Procurement of Video Endoscope Cart and Stroboscopy System

Impact Assessment Report

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Prepared by : NuSocia

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Impact. Evident.

Prepared for : Kotak Securities Limited (KSL)

kotak Securities

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Ethical Consideration

Informed consent:

The interviews were done after the respondents gave their consent. Even after the interviews were completed, their permission was sought to proceed with their responses.

Confidentiality:

The information provided by participants has been kept private. At no point were their data or identities disclosed. The research findings have been quoted in a way that does not expose the respondents' identities.

Comfort:

The interviews were performed following the respondents' preferences. In addition, the interview time was chosen in consultation with them. At each level, respondents' convenience and comfort were considered.

Right to reject or withdraw:

Respondents were guaranteed safety and allowed to refuse to answer questions or withdraw during the study.

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Project Overview

The Project "Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System", was implemented at Tata Memorial Hospital (TMH) Mumbai with the support of KSL CSR. It was executed in FY 2022-23 to strengthen diagnostic infrastructure for early detection and treatment of Head and Neck Cancers (HNCs). The project facilitated the procurement and integration of a Video Endoscope Cart (VEC) and a Video Endoscope Cart with a Stroboscope System (VECSS). It reduced the burden on Minor Operation Theatres (OTs) and ensured timely access to cancer diagnostics.

Key findings of the study are:

- A majority of cancer patients in India are diagnosed at advanced stages, significantly lowering survival rates. The project has facilitated same-day diagnostic evaluations, enabling earlier cancer detection and improving treatment outcomes. It would minimize disease progression, reducing the need for complex and expensive treatments.

- The high cost of diagnostic procedures in private hospitals has been a major barrier for economically disadvantaged patients, limiting their access to essential healthcare. At TMH, these procedures are now provided free of cost, removing financial obstacles and ensuring that more patients receive lifesaving diagnostics. The project has enhanced healthcare access for underprivileged patients.

- The procured VEC and VECSS equipment has a lifespan of 8-10 years. It ensures long-term impact with minimal maintenance costs. These machines have become a standard part of routine cancer diagnostics by fully integrating them into TMH's workflow. TMH's in-house biomedical team managed maintenance, reducing reliance on external vendors. It ensured uninterrupted patient benefits. The hospital's internal funding model sustains free diagnostic services, ensuring long-term financial stability without external dependencies.

- The project has enhanced efficiency and operational impact through faster consultations and reduced dependency on Minor OTs, enabling more patients to receive timely diagnoses and treatment. TMH team communicated that the project benefited ~244 patients in the FY 2022-23 (till October 2023) through the addition of VEC and VECSS equipment. The number of beneficiary patients reached 394 by the end of March 2024. The integration of Speech and Swallowing Therapy has improved rehabilitation outcomes for HNC patients, enhancing their quality of life.

- The project aligns with TMH's long-term vision of expanding access to affordable cancer care, ensuring broader reach and impact. Its success serves as a model for similar interventions at the upcoming 450-bed cancer facility at TMH. It focuses on integrating diagnostic results into the Electronic Medical Records (EMR) system to enhance efficiency and streamline patient care.

1. Introduction

1.1 Background

Kotak Securities Limited (KSL) is one of the oldest and trusted equity brokerage firms in India. It was established in 1994 as a subsidiary of Kotak Mahindra Bank Ltd. It offers comprehensive investment services across various asset classes such as equity, debt, mutual funds, commodities, and currencies. KSL serves more than 5 million customer accounts across India with its robust network spanning over ~310 cities, ~155 branches, and ~1000 franchises. KSL stands out for its diverse investment opportunities, accredited research, user-friendly investment platforms, and unique value-added services.

KSL has earned a reputation as a reliable partner for investors through its unwavering commitment to quality, innovation, and excellence. KSL contributes to the betterment of society, mirroring the same excellence it brings to its business endeavors. It has showcased its dedication to societal progress through impactful and meaningful CSR initiatives. The CSR efforts of KSL align with India's social development objectives and the United Nations' SDGs. KSL is making a meaningful and lasting impact by addressing key areas such as education, livelihoods, healthcare, environmental sustainability, sports, etc. It remains committed to driving positive change through collaborative efforts, ensuring long-term societal benefits and sustainable development.

The project "Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System" was implemented in FY 2022-23 with the CSR support of KSL. It was executed by the Tata Memorial Hospital (TMH) Mumbai, to provide diagnostic facilities to underprivileged patients in the Head and Neck Oncology Outpatient Department (OPD). TMH is a premier cancer care institution supported by the Department of Atomic Energy, Govt of India. It has been at the forefront of evidence-based cancer treatment, research, and education in India. TMH plays a pivotal role in delivering high-quality cancer care to all sections of society. It continues to expand its reach across the country to ensure accessible and advanced cancer treatment.

1.2 Global Challenges to Access Cancer Diagnostics

Cancer is one of the most severe and life-threatening chronic diseases. It ranks as the second leading cause of death following cardiovascular diseases. Cancer's global burden is increasing at an alarming rate. Globally 20 million new cases were diagnosed in the year 2022. This number is projected to rise by nearly 77%, reaching ~35 million annual cases by 2050. The primary drivers of this surge are the aging population, tobacco consumption, poor dietary habits, sedentary lifestyles, obesity, and exposure to cancer-causing infections, etc[1].

Head and Neck Squamous Cell Carcinoma (HNSCC) is the seventh most common cancer worldwide. It is a group of malignancies, involving the oral cavity (lips, tongue, palate, jaw, and gums), pharynx (throat), hypopharynx, larynx (voice box), nasal cavity, and sinuses (nose), and salivary glands (near the lower jaw). Globally HNSCC had ~8.9 lac new cases and ~4.5 lac deaths in the year 2022. It accounts for ~4.5% of all cancer diagnoses and related deaths. The rising incidence of HNSCC especially in developing countries is driven by the consumption of tobacco, alcohol, and areca nuts, which can increase the risk up to 40 times[2].

