



## Quality & Cost of Healthcare: An Indian View of Quality through Hospitals

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**Abstract:** *With recent progresses in healthcare, quality has become a apposite issue. As the necessitate for healthcare is rapidly developing with increasing universe base and increasing levels of affordability, so is the demand for quality healthcare services. Victor quality of medical care is often linked with higher costs of hospitalization. This paper undertakes to explore the relationship between quality of medical care services and the cost of hospitalization throughout hospitals in India. The findings have pointed a strong positive association between the cost of hospital care and infrastructure, while a negative association was observed between staff to patient ratios. Though both these arguments affect and contribute to superior quality of care their impact of cost of hospitalization differs significantly.*

**Key Words:** *Quality of Medical Care, Cost of healthcare, Average cost of hospitalization, Quality indicators, Indian Health System, Accreditation in India*

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### 1.0. Prelude

Quickly rising cost in healthcare is an altering cause of concern across the world. Indian healthcare also knows a change, with changing focus on better quality of medical care services. With a large section of healthcare practitioners in the private sector, the government has realized the need to meliorate medical care services and has stepped in to regulate the quality of medical care services by introduction of various quality accreditation norms like the NABH and NABL. As per available information (Care Continuum, 2005), the healthcare spending per capita per annum in India was about \$109, with total healthcare spending in the range of 4.9% of the country's GDP. Most of the spending occurs from the private sector with public sector contributing to a mere \$ 19 per capita per annum. Concurrently, the average spending per capita per annum in the United States during the same time frame was approximately \$4271 whilst United Kingdom the spending was \$ 1675. These figures clearly indicate that healthcare in India is fairly cheaper, a strong reason for a growing medical tourism market in the country. However, when compared with paying power parity and affordability, the cost of medical care is escalating. It is worthwhile to note that as per World Bank (2005) estimates more than 44% of Indian population earns less than one dollar a day. As per the Finance Ministry, the overall inflation rate in India was about 9.4 percent during April- December 2010, while inflation in medical expenses was in excess of 10 percent for the fourth year in a row (Business Today, 2011). There are several other factors that have been contributing to the escalation in cost of medical care. These factors include increasing demand for medical care services with consistently limited supply, increased penetration of health insurance, improvement in medical technology with new innovations improving diagnostic capabilities and increasing dependence of doctors on diagnostic procedures. Increasing demand for quality in medical care services plays a critical role in increasing the overall cost of medical care services. While empirical evidence suggests that there is an increasing demand for healthcare services across India, affordability remains a pertinent issue. This has resulted in market segmentation (Shah, Mohanty, 2010), where on one hand there is an increasing demand for quality medical care services while on the other hand there is a demand for medical care services at affordable cost. The demand for the latter has inevitably resulted in poor quality of medical care services with poor health outcomes. It is simple to compute the direct costs for various medical services, however to compute the cost of quality is not only difficult but rather elusive, which has resulted in over dependence on subjective criterions (Klint, Long, 1989). Various modalities like manpower ratios, infrastructure, medical technological capabilities, accreditation and quality assurance policies and mortality rates, have been considered as quality indicators and have been used to evaluate the quality of healthcare services. The paper attempts to explore the implication of these quality indicators on the direct expenses incurred by patients whilst seek healthcare services across India.

### 2.0. Understanding Quality in Healthcare: Components of Quality

Quality in healthcare (Gyani, 2010) may comprise of newer technology, newer and effective medication, higher staff to patient ratios, affordability, efficiency and effectiveness of healthcare delivery. Quality as defined by the Institute of Medicine, USA, is *'The degree to which health services for individuals and populations increase the likelihood of*

*desired health outcomes and are consistent with current professional knowledge.'*

Conceptually, Quality refers to any intervention made to improve the health outcome in totality. At a macro-level, quality for health systems comprises of six building blocks namely healthcare services, healthcare workforce, Healthcare Information System, Technology and Medications, Healthcare financing and Leadership and Governance (WHO, 2007). Though the sequence in terms of priorities may change, these building blocks are also essential at micro-level to have a pertinent impact on the overall healthcare outcomes.

For a hospital or a healthcare institution, it is imperative to understand the components which can influence the overall quality of medical care services. Quality hence can be understood based on their overall implication on health outcomes of the patients. The various components that impact the health outcomes and thereby influence quality include,

1. Comprehensive and integrated services, based on the demand, with adequate infrastructure and logistics. Building, equipments, water supply, sanitation, power, etc play a crucial role and considerably influence quality of medical care.
  2. Manpower skills, knowledge, qualification, technical knowhow, training and their availability is also critical for improving the healthcare outcomes and hence enhancing quality.
  3. An information system helps retrieve data and information easily and also aids in planning for expansion and need based requirement of the population. Quality is affected by the nature and comprehensiveness of the information system, which helps identify existing lacunae and take corrective action.
  4. Availability of safe and effective drugs, technology and medications directly impact on the health outcome and should be considered as an integral part of quality
  5. Accountability improves health outcomes and hence enhances quality. Effective and efficient governance is a cornerstone to ensure quality medical care services
  6. Finally, cost effectiveness plays a crucial role. Quality can be acceptable only if it affordable for the general population.
- Though the aforementioned parameters have direct impact on health outcomes, it is difficult to measure their influence on quality of medical care. It is vital to convert these parameters into specific indicators, which can be used to define and measure quality more rationally.

