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AN AUDIT OF THE INVESTIGATION REQUEST FORMS SUBMITTED TO CHEMICAL PATHOLOGY LABORATORY IN A TERTIARY CARE HOSPITAL AND ITS IMPACT ON CRITICAL AND ABNORMAL RESULTS COMMUNICATION WITH CLINICIANS

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Abstract:

Background: *In a tertiary care setup, everyone expects better care and management of the patient. This requires a lot of things. One of them is the provision of full data about the patient to the pathologist on an investigation request form so that a proper communication between the clinicians and pathologists can be developed about the critical results of investigations of the patient if there is any. So an audit has been done of the investigation request forms received in chemical pathological laboratory of Pakistan Institute of Medical Sciences (PIMS), Islamabad, during the period of past three months and the impact of incompletely filled request forms has been estimated on the critical and abnormal results communication with the clinicians.*

Methods: *Data of the past three months was collected from the chemical pathological laboratory of PIMS. Complete and incomplete request forms were isolated. Frequency of each missing information on incomplete request forms was evaluated. Evaluated data was entered on Microsoft Excel sheets. Critical and abnormal results were isolated from results of investigations carried out for collected request forms. Impact of missing information, on request forms, on communication of these critical results was calculated and analyzed by the SPSS version 23.*

Results: *During the period of 3 months about 76,260 investigation request forms were submitted at the chemical pathological laboratory of PIMS. Patients' name, age and gender were missing on 73,800 (96.77%), 73860 (96.85%) and 74133 (97.2%) request forms respectively. Date was missing on 10260 (13.45%) request forms, ward number was missing on 74163 (97.25%) request forms, bed number was missing on 75012 (98.36%) request forms, clinicians name was missing on 73860 (96.85%) request forms and brief history of the patient was missing on 74910 (98.28%) request forms. Total 204 (0.268%) results were abnormal or critical out of 76260 results for submitted request forms and only 15 (7.35%) out of 204 were communicated other 189 (92.65%) critical results could not be communicated. Only patient's control number, investigations required and clinician's sign was there on 100% request forms.*

Conclusion: *The audit of 3 months shows that very important information like patient s' name, age and gender, bed number, ward number and clinicians' name was missing in about 96-98%. Date was missing on comparatively less13.45% request forms. Patient's control number, investigations required and clinician's sign were there on 100% request forms. Out of 76260 results for submitted investigation request forms, results of 204 investigations were abnormal or critical and needed to be communicated but only 15 could be communicated and other 92.65% critical values could not be communicated due to the missing information regarding ward number, bed number and clinicians' name on the request forms. These results shows that missing information on investigation request forms have massive impact on the critical or abnormal result communication with the clinicians.*

Key words: *Investigation request forms, Communication, Critical value, Chemical pathological laboratory*

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INTRODUCTION:

In modern era there has been tremendous modification in every field of life. In medicine, approach towards the diagnosis of a disease and management of the patient has also been modified by introduction of different kinds of investigations. Especially for the patients which are under critical care and show sudden changes in their body mechanisms which can be determined by certain investigations. So the chemical pathological laboratories have gained much more importance in modern medical practice, as it is progressively reliant on reliable chemical pathological laboratory services. (1) In order to make laboratories fully reliable all errors related to laboratory practice should be corrected. Laboratories have realized that for making laboratory practice 100% reliable corrections are needed on all three levels of laboratory procedure. These levels are pre-analytical, analytical and post-analytical. In a research it has been found that out of total laboratory errors there are 46% pre-analytical errors, 6% analytical and 47% are post-analytical errors. (2) In another research the percentage of pre-analytical errors is 68.2%. (3) So these researches show that most of the errors occur during the pre-analytical and post-analytical phases. Pre-analytical phase covers the procedures which are mostly performed outside the laboratory, such as phlebotomy, sample handling, specimen identification, transportation to the laboratory and filling of investigation request forms.(4) Here our concern in this audit is on the pre analytical errors which mostly occur due to the incomplete filling of the investigation request forms.