Cancer diagnostics which include laboratory tests, medical imaging, etc., plays a critical role in clinical outcomes. However, significant disparities exist in accessing diagnostic services in low and middle-income countries (Asian and African) due to economic, healthcare, and infrastructural

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[1] https://www.who.int/news/item/01-02-2024-global-cancer-burden-growing--amidst-mounting-need-for-services
[2] https://doi.org/10.3390/medsci11020042

challenges. Many healthcare facilities in these regions lack adequate diagnostic capabilities. It leads to delays in the diagnosis and treatment of cancer[3].

There is limited availability of cancer diagnostic equipment in low-income countries. The accessibility of imaging equipment in ASEAN nations is significantly lower than the global average. As of 2016, most ASEAN countries had ~5 CT scan units per 1 million population, which is far below the global average of ~12. Similar disparities exist for MRI and SPECT units, with ASEAN countries having only ~0.25 MRI units and ~2.5 SPECT units per 1 million people, compared to the global average of ~6.7 and ~3.5 respectively. Similar challenges exist in the diagnosis of Head and Neck Cancers (HNCs) due to limited infrastructure facilities such as Video Endoscope Cart, and the high cost of the screening procedure[4].

The inequity in diagnostic and imaging infrastructure leads to delayed cancer diagnosis and hinders timely treatment. The prohibitive cost of diagnostic tests is also a significant barrier to early cancer detection among low-income communities. As a result, many patients in low-income countries are unable to access essential diagnostic services, leading to late-stage diagnoses and poorer clinical outcomes[5].

1.3 Burden of Cancer and Diagnostics Challenges in India

Cancer is a growing health challenge in India, affecting individuals across diverse socio-economic backgrounds and regions. India recorded ~14.5 lac new cancer cases in the year 2022. One in nine Indians is expected to face a cancer diagnosis in their lifetime. Lung cancer is the most common among males, and breast cancer among females. Factors such as lifestyle change, environmental influence, genetic predisposition, etc. predominantly contribute to the rising cancer rate in India[6].

Tobacco consumption is the most significant factor for cancers, especially Head and Neck Cancers (HNCs). Every year ~5.5 lac patients are diagnosed with HNCs (in the year 2022), representing ~27.5% of all cancer cases in India. This is in sharp contrast to a mere ~4% of cases reported in Western countries. Oral cancers, a type of HNCs, account for 40% to 50% of cases in men and around 20% in women. HNCs are a critical health challenge in India. The high incidence of these cancers is primarily due to tobacco chewing, smoking, and alcohol consumption, which are prevalent in various parts of the country. As of 2022, approximately 253 million people aged 15 and above used tobacco products, making the country the second-largest consumer of tobacco globally[7].

Approximately 75-80% of cancer patients in India are diagnosed at an advanced incurable stage, resulting in significantly higher mortality rates. This is primarily due to delayed diagnosis, due to high costs, illiteracy, and limited access to diagnostic infrastructure. On average, rural patients face a delay of ~68 days, while urban patients experience a delay of ~54 days to obtain their first medical appointment[8].

The Standing Committee on Health and Family Welfare, in its report titled "Cancer Care Plan and Management: Prevention, Diagnosis, Research, and Affordability of Cancer Treatment" (September 12, 2022), highlighted that the cost of cancer diagnostic procedures is expensive in India. It emphasized that due to the limited availability of diagnostic facilities in public hospitals, many patients are forced to seek expensive diagnostic services in private healthcare facilities. It adds to the financial burden of cancer care[9].

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[3] https://www.who.int/activities/promoting-cancer-early-diagnosis
[4] https://www.sciencedirect.com/science/article/pii/S2666606522002826
[5] Ibid
[6] https://ncdirindia.org/display/wcd.aspx
[7] Ibid
[8] https://www.sciencedirect.com/science/article/pii/S2666606522002826
[9] https://prsindia.org/policy/report-summaries/cancer-care-plan-and-management

1.4 Need for the Project

Patients with HNCs develop Second Primary Tumors (SPTs) in case of delayed diagnosis. It commonly occurs in the upper aerodigestive tract (head and neck region, lungs, and esophagus). It is critical to diagnose these SPTs before they reach advanced stages. Early diagnosis focuses on detecting symptomatic patients at the earliest stage. It improves treatment success and survival rates while reducing complications and healthcare costs.

Approximately 50% of cancer patients in India are at advanced stages. Early diagnosis is crucial for improving survival rate, yet remains low for HNC patients in India, due to late-stage diagnosis and limited access to advanced treatments. Delayed detection is a major concern, driven by low awareness, inadequate screening programs, and gaps in healthcare infrastructure, especially in rural and remote areas[10].

Public healthcare facilities in India often lack essential diagnostic tools, such as endoscopic scanning and advanced imaging technologies, etc. It forces patients to seek private hospitals where costs are significantly higher. Financial constraints and high out-of-pocket expenses prevent many patients from seeking a timely diagnosis. It contributes to delays in treatment.
Early diagnosis, while crucial, is a resource-intensive process, which requires robust infrastructure. It remains insufficiently addressed in India. Access to cancer care is particularly challenging for rural patients. Their journey often begins at local primary care centers that provide only basic medical services and lack diagnostic capabilities. This results in multiple referrals to other hospitals. Accessing specialised cancer care centers is a major hurdle for rural communities because more than 95% of cancer centers are in urban / metro cities. It is to be noted that Northeast India reports some of the highest cancer incidence rates, however, ~60% of specialist cancer centers are concentrated in South and West India. It forces many patients to travel long distances for optimal treatment. The high influx of patients to these selected hospitals like TMH creates infrastructural strain. This results in overcrowding and longer waiting times, causing delays between the initial consultation, diagnosis, and specialized care. It allows disease progression.

