INFORMATION MANAGEMENT, KNOWLEDGE MANAGEMENT AND PERFORMANCE MEASUREMENT SYSTEM IN A CORPORATE HOSPITAL - AN MBNQA STUDY

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Abstract: *The Malcolm Baldrige framework is considered to be a robust framework consisting of reliable and standardized assessment criteria's. Whilst Malcolm Baldrige is awarded only to US organizations, it is increasingly used by various organizations for self-quality assessment and to help them in their Continuous Improvement program. For the purpose of this study, Category 4 of the Baldrige Health criteria is selected as this dimension is considered the "Brain Center" for alignment of an organization's health care, administrative, and clinical operations with its strategic objectives. Not only this, the dimension acts as a primary source of competitive advantage and productivity growth and low scores in this category adversely affect other categories of the Health criteria.*

This study is a descriptive study with a sample consisting of Managers / Department Heads and Key Administrative Executives in a corporate hospital in Bangalore. Aim of the study is to examine and score the system adopted by the hospital in selecting, gathering, analyzing, managing, and improving its data, information, and knowledge assets and also the management of its Information Technology and Performance Measurement System using the Baldrige Health Criteria and determine opportunities for improvement. The findings show that there is growing recognition among the hospital personnel (senior managerial level) about the importance and use of information systems as a critical resource and its effect on quality performance of the hospital. The hospital has scored 68.89 points, i.e. 62% of the total points allocated for Category 4 of the Baldrige Health criteria. Certain problems have been identified and to address this, several possible solutions for improvement were identified. Among them, promotion in education and training of hospital personnel (mainly Consultants) seems to be the biggest and most important factor which can bring organizational change and improvement and hopefully improve the quality performance of the hospital.

Key words: *Healthcare, Hospital, Information Management, Knowledge Management, Performance Measurement System, Information Systems, MBNQA, Malcolm Baldrige Health Criteria.*

Introduction and Literature Review

Health care industry is fast becoming a most important industry impacting everyone in the society.[1] Shortell and Kaluzny[2] have listed out some significant differences between healthcare delivery organizations and other industrial organizations. They indicated that work is "variable and complex". Not only this, increasing cost of healthcare is putting pressure on access and quality of healthcare delivery as explained by Blumenthal.[3] Further calls for increased accountability, because of high rates of medical errors, and globalization which leads to demands of higher standards of quality, are also putting pressures on healthcare delivery organizations.[4] There has been an outburst of activity in the measurement of healthcare performance seen in the last

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decade with the consumption of vast resources on tons of different systems of data collection, analysis and reporting and the development of thousands of indicators. Various Quality organizations have taken in charge prominent exercises to formulate, apply, and account the outcomes of performance indicators. Examples include the National Quality Forum, the Joint Commission International, the National Committee for Quality Assurance and, the Malcolm Baldrige Quality Award for Performance Excellence.[5] According to Shankar et al, "Performance measurement is not an end in itself, but a tool for more effective management." [6] Organizations which do not incorporate the ongoing performance measurement and feedback into their management development programs tend to show an inclination towards lower than expected performance improvements.[7] Performance Measurement Systems assesses the performance of hospital processes so that problems and improvements in those processes can be identified.[8] There is evidence that Performance Measurement improves health service delivery, or health outcomes.[9][10]

The quality in a healthcare organization is three dimensional: patient quality is the requirements or needs of patients; professional quality is the need of patients according to the conjectures of the professionals (outcome and process); and management quality is a couple of resources to deliver the wants and needs of the patients without wastes, errors or delay, and within the policy and legal regulation.[11] Concepts of total quality management (TQM) and continuous quality improvement (CQI) have taken a central role in the health care quality management.[12 - 15] Quality is an enterprise-wide venture irrespective of the size and strength of an Organization and needs to be considered as a continuous, unceasing improvement which brings about change in the structure of the organization and modifications in the realignment of its people. It is the responsibility of everyone in the organization to carry out Continuous quality improvement.[16]

