Errors in Laboratory Requests in Chulalongkorn Hospital

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Abstract:

Objective. To study the errors in laboratory requests in the In-Patient Department of Chulalongkorn Hospital.

Design. Serial cross sectional descriptive study

Materials and methods. Laboratory requests from the In-Patient Department sent to the Clinical Chemistry Unit, Division of Laboratory Medicine, Chulalongkorn Hospital were considered using criteria based on textbooks of laboratory medicine. Obtained data were analyzed and interpreted.

Results. The major errors in request forms were incomplete due to omissions, mistakes and use of non-standard abbreviations. Many errors were observed in aspects of the time that specimens were collected, diagnosis and patient identification. But less than 1% of the specimens were considered inappropriate. It revealed that the errors of the laboratory requests decreased after the promotion of rational and correct laboratory request.

Conclusions. Incomplete laboratory request form writing was the major error found in laboratory requests. Medical personnel should be more careful in writing request forms and in specimen collection.

Key words: error, laboratory request, request form, specimen

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บทคัดย่อ: **ความบกพร่องในการส่งตรวจทางห้องปฏิบัติการทางการแพทย์ในโรงพยาบาลจุฬาลงกรณ์**

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วัตถุประสงค์ เพื่อศึกษาความบกพร่องในการส่งตรวจทางห้องปฏิบัติการทางการแพทย์ แผนกผู้ป่วยใน โรงพยาบาลจุฬาลงกรณ์

รูปแบบการศึกษา การศึกษาเชิงพรรณนาแบบตัดขวางเชิงอนุกรม

วัสดุและวิธีการ การส่งตรวจทางห้องปฏิบัติการทางการแพทย์ หน่วยเคมีคลินิก ฝ่ายเวชศาสตร์ชันสูตร โรงพยาบาลจุฬาลงกรณ์ ใช้หลักการจากตำราเวชศาสตร์ชันสูตรในการพิจารณาการส่งตรวจทางห้องปฏิบัติการทั้งหมด ข้อมูลที่ได้ถูกนำมาวิเคราะห์และแปลผล

ผลการศึกษา พบใบส่งตรวจทางห้องปฏิบัติการไม่สมบูรณ์จากความไม่ครบถ้วนของการเขียน ความผิดพลาดของการเขียน การใช้อักษรย่อที่ไม่เป็นสากล พบความบกพร่องเป็นจำนวนมากเกี่ยวกับข้อมูลเรื่องเวลาในการเก็บสิ่งส่งตรวจ การวินิจฉัยโรค และการพิสูจน์บุคคล แต่พบว่ามีสิ่งส่งตรวจที่ไม่เหมาะสมน้อยกว่าร้อยละ 1 และพบว่าภายหลังจากการจัดโครงการส่งเสริมการส่งตรวจอย่างถูกต้องทำให้อัตราความบกพร่องต่าง ๆ ลดลง

สรุป ความไม่สมบูรณ์ในการเขียนใบส่งตรวจทางห้องปฏิบัติการเป็นความบกพร่องที่พบมากในการส่งตรวจทางห้องปฏิบัติการทางการแพทย์ดังนั้นจึงควรเน้นย้ำให้บุคลากรทางการแพทย์ตะหนักถึงความสำคัญในการเขียนใบส่งตรวจทางห้องปฏิบัติการและการนำส่งสิ่งส่งตรวจ

คำสำคัญ: ความบกพร่อง การส่งตรวจทางห้องปฏิบัติการทางการแพทย์ ใบส่งตรวจทางห้องปฏิบัติการ สิ่งส่งตรวจ

Laboratory work plays an important role in medicine. Many laboratory procedures are required for diagnosis and follow-up of diseases.[1] In order to get good laboratory results not only good laboratory techniques but also proper specimen collection is required. The first step of any laboratory procedure is specimen collection so all medical personnel should know correct methods to collect medical specimens. After the specimen collection, the next step is the request. Request forms should be completely and correctly filled out in order that the medical technologist can provide the correct laboratory procedure. The laboratory should use the criteria of the International Quality System. And when any laboratory procedure is completed, follow-up laboratory results are important. The last step is the interpretation of the laboratory results by the physicians in charge. Considering these chronological steps, there are two main groups of medical personnel who play important roles in the laboratory process the medical personnel in the wards and the laboratory workers.

