

Original Article

A value-based, no-cost-to-patient health model in the developing world: Critical appraisal of a unique patient-centric neurosurgery unit

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Abstract

Background: It is well-accepted that the current healthcare scenario worldwide is due for a radical change, given that it is fraught with mounting costs and varying quality. Various modifications in health policies have been instituted toward this end. An alternative model, the low-cost, value-based health model, focuses on maximizing value for patients by moving away from a physician-centered, supply-driven system to a patient-centered system.

Methods: The authors discuss the successful inception, functioning, sustainability, and replicability of a novel health model in neurosurgery built and sustained by inspired humanitarianism and that provides all treatment at no cost to the patients irrespective of their socioeconomic strata, color or creed.

Results: The Sri Sathya Sai Institute of Higher Medical Sciences (SSSIHMS) at Whitefield, Bengaluru, India, a private charitable hospital established in 2001, functions on the ideals of providing free state-of-the-art healthcare to all in a compassionate and holistic manner. With modern equipment and respectable outcome benchmarks, its neurosurgery unit has operated on around 18,000 patients since its inception, and as such, has contributed INR 5310 million (USD 88.5 million) to society from an economic standpoint.

Conclusions: The inception and sustainability of the SSSIHMS model are based on self-perpetuating philanthropy, a cost-conscious culture and the dissemination of human values. Replicated worldwide, at least in the developing nations, this unique healthcare model may well change the face of healthcare economics.

Key Words: Neurosurgery, no-cost-to-patient health model, patient-centric, value-based

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INTRODUCTION

Health models worldwide have been long riddled with escalating costs, varying the quality of care and ethical concerns related to commercialization of healthcare.^[1,12] With a view to amend these factors, healthcare reformers have implemented various cost-containment approaches^[3,16] and measures such as electronic medical records^[17] and enforcement of policies and guidelines for fraud- and error-reduction.^[10,18] An approach that is rapidly gaining popularity is “value-based” care, the goal of which is to lower healthcare costs and improve quality and outcomes factors that augment “value” for patients.^[13] Such a patient-centric approach may, however, be a tall order in neurosurgery, a specialty with inexorable costs given its technological and skill demands, and one, that is, reportedly prone to inequities in outcomes based on the patients capacity to pay.^[5] The current paper discusses a unique neurosurgery unit at the Sri Sathya Sai Institute of Higher Medical Sciences (SSSIHMS) at Bengaluru, India [Figure 1], a non-government funded hospital that provides optimal value to all its patients through a high-quality, holistic, “no cost to patient” treatment paradigm based on professional excellence, cost-consciousness and the practice of human values. The financial viability of the hospital reflects how highly society regards excellence in healthcare that extends way beyond state-of-the-art equipment or technical accolades. This enduring and successful health model may well-provide a break-through in patient-centric neurosurgical care and in global health economics as well, at least in the developing nations.

THE SRI SATHYA SAI INSTITUTE OF HIGHER MEDICAL SCIENCES MODEL

The SSSIHMS is a zero revenue (and therefore nonprofit by definition) charitable hospital that functions on the principles (as laid down by its founder, Sri Sathya Sai Baba) that ideal healthcare should be universal (accessible to all irrespective of economic or insurance status, creed, color, religion or nationality), free-of-charge, compassionate (based on human values),



Figure 1: Panoramic view of the Sri Sathya Sai Institute of Higher Medical Sciences hospital premises

comprehensive (directed toward the body, mind, and spirit), and preventative. This billing-free, 333-bed tertiary-care hospital (providing services in neurology, neurosurgery, cardiology, and cardiothoracic surgery) was established in 2001 in Whitefield, Bengaluru, India along the lines of its predecessor, the SSSIHMS at Puttaparthi, India, that has been running successfully for more than two decades now. All services in the hospital (surgery, consultations, laboratory and radiological investigations, ward stay, and Intensive Care Unit (ICU) stay, drugs, etc.) are provided at no cost to the patients. The running cost of the hospital is met by the income generated from a corpus fund that was instituted at the hospital's inception by totally unsolicited donations from thousands of individuals and several corporations, both national and international. Although several privately owned hospitals in India and elsewhere do provide free or subsidized care to some patients, SSSIHMS is arguably the only tertiary-care hospital without a billing department and as such, is a unique experience that has attracted patients and visitors from other countries, as well. Factors that have sustained and promoted the growth of the hospital include self-perpetuating humanitarianism, a set of caregivers inspired by the ethos of such a healthcare system, and an intensely cost-conscious culture.