There is a need for Health care organizations to improve their operations for multiple stakeholders and orchestrate integrated care. Various integrated quality management models can be employed to facilitate this. One such model is the Malcolm Baldrige National Quality Award (MBNQA) criteria. The Malcolm Baldrige National Quality Award commenced in 1988 to encourage Total Quality Management, as a progressively important overture for the improvement of the competitiveness of American companies. MBNQA criteria is an integrated model that handle quality management as an integral part of all professional and management affairs at all levels of an organization and is considered as the most widely accepted model of Total Quality Management. [17 - 19] The MBNQA process has long been acknowledged as an extraordinary means for all organizations to improve organizational performance and competitiveness in a global level. The healthcare sector is of primary interest to Baldrige program stakeholders and, since 2005, healthcare organizations have represented more than 50 percent of the applicants for the Baldrige Award.[20] The Baldrige National Quality Program has a very short history in the healthcare industry; however its criteria and values have significant application for any healthcare providing organization to achieve performance excellence in a period of increasing accountability and high expectation from both the public arena and the individual/patient perception.[21]

"The clinical professionals have generally looked with suspicion upon the technically

sophisticated tools for operational improvement".[22]

This statement portrays the status of quality performance, management of health care information, and IT infrastructure by clinical professionals in health care facilities. The information management system is a key performance area of Healthcare Quality management and it plays a critical role in improving quality performance.[23] Total Quality Management forms an integral part in information management which allows efficient capture of key measures and indicators which can be effectively used for performance improvement, innovation and decision making. For an organization to perform competitively , it must be proactive in its technological capability.[24] Within the configuration of any information-processing technology, what is important is the way in which information moves, is changed, is manipulated and presented so that it can be used in managing an organization.[25, p. 231] Both information technology and knowledge management can be perceived as strategic enablers of managerial and organizational cognition.[26] In particular, for firms that operate in the technology based arena and for those that find it difficult to stay afloat in the competitive marketplace, information is seen to be an important element to improve and enhance their innovation process.[27] According to Hsu et al., for a firm to stay competitive in the present global arena, it is essential that a firm know how to manage their information and knowledge.[28]

Today Information system needs to look beyond system building and there is a need to examine how they can increase the quality of their service and enhance the performance of the organization. Quality management relies on large amounts of information to evaluate the effectiveness of patient care, the efficiency of hospital operations, the appropriate use of resources and the degree to which the expectations of patients, physicians and other hospital customers are met.[29] While defining or measuring the effectiveness of the Information Systems function, there is also a need for Information Systems assessment for effective management and continuous improvement. [30]

Baldrige in Healthcare

Despite being described as a "badge of honor", the Malcolm Baldrige National Quality Award is much more than quality award for an organization.[31] [32] For many organizations, using the criteria results in better employee relations, higher productivity, greater customer satisfaction, increased market share and improved operating performance. Juran states that the MBNQA is a helpful model for getting into world class quality.[33]

Scope of the award was expanded to Healthcare in 1999 and in 2002, SSM Health Care became the first healthcare organization to receive the award.[34] As of 2011, fifteen Healthcare organizations had received the Baldrige Award. Out of the four organizations awarded in 2011, three were from healthcare, first year that three health care organizations have been selected at one time.[35] This shows that the Baldrige Criteria in healthcare is gaining more importance and Baldrige now enjoys more interest from health care than all other sectors of the US.

Whilst the award is only for US organizations, the criteria is being used by healthcare providers around the world as a quality benchmark and more and more healthcare organizations are adopting the criteria for self-assessment. Self-assessment can provide a simple method of independent and flexible assessment that can have powerful results.[36 - 39] An important factor in organizational assessments is the model

(or models) upon which the evaluation is based. An assessment model includes constructs which reflect aspects of organizational behavior, and among it all, at least one construct that reflects an outcome or "effectiveness" measure. Many managers consider the Baldrige Criteria merely as an accolade process; but in reality, most organizations that use the Baldrige Criteria never apply for an award (national or international level). Thousands of organizations utilize the Baldrige Criteria as a management model and/or assessment tool to estimate the maturity and effectiveness of their own management system. The criteria because of its robust design is being used by healthcare organizations as the standard for performance excellence and as a standard for scoring the Quality of its various processes and outcomes.[14]

A research by David A. Foster and Jean Chenoweth concluded that hospitals using the Baldrige process exhibit significantly higher rates of improvement in balanced organizational performance than non-Baldrige hospitals.[20] It was therefore judged that, for the purpose of this study, the MBNQA health care criteria would provide a good framework to analyze the quality management of a hospital in India. Similar studies have been carried out using the Baldrige framework.[13] For this study, Category 4 of the Baldrige criteria has been selected. The intent of this study is to explore the information management, performance measurement system and knowledge management of a Corporate Hospital in India using a Malcolm Baldrige framework and suggest recommendations for improvement.