In order to obtain the best laboratory practice, all of the medical personnel should share in the process. Medical personnel in wards should have a proper system for collection of medical specimens, issuing requests and following the laboratory results. Laboratory workers should practice every procedure in accordance with the quality system.

This process is very important. If there are mistakes in any step, the laboratory results will not be accurate. Presently, of Chulalongkorn Hospital the concept of a quality system[2] in laboratory work is widely discussed but the errors in laboratory requests can still be detected. If the detail about errors in laboratory requested in the hospital is identified, proper method to solve the problems can be provided. Therefore, this study was designed to assess the errors in general practice laboratory requests of Chulalongkorn Hospital during the promotion of rational and correct laboratory requests.

Materials and Methods

This was designed as a serial cross sectional descriptive study. The study documents were all of the laboratory requests sent to the Division of Laboratory Medicine, Chulalongkorn Hospital. After the pilot study[3] (at 0-month period) about errors in laboratory requests was performed in September 1998, the promotion of rational and correct laboratory requests were set by distribution of the general principle in laboratory requests and error report notification to the medical wards. This study included laboratory requests within one-month period and six-month period after

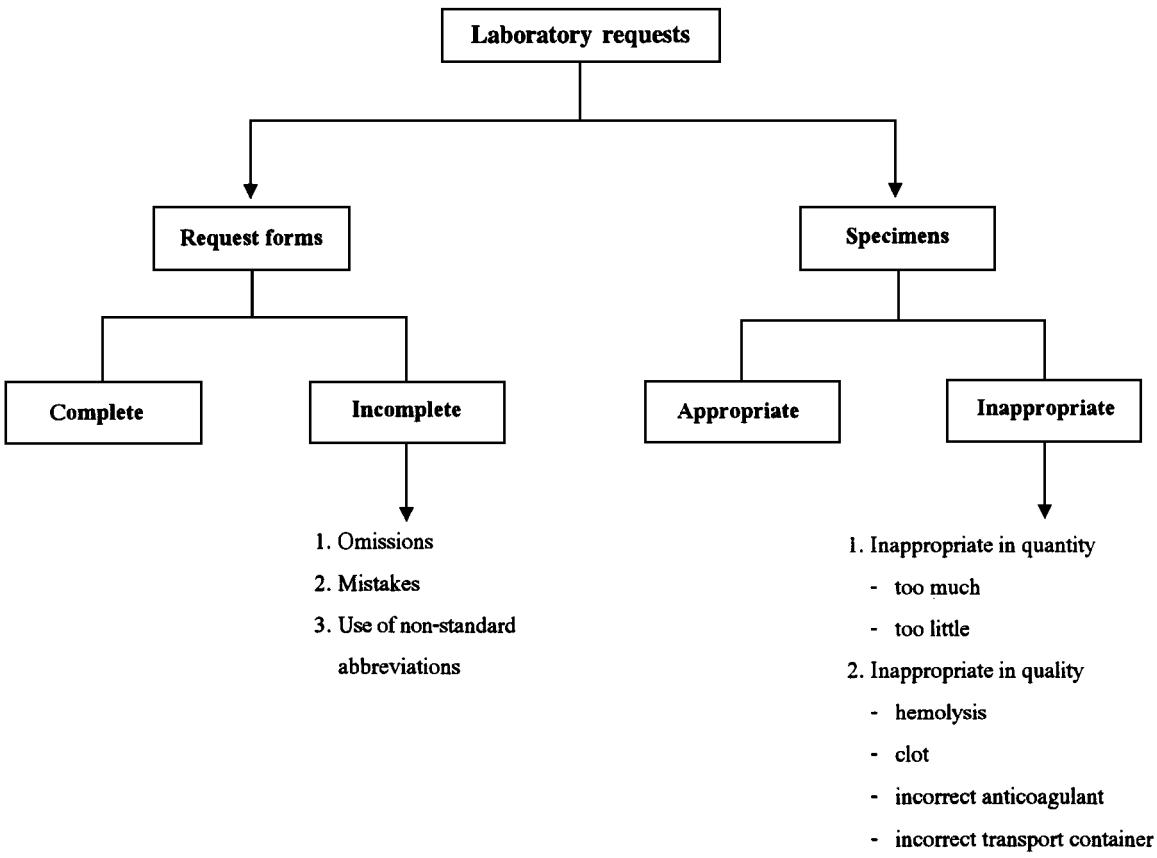

Diagram 1. Criteria used in this study

promotion program. Laboratory requests from emergency room and some units (HIV seropositive units, study units, research units) were excluded due to the fact that most of requests from those units use codes as identification so we cannot consider them in details. All laboratory requests were considered in two main issues; how complete the request forms were and how appropriate the specimens by the investigator was. Obtained data were transformed into tabular form with codes and consideration given based on criteria from textbooks of laboratory medicine.[4-9] Interpretation of the analyzed data was carried out. Descriptive statistical analysis was carried out when appropriate.

Results