Financial support to TMH is essential for strengthening its cancer diagnostic capabilities. The limited availability of Video Endoscope Carts leads to delays in the diagnosis of HNCs. Enhancing these resources helps in ensuring equitable access to cancer diagnostics and reducing the infrastructural burden on the healthcare system.

1.5 About the Project

This project “Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System” aimed to strengthen the diagnostic infrastructure at TMH by procuring an additional Video Endoscope Cart and Video Endoscope Cart with Stroboscope System. It aimed to facilitate early detection and post-treatment monitoring for HNCs patients. TMC had a single endoscopic system prior to the intervention, which led to prolonged waiting time and delay in treatment initiation. The additional and advanced endoscopic systems enable faster, more precise diagnosis. It reduces the strain on Minor Operation Theatres (OTs) by improving efficiency, reducing patient waiting time, and minimizing the need for general anesthesia procedures.
The objectives of the project are:

- Enhance the efficiency of HNC diagnosis by expanding the number of endoscopic assessments.
- Reduce waiting time for diagnostic evaluations, ensuring timely commencement of treatment.
- Support Speech Language Pathologists (SLPs) in diagnosing and treating swallowing disorders.

[10] https://www.lupin.com/the-evolving-landscape-of-head-and-neck-cancer-care-in-india/

2. Approach and Methodology

2.1 Approach

The study aimed at the Impact Assessment of the **"Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System"** project, which was supported by the KSL CSR initiative. The project was implemented at TMH Mumbai in FY 2022-23. The Impact Assessment study was conducted for the following broad objectives and outputs:

01 ***Impact on Beneficiaries***
To evaluate the level of awareness and impact on the target beneficiaries

02 ***Best Practices***
To identify best practices

03 ***Area of Improvement***
To suggest areas of improvements and innovative approaches basis market trends.

2.2 Methodology

The team adopted a Qualitative Research methodology for impact assessment. The study followed a well-defined methodology, participative and research-based strategy, consisting of a five-stage process for undertaking this study as explained below:

Context Setting	• Building common understanding of project terminology. • Introduction to key stakeholders / implementation partners
Research Design	• Desk review of project documents • Primary research tool preparation • Sharing of inception report with tools for approval of KSL
Primary Research	• Training of field research team • On-field data collection through quantitative methods to analyse programmatic elements
Analysis	• Data analysis based on OCED-DAC 'REECIS' Framework • Triangulation against qualitative research through KIIs
Output Report	• Detailed report on observations, analysis, inferences, and recommendations • Presentation of Findings

2.3 Data Collection Tools

2.3.1 Development of assessment framework: The team developed research objectives, key probe areas, and methodology of interaction with stakeholders. This helped in the effective designing of research instruments.

2.3.2 Primary data acquiring tools: The team prepared an Interview Guide for collecting qualitative data from beneficiaries and KIIs (Key Informant Interviews) based on the assessment framework

2.4 Sampling techniques

The study followed the Convenience Sampling Technique for the selection of respondents among KIIs (Key Informant Interviews) for interviews.

2.5. Acquiring Information and Data Collection

Primary and secondary research was conducted to acquire the necessary data for the program. Field-level data were collected through interviews with Key Informant Interviews (KIIs). The team conducted 6 KIIs, with 1 representative from each of the doctor team (handling endoscopy machines), purchase team, Bio-medical team, TMH administration, Oncologist and fundraising team.

The study initially planned to conduct surveys of 20 beneficiaries; however, due to the data privacy policy of TMH, conducting surveys was not permitted.

2.6. Analyzing the information

After primary and secondary research, the team compiled and tabulated the acquired data. Tabulated data was sanitized to get insight as per the requirement of the study. The sanitized data was analyzed and triangulated with the findings of KIIs. The data analyzed depicted points identified as the key objective of the study.

The assessment was done through the REECIS evaluation framework, developed by the Organization for Economic Co-operation and Development (OECD) and the Development Assistance Committee (DAC). It includes an analysis of the results based on parameters such as Relevance, Effectiveness, Efficiency, Coherence, Impact, and Sustainability. It is explained below:

REECIS Evaluation Framework

Relevance
Doing the right things for location and beneficiaries

Effectiveness
Objective achievement target v/s achievement for the project

Efficiency
Resource utilization- cost, time, and manpower

Coherence
Fit for larger ecosystem- aligning the initiatives with the institutions.

Impact
Difference made against the baseline and intended / unintended impact.

Sustainability
How long the impact lasts in form of outcomes, scalability of the program, continuation of the activities and outcome.

2.7 Documentation and Report Preparation

The team prepared a detailed report for the Impact Assessment Study of the “Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System” project covering all the necessary aspects in accordance with the findings of the data analysis.

3. Findings and Analysis

3.1 Inclusiveness

The project bridged the accessibility gap in HNC diagnosis. The inclusiveness of the project has been assessed based on its ability to serve patients of diverse socio-economic status, geographic location, etc. in accessing quality diagnostic services.

3.1.1 Reducing Healthcare Disparities through Improved Diagnostic Access

Tata Memorial Hospital (TMH) is a premier cancer hospital in India. It handled a total of 84,036 cancer cases in FY 2023-24. Among these, ~35% (~30,000) cases belonged to Head and Neck Cancers (HNCs)[11]. At least one-third of HNC patients (~10,000) require endoscopic evaluation, which is conducted either in OPD or OTs. The introduction of additional Video Endoscopic Cart and Video Endoscopic Cart with Stroboscope System has reduced the reliance on OTs for diagnostic procedures. Previously, patients requiring endoscopic evaluations in OTs had to undergo general anesthesia. It led to a prolonged waiting time of 3 to 4 days.