This study is a form of self-assessment which assesses the quality performance of the case hospital using Category 4 (Measurement, Analysis of Information and Knowledge Management) of the Baldrige Health criteria.

Why Category 4 of Malcolm Baldrige?

Category 4 of the Health Care Criteria is worth 90 points of the total 1000 in the Baldrige scoring system (refer to Table1). Category 4 is divided into two items:

4.1 Measurement, Analysis, and Improvement of Organizational Performance, worth 45 points, and

4.2 Management of Information, Knowledge, and Information Technology, worth 45 points.

Here, the Baldrige process is concerned with examining an organizations' information management, knowledge management and performance measurement systems and how the organization analyzes its performance data and information. It is important to note that the focus of data analysis is on decision-making as this dimension examines the adequacy of the data and information to support quality-based decision-making. [40] This category is the "brain center" for the alignment of an organization's health care, administrative, and clinical operations with its strategic objectives. Central to such use of data and information are their quality and availability. As such certain areas like availability, accuracy, reliability, security and confidentiality of data and information, and the hardware-software properties and user friendliness of the organizations management system are explored in this study. Furthermore, since information, analysis, and knowledge management might themselves be primary sources of competitive advantage and productivity growth, this category also includes such strategic considerations as observed by Lee et al.[41] Mark Graham Brown describes Category 4 as a central part of a company's strategy and results. He points out that low scores in this category adversely affect other categories, particularly Category 7, Results, which is worth 450 out of 1000 points.[42]

This particular MBNQA criterion has been selected for the purpose of this study based on the findings of a similar study done in 2007 in an Indian hospital of similar profile. The study by Usha et al. concluded that among all the seven Baldrige Health categoriers, the case hospital can still improve its quality with regard to Category 4 of the Baldrige Criteria.[43] Not only this, the perception of the Hospital personnel towards information management, knowledge management and performance measurement system of the case hospital is also studied to gain an insight of the systems currently deployed in the hospital . Paul et al. suggests "Perception" acts as an effective measure to assess quality.[10]

Methodology

The study was carried out in a 250 bedded tertiary-care super specialty Corporate Hospital in Bangalore. All visits and interviews were conducted during June 25, 2012 and August 11, 2012. The hospital is equipped with state-of-the-art technology making it a powerhouse of healthcare in Bangalore. It is JCI certified/accredited, which is the gold standard accreditation for health care organizations around the world and is also in the forefront for adopting quality practices and their successful implementations.

The study design chosen for this research was descriptive study and was carried out in three phases-

Phase 1: Included the following steps-

- Pretesting of the Research Instrument (i.e. Questionnaire) using a small sample.
- Validating the Questionnaire and making appropriate changes suggested by the hospital personnel.

Phase 2: Included the following steps-

- Distribution of Questionnaires to Managers/ Departmental Heads and Key Administrative Executives of the case Hospital.
- Analysis of data collected (Questionnaire responses) for measuring the perception of the Management /Administrative personnel of the hospital.
- Scoring of quality performance of the "Measurement, Analysis of Information and Knowledge Management" of case hospital using the Baldrige Health criteria.

Phase 3: Also called "Interview phase", it included the following steps-

- Interviewing key personnel of the case hospital (only individuals who responded to Questionnaire) to validate the MBNQA points scored by hospital.
- Identifying and determining opportunities for improvement during interaction with the interviewees.

Data for the study was primary data collected using a Questionnaire. For Phase 3 of the study, a semi-structured Interview Schedule was used. The Questionnaire was based on Category 4 (Measurement, Analysis and Knowledge Management) of the Baldrige Health Criteria and consisted of 21 questions/statements with a five-point Likert scale ranging from 1-5 (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree). The Questionnaires were distributed personally to every personnel after describing the purpose of study. This was done to achieve 100% response rate. Questions included in the Questionnaire have been validated for reliability during Phase 1 of the study.

The semi-structured interview schedule consisted of questions which were general in nature and the interviewer had the flexibility to ask further questions based on the replies. As the interviews progressed, specific topics were addressed to a greater extent to obtain qualitative information. Each interview session took an average of about twenty to thirty minutes.

