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Application of Business Intelligence in Decision Support to Hospital Management: An Example of Outpatient Clinic Schedule Arrangement

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Abstract

There is a gap between medical resources and patient needs, Managers need to obtain productivity information to optimize resources allocation. The value of this research is that the information provided by the dashboard allows hospital managers problems respond to it quickly. We recommend the research could integrate more data (such as temperature data, national death population data record), so as to be closed to hospital operating cost control and to estimate patients' needs.

Keywords:

Data visualisation, Quality of Health Care, Decision support

Introduction

Healthcare is a complex knowledge-driven industry and that generated a large amount of clinical and administrative data [1].

There is a gap between medical resources and patient needs, so how to allocate the hospital resources is an inevitable problem [2]. Business intelligence dashboards can assist medical managers in monitoring information from a hospital organization for decision support. Managers need to obtain productivity information to optimize resources allocation [3].

There are important issues of hospital outpatient management which are to provide patients with reasonable visiting time, balance physician with reasonable workload, improve healthcare quality and customer satisfaction, while meeting hospital operating costs (labor, equipment). However, outpatient service arrangement was affected by multi-factor, such as cost, policy, manpower, regional characteristics, and so on.

In this study, a business intelligence tool was implemented to build a smart dashboard and integrate information from outpatient services, and help hospital managers to discover problems and adjust decisions quickly.

Methods

The study was performed on the hospital in Taiwan, and collected the outpatient service data from 2019/1/1 to 2020/10/31.

The data is including date, day of the week, shifts, number of patient visits, etc.), and used "outpatient data record ", "doctor off data record", "registration record" to aggregate and clean up into the analytic data. We used Microsoft Power BI to build dashboard, and organize experts as task force to evaluate the appropriateness of outpatient service schedule arrangement.

Results

Dashboard showed the volume of outpatient services, including the trend of monthly/weekly/daily outpatient visits, and compare with the volume of the period (such as last year, last week, etc.). At the same time, it can be used with a bar chart to show the trend of business volume changes (Figure 1).

The drill-down function can show the number of outpatient visits of each divisions and physicians in the current month, and compare it with the same period last year, and the dashboard also showed the growth percentage of the number, patterns are also used to show whether these figures are increased or decreased. "V" represented increased and "●" represented decreased. (Figure 2)

Conclusions

The result of research shown that the dashboard showed the patients' behavior and trend of visits, which can indeed allow managers to quickly find abnormalities. For example, "the number of outpatient visits exceeds the reasonability of physician consultation shifts" represents physician consultation shifts should be increased. The abnormality can be understood by "drill-down" (such as physician expertise or department), and adjust outpatient arrangement immediately, which can reduce patient waiting time and physicians' reasonable workload, so patients could get the services they need.

The research's value was found that the information provided by the dashboard allows hospital managers problems respond to it quickly. BI dashboard showed medical need. In the future, we recommend the research could integrate more data (such as temperature data, national death population data record), and link hospital service trends, so as to be closer to hospital operating cost control and to estimate patients' needs, to improve patient safety.

Figure 1. Overview of BI dashboard

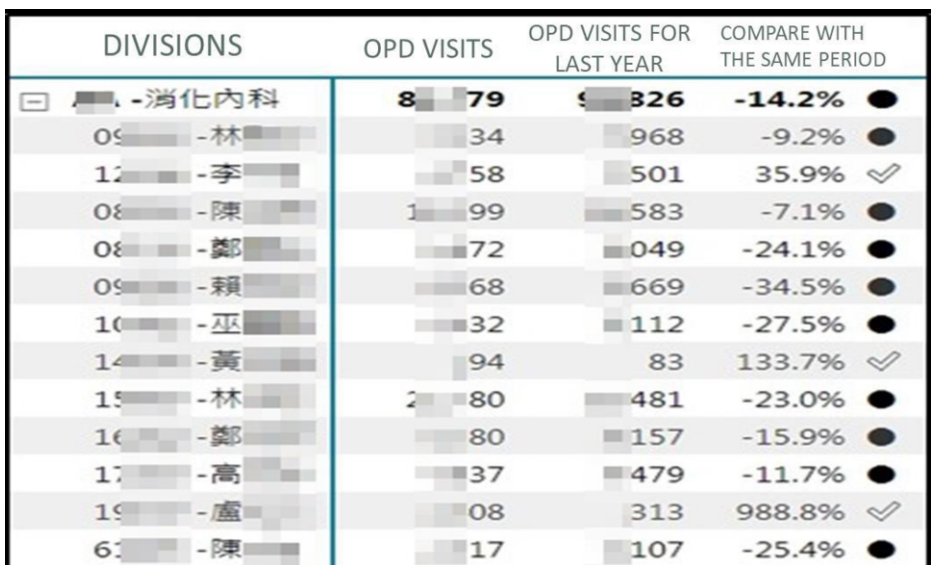

Figure 2. Drill-down: OPD visits by physicians

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