Time Intervals Between Ordering and Obtaining Laboratory Test Results

by Roy N. Barnett, M.D., Marlene Bimmel, Maryellen Peracca, M.D., and Kenneth Roseman

Doctors are hampered in their decision making relating to patient care because of delays in the flow of information, i.e., orders and results to and from the laboratory. Delays in reporting results may cause unnecessary ordering of Stat tests or reordering of the same test or have more serious effects on patient care.

This pilot study is designed to define the length of time elapsed from the initiation of a laboratory order until the doctor is informed of the test result. The purposes are: (1) to identify the degree and nature of delays in the whole process through objective and subjective observations, (2) to discover how individual nursing stations have learned to minimize these delays, and (3) to suggest methods for minimizing these delays which are found to be significant.

Methods and Materials

A study coordinator designated by the director of the Department of Pathology was responsible for the instruction of personnel and collection and analysis of data. An individual familiar with the hospital setting was hired as an observer to work on designated nursing units while the laboratory receptionists acted as observers within the laboratory.

The time requests arrived at the various steps in which the flow of a requisition was reached by the floor observer and the laboratory observers.

The dates of the personal observations were from March 4 to April 26, 1974, a total observation time of eight weeks. The observer on the floor started on a rotating day shift schedule of alternating 7 a.m. to 3 p.m., 8 a.m. to 4 p.m., 9 a.m. to 5 p.m., and 10 a.m. to 6 p.m. shifts. The observer remained on five different floors for eight days at a time. Two medical floors, one surgical floor, the Intensive Care Unit and the Emergency Room were chosen for the study.

Data were collected on study tables which were grouped according to whether the order was Stat (immediate priority), Today (within a 12 hour period) and Routine (regular course of procedure) and according to section of the laboratory involved, e.g., Hematology and Bacteriology. The five following forms were used:

1. Form for Routine and Stat tests in which specimen is not collected by laboratory personnel.
2. Form for Routine tests in which the specimen is collected by laboratory personnel.
3. Form for Stat and Today tests done on specimens collected by laboratory personnel.
4. Form for use of observer in the laboratory.
5. Comment Sheet.

Observations were made at 12 intervals in the flow of the requisition; observations on points 3–9 were made in the laboratory itself. The Comment
Sheet was used in order to evaluate the doctors' disposition regarding the laboratory tests requested: when he expected the results back, why he wanted the test ordered and how the results had helped him in treating the patient.

The 12 time intervals are described as follows:

1. **The time when the physician writes the order.** In most cases this meant writing the laboratory request in an order book. At this point the observer recorded the time and proceeded to question the physician according to questions 1–3 on the Comment Sheet.

2. **The time when the requisition slip is filled out.** The unit clerk or nurse took the request from the order book and commenced to fill out the appropriate requisition slip. The observer recorded the time when the slip was completed and marked it with a small asterisk which identified it to the laboratory observer as a test sample to be followed.

3. **For specimens collected by laboratory personnel, the time when the phlebotomist picks up the requisition slip.** If a Routine test was ordered, the observer recorded the time in which the phlebotomist picked up the requisition slip, which was usually between 7–8:00 a.m. of the following day. If the test ordered was Today or Stat, he recorded the time when the request was phoned to the laboratory.

For specimens not collected by laboratory personnel, **the time when the specimen is obtained.** This was for Routine and Stat tests.

4. **The time when the verbal request reaches the phlebotomist.** The laboratory observer recorded the time she received the phone request.

5. **For specimens collected by laboratory personnel, the time when the blood sample is obtained.** This was for Routine, Stat and Today tests.

For specimens not collected by laboratory personnel **the time when the specimen is obtained.** The observer referred back to the Comment Sheet as to the consequences of knowing the test results.

6. **The time when the requisition and sample arrive in the laboratory.** Messenger Service specimens were checked for asterisked requisitions.

7. **The time when the report is put in the messenger box or telephoned to the floor.** Most Routine and Today tests were placed in the laboratory messenger box while Stat results were called to the floors immediately.

8. **The time when the report leaves messenger box.** Time reports were picked up and delivered from the laboratory to the floors.

9. **The time when the report arrives on the floor.**

10. **The time when the report is posted on the charts.**

11. **The time when the doctor or person making judgment about patient's care is aware of the results.** The floor observer referred back to the Comment Sheet questioning the physician as to the consequences of knowing the test results.