Sampling

Sampling technique used for the study was Purposive Sampling. Here, only the Managers/Departmental Heads and Administrative Executives of the case hospital were found to be appropriate and hence they were selected. The rationale being - Category 4 of the Baldrige Health Criteria deals with chapters/sections specific to only policy makers and individuals involved in the decision making process. The sample size of the study was 36 which included 26 managers/ departmental heads and 10 key administrative executives. These are people responsible for guidance, implementation of quality initiatives and achievement of results. A breakdown of the sample is given in the Table below-

Table 1 : Sample breakdown

	Designation	N	%
Managers	Director/ Head of Department	6	73
	Senior Manager	9	
	Senior Consultant	11	
Administrative Executives	Operations	8	27
	IT	2	
Total		36	100

Respondent Demographics: Of the 36 Questionnaires distributed, 36 were obtained in complete therefore 100% response rate was achieved. Directors/ Heads of Departments/ Senior Managers consisted of non-clinical departments like - Human Resources, Healthcare Services, IT, Medical Records Department, Materials, Finance & Accounts, Operations, Medical Services and Marketing. Senior Consultants were from the major clinical functional levels of Accident & Emergency, Operation Theatre, Laboratory Services, Nursing, Pharmacy, Radiology and Physiotherapy. Administrative Executives included key personnel from Operations and IT.

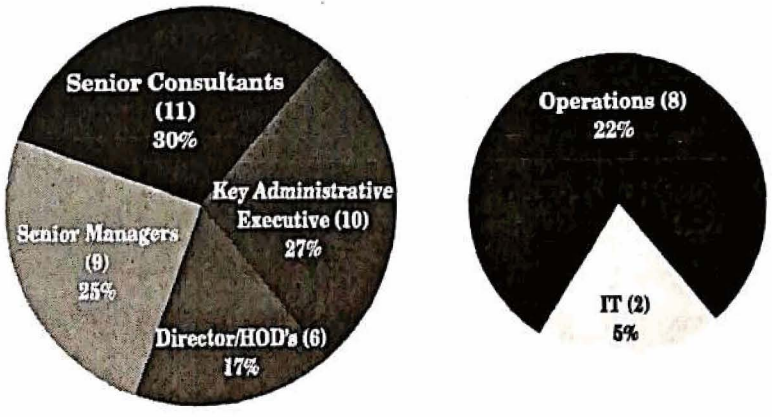


Figure 1 : Respondent Demographics

Of the 36 respondents, males were majority with a total of 24 while there were 12 females. 18 individuals had a work experience of below 5 years and the remaining 18 had work experience of over 5 years. There were 25 managerial personnel (non-medical) and 11 medical personnel.

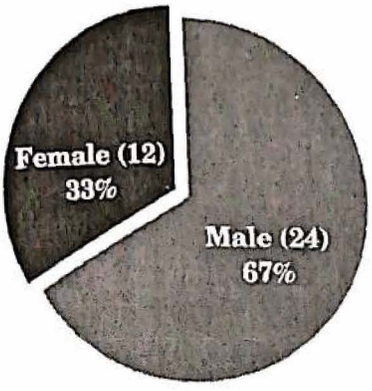


Figure 2 : Respondent Demographics (Gender)

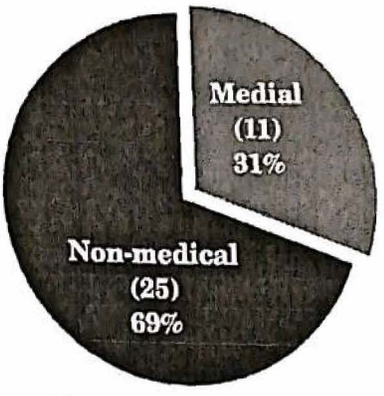


Figure 4: Respondent Demographics (Experience)

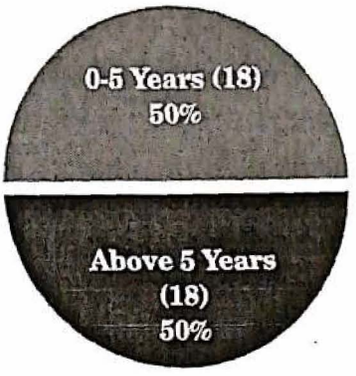


Figure 3: Respondent Demographics (Work)

Phase 3

For Interview Phase of the study, a total of seven people were interviewed. This included General Manager, IT Head, Human Resource Manager, Learning and Development Manager, Director of Operations, Quality Manager and Senior Operations Executive.