### **3.0. Defining the Quality Indicators: Literature Review**

In healthcare, health outcomes play a crucial role in determining quality. However, the importance of customer experience and customer delight can't be underestimated. Hospitals and Healthcare institutions have consistently focused on improving the patients experience and providing services in timely and orderly fashion. However it is often difficult to rate the quality of services (both clinical and non clinical), using similar indicators.

Healthcare providers often use patient satisfaction surveys to understand the lacunae in quality of care provided and identify critical areas of improvement. Patient satisfaction surveys can be used to measure the quality of services from the prospective of subjective opinion of the patients/beneficiaries. As per a study conducted in Taiwan (Cheng, et al 2001), it was concluded that patients lack the ability to judge the quality of care in healthcare institutions are in general lack awareness regarding the various quality indicators. The study indicated that patients are not able to rate the infrastructural and technological capabilities of the institution or the technical competences of their physicians or medical staff.

A healthcare institution hence has to depend on various objective parameters to ascertain quality. For the purpose of this research, some quality indicators have been identified, which have been presumed to be directly linked with the ability of the institution to provide quality medical care services. Relevant literature review to support these views has also been provided.

- **Asset value:** Asset value is indicative of the medical technology along with the other infrastructural amenities like elevators, air conditioning units, fire fighting services, etc. These services will implicate the overall quality of medical care as it directly impacts on patient safety, infection control rates and ability of the institution to provide critical care services, etc. In a study conducted in Mexico (Aguilera, Marrufo, 2007), it was observed that the infrastructure of the hospital determines the mortality rate among its beneficiaries. In another study conducted across 87 hospitals in Massachusetts (Levitt,1994), a clear positive correlation between the investment in plant, machinery and property was observed with the quality of care and patient outcomes. **Manpower ratios:** Hospitals and healthcare institutions are human resource intensive units. Higher nurse to bed and higher staff to bed ratio are indicative of reduced burden on the staff, which in turn directly enhances their ability to pay greater attention to details of patient care. In a study conducted (Grujic, et al, 1989) it was observed that the educational qualification, attitude and behavior of the staff impacted their overall ability to provide medical services and fulfilling patient expectations. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) found that staffing levels have been a factor in 24% of sentinel adverse events that resulted in death, injury, or permanent loss of function (SHS, 2005). Another research study conducted in the United States (Rothberg et al, 2005) indicated that a ratio of 8 patients to one nurse was least expensive but associated with highest patient mortality and the effectiveness of the staff increased with improvement in the ratio. These studies reiterate the importance of better staff to patient ratios and their significance in enhancing quality of medical care.

- Accreditations and quality assurance systems: There are various accreditations and quality assurance systems presently available. These accreditation and quality assurance systems help organizations to streamline their processes, provide timely services and thereby enhance patient outcomes. Evidence from JCI (JCI, nd) has indicated that accreditation tends to help enhance the overall quality of patient care services, based on select case studies from across the globe. Unfortunately there is little documented evidence about the effectiveness of NABH in improving patient outcomes and quality.
- Mortality Rate: Though this research study has not been able to evaluate the quality of medical care based on this parameter due to ethical issues, standardized mortality rates are used as a parameter to evaluate quality by many. However, there is considerable opposition to this concept and standardized mortality rate is considered a bad parameter to judge quality of medical care (Pronovost, 2010). Though risk adjustment is aimed at standardizing the mortality rate and identifies the preventable deaths, it still has several limitations. Patient Experience: In the era of consumerism, the role of patient experience is undisputed and impacts the assessment of total quality of medical care. Timely service provision, promptly addressing patient grievances, etc play a crucial role in the impression the hospital management creates on patients and thereby influences the perception of the patient about the overall healthcare services provided by the institution (Cleary, 1999). However the use of patient satisfaction should be ideally limited to a few parameters aimed at enhancing patient experience.

#### **4.0. Expenditure on Medical Care: Does quality impact cost?**

A hospital which rates high in its performance of the quality indicators can be improve patient outcomes, which would explicitly affect the quality of healthcare services. Evidence from across the globe indicates that improvement in healthcare has direct relationship with the resources diverted for healthcare services. **Table1. Per capita Expenditure on Healthcare Vs Key Health Indicators**, provides an overview of the performance of various health systems across the globe.

**Table1.** indicates that the expenditure on healthcare has a direct impact on the outcomes, using life expectancy and infant mortality rates, as a measure of quality of a health system. However this doesn't imply that quality comes at a cost. **Figure1. Life Expectancy Vs Spending on Healthcare Globally**, explains why?

It can be observed in **Figure 1.** that with a life expectancy of 76.9 years, Cuba ranks 28<sup>th</sup> in the world, just behind the US. However, its spending per person on health care is one of the lowest in the world, at \$186, or about 1/25 the spending of the United States. The countries ability to utilize its resources optimally determines its ability to improve its health outcomes.

