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TO EVALUATE THE PERFORMANCE OF A TEACHING HOSPITAL BY COMBINING THE HOSPITAL INDICES USING THE PABON LOSSO MODEL DURING THE SURVEILLANCE BY AUTHORITIES:HAWTHORNE EFFECT

Hospital Administration

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ABSTRACT

BACKGROUND: The patients' health care choice is diverting from the private health provider to the public hospital due to introduction of various schemes and incentives by the policy makers. The limited resources are posing a challenge to the hospital administrator in escalating demands, diversity and complexity of diseases of patients. The hospital performance enhances steadily by the monitoring authorities' surveillance. It is an effective method for improving quality care in the public hospital. The Hawthorne effect is a term referring to the tendency of people to work harder and increases in effectiveness of organization when they are being observed.

OBJECTIVES: 1. To assess the performance of a teaching hospital during surveillance by calculating the hospital indices, using the Pabon Losso Model.

2. To evaluate whether the Hawthorne effect is the cause of the increase in the effectiveness of hospital.

MATERIALS AND METHODS: The study was a prospective and record based cross-sectional study and conducted at Government teaching hospital over a period of 18 months.

RESULTS: A total of 18 months period census report was recorded from January 2016 to June 2017and hospital indices were estimated. The 1st phase of surveillance (January- 2016 to May -2016), where immense supervision was present, with performance feed- back, BOR was 88.65, ALOS was 3.932, BTR was 7.074 and BTI was 0.54, 2nd phase of surveillance which was intensified with communication and committee meetings (June-2016 to October- 2016), BOR was 95.59, ALOS was 3.49, BTR was 7.03 and BTI was 0.886, 3rd phase weaning period, where a little supervision (November -2016 to February-2017) BOR was 87.8, ALOS was 4.1, BTR was 6.413 and BTI was 0.5725 and 4th phase self sustain stage or no observations phase, BOR was 92.6, ALOS was 3.47, BTR was 6.547 and BTI was 0.28.

CONCLUSION: The surveillance of higher authorities over the hospital had increased the performance. Hospital efficiency is reflected by increased hospital indices. The cause and effect is the "Hawthorne effect". Therefore it is concluded that the surveillance increases the performance and efficiency of the public hospitals.

KEYWORDS

Hawthorne Effect, The Pabon-Lasso method, Bed Occupancy Rate, Average Length of Stay, Bed Turnover Rate, Bed Turnover Interval.

INTRODUCTION

The term "Hawthorne Effect" was coined by Henry A. Landsberger in 1950, when he was exploring the research of the Hawthorne plant.[1] He noted the workers' productivity increased when they were aware of being studied but returned to baseline when they were no longer aware of being observed.[2] The important mile stone in behavioral science research and sociology research was Hawthorne studies. The Hawthorne plant of the Western Electric Company in Cicero, Illinois, an arm of the Bell's company witnessed the start of two most important developments in managerial thinking. In May 1924 Walter Shewhart described the first control chart, which launched statistical process control and quality improvement.[3] In November 1924 the National Research Council initiated a set of experiments, Charles Snow, a Massachusetts Institute of Technology Instructor, and two engineers, George Pennock and Clarence Stoll supervised and investigated the experiments of illumination.[4] The result of the study revealed that the increasing illumination increased the production, and the decreasing lighting still increased the productivity- that is, until the worker could no longer see, after which the productivity declined. The second experiment was conducted by Elton Mayo, a Harvard psychologist and Fritz J. Roethlisberger, who supervised five women group in bank writing room, assembling telephone relays. The group productivity increased when they felt that they were being observed by research team. Increase in productivity was observed among the selected group of participants who were monitored intensively by a supervisor under the research program.[5] Increase in productivity was observed among the selected group of participants who were monitored intensively by a supervisor under the research program.[6] Employees execute their job duties and responsibilities well, this includes inputs of resources and time, and achieving results in the level of services and products produced, is called performance. It is a critical factor in organization success. [Kaita, P et al.]. It represents the extent to which lay down objectives are accomplished. In health services the performance is an instrument for bringing quality (the best manner), efficiency (most economical) and efficacy(solving patients' health problems) together.[7]

