STUDY OF THE HOSPITAL LABORATORY SERVICES (CLINICAL PATHOLOGY) AT ALL INDIA INSTITUTE OF MEDICAL SCIENCES HOSPITAL

Thesis submitted to the faculty of the All India Institute of Medical Sciences, in partial fulfilment of the requirement for the degree of Master of Hospital Administration.

On: 1977
At: New Delhi
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RECOMMENDATIONS

The study of the Hospital Laboratory Services in the All India Institute of Medical Sciences has revealed many areas which require modification and improvements to have better productivity and job satisfaction. The recommendations are summarised below:

1. LOCATION:
   The clinical chemistry and clinical pathology laboratories are at present accommodated in 4 different places in the hospital building. As this causes hardship to the patients and administrative difficulties in controlling, it is recommended, as a long term measure, that the clinical pathology and clinical chemistry laboratories should be accommodated in the ground floor AB wing of the hospital when the proposed emergency service is shifted to the new site. The area vacated by the existing clinical pathology in the D wing group floor should be utilized for setting up a Microbiology department (Hospital Service Wing). This proposal will not only bring the Hospital Laboratory Service in one place but also under one administrative control.

2. FUNCTIONS OF HOSPITAL LABORATORY
   a) For better effective utilization of space, man-power and equipment for the larger benefit of the attending public it has been suggested that in attending public it has been suggested that in addition to the existing clinical chemistry and clinical pathology, the department of Microbiology (Hospital Services Wing) and special haematological...
laboratories under the department of Medicine should be brought under the administrative control of the Medical Superintendent.

b) Training courses for qualifying technicians of level B and C (usually known as technicians and laboratory assistants) should be conducted by the Hospital Laboratory. In-service training for the existing technicians and Laboratory Assistants should be programmed so as to cover all the technical staff and improve their performance. Practical training for residents should be made broad based to include all branches of hospital laboratory services and broad management techniques used in the laboratories.

c) The infrastructure for consultancy services for the peripheral laboratories regarding quality and quantity of work, interchange of staff for special training and technical quality control should be developed in the hospital laboratory.

d) Research into medico-administrative problems of taking the laboratory diagnostic know-how to the peripheral laboratories should be undertaken by the hospital laboratory.

3. **EQUIPMENT**

To meet the additional work load for the future and to reduce technician strain, automatic and semi-automatic equipment have been recommended to be utilized in the laboratory. Equipment to start ‘microtechniques’ in clinical chemistry are also essential. Six or 8 channel auto analyser, electronic cell counter, automatic haemoglobin meter and automatic glass washing equipment are some of the equipment to be purchased in a phased programme. In addition semi-automatic pipettes, dispensers and diluters are inexpensive equipment which are time and labour saving.

4. **INTRODUCTION OF NEW TESTS**

Some of the new tests and procedures which are useful for diagnosis and management of patients and which are not done in the laboratory, have been recommended for introduction on a phased programme when additional staff and equipment are available.

5. **ORGANISATION**

To fulfil the functions, and meet the future increase in work load, a new organisation for the hospital laboratory has been suggested.

a) The Hospital Laboratory Services have been proposed to be a separate entity under the administrative control of the Medical Superintendent and technical control of the head of the department.
b) Microbiology (Hospital Services) and the special laboratories have been proposed to be brought under the control of the Medical Superintendent with technical control being exercised by the respective departmental in-charges.

c) Routine and urgent services of clinical chemistry and clinical pathology have been proposed to be bifurcated. The routine service unit should cater for both OPD and in-patients.

d) Lecturers have been proposed as in-charges for the departments of clinical chemistry, clinical pathology and microbiology. They will also be in-charge of the training programme and quality control activity.