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Then can better health outcomes (and overall quality of medical care) be improved without increasing the healthcare expenditure? For a nation, the answer lies in its ability to optimally utilize its resources and maximize the outcomes. The role of public sector and government in enhancing health outcomes of its population is crucial. Provisions for safe drinking water, health awareness, sanitation, availability of essential drugs, etc are public goods, which need to be provided by the government.

Private sector in India has evolved primarily due to lack of the State to provide some of the basic services to its population. Quality has often been considered to be one of the crucial aspects governing the higher utilization of private sector institution; however it is not always the case (Shah, Mohanty, 2010). Private Sector is often driven by profit orientation and hence, over utilization of private sector in India can be assumed to be one of the reasons for increasing cost of medical care services in India. Role of quality in escalating medical cost remains debatable.

#### **5.0. Methodology and Study Design**

This research paper aims at understanding the implication of the quality (as derived from the various quality indicators identified above) on the direct cost incurred to purchase medical care services. This paper compares the data from various hospitals across India, to appreciate and ascertain if higher quality of care is associated with higher patient bills.

A review of discrete primary data collected between 2009-11, from twelve different private sector hospitals from across India, was used to understand the implication of quality on cost of medical care. The hospitals were categorized as Tertiary care hospitals (n=3), Multispecialty Hospitals (n=4) and secondary care hospitals (n= 5), depending upon the service mix and focus areas. The focus areas of the various categories of hospitals included,

- Tertiary care Hospitals- Cardiac care, Neurology, Gastro-entriology, Oncology and Advanced Trauma rehabilitation.
- Multi Specialty Hospitals- Ophthalmology, Orthopedics, Nephrology, ENT, Respiratory Medicine, etc.
- Secondary care hospitals and Nursing Homes primarily focusing on Gynecology, Obstetrics, General Medicine, General Surgery, General Medicine and Pediatrics

It should be noted that the list of services provided above was not exclusive, but indicative of the level of advanced specialty services provided by the hospital. Tertiary care hospitals and Multi-specialty hospitals, surveyed in the study, provided the secondary care services, in addition to the aforementioned services.

### **5.1. Analysis Considerations**

The average cost of hospitalization, for these institutions was evaluated against the various quality indicators, to identify an association between cost of medical care services and quality standards. The average cost of hospitalization only included the direct expenditure incurred by the patient and didn't include other tangible and non tangible costs like income lost due to sickness, travel expenditures, etc.

The average cost of hospitalization was computed based on the revenue generated by the hospital, over a period of preceding six months, since individual patient bills could not be evaluated. Revenue generated by the hospital is indicative of the expenditure made by the patients; however the components of total hospital revenue were different in different hospitals. Some hospitals (in the survey sample), provided support services like canteen and pharmacy in-house while others have outsourced the services and don't reflect in the direct revenue of the hospital. In such situations, the pharmacy and canteen sales were incorporated separately to provide a comparative estimate

No separate patient satisfaction surveys were conducted. Already existing data from the same time frame was collected, codified and the comments were categories to reflect patient opinion about specific parameters.

### **5.2 Limitations of the Study design**

1. Fifteen different hospitals of different bed capacities, different facility and service mix were evaluated. It should be noted that perception of quality is affected by a wide range of factors including purchasing power parity, educational status and awareness of the population and general healthcare trends in the region. The selected hospitals were located in different regions (Mumbai, Kolkotta and Delhi). These inherent differences in the population dynamics could have acted as confounding variables in the analysis of the study. Internal comparison was made to provide a realistic picture; but considering the small sample size for internal comparison, the findings could not be substantiated.
2. No data regarding the mortality rates was shared and hence it could not be used to evaluate the quality of healthcare services with specific reference to patient outcomes.

## **6.0. Findings of the Study**

The direct cost of healthcare services (in terms of average cost of hospitalization per bed per day) was evaluated against the various quality indicators described in section.3, which have been associated with quality of medical care services. This was aimed at understanding the overall implication of cost of quality of healthcare services.

### **6.1. Asset Value and Impact on Direct Cost of Hospitalization**

Literature Review shows that the Asset value of a healthcare institution is directly related to the healthcare outcomes, which higher asset value associated with better quality of care.

The asset value in terms of medical equipment technology varies primarily due to variation in the installed infrastructure capacity of the healthcare institution. A secondary care hospital has limited diagnostic and imaging services (like CT scan, MRI, Immunoassay, etc), which in turn affects the ability of the physician to diagnose and treat the patient appropriately. Further, equipments and technology, like a well equipped Intensive care unit improved the chances of patient survival (Lee, 2009). This directly impacts the overall outcome and thereby has an implication on quality of medical care. The cost of infrastructure includes various aspects like evidenced based design of the hospital, hospital ambiance, furniture and finishing of the facility. It also is indicative in terms of availability of various amenities like clean drinking water, toilet facilities, etc.

Also operating costs for these institutions may vary considerably depending upon the infrastructure. In institutions with a centralized chiller plant the average consumption of energy per bed per day was observed to be approximately 80 units, whereas in institutions without a centralized unit, the average energy consumption per bed per day was as low as 25 units. A centralized unit plays a crucial role in enhancing patient experience and providing comfort but also plays a crucial role in controlling the infection rates (Desai, 2002), which in turn has a direct impact on the outcome and quality of care.