An audit can be defined as a quality perfection process that look for improvement of patient care and outcomes through systematic evaluation of care against defined criteria and the application of change.(5) In a tertiary care hospital investigations are carried out by sending samples along with investigation request forms to the chemical pathological laboratory. Investigation request forms have patients' data like name, patient control number, age, gender, ward number, bed number, brief clinical history, along with date, investigation required and doctor's name and signature. These investigation forms are supposed to be duly filled by the clinicians so that the pathologist can have complete information of the patient. But it is the malpractice by the physicians that the investigation request forms are usually not filled completely. In a research it has been demonstrated that only parameter that was filled on 100% request forms by the physicians was patients' name. All other parameters were incompletely filled in different percentages. (6) Unfortunately in developing countries like Pakistan due to the excessive load of the patients in a tertiary care hospital, this malpractice is much more common. As a result of this, incomplete information about the patient is conveyed to the pathologists. These request forms are the only mean of communication between the clinician and pathologist. This incomplete information can lead to wrong diagnosis, poor management and can compromise patients' care, as laboratory data is necessary for diagnosis, follow up, treatment, screening, quality control and as a marker for treatment effectiveness. (7) But here our concern is with the patients which need prompt interventions and emergency treatment after critical or abnormal results of their investigations. So it is important that abnormal and critical results are communicated with the respective clinician without delay. (8) But unfortunately due to the lack of information on request forms, these critical results cannot be communicated with the clinicians. This lack of communication can prove fatal for the critical patients, which need prompt medical intervention.

The aim of the study is to estimate the level of completion of the request forms by the clinicians, identify the missing percentages for each parameter on the request forms and approximate the impact of incomplete information on the communication of critical and abnormal results with the clinicians. For this purpose an audit of the incomplete investigation forms is done, which includes calculation of number of incomplete investigation forms out of total request forms submitted in chemical pathological laboratory during the period of three months and to determine the frequency of each missing information on incomplete request forms. Critical and abnormal results were isolated from the results of the submitted request forms, which needed to be communicated with their respective clinicians for early management but cannot be communicated due to the incomplete information on the respective request forms.

MATERIALS AND METHODS:

Investigation request forms were collected from the chemical pathological laboratory of PIMS, Islamabad, during the period of 3 months from 1st January to 31st March 2018. PIMS is the largest public sector hospital in the capital territory of Islamabad and it also covers various surrounding rural and northern areas of Pakistan. In this cross sectional study request forms were received at the laboratory filled by clinicians practicing in different departments of the hospital. Request forms for all the modalities available in the laboratory are included in the study. Evaluation was done for the given information regarding each parameter on each request form. These parameters are patient control

number, patients' name, age, gender, date, ward number, bed number, brief history about the disease, investigation required, sign and name of the clinician. After evaluation information was entered on the Microsoft excel sheets and then analyzed by the SPSS version 23. Critical and abnormal results were isolated from all the results of investigations carried out for the submitted request forms during the period of 3 months. Then it was assessed that whether these critical results were communicated with the clinicians or not. If communication was not carried out then it is determined that whether this miscommunication was due to missing information on the request forms or due to any other cause. The data is then entered and analyzed by the SPSS version 23.

RESULTS:

During the period of three months 76260 investigation request forms were submitted at chemical pathological laboratory of PIMS. Only 1248 (1.64%) request forms were completely filled and there were 75,012 (98.36%) request forms, which had at least one or more parameter missing (Fig-1). Only three parameters, patient's control number, investigation required and clinician's sign were written on all the submitted request forms. Detail of the number of request forms with missing information for each parameter and missing frequency for each parameter has been given in table-1 and demonstrated in figure-2.

Figure-1. Evaluation of complete and incomplete request form

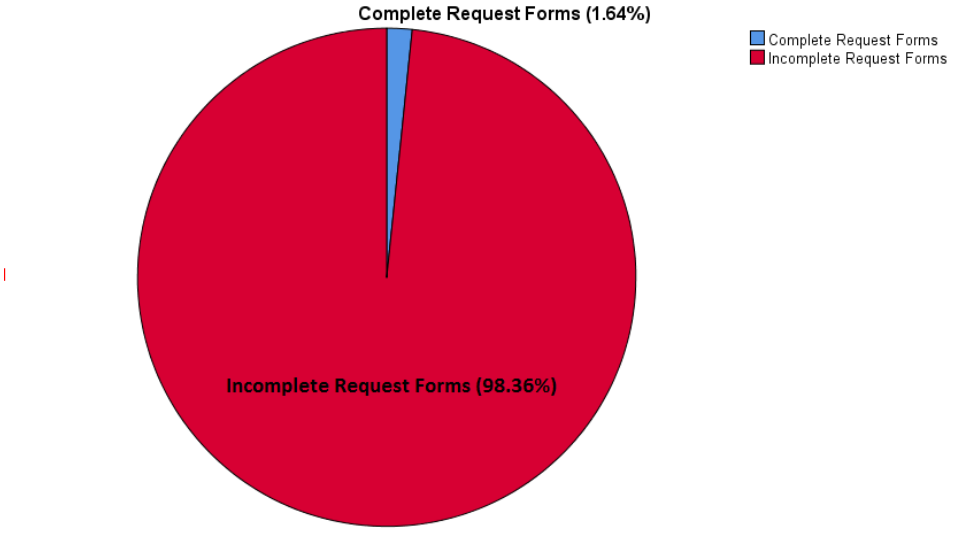

Figure-2 Graphical presentation of missing frequencies of different parameters on investigation request forms