Complete data on all laboratory requests were collected during the 0-month, 1-month and 6-month period, respectively. In considering the laboratory request forms, the information in terms of completeness and correctness in each period were presented (Table 1). Major errors of the incomplete forms for each period were omissions, mistakes and use of non-standard abbreviations. Omissions included failure to specify the specimen collection time, diagnosis and patient identification. Mistakes were caused by incorrect spelling and poor handwriting.

In considering specimen, the information about appropriateness in the quality or quantity in each period were focused. Too much or little quantity of specimens that laboratory could not be analyzed were considered inappropriate in quantity. Examples of inappropriate specimens in quality were hemolysis, clot and incorrect anticoagulant. Various inappropriate aspects of specimen were detected (Table 2).

Comparing the information about completeness and correctness of the request forms and appropriateness of the collected specimen in each period, it revealed that the valid percentage of incompleteness, incorrectness and inappropriateness decreased in orderly.

Table 1. Number and percentage of completeness and incompleteness in writing laboratory request forms

Laboratory requests	Valid percentage		
	0-month (n = 3,043)	1-month (n = 3,156)	6-month (n = 2,987)
Complete	37.0	41.0	52.0
Incomplete in			
- specimen collection	27.84	25.74	23.22
- diagnosis	20.54	19.14	16.06
- patient identification	0	0	0
- specimen collection and diagnosis	14.46	13.99	8.62
- specimen collection, diagnosis and patient identification	0.16	0.13	0.10

Discussion

From this study, a high incidence of errors in laboratory requests at the starting period, especially laboratory request form writing, was found. Many request forms had more than one incomplete aspect. Omissions, mistakes and use of non-standard abbreviations were important reasons for the incompleteness of the laboratory forms. But after promotion program, the incidence of errors decreased and the major problem was still the same aspects.

Though the importance of laboratory request writing[10] is frequently taught in medical education, many errors have been found in actual medical practice. Violation of the basic principles is commonly found in any practice due to neglect after becoming experienced. The ignorance and carelessness of some practitioners are commonly reflected in the laboratory requests that they wrote. Incomplete laboratory request forms can be hazardous to the patients and result in wasted time and money in consulting doctors to recheck their requests. Delayed and false laboratory results are important topics, especially in emergency unit. Therefore, medical personnel should pay attention to the writing of laboratory requests.