The introduction of an integrated diagnostic system in the OPD has significantly reduced reliance on minor OTs, allowing for quicker and less invasive evaluations. Patients can now undergo endoscopic assessments in a single day minimizing logistical barriers and reducing the overall financial burden. It allowed evaluations to be conducted in the OPD itself under local anesthesia. This has reduced patient visits and streamlined the diagnostic and treatment process. It improved the Turn Around Time (TAT) for diagnostic procedures. It ensured that HNC's diagnosis and treatment could commence in a timely manner, enhancing patient outcomes and overall healthcare efficiency.

The features of the new machines are given below:

Video Endoscope Cart (VEC)

It typically includes components such as a video processor, light source, display monitor, and dedicated storage for endoscopes. It is used for the diagnosis and management of HNCs. The instrument plays a crucial role by enabling high-resolution imaging and real-time visualization of tumors and lesions in the oral cavity, pharynx, larynx, nasal cavity, and esophagus.

The newly procured VEC is similar to the previously existing endoscopy system at TMH.

(The picture of the Video Endoscope Cart captured during the hospital visit)

[11] https://tmc.gov.in/assets/PDF/annual_report/TMC%20AR%202023-2024%20English.pdf

Video Endoscope Cart with Stroboscope System (VECSS)

It includes all the components of a standard VEC with an additional stroboscope system. Stroboscope is a specialized technique used in laryngology to assess vocal cord vibrations by utilizing a synchronized strobe light source. It allows slow-motion visualization of vocal fold movements, enabling detailed evaluation of laryngeal function. The integrated stroboscopic imaging enhances the precision of vocal cord assessments. It is essential for diagnosing and managing conditions related to voice and swallowing in HNC patients. This system was not available earlier at TMH.

This addition of VEC and VECSS enhanced inclusivity in cancer diagnostics and treatment at TMH by reducing logistical barriers, particularly for rural and underprivileged patients, who face delays and limited access to specialized diagnostic facilities.

Acting HOD of TMH, stated, "Patients requiring diagnostic assessments had to schedule procedures in minor OTs, leading to delays of 2-3 days. These procedures often required general anesthesia, adding to patient discomfort and increasing the operational burden on hospital resources. Waiting time was further extended due to the high case volume of daily 20-30 patients in minor OTs, impacting timely diagnosis and treatment. The availability of equipment was a major constraint, as only one endoscopic machine was accessible in the Speech Therapy department, which was not dedicated to oncology, causing further delays in cancer patient assessments."

3.1.2 Gender Inclusivity

Women in India generally encounter barriers to accessing cancer care due to social stigma, economic dependency, and caregiving responsibilities. Many women delay seeking medical attention due to socio-economic constraints. Financial dependency and societal stigma discourage women from accessing timely oncology care. It exacerbates gender inequalities in cancer diagnosis and treatment outcomes[12].

While HNCs are more commonly diagnosed in men, an increasing number of cases are being reported in women due to rising tobacco and areca nut consumption. The project of TMH improved accessibility for all sections of society including women, reducing logistical and financial burdens and making it easier for women to seek timely diagnosis and care. However, this finding could not be verified through the research due to the unavailability of data.

3.1.3 Improved Accessibility for the Patients

Earlier, diagnostic processes often required patients to travel between multiple departments such as OTs for various scans. It creates discomfort for patients. The introduction of additional VEC and VECSS in the OPD has streamlined the diagnostic process by minimizing patient movement, particularly benefiting wheelchair-bound or mobility-impaired patients and enabling them to receive necessary care with greater ease and reduced physical strain. However, this finding could not be verified through the research due to the unavailability of data.

[12] https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-0042-1742652.pdf

3.2 Relevance

3.2.1 Relevance in Cancer Diagnosis and Treatment

The Tata Memorial Centre, established in 1941, is a premier institution dedicated to cancer research, education, and comprehensive patient care. It includes the Tata Memorial Hospital (TMH), the Advanced Centre for Treatment, Research, and Education in Cancer (ACTREC), and the Centre for Cancer Epidemiology (CCE). TMH plays a crucial role in advancing cancer treatment in the country. It has marked its 83rd anniversary, reflecting its longstanding commitment to excellence in oncology.

The relevance of any healthcare initiative is determined by its ability to address a critical gap in patient care, disease management, and resource optimization. The contribution of VEC and VECSS at TMH is relevant as it contributes to the mission of TMH in addressing critical gaps in India's HNC care system. It would have improved early diagnosis, reducing cost, optimizing resources, and expanding access to underprivileged patients.

3.2.2 Addressing the High Burden of HNCs in India

HNCs constitute ~27.5% of all cancer cases in India, with ~5.5 lakh new cases reported annually in the year 2022. The key factor driving this high prevalence is the widespread use of tobacco and areca nut, with an estimated 253 million Indians consuming tobacco-based products. Approximately 75-80% of cancer cases in India are diagnosed at advanced, often incurable stages, leading to significantly higher mortality rates[13]. The introduction of VEC and VECSS at TMH through the project has played a crucial role in improving early detection by reducing delays in diagnosis. It would ultimately enhance the survival rate by facilitating timely intervention.

3.2.3 Reducing the Cost of Cancer Care

In India, healthcare expenses drive ~32 to 39 million people into poverty annually. Cancer accounts for the highest hospitalization costs and out-of-pocket expenditures in the country. It leads to a severe financial burden and catastrophic economic impact on patients and families[14]. Financial constraints often force many patients to forgo diagnostic procedures, leading to late-stage diagnoses and poor survival rates. The introduction of an integrated diagnostic endoscopic system for HNCs provided a crucial solution. TMH offers these diagnostic procedures at a very minimal cost. However, similar procedures in private hospitals cost between Rs 15,000 to 20,000 per session, making them inaccessible for economically weaker sections. The project reduced the financial burden on underprivileged patients, ensuring equitable access to timely diagnostics of HNCs and improving overall treatment outcomes.