THE NEUROSURGERY UNIT AND ITS VALUE TO THE COMMUNITY

The SSSIHMS neurosurgery unit has performed 196,696 out-patient consultations (including those for patients making their first visit, and for subsequent re-visits, including postdischarge visits for operated patients), 4586 teleconsultations and 18,179 nontrauma related surgeries of varying complexity in the period, January 2001 to December 2013. In the same period, 26,221 diagnostic or follow-up computed tomography (CT) scans, 79,766 magnetic resonance imaging (MRI) scans, and 2096 angiographies were done for patients in the unit. The unit is equipped with state-of-the-art equipment that includes a Leica OH5 operating microscope with fluorescence imaging, a Medtronic S7 neuronavigation system, an intraoperative monitor (Nihon-Kohden), and a Karl Storz endoscopy set. The surgical team (consisting of five consultants and five residents) has performed 1852 surgeries in the period, January 2013 to December 2013 [Table 1], operating 5 days a week in four dedicated neurosurgical operating rooms (ORs). The annual number of cases has demonstrated an upward trend over the last decade (except for a small dip in 2006 due to unexpected staff turnover), indicative of a well-sustained model [Figure 2]. With regard to the value delivered to the community, the Indian market value of all the surgeries performed till December 2013 is INR 5310 million (USD 88.5 million at an exchange rate of USD 1 = INR 60). The unit offers a residency program

Table 1: List of neurosurgeries performed at SSSIHMS (January-December 2013)

| Diagnosis/surgery type | n (%) |
|--|-------------|
| Cranial | |
| Tumors - intracranial | 450 (24.3) |
| Skull base (e.g., orbital/sellar/ACF or MCF base/clival/ petroclival/CP angle/foramen magnum lesions) | 220 (11.9) |
| Infection (pyogenic/tubercular/fungal lesions) | 13 (0.7) |
| Vascular - aneurysms | 72 (3.9) |
| AVMs | 29 (1.6) |
| Moyamoya disease | 02 (0.1) |
| Trigeminal neuralgia | 10 (0.5) |
| Hydrocephalus | 87 (4.7) |
| Stereotactic biopsy | 10 (0.5) |
| Others (e.g., CSF rhinorrhea, chronic subdural hematomas, calvarial lesions, craniostenosis, decompressive craniectomy) | 88 (4.8) |
| Spinal | |
| Congenital (e.g., Chiari malformation, spinal dysraphism) | 63 (3.4) |
| Degenerative | 535 (28.9) |
| Tumors | 80 (4.3) |
| Infection (tubercular) | 05 (0.3) |
| Instrumentation (e.g., occipito-cervical fusion, C1-2 fusion, cervical lateral mass fixation, cervical/dorsal/ lumbar corpectomy and fixation, dorsal/lumbar pedicle screw fixation) | 136 (7.3) |
| Miscellaneous (e.g., carpal tunnel release, debridement) | 52 (2.8) |
| Total | 1852 |

ACF: Anterior cranial fossa, MCF: Middle cranial fossa, CP: Cerebello-pontine angle, AVM: Arterio-venous malformation, CSF: Cerebrospinal fluid, SSSIHMS: Sri Sathya Sai Institute of Higher Medical Sciences