Results

Phase 1

For the purpose of testing the reliability and validity of the research instrument, questionnaires were distributed to 10 hospital personnel who satisfied the sampling criteria. All the questionnaires were obtained in complete and feedback was obtained during collection. No serious fault was found with the instrument and reliability was tested using Cronbach's Alpha. Nunnaly claims that for a questionnaire to be reliable, value of Cronbach alpha should fall in the range of 0.75 to 0.83 with at least one claiming a Cronbach alpha above 0.90.[44] All analysis was done using IBM® SPSS® Statistics v.20.

Table 2 : Reliability Statistics

Section	No. of Items	Cronbach's Alpha
Performance Measurement	5	0.83
Performance Analysis and Review	2	0.82
Performance Improvement	5	0.97
Data, Information and Knowledge Management	7	0.75
Management of Information resources and Technology	2	0.94

As shown in Table 2, Cronbach alpha value for the first section was found to be 0.83, second section was found to be **0.83,** third section was found to be **0.97,** fourth section was found to be **0.75,** and fifth section was found to be **0.94.** Therefore, the Questionnaire was found to be reliable as the Cronbach alpha value for all the sections fall between 0.75 to 0.83 with at least one claiming a Cronbach alpha above 0.90. After testing and proving the Questionnaire to be reliable, questionnaires were handed out to the remaining 26 respondents.

Phase 2

To understand and measure the perceptions of the Management/Administrative personnel of case Hospital, all respondents were grouped into three groups based on- Gender, Work and Experience.

a) **Gender:** Under this, the hospital personnel were grouped into males and females.

b) **Work :** Under this, the hospital personnel were grouped into medical and non-medical staff. Medical staff consisted of Senior Consultants who were the heads of various functional clinical departments. Non-medical staff consisted of managerial and administrative personnel.

c) **Experience :** Under this, the hospital personnel were grouped based on their work experience in the case hospital (0-5 years and 0-10 years)

A research question was formulated to measure the perception of the hospital personnel –

Question - *Is there any significant difference in the perception with respect to "Performance Measurement, Analysis and Improvement; Data, Information and Knowledge Management; and Management of Information resources and Technology" between males and females, medical and non-medical personnel of the hospital and among hospital personnel with varying work experience?*

To address this question, analysis was carried out using Student's t-test. The test assesses whether the means of two groups are statistically different from each other

Group 1 : GENDER

Table 3: Mean and Std. Deviation between males and females

Sections in Category 4 of Baldrige Health Criteria	Gender	N	Mean	Std. Deviation	t	DF	p
Performance Measurement, Analysis and Improvement	Male	24	46.38	7.35	0.131	34	0.896
	Female	12	46	9.40			
Data, Information and Knowledge Management	Male	24	26.71	3.08	0.162	34	0.872
	Female	12	26.50	4.56			
Management of Information resources and Technology	Male	24	7.75	1.54	0.291	34	0.773
	Female	12	7.5833	1.78			

Group 2 : WORK

Table 4 : Mean and Std. Deviation between medical and non- medical personnel

Sections in Category 4 of Baldrige Health Criteria	Work	N	Mean	Std. Deviation	t	DF	p
Performance Measurement, Analysis and Improvement	Medical	11	45.73	9.28	0.258	34	0.798
	Non- Medical	25	46.48	7.49			
Data, Information and Knowledge Management	Medical	11	26	3.69	0.705	34	0.485
	Non- Medical	25	26.92	3.57			
Management of Information resources and Technology	Medical	11	7.45	1.86	0.591	34	0.558
	Non- Medical	.25	7.80	1.50			

Group 3 : EXPERIENCE

Table 5: Mean and Std. Deviation with respect to work experience

Sectionsin Category 4 of Baldrige Health Criteria	Experience	N	Mean	Std. Deviation	t	DF	p
Performance Measurement, Analysis and Improvement	Below 5 years	18	44.39	7.67	1.424	34	0.163
	Above 5 years	18	48.11	8			
Data, Information and Knowledge Management	Below5 years	18	25.78	2.88	1.467	34	0.152
	Above 5 years	18	27.50	4.06			
Management of Information resources and Technology	Below 5 years	18	7.72	1.74	0.103	34	0.919
	Above 5 years	18	7.67	1.49			

Result:

From the above analysis of Group 1, Group 2 and Group 3 using Student's t-test; it has been found that there was no significant difference in the mean scores between males and females, medical and non-medical personnel of the hospital and among hospital personnel with varying work experience. Hence, all hospital personnel perceive the measures taken by the hospital for "Performance Measurement, Analysis and Improvement; Data, Information and Knowledge Management; and Management of Information resources and Technology" are adequate and efficient ($p > 0.05$).