**Table 2: Indicative Asset Value Vs Av Revenue per bed (n=12)** provides average estimates for the cost of infrastructure and the average cost per hospitalization in the hospitals. While considering the estimated cost of medical technology, estimates were based on the audited financial sheets of the hospital, which included depreciation of older equipments. Pearson Liner correlation coefficient for the cost of infrastructure verses the average cost of hospitalization was  $R=0.975$ . **Figure 2: Relation of Asset Value with Cost of Hospitalization (n=12)**, shows that higher asset values were linked with higher cost of hospitalization.

Asset value of a healthcare institution is considered as a quality indicator and higher asset value is strongly associated with better quality of care. The findings of this study indicate that cost of hospitalization increases with the overall asset value of the healthcare institution.

### **6.2. Manpower Ratios and Direct Cost of Hospitalization**

The deployed manpower at different facilities varies depending upon the complexity of the medical care services provided. Though some studies in the United States (Needleman et al, 2002) have shown that staffing can't be considered as a measure of quality of care, evidence for other studies indicates staffing affects morbidity patterns of hospitals and hence is crucial measure of quality. For the purpose of this study, we have assumed that staffing plays a strong role in quality of medical care, however comparing staffing parameters across different hospitals with different facility matrix may not provide a rational and

realistic picture. Hence this assessment has to be based on internal comparison of the three categories of hospitals covered in the survey. The relationship is presented in the **Figure 3 Nurse to bed ratio versus average cost of hospitalization per bed per day**

The Figure.3 clearly depicts that the average cost of hospitalization per bed per day is related to Nurse to bed ratio. Pearson Liner correlation coefficient for secondary care hospitals was -0.15, for multispecialty hospitals was -0.19 and for tertiary care hospitals was -0.5.

Different studies have indicated that higher Nurse to patient ratios reduce hospitalization stay, which impact the cost of care (Amaravadi et al., 2000 and Cho et al., 2003). Though these studies have computed cost of hospitalization in terms of reduction of average length of stay, the reduced requirement for intensive care also reduces the cost of hospitalization significantly. This reiterates the findings of this study which observed a negative correlation between nurse to bed ratio and the average cost of hospitalization. Negative correlation was also observed when staffs to patient ratios were compared with cost of hospitalization. This implies that higher patient to nurse/staff ratio, tend to reduce the hospitalization cost, while enhancing quality of medical care services.

While evaluating the manpower deployed in healthcare institutions, the other basic parameters that need to be evaluated is the basic training and qualification of the deployed staff. In the Indian context, hospitals may have designated nurses in its staff, but most of them lack formal degree or qualifications. Higher the proportion of qualified staff is an indication of better quality of medical services provided and the proportions are depicted in **Figure 4 Percentage of Qualified Nursing Staff Vs the Average Cost of hospitalization per day per bed of the hospital.**

A similar negative correlation was observed when hospitalization costs were compared with the percentage of qualified nursing staff deployed at the hospital.

### **6.3. Accreditation and Quality Assurance and Direct Cost of Hospitalization**

National Accreditation Board for Hospitals and Healthcare institution is the nonprofit organization that provides accreditation to Indian hospitals that comply with certain quality standards. The process of accreditation is voluntary and lack of certification doesn't imply that the overall quality of services of the healthcare institution are poor, however accreditation standardizes certain quality protocols which impacts the quality of medical care. Some hospitals, in India opt for Joint Commission International (JCI) accreditation to attract medical tourists. The NABH guidelines are similar to JCI with a basic difference in cost and overall flexibility.

Similar, certain hospitals also opt for ISO certification, which unlike accreditation is a quality assurance system. Though, similar to accreditation, lack of ISO certification doesn't imply poor quality, but it points towards the organizations commitment to provide quality services to its beneficiaries. Psychoanalysis of data with hospitals with and without accreditation commented towards marginal variation in cost of medical care services. The **Figure 5 Accreditation and cost of Healthcare** describes the impact of certification on cost of medical care. The psychoanalysis of the determinations was two dimensional. For secondary care hospitals, certification ensued in increase in cost of medical care services, which was due to the need to follow with various mandatory requirements. On the other uttermost, certification for tertiary care hospitals really helped in cutting down the cost of medical care to a considerable extent, due to standardized procedures and policies. Hence the role of certification, particularly for larger hospitals has been proven good in improving quality of care and comparatively affordable costs.

### **6.4. Patient Experience and Direct Cost of Hospitalization**

Data from Patient satisfaction surveys conducted internally by the twelve surveyed hospital, was codified and integrated to evaluate patient satisfaction across three basic categories including the quality of medical staff, infrastructure and cost effectiveness.

**Figure.6. Average cost of hospitalization Vs Overall patient perception** suggests a clear association between patient satisfaction index and the average cost of hospitalization. It should be mentioned that patient gratification is a subjective rating of the quality of care, but is crucial in understanding the deficiencies in service provision. On comparing data internally, a positive correlation was observed for secondary care services with  $R= 0.656$  while a strong positive correlation was observed for multispecialty hospitals and territory care hospitals at  $R= 0.97$  and  $0.923$  respectively.