In health care business, the standard method is under evolution to measure the hospital performance and its quality. Based on descriptive studies or expert reports the hospital performance can be measured by five different types:

1.Regulatory inspection: the statutory inspectorates will monitor the compliance of Hospital with published licensing regulations, 2. Survey of consumers' expectations, 3. third-party assessments 4. Internal assessments and 5. Statistical indicators.[8]

Davies and Macaulay (1995) and Mogli (2001) enumerated the hospital indices to express the utilization of hospital. [9,10] *Few indices of that were:*

1. Average Length of Stay(ALS) = H/(D+d) Total number of bed-days in a month = H; Functional beds × day in a calendar month. Number of discharges and deaths in the same month. In this study D = discharges, referred cases, LAMA (left against medical advice) and absconded.
2. Bed Occupancy Rate (BOR) = (N/B)×100 N = Total patient bed days in month; B = Total functional beds × days in calendar month.
3. Bed Turnover Rate (BTR) = (D+ d)/ B
4. Turnover Interval (TOI) = (B× days in a month) – H/ (D+d)
5. Abscond Rate = Number cases absconded in the month × 100/ Number of admissions in the month.
6. Referral Rate = Number cases referred in the month × 100/ Number of admissions in the month.
7. The Pabon Lasso method is used to analyze the hospital performance in four phases. This is a graphical method uses BOR, BTR and ALOS simultaneously.[11] The description of Pabon Lasso analysis is shown in the Fig. 1.

Fig.1. Description of the Pabon Lasso analysis.

Bed turnover Rate (BTR)	Bed Occupancy Rate(BOR)	
	Low BOR, High BTR Surplus beds capacity Unneeded hospital care Admitted for observation Many normal deliveries	Quadrant 3 High BOR, High BTR Less number of unused beds Better quantitative performance Low wastage in the system
	Quadrant 2 Low BOR, Low BTR Excess bed capacity Less hospitalization need Low demand and low utilization	Quadrant 4 High BOR, Low BTR High number of serious cases Predominance of chronic cases Elongated hospitalization

OBJECTIVES

1. To assess the performance of a teaching hospital during surveillance by calculating the hospital indices, using the Pabon Losso Model.
2. To evaluate whether the Hawthorne effect is the cause of the increase in the effectiveness of hospital.

METHODS

This was a prospective and record based cross-sectional study with a quantitative approach towards the data, which was sought to identify the use indicators to measure the performance of hospital. To identify different kinds of hospital indicators a review of literature was done. Google scholar, PubMed. Spinger Link, Elsevier, Proquest, Scopus, Emerald and Inter science were searched, with key words of performance indicators and hospital.

The study was carried out in a 500 bedded tertiary care teaching hospital. The data, daily census for the entire study period was collected from the medical record section and Nursing Superintendent Daily report. Data was collected in two stages. In the first stage a format was prepared, and to collect general data as total number of beds in each department, active bed-days, occupied bed-days, number of admissions, discharges, deaths, absconded, referred and leave against medical advices (LAMA). Data was entered into MS Excel 2016 and calculations was performed to derive the selected hospital bed utilization indices. To evaluate the performance of hospital during surveillance BOR, BTR and ALOS were plotted over the Pabon Lasso Model Graph. The study was approved by the institutional ethical committee.