3.3 Effectiveness

The effectiveness of the project “Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System” has been evaluated based on its progress against the input and output activities as detailed in the impact map. The planned input activities and intended outputs of the project are given below:

[13] https://ncdirindia.org/display/wcd.aspx
[14] https://ncdirindia.org/display/wcd.aspx

Planned Activities	Intended Outputs
1. Procurement and infrastructure enhancement 2. Financial accessibility and equity 3. Operational efficiency and training	1. Enhanced access and early diagnosis to underprivileged patients 2. Delivery of quality cancer care 3. Reduction in minor OT dependency 4. Financial relief and equitable healthcare 5. Operational efficiency

3.3.1 Effectiveness in Implementing the Planned Activities

The Tata Memorial Centre, established in 1941, is a premier institution dedicated to cancer research, education, and comprehensive patient care. It includes the Tata Memorial Hospital (TMH), the Advanced Centre for Treatment, Research, and Education in Cancer (ACTREC), and the Centre for Cancer Epidemiology (CCE). TMH plays a crucial role in advancing cancer treatment in the country. It has marked its 83rd anniversary, reflecting its longstanding commitment to excellence in oncology.

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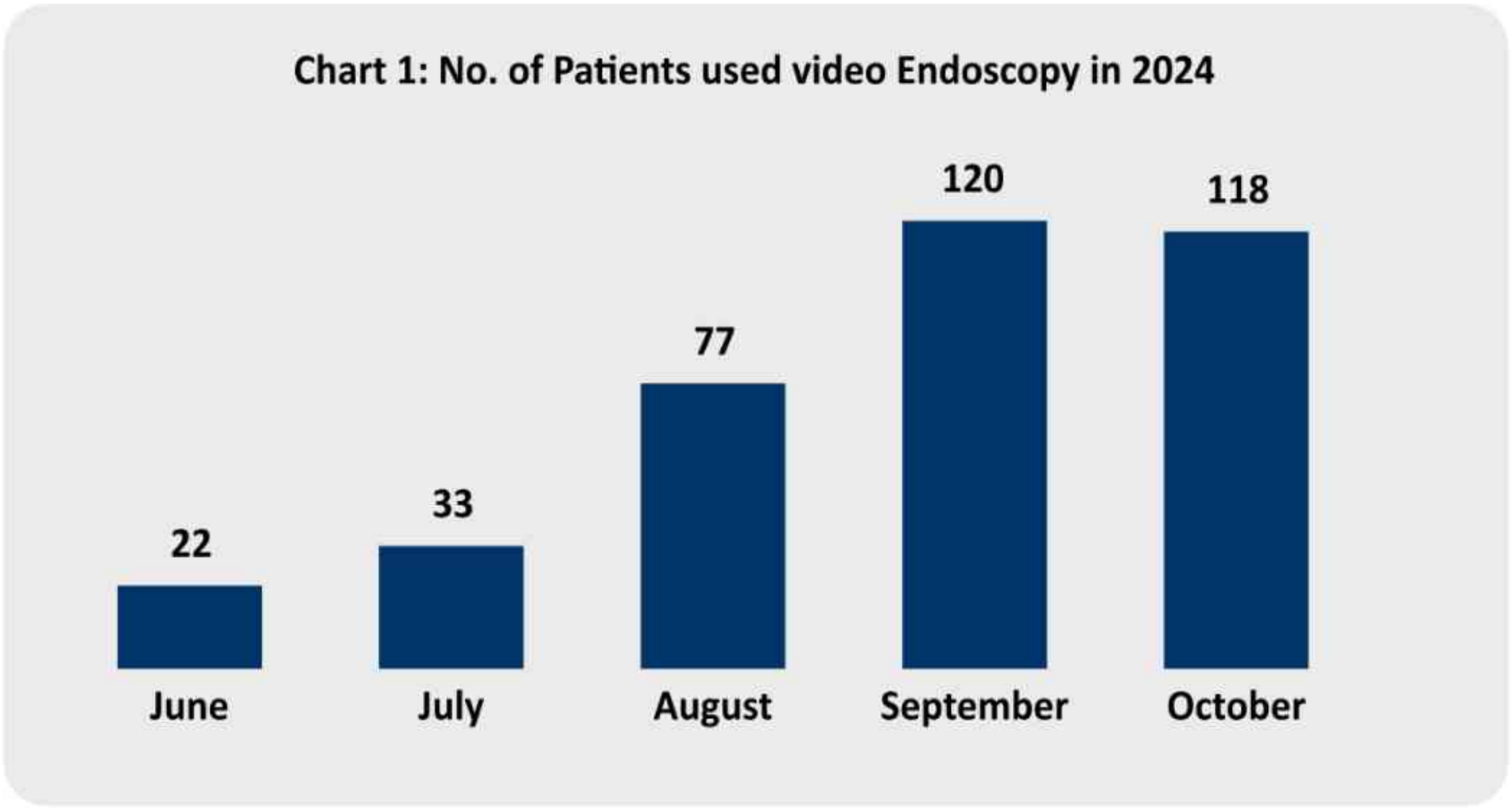
- **Transparent Procurement Process**

  TMH team followed a transparent process for the procurement of VEC and VECSS. It was structured and aligned with operational needs. It integrated stakeholder inputs, thorough technical validation, and post-procurement support. The procurement process began with the submission of requirements by the HNCs department to the administrator. It ensured that the procurement was driven by necessity. The Terms of Reference (ToR) were then published on the Government e-Marketplace (GeM). It ensured a fair and competitive process while adhering to government procurement norms. The procurement team conducted a detailed review of specifications. The biomedical team of TMH further validated the technical specifications of the selected product to meet the required standards. As a next step vendors were invited to conduct on-site demonstrations. It allowed a hands-on evaluation of machine functionality. The final vendor was selected based on performance and compatibility with TMH's requirements.

  The procurement process faced no financial constraints, enabling decision-making purely based on quality and suitability rather than only cost considerations. The sale contract included a two-year warranty and eight Annual Maintenance Contracts (AMCs). It ensures long-term operational efficiency, reduces downtime, and minimizes future maintenance costs.



