Surveying the influence of laboratory information system: An end-user perspective

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ABSTRACT

Background: The goal of the present survey is to investigate the effect of the Laboratory Information System (LIS) among users in a tertiary healthcare facility in Saudi Arabia.

Methods: The current cross-sectional descriptive study was carried out at the National Guard laboratory department of KAMC in Riyadh. All the active users of LIS at the laboratory department were included in the study. A total of 427 questionnaires were distributed of which 268 were returned completed. The response rate was 62.76%. The study instrument was developed to examine the effect of LIS on end-users based on five interrelated variables; External Communication, Service Outcomes, Personal Intentions, Personal Hassles, and Increased Blame. Descriptive statistics, Pearson’s correlation, and ANOVA were used to analyze the data.

Results: The users had a general positive perception towards the LIS system. A statistically significant relationship between user characteristics and External Communication, Service Outcomes, Personal Hassles and Increased Blame variables exists. The results showed a strong positive correlation between External Communication and Service Outcomes variables and it showed a moderate positive correlation between Personal Hassles and Increased Blame variables.

Conclusions: Overall, the study participants demonstrated a positive attitude towards the LIS on personal basis and on the basis of their daily work routine. It is a good implication of LIS success in health care sector and paves the way for incorporation of more advanced and efficient LIS system in the future.

1. Introduction

1.1. Background

The main purpose of establishing a medical laboratory is to conduct the diagnostic tests to primarily diagnose the disease and analyze the treatment outcome, thus aiding in prevention of diseases. The laboratory information system (LIS) is a software system for managing, processing, reporting, and storing laboratory information to deliver meaningful results within a stipulated time as needed by the doctors or lab technicians [1]. In recent years, LIS has become a necessity of every laboratory. It not only elevates the capacities of the clinical laboratories, but also reduces the diagnostic errors and the time required for reporting results, thus enhancing the decision making process leading to better treatment and diagnostic outcomes [1–4]. Wurtz and Cameron [5] reported that LIS usage while reporting and conveying results ameliorated the legal threats by assuring the preciseness, completeness, and accuracy of the reported results.

The LIS-based studies usually focused on assessing the software performance and quality as a diagnostic and decision support tool in medical laboratories. Considering all the studies, a significant number emphasized on examining the overall performance and quality of the LIS system itself. Nonetheless, only few studies contemplated investigating the LIS system's effect on users. The laboratory staffs not only use LIS but also interact maximally with it to certify and pass on the results to other physicians. Hence, the commencement of the LIS technology was associated with higher expectations of in terms of good laboratory management, better decision making capacities and improved overall functioning of the medical organizations. The most crucial impact of LIS is that it brings all the cadres of people working in a hospital under one roof when it comes to gaining an access to accurate, appropriate, understandable, and comparative data [6]. This positive attitude also favors increased usage of LIS by the hospital staffs [7,8]. This positive attitude can be acquired only if the system does not brings in much of changes in the work environments of the laboratory staffs including technical, social, and organizational factors. Nonetheless, introducing a new and
The present study was designed as a descriptive cross-sectional research and uses a survey-based method to collect data. Based on the study of J. Anderson, C. Aydin, and B. Kaplan, the current survey includes five features that estimate the effect of LIS on laboratory staff [27]. These features help in evaluating the users' viewpoint about LIS. They are external communications, service outcomes, personal hassles, increased blame and personal intentions. Furthermore, association between users’ perceptions toward system and demographic variables such as gender, age, work experience, area of work, academic qualification, job position, LIS training, computer experience, and time using LIS will be determined as well.

The LIS users opinion regarding various aspects of LIS was collected using a questionnaire adopted from the work of Kaplan and Duchon [28,29]. The questionnaire was developed for assessing the Laboratory Computer System. The questionnaire was modified and updated to include the current laboratory work. The study instrument was given to four laboratory technicians and one pharmacist working at KAMC to check the accuracy of the statements and to bring out any ambiguity in the questionnaire statements before beginning the survey. After receiving the feedback, few modifications were incorporated to the statements. The questionnaire includes 37 questions which is categorized into different parts:

- The first part deals with demographic and background information of the participants and consists of 9 questions.
- The second part enlists the user responses on the variables influencing the impact of LIS on users. The responses were recorded on five point Likert scale (Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D) and Strongly Disagree (SD)). This section is further sub-divided to contain:
  - Three questions related to external communication.
  - Six questions on service outcomes.
  - Two questions on personal intentions.
  - Eight questions related to personal hassles.
  - Nine questions on assessing user blame.

The questionnaires were distributed in paper-based format to the participants. Each questionnaire had a cover page which gives a brief description about the study goal along with the assurance of confidentiality and privacy of the participants’ information. The following scale was used to convert the Likert scale responses to level of user agreement: 1–1.8 strongly disagree, >1.8–2.6 disagree, >2.6–3.4 neutral, >3.4–4.5 agree, >4.5 strongly agree [30].

### 2.2. Participants

The target population included all the laboratory personnel working at KAMC, Riyadh who are using LIS routinely in their medical practice during the study period. The users approached in this study are all laboratory department personnel who are working in the laboratory and who are using the LIS in their daily practice. They are approached to test their perception towards LIS impact on their daily work and on their personal perception toward the system in general. In total, 427 LIS users were approached to participate in the study.

### 2.3. Study design

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### 2.4. Data analysis

The data analysis is based on Cronbach Alpha test to check for the
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