RESULTS

A total of 18 months period census report was recorded from January 2016 to June 2017.This included, the 1st phase of surveillance (January- 2016 to May -2016), where immense supervision was present, with feed- back performance, 2nd phase of surveillance which was intensified with communication and committee meetings (June-2016 to October- 2016), 3rd phase weaning period, where a little supervision(November -2016 to February-2017) and 4th phase self sustain stage or no observation phase,(March 2017 to June - 2017),where the results were sustained and the daily performance was communicated to all departments through HIMS data portals. We analyzed 18 months performance in four phases, which are divided according to surveillance pattern. There were five hundred beds available in hospital with ten broad specialties, medical and allied departments, surgical and allied departments and obstetrics and gynecology. A total of 154423 patients were admitted from January 2016 to December 2016 and 81896 patients were admitted from January 2017 to June 2017. The number of patients admitted from January 2016 to May 2016 were 17255, discharges were 11306, absconds were 6049, and deaths were 329. The number of patients admitted from June 2016 to October 2016 were 17110, discharges were 10958, absconds were 6262, and deaths were 356.The number of patients admitted from November 2016 to February 2017 were 12634, discharges were 8731, absconds were 3789, and deaths were 305.The number of patients admitted from March 2017 to June 2017 were 16136, discharges were 10673, absconds were 5396, and deaths were 299.The number of patients admitted in last four months of surveillance was higher than previous phases of surveillance. The surveillance phases were shown in Table 1. There were five or four months in each phase, the results of each phase were condensed to average of months and enumerated and shown in the Table 1. Hospital census and selective indices were plotted in a graph and shown in the Fig 2 and Fig 4. Bed occupancy rate and deaths were increased from phase I to phase IV and shown in the Fig 3. BOR, BTR and ALOS plotted in the Pobon Lasso graph and shown in the Fig 5.

Table 1. Phase wise census and selective hospital indices.

	Admissions*	Discharges	Absconds	Absd. rate	Deaths	De. rate	BOR	ALOS	BTR	BTI
Phase 1	3451	2261	1210	34.992	65.8	1.87	88.65	3.932	7.074	0.54
Phase 2	3422	2191	1252	36.628	71.2	2.082	95.59	3.49	7.03	0.886
Phase 3	3151	2472	947	30	76.25	2.41	87.8	4.1	6.413	0.5725
Phase 4	4034	2668	1349	33.9	74.75	1.892	92.6	3.47	6.547	0.28

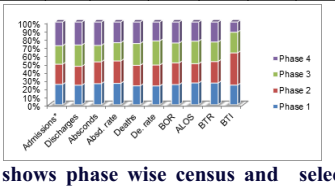

Fig 2. Graph shows phase wise census and selective hospital indices

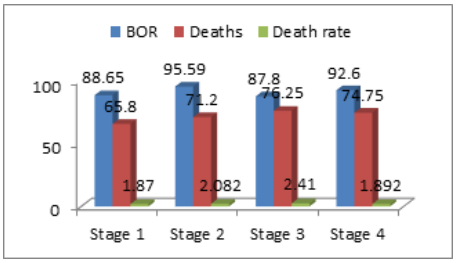

Fig 3. Graph shows BOR death and death rate.

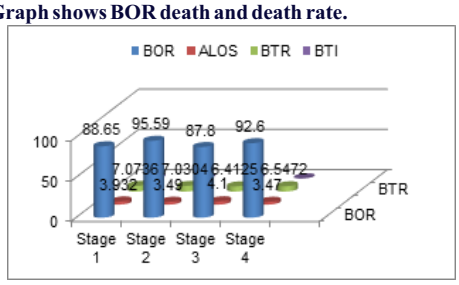

Fig 4. Graph shows selective hospital indices.

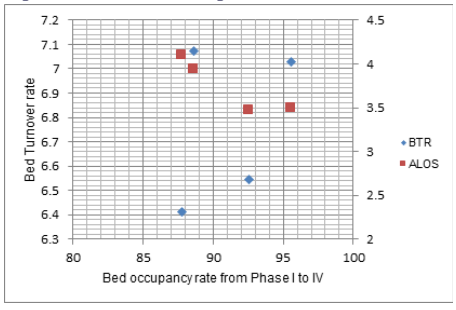

Fig 5. Pabon Lasso graph, BOR, BTR and ALOS plotted.