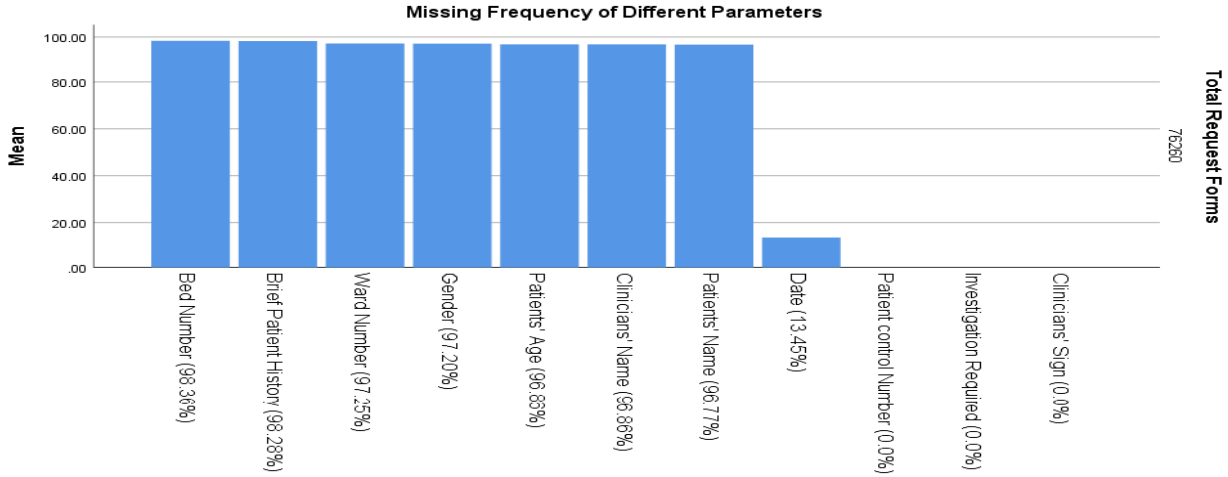

Table-1 Evaluation of different parameters on investigation request forms

Parameter	**Missing on request forms (Total request forms= 76260)**	**Missing Frequency**
Patients' name	73,800	96.77%
Patients' age	73,860	96.86%
Gender	74,133	97.2%
Patient control number	0	0
Date	10,260	13.45%
Brief patient history	74,910	98.28%
Ward number	74,163	97.25%
Bed number	75,012	98.36%
Clinicians' name	73,860	96.86%
Clinicians' sign	0	0
Investigation required	0	0

Table-2 Number of critical results above and below the critical range for different parameters.

Parameter	Critical range (9)	Number of Critical Cases Observed (Total=204)
Bicarbonate	<10 mEq/L	5
	>40 mEq/L	2
Calcium	<6.5mg/dL	5
	>14mg/dL	3
Chloride	<80 mmol/L	4
	>120 mmol/L	
CO_2	<10 mmol/L	8
	>40 mmol/L	11
Glucose (depends upon age)	<40-55 mg/dL	5
	>300-450 mg/dL	35+7*
GDM	<50mg/dL	
	>300mg/dL	4
pCO_2	>75 mmhg	14
pH	<7.20	10
	>7.60	2
pO_2 (arterial)	< 40 mg/dl	8
Potassium	<2.8 mmol/L	29
	>6.0 mmol/L	18+8*
Sodium	<120 mmol/L	12
	>160 mmol/L	5
Total Bilirubin	>7-15 mg/dL (depends upon age)	9

*Number of cases communicated with the clinicians (7 cases of hyperglycemia and 8 cases of hyperkalemia). Rest of the critical results could not be communicated due to the lack of information

There were 204 (0.268%) critical or abnormal results, out of 76,260 results for submitted request forms, which needed to be communicated with the clinicians. Only 15 (0.019%) critical results could be communicated with the clinicians and 189 (0.248%) critical results could not be communicated. Detail of number of critical values above and below the critical range for different parameters, which has been observed in this study has been shown in the table-2. So only 7.35% critical results were communicated out of total 204 critical and abnormal results, and 92.65% critical results could not be communicated. Cause of non-communication of each critical result was determined and it came out that reason for all these cases was missing information on the request forms regarding patients' name, ward number, bed number or clinicians' name through which critical or abnormal results could be communicated. This is a significant number and can impact greatly on patients' condition, survival and care. Apparently 189 out of 76,260 is a small number but when it comes to the life of a patient, which depends upon the timely communication of a critical or abnormal result with the clinician then only a single figure can matter the most.