6. **FUNCTIONING OF THE VARIOUS DEPARTMENTS**

A. **Clinical Chemistry**

a) As a short term measure modification in the lay out of the clinical chemistry first floor has been proposed. Two more adjacent rooms are proposed to be added to the clinical laboratory to provide a rest room, special investigational laboratory and a preparation bay.

b) One technician is proposed to be entrusted with the duties of reception of ward specimen, scrutiny of the laboratory forms, raising of discrepancy slips where ever necessary, compiling daily work entry register and entering the final reports in the register from the individual technicians work book.

c) Preparations of stock reagents are proposed to be done by a senior technician under the immediate guidance of the biochemist. A rest room is proposed for the use of the technicians which should have arrangements for tea and receiving visitors.

d) Jobs should be assigned to the technicians for at least one month at a time to improve accuracy and job satisfaction.

e) The technical assistants should devote more time on supervisory duties.

f) The layout of the work benches is proposed to be altered so as to make them parallel to the length of the laboratory. There should be one peninsular bench running the complete length of the laboratory and if space is available, additional work benches may be fixed on one or both side-walls.

g) To eliminate interference and interruptions from visitors, patients, telephone calls etc. it is proposed that the present entrance should be closed off and a door provided from the
present wash room for the exclusive use of the laboratory staff only. All visitors should be dealt with by the Biochemist or the specimen reception counter.

h) A record retrieval system has been proposed for the laboratory which should be maintained on card indexes, number-wise, patients name-wise and unit-wise. A full-time clerk is proposed for this functions.

i) For optimal utilization of the technician’s time the routine laboratory is proposed to be run from 11 AM to 6 PM instead of the present 10 AM to 5 PM as specimens are received from the central collection rooms and wards usually by 11 AM. Only one technician is required counter from 9 AM to 11 AM.

B. **Clinical Pathology**

a) The laboratory is proposed to be bifurcated to undertake routine and urgent services. The ground floor laboratory should be able to render routine services both for OPD and inpatients. The laboratory in the third floor should be earmarked for urgent services alone.

b) The availability of technicians for blood collection in the central collection room is proposed to be augmented by the staff from the clinical chemistry routine laboratory first floor.

c) For better utilization of technical staff, it is proposed that the laboratory timings should be staggered. 50 percent of the staff should be reporting for duty from 11 AM onwards as in clinical chemistry first floor, the other half reporting as usual at OPD working time.

d) A report retrieval system in the same manner as for clinical chemistry is proposed for this laboratory also. A full-time clerk will be required for this function.

C. **Central Collection Room**

a) To overcome the difficulties encountered in functioning at present, modifications have been proposed in the present layout. With the removal of the partition, a bigger hall is obtained which can be used for accommodating accompanying relatives and waiting patients.

b) The blood collection chairs are proposed to be mounted on separate platforms to allow free all round movement.

D. **Proposal for staff**
To provide adequate services for existing work load, the following staff are proposed.

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<tr>
<th>Department</th>
<th>Category of staff</th>
<th>Existing</th>
<th>Proposed</th>
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<td>3</td>
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<td></td>
<td>Sweepers</td>
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<td>4</td>
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<td></td>
<td>Store Clerk</td>
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<td></td>
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2. Clinical

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<td>9</td>
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7. REPORT DISTRIBUTION SYSTEM

The system of distribution of reports to the wards were found to be functioning satisfactorily. For the OPD units/clinics, the completed reports from the laboratories have been recommended to be distributed through a locker system which will be directly operated by the doctors of the concerned units. This will considerably reduce the chances of loss and misplacement of reports. In cases where a duplicate report is required, a request slip signed by the doctor is to be brought by the patient to the laboratory concerned.

8. IMPROVING COMMUNICATION

Effective communication is proposed to be improved by means of staff manuals for the laboratories. All procedures from the time the samples are collected from the patients to the time the reports are distributed to the respective units/wards, should be standardised and
incorporated in the staff manuals. These should be periodically reviewed and brought up-to-date.

In addition to staff manual, publication of a Laboratory Bulletin will go a long way in bringing the communication gap between the clinician and the laboratories, and will also act as a public relations organ of the laboratories.