- **Training for Effective Operation and Maintenance**

  The training was provided to the medical and technical team for the operation and maintenance of the endoscopy system. It ensured the integration of the system into hospital workflows. The installation team of the vendor conducted training covering aspects of system operation, handling, maintenance, patient positioning, and optimizing the visualization process for accurate diagnosis. Since the doctors were already familiar with endoscopic technology, the transition to using these specific machines was smooth.

  The training also covered equipment maintenance protocols, ensuring that the biomedical team could effectively manage routine upkeep, troubleshoot minor issues, and coordinate with vendors for any technical support.

  TMH also adopted already established Standard Operating Procedures (SOPs) for guiding staff on equipment usage, disinfection procedures, and compliance with hospital protocols. This structured training program has contributed to the successful implementation of the endoscopy system, ensuring optimal utilization, and ultimately improving patient care through timely and accurate diagnostics.

3.3.2 Effectiveness in Achieving the Intended Outputs

- **Enhanced Access and Early Diagnosis to Underprivileged Patients**

  The project addressed the challenges faced by cancer patients from economically disadvantaged backgrounds. The timely and affordable access to quality diagnostic service would have improved patient outcomes and reduced the emotional and financial burden on families.

  It was found that TMH did not maintain socioeconomic data of patients, however, discussions with the administration team indicate that the majority of patients seeking treatment belong to economically weaker sections. Based on this, it can be inferred that the VEC and VECSS equipment were primarily utilized by these patients, ensuring accessibility to advanced diagnostic facilities for underserved communities.

- **Delivery of Quality Cancer Care**

  The effectiveness of the project is evident in its significant contribution to improving cancer diagnostics, reducing patient waiting times, and enhancing the overall efficiency of healthcare delivery. Prior to the introduction of the VEC and VECSS equipment, patients faced long delays which have increased both financial and logistical burdens. The project minimized OT dependency, streamlining patient flow, and ensuring quicker and more accurate cancer care.

The project played a role in improving multidisciplinary treatment decision-making. The doctors were able to assess endoscopic findings in real time and formulate holistic treatment plans through Disease Management Groups (DMGs). It has resulted in early detection of HNCs, reduced metastasis risks, and better pretreatment assessments, ultimately improving patient outcomes. The machines have allowed for high-definition imaging and stroboscope, which enhanced diagnostic precision for head and neck oncology cases.

- **Financial Relief and Equitable Healthcare**

  The project has reduced out-of-pocket expenditures for economically weaker patients. They saved the high cost of private hospitals for similar procedures. TMH provided free of cost services to General OPD category patients. It ensured equitable access to advanced diagnostics. The project strengthened TMH's role in reducing health disparities by ensuring that rural and socio-economically disadvantaged patients receive high-quality HNC diagnostics without logistical and financial barriers.

- **Operational Efficiency**

  The project required no significant infrastructural modifications, as the machines seamlessly integrated into OPD settings. Maintenance is efficiently managed by the biomedical team with vendor support, ensuring uninterrupted service delivery and operational efficiency.

  The integrated endoscopic system improved diagnostic Turn Around Time (TAT). It reduced patient waiting time, increased diagnostic throughput, and improved treatment initiation rates. It allowed hospital staff to focus more on treatment rather than managing diagnostic backlogs, streamlining patient care. The consistent usage of equipment for more than a year confirms that the machine has effectively met patient demand. It validates its necessity and impact. It highlights that the installation of VEC and VECSS equipment has successfully contributed to better healthcare delivery, ensuring timely and accurate diagnoses for a large number of patients.

  TMH team acknowledged that the machines have improved their ability to handle a larger number of cases efficiently. However, it was observed that the patient follow-up system and feedback mechanism is not implemented by the hospital. It is crucial to ensure timely treatment post-diagnosis.

3.4 Efficiency

The efficiency of the project has been measured based on the intended outcome of the program. The "Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System" project had intended to support patients for:

1. Reducing dependency on minor OTs by enabling endoscopic procedures to be performed in OPDs under local anesthesia.
2. Enhancing early detection of HNCs recurrence, improving treatment planning and patient outcomes.

The project ensured efficiency in the implementation process to serve economically disadvantaged cancer patients. It is defined by the optimal utilization of resources to achieve maximum impact such as time savings, cost-effectiveness, workforce productivity, and improved service delivery.

3.4.1 Enhanced Diagnostic Precision and Improved Treatment Planning

The VEC and VECSS machines enabled high-resolution imaging of critical anatomical structures associated with HNCs such as oral cavity, pharynx, larynx, nasal cavities, and esophagus. It allowed detailed assessment of tumors and lesions. The real-time visualization capability aids in the early detection of malignancies, reducing diagnostic errors and ensuring timely intervention. The stroboscope system helped in assessing vocal cord

vibrations, which was previously unavailable at TMH. The stroboscopic imaging enhanced vocal fold assessments and enabled the early diagnosis of voice and swallowing disorders in HNC patients.

The precise imaging and real-time visualization also enabled accurate tumor localization. It assisted oncologists in developing targeted treatment strategies. The stroboscopic system facilitated specialized interventions that significantly improved patient quality of life post-treatment. The integration of these advanced imaging techniques reduced the reliance on invasive diagnostic procedures thereby minimizing patient discomfort.

3.4.2 Operational Efficiency and Optimized Workflow

The training and installation process ensured a seamless transition for medical staff and eliminated the need for extensive learning curves. The additional VEC and VECSS machines reduced dependency on minor OTs for diagnostic evaluations. Earlier OTs were occupied with diagnostic procedures, delaying surgical cases and major treatments. A number of minor OT procedures for diagnostic evaluations has dropped by ~50% due to the project. It allowed same-day assessments in OPD settings and optimized hospital resources. The equipment reduced the number of repeat procedures and ensured accurate first-time diagnoses. The system would have contributed to better patient survival rates and improved post-treatment rehabilitation by minimizing diagnostic delays and improving treatment precision. The integration of stroboscopic imaging in HNC treatment ensured that patients receive comprehensive care, addressing both oncological and functional rehabilitation needs.

