse events and reason contributing to their

occurrence, improve upon practices to enhance patient safety and quality improvement, to identify deficiencies in standards of care along with a particular focus on the education and training of residents, fellow and faculty.<sup>14</sup> This forum to discuss errors needs to provide positive criticism, mutually respectful discussions and collegial support for shared professional learning. Such an environment will thus help to alleviate the fear of embarrassment, loss of reputation or discipline.<sup>15</sup>

Regular occurrence of error meetings in the radiology department and attending three or more error meetings was stated by 35% of participants and among them 20% were consultants and 15% were fellows or residents. This clearly shows that a significant number of radiologists did not attend error meetings. The reason why more consultants attended these meetings might be because of their involvement in the presented cases or because of requirement in the yearly appraisal system.

The error meetings can be an excellent learning opportunity if an open environment is provided to individual who committed mistake, to review what they did wrong and suggestions and solutions are given about ways to avoid those in future. Collaborative efforts and discussions will aid in the development of new policies that reduce the chance of an accident happening again.<sup>16</sup> The possibility of candid and encouraging discussions in error meetings are, however, limited by fear about blame, embarrassment, lack of a senior clinician who role model by admitting their own mistakes and inattention to the poignant impact of errors on physician.<sup>17</sup> The ideal forum should encourage shared professional learning and provide emotional support concurrently. In a study by Harbison *et al.* the most often quoted suggestion for improvement for the M/M meetings was to decrease defensiveness and blame. This may provide positive feedback to the faculty and residents, assuring that adverse outcomes are unavoidable but these should be used as sources of learning and improvement.

The non-intimidating, non-judgmental, non-punitive and constructive environment of the M/M meetings is needed to improve the educational programme with broader educational experience for the residents and faculty. As for this educational setting without blame and shame there has been an increased discussion of potential errors i.e. adverse events and near miss.<sup>18</sup> In the present survey, the atmosphere of the departmental error meetings was described as comfortable and informative by 62.8% which is in line with the recommendation in literature and is thus a healthy trend. The proven benefit of M/M meetings is as a forum for deliberation and education.<sup>19</sup> The errors reviewed in these meetings have positive impact on departmental performance with resultant improvement in practice and policies.

Although the survey questioned a large group of radiologist from the tertiary care hospitals, it relied on the recall of the number of errors made in the preceding year and the predominant error type, which may have introduced recall bias. Since the survey included four institutions, duplications of some aspects of the data cannot be excluded. In departments where there was lack of quality control, individuals may not have been aware of their own errors or underestimated their mistakes. Another limitation is the unequal number of residents and faculty who participated in the survey.

### CONCLUSION

“Learning from errors” is unquestionably essential to enhance the performance yet many radiologists and radiology organizations are oblivious to its importance. The data presented from this survey corroborate that many radiologists do not engage in the practice of keeping a record of their errors or organizing and attending error meetings. It is of utmost importance to develop a culture of learning from mistakes by conducting error meetings and improving the process of recording and addressing errors to enhance patient safety.

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