Furthermore, for purpose of scoring the quality performance of case hospital, the formula shown below was used

MBNQA points for hospital = $R/N \times Max$ *MBNQA points*

This formula has been used in several studies. [43] Here, respondents' ratings were averaged for each sub criteria (R) of MBNQA. The average rating was converted to MBNQA points with reference to its maximum points. And also the data has been collected using a Likert scale based Questionnaire having a scale range of 1-5, with 1 being "Strongly Disagree" and 5 being "Strongly Agree", so N is taken as 5 based on the scale range. Finally, MBNQA points for each sub criteria (5 in this case) were added to give the total MBNQA points for the hospital.

Therefore, MBNQA points for hospital = R/N × Max MBNQA points

Where, R = average score for each sub criteria (ratings from all respondents were considered).

N = Scale range used in the Questionnaire for scoring (in this case, 5) and Max MBNQA points = 90

Table 6 : MBNQA points scored

Baldrige Criteria category	Average score for each sub criteria (R)	Maximum MBNQA points	MBNQA points for Hospital
Measurement, Analysis and Knowledge Management		90	68.89
a) Performance Measurement	3.89	18	14
b) Performance Analysis and Review	3.76	18	13.53
c) Performance Improvement	3.85	18	13.86
d) Data Information and Knowledge Management	3.80	18	13.68
e) Management of Information resources and Technology	3.84	18	13.82

Based on the data collected, the hospital was found to have scored **68.89 points (62%)** out of the total **90 points** for this particular Category of Malcolm Baldrige i.e. "Measurement, Analysis and Knowledge Management". In addition, the hospital scored 77.78% of the score of "Performance Measurement", 75.16% of the score of "Performance Analysis and Review", 77% of the score of "Performance Improvement", 76% of the score of "Data, Information and Knowledge Management" and 76.78% of the score of "Management of Information Resources and Technology". Even though the scoring is good, the hospital can still do better as there is always room for improvement.

Finally, since Phase 3 of the study is concerned with interviewing the hospital personnel, no statistical analysis has been done.

Discussion and Recommendations

The MBNQA points obtained by the case hospital shows that the hospital has a fairly comprehensive system to gather and integrate information for strategic decision making and innovation. There are processes in place to manage the dispersion of relevant information. This information may be to-suppliers, customers, staff and partners. The hospital has in place systematic, responsive and effective approaches to select, align and integrate data. Data is collected and tracked on organizational performance indicators such as- finance, HR, social responsibility, operations and customer satisfaction. Data are also used for accurate view of healthcare service competitors and to determine and create projections and scenario planning to aid in identifying potential future needs and outcomes.

The change cycle is always running in the hospital and this is backed up by a strong, fact based evaluation and improvement process. The hospital believes in continuous improvement and there is evidence of refinement and improvement at all levels. Benchmarking is also against the best in class, with the focus on key improvement indicators. The hospital takes consumer/patient feedback very seriously and changing patient needs are fully integrated into processes. This is evident as patient feedback has prompted the hospital to set various processes right.

The hospital has processes for identifying and assessing new technologies that identify additional resources that can strengthen

competitive advantage. Top management considers IT as a crucial department and is very supportive. Senior leaders are also pushing towards implementation of all IT enabled services. The hospital regularly keeps a track on the hardware and software to ensure their reliability and to make sure they meet current healthcare needs. Hardware and software is upgraded as and when required.

During the interview session, several problems were identified which impacted the quality performance of the hospital. They are-

1) There was difficulty in accessing interdepartmental information. This may be because of information ownership and resistance for sharing. Also, interdepartmental best practices are also not being openly shared which shows a serious lack in the Knowledge Management system.