Incomplete data about the time that specimen was collected can result in misinterpretation of laboratory results.[4-9] Some biochemical substances are fragile that the level of them will vary with time. Some biochemical substances are useful in decisions of treatment in one period but not useful in other periods. If the time that the specimen was collected is known, delayed specimen processing can be adjusted for. It is waste of time to

Table 2. Number and percentage of completeness and incompleteness regarding specimen collection

Specimen collection	Valid percentage		
	0-month (n = 3,043)	1-month (n = 3,156)	6-month (n = 2,987)
Appropriate	99.28	99.60	99.65
Inappropriate			
In quantity			
- too much	0.03	0.02	0.02
- too little	0.27	0.13	0.11
In quality			
- hemolysis	0.27	0.20	0.18
- clot	0.06	0.04	0.03
- incorrect anticoagulant	0.09	0.01	0.01

investigate expired specimen. Furthermore, when the laboratory results are reported, the medical personnel should not delay treatment.[11]

Incomplete data about diagnosis[4-9,12-13] is another error that should be avoided. The diagnosis of the patient should be included in the request form because it can be a clue for the laboratory investigation. In cases where laboratory results are unusual, a recheck investigation is required. Writing the diagnosis in the laboratory request can save time in consulting doctors to recheck. It is considerable helpful if data about the underlying method used for the specimen collection and substances that patient received while the specimen was collected are included because these factors cause variations in many laboratory results[14]

Error in patient identification[4-9,12-13] is a topic that should be of significant concern. It can be the most hazardous error because incorrect patient identification invariably means incorrect laboratory results. Incorrect laboratory results can lead to patient's death in the worst case.[15] This study could not observe each specimen collection process but it did check the identifications in the request forms. This study considered the main identifications; patient's name, sex, hospital number and ward which should not be omitted. Some request forms were found lack of these three important identifications. If the study considered all other identifications, much more errors would have been found.

In this study most of the complete data on the form were about these three topics, and this implied that many medical personnel neglect or overlook the importance of laboratory request writing. Perhaps the present laboratory request forms are too complicated and cannot be easily understood. Or perhaps, many medical personnel consider that writing laboratory requests uses too much time, so improving this is very important.

In considering specimen quality and quantity, less than one percent displayed errors. Perhaps this is because there are sufficient guidelines for specimen collection for medical personnel in the wards. Or it can imply that when medical personnel in the wards had questions about the requested specimen collection, they chose to find proper method instead of possibly making mistakes.

According to the data accumulated and the problem from the studied document's perspective, the strategies to reduce errors in laboratory requests as the promotion program like in this serial cross sectional study should include the following:

1. It is essential that all of the medical personnel realize the importance of correct and complete laboratory requests. Standard guidelines[4-9] according to specimen processing should be established specifically for different health care practices and should be uncomplicated as possible (Table 3).

2. A proper system for collection and issuing requests should be continuously emphasized, supervised, monitored and properly adjusted when necessary.

3. Medical technologists should check all laboratory requests sent to the laboratory. Incomplete request forms or inappropriate specimens should be rejected.

4. The ignorance and carelessness of some practitioners are commonly reflected in the request forms they write. Errors in laboratory requests may be

hazardous to the patients and result in a waste time and money in consulting the doctor in-charge to have the request forms corrected or the new specimen collected. Do not neglect or overlook the importance of laboratory requests. It is not useful for the medical technologists if the specimen processing is not correct.

5. Laboratory requests via the computer network can reduce the errors in issuing the request forms. There should be a good laboratory information system in the hospital.

Conclusions

Laboratory procedures will be successful if there is an effective system. To get the best quality laboratory procedure results, both medical personnel in the wards and laboratory staff must cooperate well with each other. And a high quality system in the laboratory is as important as proper specimen processing in the wards. In order to obtain the ideal laboratory processing, all medical personnel should fulfil their responsibilities as best. The best results mean not only success in the laboratory process but also success in the treatment of the patient.

Table 3. Specimen processing guidelines[3-8]

Steps	Keys
1. Decision making	- with indication - without contraindication
2. Specimen collection	- correct collection procedures - without contamination - control variation - universal precaution
3. Issuing request form	- complete issuing (no omissions, mistakes and use of non-standard abbreviations) - universal precaution
4. Specimen transportation	- effective transportation
5. Specimen presentation	- rejection criteria (hemolysis, clot, incorrect anticoagulant, incorrect transport container) - universal precaution
6. Laboratory analysis	- quality control, quality assurance, quality management - ISO
7. Reporting system	- information management system - follow-up result

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