Chapter 4
Overview of Requirements and Future Perspectives on Current Laboratory Information Management Systems

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ABSTRACT

The chapter argues that a Laboratory Information Management System (LIMS) is the application of computational technology in laboratory medicine. This is an advanced technology that can support the general work in medical laboratories. The LIMS can also be useful in all steps of the laboratory cycle (pre-, intra-, and post-analytical phases). There are many LIMSs at present, and those LIMSs are used worldwide. The present concern is on the standardization of the existing system. In this context, international collaboration to set the standards is required. In addition, the multidisciplinary approach to add up the advantage and application of the technology is promising. With the more advanced computational and wireless information technology, the next step of LIMS will be big wireless LIMS networks that extend from medical laboratories and wards within the hospital to outside units as well as patient homes. The point-of-care LIMSs are the actual future perspectives.

INTRODUCTION

"Information" is an important thing in scientific work. In biomedical work, there is information, which is considered as important data for diagnosis and treatment of the patients. In laboratory medicine, the information also exists and becomes an important concern. By definition, laboratory medicine deals with any steps and aspects of medical laboratory. This includes both intra- and extra- medical laboratory processes. The laboratory information means any data that exist within the intra- and extra- medical laboratory processes. For the specific medical laboratory, the laboratory information is called "medical laboratory information". Those data can be the direct laboratory analytical information or indirectly related information.

DOI: 10.4018/978-1-4666-6320-6.ch004

As already mentioned, the medical laboratory information can be generated in any step, directly and indirectly related to the analysis, hence, there is a heap of data in routine medical laboratory work. It can be seen that the medical laboratory information is an important thing in medical laboratory service activity. Hence, the management of medical laboratory information has a direct interrelationship with the medical laboratory management process (Wiwanitkit, 2000).

To help the reader better understand the medical laboratory information and the interrelation with the laboratory cycle, the author will hereby describe the details for each step. First, the medical laboratory information in pre-analytical phase means any medical laboratory information that is generated within the pre-analytical phase of the laboratory cycle. The good examples include patient identification data (name, surname, hospital number, age, diagnosis, financial information, laboratory request, etc.) Second, the medical laboratory information in the analytical phase means any medical laboratory information that is generated within the analytical phase of the laboratory cycle. The good examples include laboratory results (either qualitative or quantitative ones), quality control data (either internal or external controls), picture from microscopic examination, etc. Third, the medical laboratory information in post-analytical phase means any medical laboratory information that is generated within the post-analytical phase of the laboratory cycle. The good examples include laboratory reports, notification, etc. Hence, when one would like to manage the medical laboratory information, one must focus on all phases within the laboratory cycle.

In the medical laboratory, there are several data. Those data can be easily classified into three groups: a) textual data (examples: patient name and surname, laboratory request, pathological description, seroreaction result) b) numeric data (examples: hospital number, laboratory number, laboratory price, biochemistry analytical results values) and c) figure data (usually from microscopic examination such as blood smear picture, the histological picture). It can be seen that these data are considered as primary data, which means these data are directly generated within the process of laboratory analysis, from patient requesting to interpretation of the laboratory result. To properly manage these data is very important. The good practice is required for data acquisition, recording, reporting and storage. First, data acquisition is the first step of the process. The examples are acquisition of laboratory request form from a medical ward, acquisition of payment slip of laboratory charge, etc. Second, data recording means the process of creating data within the laboratory. This covers the generations of the barcodes for laboratory investigation, recording of results from the analysis of the specimen, recording of the quality control result, etc. Third, reporting is the next step of the process. This is an important process transferring the data from the laboratory to the ward. A good example is the reporting of the result via the laboratory result report form. Fourth, the final step is the storage. This step is the backing up of the data for tracing back and future referencing. This is a very important but usually forgotten step. Without data storage, the accountability of the laboratory cannot be done, and this means no quality due to non-traceability or no transparency.

BACKGROUND

There are many kinds of information within medical laboratory. Both direct and indirect information can be seen in routine daily medical laboratory work (Table 1). There is no doubt that the medical laboratory has to put great effort to effectively manage the information. To manage the information in the medical laboratory is usually an important issue to be discussed in laboratory medicine. Successful management of information in medical laboratory means a) effectively receiving information from the outside laboratory, b) effectively providing