2) Data are also often insufficient for decision making. This may be because process data are not fully captured which suggests loopholes in the data capture system or, HIS (Hospital Information System) does not have the necessary search fields which suggests needed data is captured but no process exists to retrieve this needed data.

3) There were also instances where hospital personnel were unaware of what information is already available in the system.

4) Information System (IS) of hospital is also not being fully utilized. It was learned that only 70% of the total IS capability is being utilized. This non-utilization may be because of various reasons like:

   - Mindset of Consultants- This proved to be the major reason for non-utilization of the IS. Most consultants are more into the pen-paper approach and don't have the time to input information into the system. It was also learned that this mindset problem was more apparent with senior consultants rather than junior consultants.
   - User friendliness- Some end users may find the system interface user friendly enough while others may find it complex and hard to navigate. This brings down the willingness of hospital personnel to use the systems available.
   - There may be difference in end-user expectations.

To address these, various recommendations which will result in possible improvements can be -

1) **Promotion in education and Human Resources** - This is the most important factor which can bring change and improvement to the system. For example, more inter-departmental seminars, where knowledge can be shared, should be conducted on a regular basis. Most hospital personnel agree that the most valuable information in an organization still walks out the door when senior employees/consultants retire. This can be avoided by conducting knowledge transfer classes where knowledge and expertise of senior personnel can be transferred to other individuals. The importance of IT in healthcare should also be communicated to the hospital personnel and they should be trained to utilize and efficiently use the already existing IS to its full potential.

2) **Inter departmental best practices should be shared** - Sharing of information, be it best practices, should be efficiently carried out within the organization. Not only will it help the organization in its continuous improvement programmes but also inter departmental transparency will help boost the morale of the employees. It has been learned that projects done by previous trainees/managers are not being openly shared. This creates a negative impression on managers who are in search of this information. Also, employees should understand the importance and necessity of information sharing.

3) **Efficient use of Information System capacities** - The hospital has a robust IS in place but non-usage amounting to 30% of the total IS capability shows a negative picture. A simple way of overcoming this is by training hospital personnel (mainly Consultants) to use the system. Various advantages of using the system should also be communicated. These may be personal advantages or advantages for the organization as a whole.

4) **Data bank for decision makers** - A central data bank needs to be established to which decision makers can have easy access to. This data bank (or database) should contain all the important and strategic information which the decision makers require at any point of time to help them make necessary decisions or formulate action plans.

5) **Easier data accessibility** - Data accessibility should be made easier and less complicated. A way of doing this is by minimizing and removing unnecessary steps in the system interface. All hospital personnel should be briefed on how to access data they require.

Conclusion

Information Technology plays a crucial role in the quality performance of any organization. This study was conducted not to study in detail the systems deployed by the hospital but to access and understand the role of the Hospital Information System which supports the Performance Measurement and Knowledge Management systems/processes by supplying quality data and information and also to know how these data are being effectively used for supporting strategic decision making. Analysis of the responses obtained from the questionnaires suggests that there is a growing recognition among the hospital personnel (senior managerial level) about the importance and use of information systems as a critical resource and its effect on quality performance of the hospital. The studied hospital has taken appropriate and adequate measures in infrastructure development by establishing a robust Information System which captures appropriate data and supplies needed quality data and information to its decision makers and various stakeholders. The MBNQA points scored by the hospital is good but for a hospital of this stature, more can be expected. This shows there is room for improvement. Among the recommendations made, promotion in education and training of hospital personnel (mainly Consultants) seems to be the biggest and most important factor which can bring organizational change and improvement and hopefully improve the quality performance of the hospital.

This study expresses the robustness of the, already widely accepted, Baldrige Health Criteria and shows how an effective self-assessment tool it is for healthcare organizations. The criteria and its framework can be used as the standard for

performance excellence and as a standard for scoring the Quality of healthcare processes and outcomes.

Limitation and Future Work

There was no system intervention as such the system and processes could not be studied in detail due to time constraints and privacy issues. As a result, comments about the systems and processes in place may not be considered as conclusive enough and it is recommended that a more detailed study be carried out. Comments about the systems/processes highlighted in the study have been obtained during interaction with key hospital personnel.

This study can be considered as a form of self-assessment for the hospital using Category 4 of the Malcolm Baldrige health criteria. Similar studies can be carried out using the remaining six categories of the Health Criteria so that the hospital can score its own quality performance, identify problems and plan necessary actions for improvement.

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