## **7. Conclusion And Discussion**

Cost of healthcare depends upon a host of modalities including the disease condition, insurance coverage, age of the individual, etc. In addition, cost of healthcare is influenced by other institutional factors namely the service mix, the treatment modalities, brand image of the institution, etc. Whilst defining quality of care is difficult and subjective, quality parameters can be used to assess the overall quality of medical care services. Studies have shown that there is a non linear U shaped association between quality and hospital charges. This implies that for the lowest quality will have the lowest price and as quality improves the hospitalization charges are bound to increase (Peabody, et al, 2010). However, to generalize the findings of this study to all contexts may lead to misinterpretations, as the methodology used was purely exit interviews and patient opinions. In another study conducted in the United States, it was observed that there was no relation between patient satisfaction levels and the expenditure made on healthcare services (Fu, Wang, 2008). Taking lessons from the United States

and Cuba example, optimum utilization of resources plays a crucial role in controlling costs in a healthcare institution. Quality indicators namely manpower ratios, infrastructure and asset value, accreditation and quality control procedures can be used to ascertain of the quality of healthcare services. Patient satisfaction surveys also play a crucial role in assessing the quality of care provided by the healthcare institutions (Express Healthcare, 2007). Patients appreciate better quality of medical care services (Express Healthcare, 2007). Though several organizations use patient satisfaction reports to evaluate the quality of medical care services, the findings are often not very compelling. Patients are often considerably biased towards reporting satisfaction depending upon various factors including their underlying condition, ethnicity, age, improvement in the condition, etc (Thiedke.C, 2007). However, careful and appropriate evaluation of patient satisfaction surveys could also act as a vital quality indicator can provide insights into areas of improvement. Though other factors like disease standardized mortality rates may be used, their application is constrained due to technical issues and statistical limitations. Asset value of hospitals, implying the infrastructure, medical equipment technology, basic amenities and additional services provided play a crucial role in cost of hospitalization. This study observes that with higher asset value the average cost of hospitalization increases. Reports indicate that hospitals with centralized air conditioning units are associated with higher cost of hospitalization (Times of India, 2011). Nurse to patient ratios and staff to bed ratios also influence quality of care. Though it may appear that higher staff would increase the cost of medical care borne by the common man, the findings of the study indicate otherwise. The rational for higher staff to bed ratio, results in provision of better quality of care, which in turn reduces the average length of stay and hence average hospitalization cost. Higher staff to bed ratio reduce the need for intensive care services and medical equipment support, which in turn reduce the cost of hospitalization. Accreditations and quality assurance systems have also been observed to reduce the average cost of hospitalization. This clearly indicates that accreditations and quality assurance systems help hospitals to streamline their functions and processes, minimize wastage and thereby aid in enhancing quality and reducing cost of care. Then, does higher quality of care imply higher costs? On considering the intangible cost including man days lost due to morbidity or life years lost due to premature mortality, poor quality of services actually increase the overall cost of medical care services (Kaiser Family Foundation, 2009). As per the latest estimates by the Central Statistical Organization, the per capita income of Indian population stands at INR 46,492 which is about 14.5% higher than the previous year estimates (TOI, 2011). As per the Human Development Report, 2009 of the UNDP, the estimated income in US dollars was \$ 2753 (adjusted by purchasing power parity). The public expenditure on healthcare was about \$21 (adjusted to Purchasing Power Parity), which implied that the overall expenditure on healthcare was approximately \$140 (adjusted to PPP). This paper attempts to answer this question by evaluating the various quality indicators and their association with cost of hospitalization. The findings have indicated the role of each specific indicator in cost of hospitalization, but fail to answer the pertinent question. The various quality indicators evaluated in the study impact the overall quality of care, with varying degree of intensity. This makes it difficult to estimate the contribution of each specific indicator to quality of care, which in turn results in failure to understand the overall association of quality of care and cost of hospitalization.

### 8.0 Tables

Country	Per Capita Expense on Healthcare per annum (in US\$)	Infant Mortality Rate ( per 1000 live births)	Life Expectancy( in years)
United States	6096	6.1	78.2
United Kingdom	2560	4.7	79.9
Australia	3123	4.7	81.7
Kenya	86	53.5	58.8
Sudan	54	68.07	55.42

**Table 1: Per capita Expenditure on Healthcare Vs Key Health Indicators**

Type of Hospital	Cost of Infrastructure/ bed in million INR ( Std. Deviation)	Cost of Medical Technology/ bed in million INR ( Std. Deviation)	Av Cost of hospitalization per day in INR ( Std. Deviation)
Tertiary care	4.6 (0.3)	0.44 ( 0.054)	14,167 (1527.5)
Multi Specialty	3.225 (0.263)	1 (0.141)	9,075 (1281.6)
Secondary Care	1.36 (0.114)	1.7 (0.1)	1,680 (238.7)

Table 2 : Indicative Asset Value Vs Av Revenue per bed (n=12)

