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Original Article

Business Intelligence Dashboard in Healthcare: Lesson Learned

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Abstract

Introduction: The present study aimed to investigate the impact of business intelligence dashboards on creating healthcare reports.

Methods: This is a cross-sectional study conducted in 2018 based on the type of data in occupational medical records of Shiraz Oil Company. First, based on non-structured interviews with occupational health authorities, the weaknesses of the existing health reporting system, the required indicators, and requirements of a business intelligence (BI) system were gathered. Then, according to the type of information available in the occupational medical records, business intelligence system including data warehouse and dashboards were implemented. Finally, to find out the effect of dashboards on the process of creating healthcare reports, the authors investigated the taskcomplexity, speed, and usability of the system using the cognitive walkthrough method, System Usability Scale (SUS), and Software Usability Measurement Inventory (SUMI) questionnaires.

Results: Findings indicated that the existing system was not user-friendly, was difficult to use and very slow, and required a lot of experience to work with. Results show that BI dashboards can tackle these problems. Moreover, the results of the usability evaluation of BI dashboards using the SUS and SUMI questionnaires were 90/100 and 67/73, respectively.

Conclusion: Based on the results, it can be concluded that the business intelligence dashboard can solve the problems of traditional reporting systems such as slowness and difficulty in producing analytical reports. Also, usability of BI dashboards was acceptable. Results indicated that BI dashboards could solve the mentioned problems, were much faster and user- friendlier than the existing system, and needed a little knowledge to work with. BI dashboard drastically decreases the problems of health managers in creating reports.

Keywords: Clinical decision support systems, Business intelligence, Clinical dashboard, Data analysis, Usability evaluation

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Introduction

A vast amount of medical data is generated every day (1). These health data need to be tracked and monitored for better management and control of diseases. Managing and controlling diseases is crucial for timely and appropriate measures to be taken in any community. If diseases are not monitored well, they cannot provide an overview of the current and past trends; hence, proper decision-making is disrupted, and readiness for future events is reduced. However, it is known that using a large amount of data to make decisions without using information technologies is difficult (2-4). One way to work with health data is to use business intelligence (BI) systems. BI with dashboards is a solution to working with huge amounts of data. Currently, BI is used in a variety of fields to integrate heterogeneous data types from different sources, do better data analysis and knowledge discovery (5-7), decrease errors, solve the problem of accessibility and availability of data (8), and perform a better data management and decision making (9-11).

Oil industry recognized the potential for significant health hazard. Therefore, monitoring health performance regularly is important (12). Moreover, development of business intelligent for reporting health performance in oil industry is essential. The authors conducted an applied study in the health sector of Shiraz Oil Company. They used DW/BI to help occupational health managers handle the staff's health. The problem with the current system of occupational health regarding the company is that access to the

concerned with the vital situation of health status in the population.

The system needs more time to detect changes occurring in the hospital workflow and adapt to the new system. Moreover, this system is designed for monitoring the trends of occupational diseases. It is not used by physicians in the process of examination of the participants. The findings of this study were limited concerning displaying how fast and efficient a dashboard can show a holistic view of health and diseases in the population and deliver an accurate foundation to decision-makers. This is to find priorities in health status based on the trend of diseases.

The researchers created DW and clinical dashboards to monitor the trends of diseases in an organization as a case study. Checking changes made by the system at the time of creating health analytical reports and the level of stress and pressure on stakeholders to prepare these types of reports to decide about the diseases in the company, and doing a usability evaluation of dashboards gave the authors a comprehensive view about this type of system. Findings indicate that dashboards are visualizing systems that provide the information needed impressively: they are created one time and used every day. They can competently present information, so that everyone understands the message behind them. Using dashboards to visualize the important information about occupational diseases and health status was beneficial and the users were highly satisfied. An important characteristic of dashboards is that they are efficient, effective, easy to learn and control and reduce the time of reporting and decision making. Managers could filter their required information with just one click; they could prepare proper reports in a short time with no trouble. In addition, dashboards help the users to know the health status of the population in a short time. It seems that visualizing health status in dashboards is a good way of providing information to doctors and decision-makers on occupational health. The authors expect that dashboards would make it easier to check out the health conditions of a large number of people.

Conclusion

The results of this study clearly showed that the business intelligence dashboard can solve the problems of traditional reporting systems such as slowness and difficulty in producing analytical reports. Also, usability of BI dashboards was acceptable. Results indicate that BI dashboards can solve mentioned problems; they are much faster and user friendlier than the existing system and need a little knowledge to work with. BI dashboard drastically decreases the problems of health managers to create reports. In our future research, we intend to concentrate on developing BI dashboard for monitoring health performance indicators in health sector of oil industry in national and international scale.

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Authors' Contribution

AL: conceptual and design study, data acquisition, data analysis, drafted and revision paper. MK: contributed to conceiving and design of the study, interpretation of data, commented on drafts, and made significant revisions to the paper. MN: contributed to the design of the study, interpretation of data, commented on the draft, and made significant revisions to the paper. RSH: contributed to the design of the study, statistical analysis, commented on drafts, and made significant revisions to the paper.

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Ethical Approval

This study was approved by institutional review board of Shiraz University of Medical Sciences (Approval ID: IR.SUMS.REC.1397.863).

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Conflict of Interest: None declared.

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