**SUMMARY**

**INTRODUCTION**

The hospital laboratory is an important area on which modern medical practice heavily depends for accurate diagnosis and effective treatment. For the hospital administration also it is an important area as its effective use can substantially reduce pressure on hospital beds as many investigations and diagnostic work can be carried out as outpatient.

The hospital laboratory service (clinical pathology and clinical chemistry) of the All India Institute Of Medical Sciences was studied with the following objectives:

1. To assess the work load in relation to organisation staffing pattern, physical facilities and location.

2. To study the system of specimen collection, transportation to the laboratories and disposal of reports to the various OPD units and wards.

**METHODOLOGY**

1. Retrospective study of the records of the clinical chemistry and clinical pathology laboratories for the past 10 years were done to determine the trend of rise in work load, test-wise distribution, work load from urgent requests and technician/work load ratio.

2. Prospective study of the clinical chemistry was done to determine the arrival pattern of specimens in the laboratory.

3. Method study of the present flow of specimens and requisitions forms, by means of outline process chart, from the wards and OPD central collection room to the laboratories and the distributions of the reports to the various wards and OPD units was carried out. A critical examination of the flow chart was done to identify delays and bottlenecks and to evolve better methods.

4. The location of the laboratories and physical facilities were subjected to critical examination in the light of the flow chart and discussions with the officers in charge to facilitate better productivity.

5. Work measurement was done by applying the following methods:
a) A comparable work load in terms of ‘‘weighted tests’’ was prepared for the laboratories.

b) Standard time for common routine tests was determined. From the standard time, staff hours required to meet average existing work load was determined.

c) Activity (work) sampling was carried out to investigate the types of activity done by the technical staff. The activities were given code numbers after pretesting. The observer toured the laboratories, during the working hours (excluding lunch hour) at regular intervals and recorded the code number of the activity occupying each of the technical staff. Each class of activity was converted into percentage of the total number of observation, so giving percentage of occurrence of each type of activity.

OBSERVATIONS

Clinical Chemistry:

1. Over the past 10 years, the work load had increased from 46,238 to 197,514 in the clinical chemistry and the number of technicians have increased from 5 to 12.

2. The projected workload for the year 1979-80 is expected to be 352,000.

3. The daily average workload of routine tests are as under:
   a) Blood chemistry 238
   b) Enzyme chemistry 43
   c) Electrolytes 55
   d) Liver function tests 47
   e) CSF chemistry 3

4. The work load from urgent requests has increased from 10.4% in 1973-74 to 29.0% in 1975-76.

5. 13.9% of the total specimens received in the laboratory during normal working hours were urgent requests. They were spread over the whole working time requiring the reception counter to be manned throughout the working time.

6. The bulk of the specimens from OPD collection room arrived too late for inclusion in the day’s work.

7. The work load for clinical chemistry in terms of ‘‘weighted tests’’ on average daily work is 2017 tests and work load/technician is 224.
8. Standard time required for average daily work load is 1408 minutes.
   The staff hour required 46.2
   The technicians required 7

9. In activity (work) sampling it was observed that technical work formed 61.6% of the observations which is a good rating for work measurement.

10. The level of supervision was found to be low.

11. 20.9% of the activity was utilized by technical staff on non-technical work.

12. Unproductive work came to 17.3%.

13. Method study of the outline process chart of the clinical chemistry had suggested various improvements which are summarised in the recommendations.

**Clinical Pathology:**

1. Over the past 10 years the work load of haematology had increased from 87,089 to 156,947 and the number of technicians from 3 to 4.

2. The projected work load for the year 1979-80 is 169,000 for haematology Lab.

3. The daily average work load of routine tests is as under:
   a) Haematology routine 378
   b) Haematology special 60
   c) Fluid of exertion 72

4. The work load for the clinical pathology (Haematology) is terms of ‘‘weighted tests’’ on average daily work is 1291 tests and work load/technician is 258.2. For fluid excretion laboratory the work load/technician is 101.5.

