Optimising cost & sustainability for Gamma Knife Radiosurgery – *A cost & breakeven analysis at India's largest Neurosurgery Centre*

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INTRODUCTION

- Establishing & maintaining gamma knife facility incurs significant costs.
- Cost analysis are instrumental for hospitals to distribute direct & indirect costs accurately, thereby deriving the actual cost of services
- Meticulously assess financial implications for sustainability.
- GKRS started in 1997 at Neurosurgery Centre of AIIMS, New Delhi, India, first in the region in a public sector hospital.

OBJECTIVE

To estimate the cost of establishing & operating a gamma knife facility for calculating user charges for achieving breakeven

METHOD

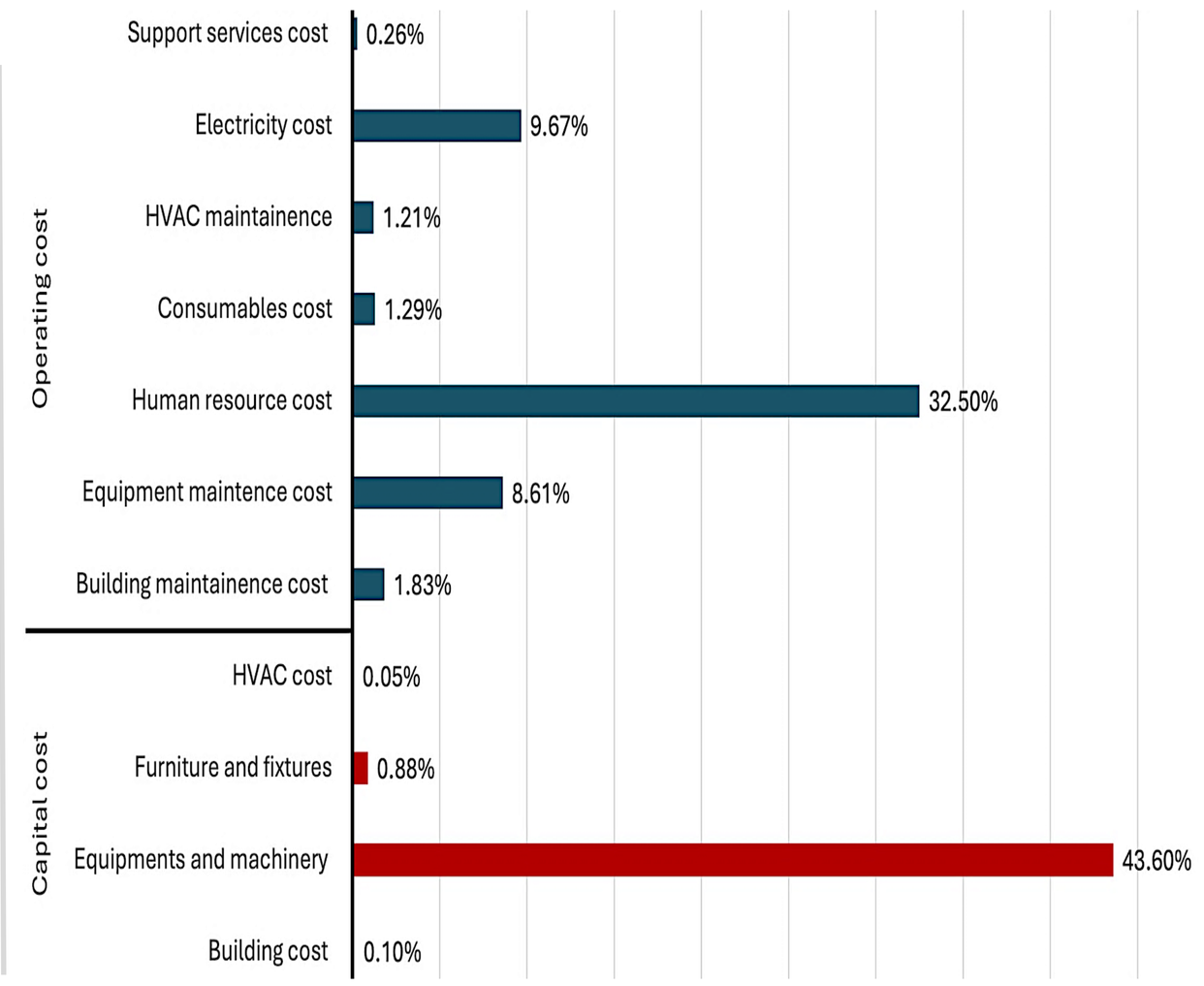
- Exploratory & observational study.
- Jan to June 2019 - Largest Neurosurgery Centre of an Institute of National Importance, Delhi, India

Cost centres included in the study	
Capital Cost	Operating Cost
Building	Building maintenance
Machinery & Equipment	Equipment maintenance
Furniture fixtures	Human resource
	Consumables (Medical, surgical, general etc.)
	Heating Ventilation and Air Conditioning (HVAC)
	Electricity
	Support Services
Cost centres excluded in the study	
Land, IT, Medical Records, Water supply	

- Process analysis, interaction with concerned stakeholders and retrospective record review
- Traditional and time driven activity- based costing methods
- GKRS - April 2018 to March 2019
- Unit Cost = (Total annualized capital cost + Total annualized operating cost)/Total procedures done in a year
- Cost for establishing the Gamma Knife Facility with or without MRI Facility was calculated
- Breakeven analysis assuming various scenarios.

RESULTS

- NS Centre has 205 inpatient beds including two ICUs having 23 beds.
- Annual outpatient of 150,000 (including emergency patients), 10000 inpatients and 4000 neurosurgical procedures every year.
- Total procedures in one year were 651 & Annual cost of Gamma Knife Facility was calculated to be US $1,607,453 (INR 113,164,674)
- Unit cost GKRS = US $ 2469 (INR 1,73,832.06) & 55% was operating cost
- GKRS user charges = US $ 1074 (INR 75000) per procedure
- Machinery, manpower and electricity cost accounted for 94.38% of total cost with machinery cost being more than 50%.
- Model A (Gamma Knife Facility with a MRI facility) = Cost of establishing and operating (five-year period) - US $ 9,836,423 (INR 69,24,84,164)
- Model B (Gamma -knife Facility only) - Cost of Establishing and operating (five-year period) - US $7,294,986 (INR 51,35,66,988).
- Three scenarios were studied where the cost to patient was $1417.53 (INR 99,000), $ 1646.62 (INR 1,15,000) and $ 1789.81 (INR 1,25,000) and the working hours per day were taken as 18, 12 and 12, respectively.
- Breakeven point for three scenario's was 4567 procedures (approx. 5 years), 3019 procedures (approx. 5 years) & 1944 procedures (3 years), respectively.



Cost centres of Gamma Knife facility at Neurosurgery Centre, AIIMS New Delhi, India

CONCLUSIONS

- Costly to establish and operate a Gamma Knife Facility
- Incorporating both cost & break-even analysis for healthcare services is essential for optimal utilization of resources and financial sustainability.
- Policymakers need to be aware of these financial assessments to standardize practices, create or update relevant healthcare packages, and ensure that the system remains aligned with the technological advancements.
- **This strategic approach will facilitate the sustainable integration of high-end medical technologies into healthcare delivery, thus serving as a crucial reference for decision-makers seeking to strike a balance between affordability and financial sustainability within a public sector framework for achieving the overall goal of healthcare for all.**

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