3.4.3 Improving Patient Experience and Satisfaction

Earlier, minor OT-based endoscopy required General Anesthesia (GA), often causing fear and discomfort among patients. Endoscopies are now performed under local anesthesia, eliminating GA-related complications due to the introduction of the new OPD-based procedure. Patients experienced less stress. It would contribute to faster recovery.

Many rural patients previously had to make multiple visits to hospitals for diagnosis due to long wait times. The project significantly reduced logistical and financial burdens. It has cut down patient waiting periods and enhanced overall service delivery. It would optimize both hospital resources and workforce productivity.

3.4.4 Structured Procurement and Deployment

The project adhered to Government of India procurement guidelines. It ensured a transparent and efficient acquisition process. The equipment procurement was strategically executed in two phases, prioritizing optimal fund utilization. The first machine was deployed immediately, while the procurement of the second machine was contingent on the utilization of the first. It ensured effective resource allocation and operational efficiency.

3.4.5 Improved Cost Effectiveness for the Hospital

Performing endoscopy under local anesthesia in OPDs is more cost-efficient compared to using minor OTs and GA. TMH would have achieved operational cost savings by reducing minor OT usage for diagnostic procedures. It allows for optimized resource allocation where funds can be directed towards essential cancer treatments. The VEC and VECSS machines seamlessly integrated with OPD workflows, effectively freeing up minor OTs for surgical procedures. The hospital would have created more space for critical care interventions by decentralizing diagnostic procedures.

3.4.6 Enhanced Workforce Efficiency

Doctors and nurses would have spent less time coordinating minor OT schedules for

diagnostic procedures after the installation of VEC and VECSS. It allows them to focus more on treatment and patient care rather than managing delays. The workload on anesthesiologists would have been reduced due to the decrease in GA procedures, enhancing overall hospital efficiency.

3.5 Coherence

The project is coherent with the objectives of India's national healthcare programs and the UN SDGs. It addressed critical gaps in access, affordability, and quality of HNC care

3.5.1 Alignment with Schemes of Government of India

- **Ayushman Bharat Scheme**
  The Ayushman Bharat Scheme aims to provide financial protection to vulnerable populations for catastrophic health expenditures. The project promoted financial inclusion in healthcare by ensuring free endoscopic diagnostic procedures. It reduced out-of-pocket expenditures for economically weaker patients. The project supports the scheme's objective of bridging healthcare access gaps in underserved regions by eliminating logistical barriers for rural patients.

- **Rashtriya Arogya Nidhi (RAN)**
  RAN provides financial assistance for patients living below the poverty line who are suffering from life-threatening diseases. The free diagnostic services offered through the project complement the objectives of RAN by ensuring affordable and equitable cancer care.

- **National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS)**
  NPCDCS focuses on strengthening healthcare infrastructure for cancer care and early detection. However, access to timely cancer treatment remains a challenge due to limited facilities. The project directly supports NPCDCS's goal by timely diagnosis and treatment of HNCs. It contributed to NPCDCS's mandate of reducing morbidity and mortality related to cancer by integrating OPD-based endoscopy for early diagnosis of HNCs.

- **National Health Policy 2017**
  The National Health Policy advocates reducing the financial burden of healthcare on families and ensuring universal health coverage. The project aligns with the policy's focus on equity and inclusion in healthcare delivery.

3.5.2 Coherence with SDGs

The project reduced financial distress for cancer patients and prevented impoverishment due to medical expenses by offering cost-free diagnostics

The project provided early detection and intervention for HNCs facilitated by VEC and VECSS. It directly contributed to reducing cancer-related deaths. The free diagnostic services at TMH align with the SDG-3 by ensuring equitable access to advanced cancer diagnostics.

The project addressed gender disparities in cancer care. It ensured financially dependent and socially disadvantaged women received timely diagnostic services without economic barriers.

The project enhanced healthcare accessibility for underprivileged communities, rural patients, and people with disabilities. It ensured inclusive cancer care.

3.6 Impact

The project has been evaluated based on its intended impact. The project "Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System" had the following intended impact:

1. Improved patient outcomes and early cancer detection
2. Enhanced healthcare access for underprivileged patients
3. Increased utilization of diagnostic services by economically weaker sections

3.6.1 Improved Patient Outcome and Early Cancer Detection

In India, most cancer patients are diagnosed at an advanced stage. It significantly reduces their survival rates. The introduction of VEC and VECSS has improved early-stage detection of HNCs, allowing for timely intervention and better treatment options. Patients have a higher chance of survival and improved prognoses due to faster diagnoses. Delays in diagnosis allow tumors to progress, making treatment more complex and expensive. The project reduced diagnostic wait times and enabled immediate evaluations. It would have lowered the risk of disease progression and ensured that patients receive treatment at the optimal stage, maximizing their chances of recovery and enhancing overall healthcare outcomes.

3.6.2 Enhanced Healthcare Access for Underprivileged Patients

Endoscopy procedures at private hospitals are often very costly, making them inaccessible to many low-income patients. These procedures were provided free of cost at TMH. It effectively eliminated financial barriers and enabled underprivileged patients to access lifesaving diagnostic services. TMH team communicated that the project benefited ~244 patients in the FY 2022-23 (till October 2023) through the addition of VEC and VECSS equipment. The number of beneficiary patients reached 394 by the end of March 2024. This project has increased the number of economically disadvantaged patients receiving timely diagnoses and treatment. It has bridged the urban-rural healthcare divide by making advanced diagnostics more accessible to rural populations. OPD patients at TMH belong to nonpaying categories, the project has directly benefited those who would otherwise struggle to afford essential cancer diagnostics and care.