From the study tables, 135 valid samples were obtained and charted on bar graphs which were recorded according to Stat, Today and Routine work, Hematology and Chemistry work, by floors and by the 12 time intervals.

The data were computed to establish an average time (total hours and minutes divided by the number of samples), $P_{50}$ (the point at which half of the samples in the group would have been processed) and the range (from the shortest time interval to the longest time interval). All data reported in this study were according to the $P_{50}$ which was considered the most reliable because it is least affected by single unusual events. The data were then divided into groups according to the 12 time intervals.

**Significant Findings**

Here are some of the most significant findings:

- **Time physician writes order to the time the requisition slip is filled out (steps 1–2):** The Intensive Care Unit showed a $P_{50}$ elapsed time of 72 minutes while all other floors showed a $P_{50}$ elapsed time of 35 minutes.

- **Time requisition and sample arrive in the laboratory to the time the test result arrives at the laboratory desk (steps 5–7):** For Routine work this proved to be the longest elapsed time interval. All Routine tests took a $P_{50}$ of 240 minutes. All Routine Chemistry tests took a $P_{50}$ of 412 minutes while all Routine Hematology tests took a $P_{50}$ of 145 minutes. For Today work, the time lapsed ranged from 45 minutes to 195 minutes with a $P_{50}$ of 76 minutes. All Stat Chemistry tests took a $P_{50}$ of 78 minutes while all Stat Hematology work took a $P_{50}$ of 28 minutes.
• Time physician writes order to the time when the report arrives on the floor (steps 1–10): All Routine test results arrived on the floors in a P50 of 27 hours. All Today Chemistry results arrived on the floors in a P50 of 7 hours, while all Today Hematology results arrived on the floors in a P50 of 4 hours. All Stat Hematology results arrived on the floors in a P50 of 50 minutes. All Stat Chemistry results arrived on the floors in a P50 of 150 minutes, while the Stat results over-all arrived on the floors in a P50 of 55 minutes.

• Time physician writes order to the time when doctor or person making judgment about patient's care is aware of the result (steps 1–12): Physicians were aware of all Routine Hematology results in a P50 of 27 hours while they were aware of all Routine Chemistry and Routine results over-all in a P50 of 44 hours. Physicians were aware of all Today results, all Today Chemistry and all Today Hematology results in a P50 of 24 hours. Physicians were aware of Stat results approximately the same time as the results were reported to the floors.

Over-all, the most laboratory work requested was for Routine testing. Stat work was ordered second to Routine work and Today work was ordered the least often. Stat work was handled the fastest at 55 minutes and seen by the physician in 60 minutes. Today results arrived in 300 minutes and were seen in approximately 24 hours from the time of the initial request. Routine results arrived in 26 hours and were seen by the physician in 44 hours.

Discussion of Results

The elapsed times between intervals varied according to the type of test ordered (Hematology or Chemistry), and the manner in which it was ordered (Routine or Stat or Today). The longest elapsed time was generally between steps 5–7 at which point the sample and requisition were in the laboratory being analyzed. The amount of time for steps 5–7 depended on the test requested (e.g., CBC or Medical Screen), the department workload for the day, the personnel available and the time the order was requested. Routine Chemistry work requested after 4:00 p.m. is either delayed or done the next morning (Medical Screens, for example). Stat Hematology work requested in the early morning is impeded by the daily routine workload.

Generally, steps 1–2 did not show any great time lapse except for the Intensive Care Unit where physician orders are written on patient charts in contrast to all other units where order books are utilized. Although the Intensive Care Unit system seemed to be preferred by many of the staff physicians and nurses, the time elapsed for picking up patient orders on this unit on a P50 was 72 minutes. This may be caused by the difficulty in finding individual patient charts, that is to say, many times patients are sent to various departments for therapeutic purposes and their charts go with them. This problem was also evident on B 5, a team care floor, where the interns and residents took the order books with them while on their morning rounds and did not return them until they had seen every patient on the floor. This caused delays in picking up the orders, especially in the case of Today requests.

Observations of Nurses and Physicians

The absence of a unit clerk caused delays in the speed in which laboratory results were posted on the charts. When unit clerks were present, posting was prompt and efficient.

There is a communications gap between nurses and unit clerks on many units where both nurse and unit clerk may fill out a requisition for the same laboratory request.