9.0 FIGURES

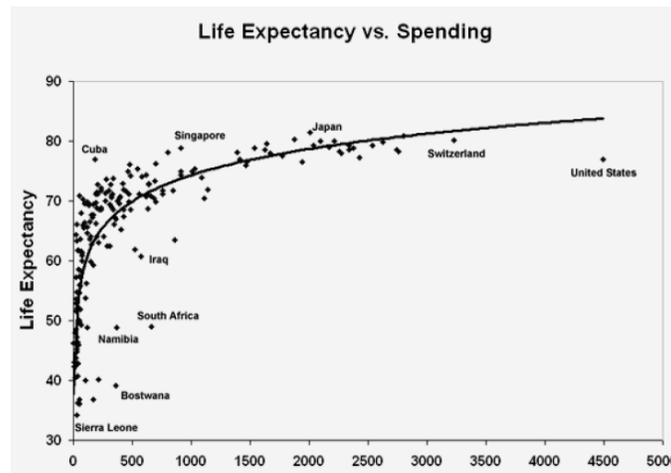


Figure 1: Life Expectancy Vs Spending on Healthcare Globally

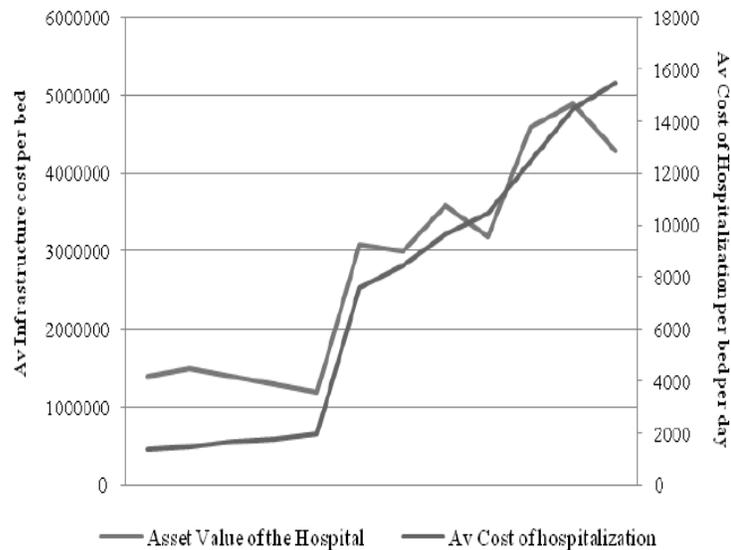


Figure 2: Relation of Asset Value with Cost of Hospitalization (n=12)

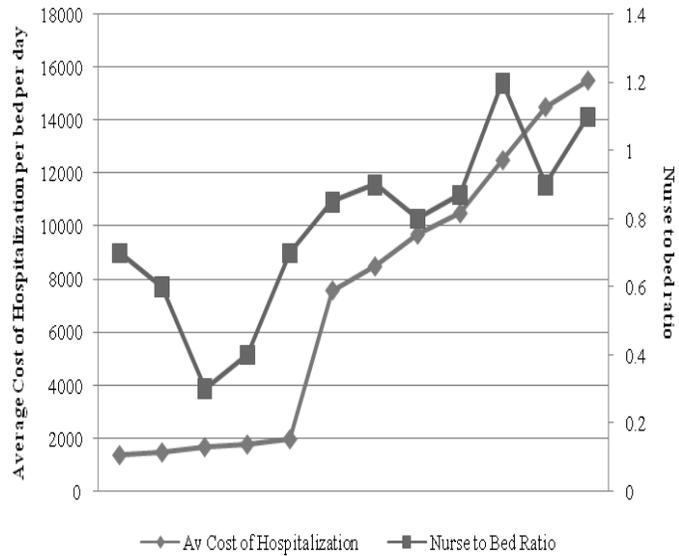


Figure 3: Nurse to bed ratio versus average cost of hospitalization per bed per day

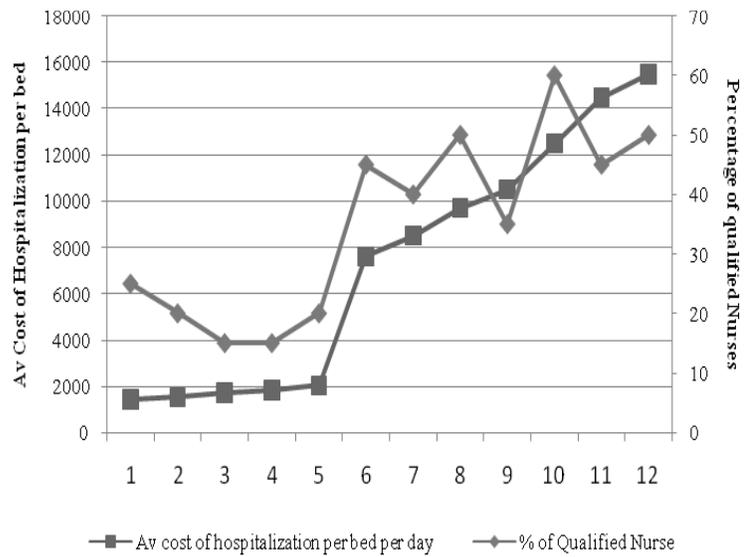


Figure 4: Percentage of Qualified Nursing Staff Vs the Average Cost of hospitalization per day per bed of the hospital