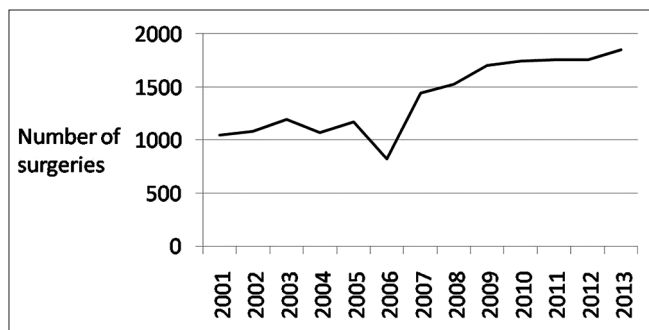


Figure 2: Graph depicting the annual number of neurosurgeries performed at Sri Sathya Sai Institute of Higher Medical Sciences, from January 2001 to December 2013

leading to a Diplomate of National Board (DNB) in Neurosurgery. While the residents are paid stipends as per the DNB guidelines, the course itself is offered free of cost, in keeping with the philosophy of all the Sathya Sai Educational Institutions. In addition to the in-house academic program, regular operative workshops and inputs from honorary, foreign visiting faculty help sustain the academic excellence. The unit also promotes

substantial research and has been collaborating with other centers in various government-aided projects in areas such as genomics and proteomics of gliomas, development of indigenized titanium spinal implants, and molecular neuro-oncology. It has over a hundred publications in indexed national and international neurosurgery journals to its credit.

STANDARDS OF CARE

At SSSIHMS, the decision on the type of intervention and the degree of care including the length of postoperative stay for a given patient is ascertained on the basis of evidence-based standards of care and is not biased by factors like cost or insurance status. Patients also benefit from a host of free-of-charge facilities that ensure multi-modality treatment, augment patient comfort and provide ease of access for follow-up. Nonsurgical utilities include a 128-slice, 750 HD CT scanner (GE Medical Systems), a Magnetom Aera 1.5 T MRI (Siemens), an Artis Zee biplane neuro-vascular lab (Siemens), automated laboratory services and blood bank (backed by voluntary blood donors), dietary counseling and physiotherapy. Nonneurosurgical specialty services in the disciplines of cardiology and cardiothoracic surgery are provided by the SSSIHMS, while services in the general specialties are offered by an affiliated general hospital that also follows the five principles of ideal healthcare listed earlier. In addition, a panel of doctors from various specialties, and across different hospitals provide consultations for in-patient referrals free of cost, moved by the altruistic nature of the hospital. As a step beyond treating just the physical aspect of disease in an attempt to deliver “whole-person care,”^[14] the hospital provides a full-fledged counseling service that integrates non-denominational spirituality in the delivered care and ensures psychological support and patient education. Research has demonstrated that patients attach a higher value for healthcare administered with compassion,^[15] and for a holistic approach to healthcare.^[9] An admission unit streamlines the admission process and coordinates preoperative evaluation. A correspondence unit and a well-developed telemedicine service provide diagnostic advice and postoperative counseling for a large number of patients from distant parts of the country.^[2] As a value factor for the patients’ families, there is a provision for subsidized food and accommodation for them for the duration of patient hospitalization. Several elegant features recognized to improve care outcomes are integral to the SSSIHMS, health model. Medical records are electronic in nature, and this maintains the accuracy of diagnosis, improves care coordination and practice efficiencies. The availability of Synapse, an effective radiology imaging and information network, and meets similar ends by increasing efficiency in diagnostic- and patient care-cycles system. International quality standards require the determination of several elements (standard operating procedures [SOPs])

used in any process that could affect the quality of the end-product. Targeted at achieving procedural consistency at all levels of care, SOPs in the SSSIHMS neurosurgery unit span the out-patient clinic, in-patient wards, surgical protocols, ORs, and ICU. Another feature that has been gaining importance in surgical management systems is the surgical unit time utilization analysis, given that ORs, in general, have been identified as potential areas for cost-reduction efforts. In the neurosurgery ORs at SSSIHMS, approaches to this concept include utilization monitoring, computerized scheduling of OR procedures, and a continual refinement of scheduling policies. Monitoring committees related to patient care (including morbidity and long-stay), infection control, sentinel event reporting, medication reconciliation, and mortality have been instituted, and details of their deliberations are disseminated to all cadres of caregivers in the unit. Table 2 lists some of the outcome benchmarks of the neurosurgery unit for the year 2013. The SSSIHMS conforms to several government regulations (e.g., Minimum Wages Act, Provident Fund Act, Workman Compensation Act, Payment of Gratuity Act, Industrial Disputes Act, Contract Labour Act, Employment Exchange Act and Rules, Maternity Relief Act etc.).