5. Standard time required for average daily work load is 2564.2 minutes. The staff hours required is 85.2. The technician requirement is 12.0.

6. In activity sampling it was observed that technical work formed 59.8% of the observations.

7. The level of supervision was found to be satisfactory.

8. The quantum of non-technical staff was 14.1%.
9. Unproductive group of activities was found to compose 21.9%. Reasons for this high incidence were determined and suggestions made to reduce them.

10. Method study of the outline process chart of the clinical pathology had suggested various improvements which are summarised in the recommendations.

RECOMMENDATIONS
1. As a long term measure, the different laboratories which form the hospital laboratory services have been recommended to be accommodated in one wing of the hospital for better administrative control.

2. The department of Microbiology (hospital services wing) is proposed to be formed. Special haematological laboratories in the department of Medicine should be brought under the administrative control of the Medical Superintendent.

3. Training programmes in the hospital laboratories should be augmented. In service training for the existing staff should be started.

4. Infra-structure for consultancy service for the peripheral laboratories should be strengthened.

5. Research into medico-administrative problems of talking laboratory diagnostic know how to peripheral hospitals should be undertaken.

6. To meet the ever increasing work load and to reduce technician strain, automatic and semi-automatic equipment should be used in the laboratory. The accuracy and reliability are improved by their use. They are also economical as less reagents are used and breakage of glassware is reduced.

7. Some new tests and procedures are recommended to be introduced on a phased programme.

8. ‘Routine’ and ‘urgent’ services of clinical chemistry and clinical pathology have been purposed to be bifurcated.

9. Lectures have been proposed as in charges for the departments of clinical chemistry, clinical pathology and Microbiology. They will also be in charge of the training programme and quality control activity.

10. As short term measure, the layout and work flow of the clinical chemistry have been proposed to be modified to increase efficiency.
11. Job assignments of technicians have been modified to improve efficiency and increase job satisfaction.

12. A record retrieval system based on card indexes-number-wise, Patient’s name-wise and unit-wise has been proposed for both the laboratories.

13. Changes in the normal working time of the laboratories have been recommended for optimal utilization of ‘technicians’ time.

14. The availability of technicians for blood collection duty in central collection room is proposed to be augmented by staff from clinical chemistry (routine) laboratory.

15. The layout of the central collection room is proposed to be modified to improve the work flow.

16. Additional staff has been proposed to improve the efficiency of the laboratories and to provide effective round the clock ‘urgent’ service. A quality control cell has been proposed.

17. Resort distribution to the OPD units and clinics had been proposed to be modified to minimise loss and misplacement of reports.

18. To improve communication, compilation of standard procedures into staff manuals has been recommended. These should be periodically reviewed and brought up to-date.

19. Publication of a laboratory bulletin may considerably reduce the communication gap between the clinicians and the laboratories besides acting as public relations organ of the laboratories.

CONCLUSIONS

The Hospital Laboratory Services in the All India Institute of Medical Sciences Hospital, as they exist at present, have been studied in terms of the managerial functions (planning, organising, staffing, directing, and controlling) to analyse the deficiencies so that the services can be made more efficient and effective toward attainment of hospital goals. The increasing dependence of modern medical practice on laboratory investigations and the rising expectations of the public from the health services, make it imperative that the services are reviewed and updated.

A study of the quality control methods in Clinical Chemistry was carried out in 1973 but the recommendations have not been fully implemented due to shortage of staff. The present study also have revealed various areas for strengthening the managerial functions.
The study is, by no means, exhaustive. There is scope for further study in many areas such as evolving a comparable method for measurement of Pathology work, evaluation of the Pathology services, cost analysis to mention a few. It is hoped that the methodology and findings of the study will be found useful for similar managerial studies of big hospital laboratories which undertake all routine clinical haematology and blood chemistry investigations.