Errors made included: overlooking doctor's orders; not properly filling out laboratory requisitions; not recording the time when Stat results were received on the floors; and obtaining samples from wrong patient because the laboratory requisition was stamped with the wrong name plate.

Specimen pick-up areas on floors are often cluttered to the point where Messenger Service cannot see the specimen.

Observation of physicians shows that lack of a mandatory discharge and admission time delays the swiftness with which laboratory results can be returned to the floors. Delayed admissions, often the direct result of delayed discharges, lead to long delays in securing tests. For example, medical screens cannot be started later than 3:00 p.m. if tests are to be completed that day for report to the chart by the next morning.

Also several physicians call for the same report after it has been telephoned to the floor. Another observation is that many hand written laboratory slips do not include a physician's name.

Observations of Laboratory and Messenger Service

Some laboratory receptionists do not verbalize test results effectively and efficiently. Also there is much transferring of telephone calls from the reception desk to the various laboratory departments when looking for a test result. There is a communica-
tions gap between the laboratory receptionists and the medical technicians, such as, who, if anyone, called the Stat report to the floor or physician? Alarm Values must be called to the physician. Is this the medical technologist’s responsibility or the nursing staff’s responsibility?

Regarding Messenger Service, the majority of laboratory results seem to be delivered around 4:00 p.m. each day even though there are scheduled hourly Messenger Service rounds throughout the day. Unit clerks are responsible for posting these results on the patients’ charts. By receiving laboratory results at this hour, they frequently do not have enough time to post them since their shift ends at 4:30 p.m. Although Messenger Service is scheduled to make hourly rounds throughout the hospital, this does not seem to be carried out.

Messengers frequently place Stat urines in the laboratory refrigerators where they remain unnoticed for an indeterminant amount of time.

Also observed is that much transferring of patients hinders the prompt delivery of laboratory results to their proper destinations. Also frequently the laboratory does not know where to send the test results for patients having been admitted through the Emergency Room.

Some Suggestions

To minimize certain delays among the nursing department, a floating unit clerk should be available to cover those days when the regular unit clerk is not scheduled. To avoid duplication of orders when both the unit clerk and nurse transcribe them, there should be a clear decision as to who is responsible. Also, one specific area should be designated on each floor for specimen pick up and nothing else should be placed there.

If necessary, blood specimens for admission can be drawn by 3:00 p.m.; this will prevent a major delay which can be effected by earlier admission or by drawing blood in the out-patient laboratory even before completion of the admission process. Since most blood tests do not require fasting, sampling need not be postponed due to previous food intake.

The physician should be made aware of laboratory results as soon as the floor receives them.

To minimize Stat requests and eliminate Today requests, phlebotomists should make continuing rounds throughout the day to draw Routine work or any Stat work requested.

A special box should be designated for all completed Stat work to be placed at the receptionist desk to insure rapid reporting of Stat results.

The lab should have its own messenger to deliver and post laboratory results.

A direct reporting system to bypass both the Messenger Service and the overburdened telephone service would be most useful.

Nurses’ stations have learned to minimize delays by following these procedures:

Those floors in close proximity to the laboratory will pick up their own laboratory results. Some unit clerks personally deliver specimens to the laboratory. Nurses or unit clerks will look through the order books every hour to check for any laboratory requests that may have gone unnoticed.

Some nurses will place all Routine laboratory requests on the patients’ charts instead of in the 7:00 a.m. pick-up box so that the next shift will not reorder the same tests.

Stats are handled on a priority basis. Requests for Stat work are telephoned to the laboratory and the blood is drawn as soon as possible. All Stat tests are pushed ahead of any Today or Routine work. The results are called back to the floor as soon as completed.

Routine requests are drawn the morning following the initial request. They are done after any Stat work and in conjunction with Today work. The results are placed in the laboratory messenger box and subsequently delivered to the floors.

Appendix

1. Times of observations were changed—After the first 10 days, it was found that most laboratory requests for the day shift centered around the 8 a.m.—4 p.m. schedule. The remainder of the observations were thus recorded during this time period.

2. Laboratory receptionists used as observers—This served to introduce an element of bias because the receptionists were recording time intervals on their own efficiency.

3. Physical presence of an observer on the floors—To a degree, the presence of the observer on the floors altered the routine of the staff.

4. Observer prevented mistakes when she could—This affected some of the raw data obtained.

5. Emergency Room—This unit was only observed for five days. The study coordinators felt that this was an adequate amount of time to obtain a sufficient quantity of data.

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