COST-CONSCIOUS CULTURE

Assessing cost implications of every decision is inviolable as SSSIHMS has a fiduciary responsibility to the donors of the Sri Sathya Sai Central Trust's (SSSCT) corpus and further, as the free medical care provided by SSSIHMS is not reimbursed by any third-party payers. Cost consciousness without quality compromise pervades across the hospital, and prudent expenditure is a shared goal. This culture, in fact, forms the basis for SSSIHMS's ability to meet rising costs. Being a zero income model, there is no price list for the rendered services. The cost structure consequently is the key economic driver and enables budgetary allocation of resources to support the periodic activity objectives, evaluation of capital expenditure options, assessment of asset performance and utilization reviews, and identification of cost control opportunities.

Cost evaluation is supported by a robust costing methodology that includes all operating and capital, fixed

and variable cost elements. Using a mix of top-down and bottom-up costing methods based on the principles of relevance, accuracy, transparency, and materiality, costs are computed at three main cost object levels. First, they are aggregated at points-of-service delivery- at the OR, ICU, ward, and outpatient clinic. Second, average per episode cost (intervention and stay) are computed for "surgery types" for similar combinations of "surgery site" (cranial/spinal)-"procedure"- "implant use" features. Third, cost per consultation at the outpatient clinic is measured. The principles of time-driven activity based costing^[7,8] are applied to calculate all costs other than direct material for each "surgery type," which is the most significant cost object for decision-makers. Standard costs and actual per patient cost are used for calculating the direct material cost. Allocation of costs of the medical ancillary departments to the points-of-service delivery departments is based on cost drivers that reflect relative resource use.

Policies and processes are designed to highlight the cost-effectiveness of alternative options and cost implications of decisions - both for acquisition and for utilization of all resources. Some of the general policies related to cost-containment in acquisition of equipment and consumables at SSSIHMS include selecting equipment for absolute patient-care value rather than their flair quotient, centralization of purchases for all hospitals managed by the SSSCT, inclination toward long-term contracts to fix reasonable and stable rates, direct imports rather than third party purchases, establishing forward contracts (for imports) to hedge against exchange rate fluctuations, following a "just in time" ordering method where feasible and minimizing wastage/pilferage. Cost-containment initiatives in utilization include in-house innovations like the "stores module" - an inventory management system developed by the Information Systems Department; rigorous efforts to ensure optimal utilization of resources wherever possible such as avoidance of unnecessary investigations, minimizing surgical unit time, rigid infection control, and application of economies of scale; and decreasing equipment-related "cost per unit" by maximal utilization of their capacity. Such stringent financial budgeting and also independent goal-setting by clinical departments help balance available resources against the demand.

Human resource cost, which is a major contributor to total healthcare costs, is controlled by offering fixed remuneration to all medical and nonmedical staff. Without volume-based incentives, there are no unnecessary orders for investigation or consultations that tend to occur in the fee-for-service system. Performance incentives arise from commitment to the five founding principles and evidence of definitive individual impact on patient well-being. In managing people cost, as well as in other aspects, the financial system of the SSSIHMS

Table 2: Outcome measures for the SSSIHMS neurosurgery unit (January-December 2013)

| Outcome measure | n (%) |
|--|----------|
| Re-exploration within the same admission | 21 (1.1) |
| Postoperative CSF leak | 19 (1.0) |
| New neurological deficit after surgery | 32 (1.7) |
| Need for intensive rehabilitation/nursing care after discharge | 21 (1.1) |
| Postoperative surgical site infection | 16 (0.9) |
| Mortality | 13 (0.7) |

CSF: Cerebrospinal fluid, SSSIHMS: Sri Sathya Sai Institute of Higher Medical Sciences

health model merits substantially from the dissemination of human values in its structure, as detailed in the section below.