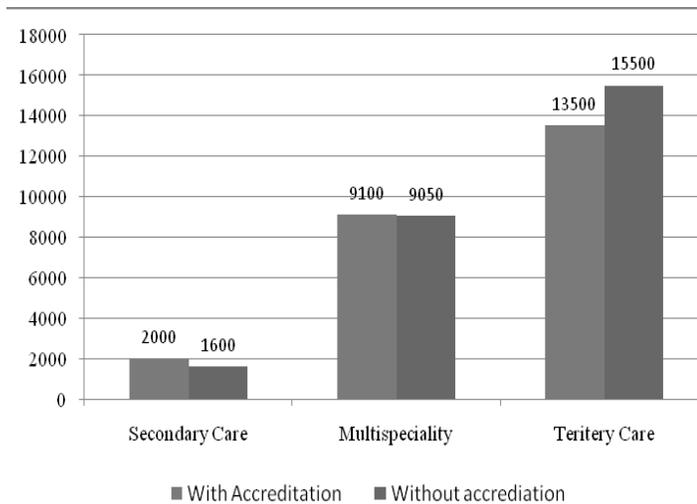


Figure 5: Accreditation and cost of Healthcare

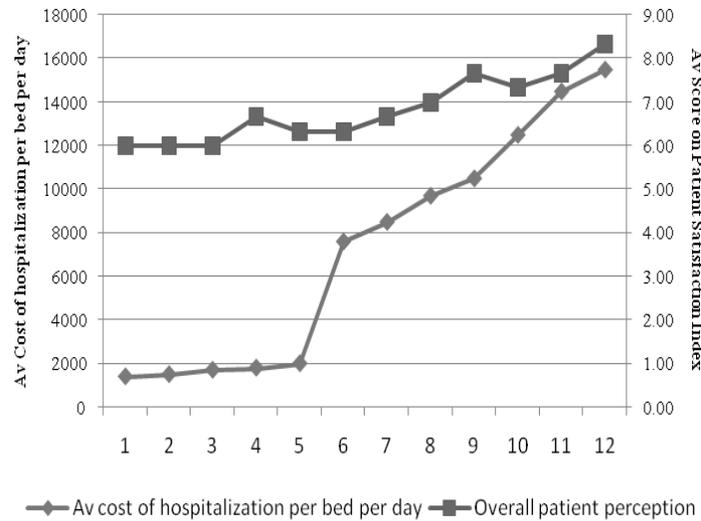


Figure 6: Average cost of hospitalization Vs Overall patient perception

Reference

- 1) Aguilera.N, Marrufo.G (2007), Can better infrastructure and quality reduce hospital infant mortality rates in Mexico?, Health Policy, Vol 80, Issue.2, pg 239-252, February 2007, retrieved from <http://www.healthpolicyjml.com/article/S0168-8510%2806%2900055-8/abstract>
- 2) Amaravadi, R.K., Dimick, J.B., Pronovost, P.J., & Lipsett, P.A. (2000). ICU nurse-to-patient ratio is associated with complications and resource use after esophagectomy. *Intensive Care Medicine*, 26, 1857-1862.
- 3) Bhat. R, Jain,N (2006), Financial Performance of Private Sector Hospitals in India: Some further evidence, Research and Publications, IIM-Ahmadabad.
- 4) Business Today (2011), Medical bills rising faster than inflation, New Delhi, 31st March, retrieved from <http://businesstoday.intoday.in/bt/story/cost-of-health-insurance-cover-surgin-in-india/1/13627.html>
- 5) Care Continuum Alliance (2005), retrieved from , <http://dmaa.pbworks.com/w/page/17960771/India%20-%20Health%20Care%20Financing%20and%20Expenditure>
- 6) Cheng.S, Ho.Y, Chung.K (2001), Hospital quality information for patients in Taiwan: Can they understand it?, *International Journal for Quality in Health Care*, Oxford Journals, Vol 14, Iss.2, pp 155-160, retrieved from , <http://intqhc.oxfordjournals.org/content/14/2/155.full>
- 7) Cho, S.H., Ketefian, S., Barkauskas, V.H., & Smith, D.G. (2003). The effects of nurse staffing on adverse events, morbidity, mortality, and medical costs. *Nursing Research*, 52, 71-79.
- 8) Cleary, P (1999), The Increasing Importance of patient Surveys, *British Medical Journal*, September, 18; 319 (7212):720-721, retrieved from , <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1116581>
- 9) Desai.V (2002), Planning HVAC systems in Hospitals in India, *Air-conditioning and Refrigeration Journal*, Indian Society of Heating, Refrigerating and Air Conditioning Engineers, July-September 2002, retrieved from , <http://www.ishrae.in/journals/2002july/article05.html>
- 10) Express Healthcare (2007), Quality is what patients expect, Hosman 2007, *Express Healthcare*, November 2007 , retrieved from , <http://www.expresshealthcare.in/200711/market17.shtml>
- 11) Fu. A, Wang. N (2008), Healthcare expenditures and patient satisfaction: cost and quality from the consumer's perspective in the US, *Curr Med Res Opin*, May: 24 (5): 1385-94, retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18387219>
- 12) Grujic.S, O'Sullivan.D, Wehrmachur.W (1989), Organizational Control of Hospital Infrastructure Determines the Quality of Care, *American Journal of Medical Quality*, vol. 4 no.1.pg. 19-24, February 1989
- 13) Gyani, J. G. (2010), Hospital accreditation in India- Standardizing healthcare, retrieved from
- 14) [http://findarticles.com/p/articles/mi\\_m0843/is\\_n5\\_v15/ai\\_8134799/pg\\_2/?tag=content;col1](http://findarticles.com/p/articles/mi_m0843/is_n5_v15/ai_8134799/pg_2/?tag=content;col1)
- 15) [http://www.asianhnm.com/Knowledge\\_bank/articles/healthcare\\_accreditations\\_india.htm](http://www.asianhnm.com/Knowledge_bank/articles/healthcare_accreditations_india.htm)
- 16) JCI (nd), JCI success stories, retrieved from , <http://www.jointcommissioninternational.org/JCI-Success-Stories/>
- 17) Kaiser Family Foundation (2009), Healthcare Cost: A Premier, Key information on healthcare costs and their impact, The Henry J. Kaiser Family Foundation, retrieved from <http://www.kff.org/insurance/7670.cfm>
- 18) Klint.R, Long.H (1989), Towards a definition of Quality-Healthcare, *Physician Executive*, Sept-Oct, retrieved from
- 19) Lee. J (2009), The inter hospital variation of intensive care unit mortality in Korea: What's the problem and what do we do to solve it?, *Editorial, Korean Journal of Anesthesiology*, December: 56(7): 691-92, retrieved from [synapse.koreamed.org/Synapse/Data/PDFData/0011KJAE/kjae-57-691.pdf](http://synapse.koreamed.org/Synapse/Data/PDFData/0011KJAE/kjae-57-691.pdf).