DISCUSSION

There are drastic changes witnessed in health care industry, like technology utilization, organization culture and community needs, due to above consequences the complexity and diversity is increased in health care. Today public hospital are changed to where they "characterized by more know, more to do, more to watch, and more people involved than ever before." To manage the complex requirements of a hospital requires an efficient Hospital Information System (HIS). HIS is defined as "The socio-technical subsystem of an enterprise, which consists of the information- processing activities and responsible human and mechanical components in their information – processing roles. HIS is characterized by "it should support information logistics with in a hospital (and with external monitoring agencies), making appropriate knowledge – at appropriate time – at appropriate location – the appropriate individuals – in an appropriate and usable form."[12]

ALOS reveals the clinical efficiency of doctors and the efficacy is identified by the ALOS and BOR of the hospital.[7]

An incisive analysis made by Miller et al.,(2014) suggested that "the Hawthorne effect is a powerful tool and that enhanced the behavior of emergency medicine physicians in performing Brain computed tomography as routine investigation, which was revealed by assessing hospital metrics.[2] Srigley et al.,(2014) describes the significance of Hawthorne effect in hand hygiene compliance monitoring. The hand hygiene practice rate were approximately three fold higher when observed by an auditor.[13]

Macefield (2007) stated that "the Hawthorne studies were all in longitudinal in nature that is, the idea was to improve the performance of some task over a period of time by participants and there is a relation between participants and the management. Hawthorne effect primarily concerned with efficiency, effectiveness and satisfaction of participants which can be measured by metrics in the organization.[14]

Smith et al., (2002) observed in their study the physicians and participants were altered, both the diagnosing and prescribing pattern for children with upper respiratory tract infections, merely as a result of

being observed and there was a tendency to improve their performance. The above study offered some insights of HE in health care settings.[15]

According to Tripathi et al.,(2016), Pabon Lasso model is an effective tool and is recommended to hospital management to analyze the performance of various units in the hospital and among hospitals and useful for health planners and policy makers in the decision making.[16]

To avoid erroneous conclusion according to the studies of Tripathi et al.,(2016), the Pabon Losso model has been applied to study the Hawthorne effect in the public hospital. Three performance indicators (BOR, ALOS, BTR), estimated and plotted in above graph to know the effectiveness of I to IV phases of surveillance. In the present study the BOR was increased from 88.65% (I phase) to 95.59%(II phase), the ALOS was declined from 3.932 days(I phase) to 3.49 days(II phase), the BTR also decreased from7.0736 (I phase) to 7.0304 (II phase). In II phase high BOR and high BTR implies that there was some improvement in performance and there less number of unused beds, enhanced in quantity, and less wastage of resources and system. In Phase III weaning period of surveillance BOR was 87.8%, where BOR was decreased, ALOS was increased to 4.1 and BTR further decreased to 6.4125, which occupies in quadrant 1(low BOR, low BTR)., where excess bed capacity was present, decreased referral from the peripheral hospital catchment area, caused the low utilization of hospital resources. In phase IV again BOR was escalated to 92.6%, ALOS further reduced to 3.47 days, BTR increased to 6.5472, which occupy the quadrant 3in Pabon Lasso model, again there was increase in performance, decreased in number of unused beds in hospital and less wastage of public hospital system. In our study the Hawthorne effect was clearly elucidated by estimating of hospital performance in various phases of surveillance.

CONCLUSION

The Hawthorne effect occurs when observation over the behavior of professionals in any organization, auditing or feedback also increases the efficiency, the surveillance increases the performance of the staff, whether by peer pressure or authoritative monitoring systems and controls. In future research, these findings may be validated with other departments or the systems in different settings. The compliance rates or performance indicators can determine the Hawthorne effect. To determine whether other factors like work pay, other special intensives, enhancing the environment ambience observation and surveillance increases the efficiency and performance of the health care organizations. Idealized influence and supervision over the public hospital and professionals has an impact on the performance of the public hospitals. It must be used in conjured way by the surveillance authorities to extract the performance. The improvised performance was more significant due to the Hawthorne effect. Collectively, the study indicates the Hawthorne effect has potential significant role over health care systems. It is an excellent phenomenon to conduct further research in various departments or units where immense supervision is required to execute quality service and the efficient outcomes for community. The study states that expanded surveillance in conjure manner by the college principal, medical superintendent and the head of the institution will enhance the performance of the public hospitals. Increase in quantity is the prior step to enhance the quality of services. Therefore, our study supports the argument that Hawthorne effect is visible in augmenting the sub-optimal performance to effectiveness in public hospitals.

Competing Interest: None **Financial Assistant** None
Ethical Considerations: Ethical issues have been completely observed by the author.

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