DISCUSSION:

This study shows that only 1.64% request forms were completely filled and rest of the request forms had at least one parameter missing. Almost similar result has been demonstrated in a study in which 1.3% request forms were completely filled. (10) Three parameters were filled on 100% request forms which, were patient control number, investigation required and clinicians' sign. In a study by Olayemi and Asimah-Broni completion rate is also 100% for parameter of laboratory request. (11) In another study hospital identification number was missing only on 7(0.3%) out of 2550 request forms. (12) Patient name was missing on 96.77% request forms but patient name completion rate is 100% in two different studies (6, 11) This huge difference in results for patients' name may be due to the different parameters of identification for the patients at two different places, which in PIMS is patient control number. Date was missing on 13.45% request forms in this study and was missing on 11.8% request forms in audit done previously in Lagos. (10) Age and gender was missing on 96.86% and 97.2% request forms respectively, but this missing rate is very low 25.6%, 8%, 0.49%, for age and 32.7%, 9.7%, 1.03% for gender in studies by Edeghonghon Olayemi, Abiola Oyedeji and Shruti Singh respectively. (11, 10, 6). Brief clinical history or diagnosis completion rate is only 1.72% while it is 28.4%, 65.9%, 77.3%, and 80.9% in some above mentioned studies. (6, 10, 11, 12) Ward number and bed number was missing on 97.25% and 98.36% request forms respectively and the closest figure to this result is missing rate of 84.89% for ward number, which is demonstrated in a research done in India. (6) But missing rate for this parameter of ward number is very low that is 4.9% in a study done in South Africa. (12) Missing rate for clinicians' name is 96.86% for this study which is exactly opposite to a result concluded in a study done in Lagos that is only 1%. (10) These huge differences are due to malpractice of the clinicians and burden of a huge population on PIMS. There were 204 critical or abnormal results which needed to be communicated as soon as possible with the clinicians so that prompt measurements could be taken by the clinicians to save lives of the patients. But unfortunately only 15 such critical results were communicated with the doctors, which too were possible to communicate because ICU was mentioned on respective investigation request forms. Other 189 critical results could not be communicated due to the missing information on respective request forms like bed number, ward number and clinicians' name which are important parameters for communication with the clinicians. In another research done in a tertiary care hospital of South Africa there were 151 critical results but in contrast to chemical pathological laboratory of PIMS they were able to communicate 121 such results. But they could not communicate 30 critical results as ward number and clinicians' name was not mentioned on these request forms. (12)

CONCLUSION

This study shows the importance of information given on investigation request forms and its impact on critical result communication. A single information given on the request form can save the life of a patient if the critical result is communicated timely with clinician. That information can be ward number, bed number or clinicians' name. Brief history or diagnosis, date and age are also important for estimation of a critical value. Completion rate for almost all parameters on investigation request forms is very poor in PIMS as proved by this study. Only three parameters patient control number, investigation required and clinicians' sign were there on 100% request forms. This 100% completion rate is due to the fact that without this information no investigation is carried out by the laboratory that is why clinicians tend to fill these three parameters and left other parameters unfilled. 189 critical values were not communicated out of total 76260 request forms during the period of 3 months, which is a

significant number when it comes to the life of a patients. Prompt, lifesaving and better decisions can be taken for the critical patients only if complete information is provided on request forms and communication of critical and abnormal results with clinicians is made. There are some recommendations for communication of critical and abnormal results with the clinicians that has been explained below. But these recommendations can only be followed if complete information is provided to the pathologists through request forms.

Recommendations

1. First of all investigation request forms should be completely filled, especially date, ward number, bed number and clinicians' name for proper communication of critical results.
2. If these informations are available then for patient safety critical results can be communicated through reliable ways of communication which can be verbal or non-verbal. (13)
3. In person verbal communication (face to face interaction) can be done by the individuals, who are trained for this purpose, in small hospital setups or where there are no resources for automated or call center based communication. (14)
4. Standard way of communication being used in most of the healthcare units include contacting with clinician or respective ward by the working pathologists about the critical value.
5. Verbal communication can be done through call based communication system. A special call center can be developed with a centralized unit receiving all critical values by the qualified individuals for effective communication of these critical values with the respective clinicians or respective ward through phone calls.
6. Non-verbal ways of communication include automated notification systems, which are automated notifying systems or computerized notices using mobile phones, email, pagers or other individual electronic devices. (15)

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