- 20) Levitt.S (1994), Quality of Care and Investment in Property, Plant and Equipments in Hospitals, Health Services Research, 28:6.
- 21) Needleman J., Buerhaus P., Mattke S., Stewart M., Zelevinsky K (2002), Nurse staffing and quality of care in hospitals in the United States, New England Journal of Medicine; 346(22):1715-1722, May 2002.
- 22) Peabody. J.W, Florentino.J, Shimkhada.R, et al (2010), Quality variation and its impact on costs and satisfaction: evidence from the QIDS study, Med Care, Jan 48 (1): 25-30, retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/20009777>
- 23) Pronovost (2010), Using Hospital Mortality Rates to Judge Hospital Performance: A bad idea that just won't go away, British Medical Journal; 340:C2016, retrieved from <http://www.bmj.com/content/340/bmj.c2016.full>
- 24) Rothberg.M, Abraham.I, Lindenauer.P, Rose.D (2005), Improving Nurse to Patient Staffing Ratios as a Cost Effective Safety Intervention, Medical Care, Vol.43, No.8, pp 785-791, retrieved from [www.nursingadvocacy.org/faq/staffing.../rothberg\\_2005.pdf](http://www.nursingadvocacy.org/faq/staffing.../rothberg_2005.pdf)
- 25) Shah.U, Mohanty.R (2010) , Private Sector in Indian Healthcare Delivery: Consumer Perspective and Government Policies to promote private Sector, Information Management and Business Review, Vol.1, No.2. pp 79-87, December 2010
- 26) SHS (2005), Position statement on Mandated Nurse Ratio, Society for Health Systems, retrieved from [www.iinet2.org/uploadedFiles/SHS/Resource\\_Library/.../positionPaper.pdf](http://www.iinet2.org/uploadedFiles/SHS/Resource_Library/.../positionPaper.pdf)
- 27) Thiedke.C (2007), What Do We Really Know about Patient Satisfaction?, Family Practice Management, Jan: 14 (1):33-36
- 28) Times of India (2011), Rising healthcare cost enough to make you sick, 1st March, retrieved from <http://timesofindia.indiatimes.com/home/union-budget-2011/Rising-healthcare-costs-enough-to-make-you-sick/articleshow/7598099.cms>
- 29) TOI (2011), Indians get richer: Per capita income at Rs 46,492, Times of India, January 31, 2011 retrieved from [http://articles.timesofindia.indiatimes.com/2011-01-31/india/28377288\\_1\\_capita-income-indian-economy-national-income](http://articles.timesofindia.indiatimes.com/2011-01-31/india/28377288_1_capita-income-indian-economy-national-income)
- 30) WHO (2007), Strengthening Health Systems to Improve Health Outcomes, WHO framework for Action, World Health Organization Publications, Geneva, retrieved from [www.who.int/healthsystems/strategy/everybodys\\_business.pdf](http://www.who.int/healthsystems/strategy/everybodys_business.pdf)