Based on present billing rates at Indian corporate hospitals, the market value of surgeries performed at SSSIHMS in 2013, is estimated to be INR 556 million (USD 9.3 million). As an illustration of how the cost per surgery at SSSIHMS compares with that elsewhere, spinal fusion with instrumentation costing approximately INR 80,000 (USD 1333) in SSSIHMS would have cost around USD 5500 in a corporate hospital in India, and around USD 43,000 in the United States.^[4]

ROLE OF HUMAN VALUES

Sri Sathya Sai Baba's emphasis on universal values (truth, love, right conduct, peace, and nonviolence) and holistic patient-centric care ("Love all, Serve all," "Patient First, Institution Next, Staff Last") set the basis for the SSSIHMS ethos. Hippocrates has remarked that it is more important to know and care for the patient than it is to know and care for the disease. Indeed, it is even better to know and care for both, and this remains the cornerstone of the commitment made by the SSSIHMS. Given the importance of the value-based attitude and ethics that have helped to build and sustain this high-volume unit, the staff here is selected on a "hire for attitude and train for skills" principle. Recognizing the long-term, nonfinancial rewards of working in such a system, even the medical professionals willingly accept a moderate, need-based pay, and some voluntarily assume multiple responsibilities or even prefer to render honorary services. Such an inspiring ethos precludes any tendency to get influenced by commercial inducements that may otherwise result in the use of drugs or equipment that are more expensive than necessary. A sense of ownership amongst committed caregivers leads to a higher productivity and cost-effective delivery of care, an overall low staff attrition rate (9.72% for the 2013–2014 financial year compared to a national average attrition rate of 14% in the healthcare sector) that helps in containing induction- and training-related costs, and an improved quality of care that results in better outcomes. The existence of a common, noble shared purpose engaging the physicians, as seen here, has indeed been cited as a crucial starting point in the healthcare revolution.^[11] Volunteers drawn to the hospital by the opportunity to work in an environment dedicated to the practice of human values provide gratuitous services - especially in administrative tasks and logistics support. Given their motivation, they become natural disseminators of the hospital culture and also provide reassurance to anxious patients. The SSSIHMS altruism extends outside the hospital, as well. Provision of incentives by the government (e.g., subsidies for electricity and VAT and tax abatements for donations received) and an instinctive decrease in rates and margins quoted by

hospital-allied vendors demonstrate the multiplier effect of humanitarianism down the service chain.

REPLICABILITY OF THE SRI SATHYA SAI INSTITUTE OF HIGHER MEDICAL SCIENCES MODEL

The need for a synthesis of professionalism and the practice of human values in optimal neurosurgical practice has been acknowledged.^[6] Global economic policies have, however, been long festered by the premise that the stakeholders in any system have an innately profit- or utility-maximizing tendencies. Such self-seeking is antithetical to the soul of the profession rooted in the Hippocratic Oath. Models like the SSSIHMS model, however, prove that altruism not only exists but can become one of the foremost impetuses of caregivers. Replication of such a model may well lead the world into an era in which altruism becomes the attribute our health economic system nourishes. On a practical note, this would need, in addition to setting up a corpus fund at inception, factors such as attracting committed doctors who value patient care and professional careers (without being distracted by the appeal of volume-based incentives), a cost-conscious culture and above all, the existence of shared human values in the system.

CONCLUSIONS

The neurosurgery unit at the SSSIHMS, a private charitable hospital, has been providing high-value, holistic treatment at no cost to its patients for more than a decade. The inception and sustainability of the model are based on self-perpetuating philanthropy, a cost-conscious culture and the dissemination of human values. Replicated worldwide, at least in the developing nations, this unique healthcare model may well change the face of healthcare economics.

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