3.6.3 Improved Quality of Life for Patients

Faster consultations in the project ensured that patients began treatment sooner, leading to improved prognosis and better recovery outcomes. The reduction in referrals would have lowered travel costs for rural patients, making specialized cancer care more accessible. The

project enabled the integration of Speech and Swallowing Therapy into the treatment process, enhancing rehabilitation outcomes and helping patients regain essential functions and improve their quality of life post-treatment.

3.6.4 Perceived Impact on Economic Empowerment of Underprivileged Families

The project eliminated the financial barriers to diagnostic services for HNCs. Early diagnosis of malignancies due to VEC and VECSS reduced diagnostic errors, ensuring timely intervention. It would have contributed to the successful recovery of patients, preventing loss of income due to prolonged illness and enabling patients to resume daily activities and regain financial stability. Families would have relieved of the emotional and economic burden that cancer often imposes, allowing them to focus on rebuilding their lives. The project would have positively impacted on the livelihoods and empowerment of economically disadvantaged patients and their families.

3.7 Sustainability

The sustainability of the project lies in its strategic planning, inclusive approach, and operational efficiency. Key elements that ensure the project's long-term impact and viability are given below:

3.7.1 Long-Term Utility of the Machines

The procured VEC and VECSS equipment were designed to last 8–10 years, ensuring a sustained impact on cancer diagnostics over time. The machines provided continuous patient benefits without frequent repairs or downtime. It required minimal maintenance. The procurement of VEC and VECSS machines is capital expenditure (CAPEX) funded through KSL CSR, distinguishing it from operational expenses (OPEX) that require recurring financial support. This one-time investment ensures long-term utility without ongoing financial constraints. TMH does not require recurring external funding for machine operations, reinforcing financial sustainability at an institutional level.

3.7.2 Free Diagnostic Services Without Financial Strain on Patients

The VEC and VECSS machines have been fully integrated into TMH's daily workflow, becoming a standard part of the hospital's protocol rather than an external initiative. This institutionalization ensures long-term sustainability. Diagnostics is embedded within TMH's routine cancer care strategy, reducing dependency on external funding or temporary projects. TMH offers these procedures free of cost, lowering the financial burden on underprivileged patients. Sustainability is further reinforced through TMH's internal funding model, which subsidizes patient care independently, ensuring continued access to high-quality diagnostics without reliance on ongoing CSR support.

3.7.3 Maintenance by TMH's Biomedical Engineering Team

A dedicated in-house biomedical engineering team oversaw the maintenance and repairs of the machines. It ensured operational continuity without reliance on external vendors. This institutional self-reliance enhances sustainability, allowing TMH to manage upkeep efficiently. Regular preventive maintenance protocols ensured that the machines remained fully functional with minimal downtime, optimizing patient care. The high quality and durable nature of the equipment reduced the need for frequent replacements. It made the project technologically sustainable in the long term without requiring additional funding for new procurements.

3.7.4 Compatibility with Future Technological Advancements

The integrated endoscopic system had been designed to be compatible with future

technological upgrades, ensuring their continued relevance as cancer care advances. TMH's Digital Health Strategy incorporated this system into the Electronic Medical Records (EMR) framework. It streamlined diagnostic data management by enhancing overall operational efficiency. This integration optimized patient care workflows. It allowed for seamless access to diagnostic results, better treatment planning, and improved long-term patient monitoring.

3.7.5 Alignment With TMH's Long-Term Strategy

TMH's core mission is to provide world-class cancer care that is both affordable and accessible to all patients, regardless of their financial background. The project seamlessly aligns with the TMH's mission by ensuring that high-quality diagnostic services remain available to underprivileged patients. TMH is planning to establish a new 450-bed cancer facility set to be operational by 2026. The success of the project serves as a scalable model for expanding advanced diagnostic interventions at the upcoming center, further strengthening TMH's commitment to equitable cancer care.

3.7.6 Patient Awareness and Long-Term Adoption

Financial constraints prevent many patients from undergoing essential diagnostic procedures. It leads to delayed cancer detection. The project enabled more individuals to seek early screening due to the introduction of free diagnostic services. It fosters a sustainable shift in healthcare-seeking behavior and improves long-term patient outcomes.

4. Best Practices, Suggestions and Conclusion

4.1 Best Practices of the Program

The best practices of the "Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System" project are given below:

4.1.1 Strengthening Early Cancer Detection and Timely Diagnosis

The integration of VEC and VECSS has enhanced the early detection of HNCs. It improved diagnostic precision. The project has reduced dependency on minor OTs by shifting endoscopic evaluations to OPDs. It streamlined the diagnostic process and enabled timely treatment initiation. It ultimately reduces the risk of disease progression.

4.1.2 Enhancing Access to Equitable Healthcare

TMH has eliminated financial barriers for economically weaker sections by providing free diagnostic procedures, which would otherwise cost Rs 15,000-20,000 in private hospitals. The project bridged the urban-rural healthcare divide by ensuring that rural and economically disadvantaged patients can access advanced HNC diagnostics without financial or logistical challenges.

4.1.3 Enhanced Diagnostic Precision and Treatment Planning

The project enabled doctors to perform precise diagnostics through real-time visualization and high-resolution imaging, enhancing treatment planning.

4.1.4 Leveraging Technology

The endoscopic system is built as a future-ready and scalable model, ensuring compatibility with emerging technological advancements and sustained relevance in evolving cancer care. Its integration with EMR enhances the digital health strategy at TMH by linking diagnostic results with patient records. It will improve efficiency in data management, treatment planning, and long-term follow-ups.

4.2 Suggestions for Improvement of the Program

4.2.1 Enhance Data Collection and Monitoring

It is recommended to implement a structured data management and tracking system to document patient demographics, socio-economic backgrounds, and clinical outcomes. It ensures comprehensive analysis and better-informed decision-making. It will enhance impact assessment and support future planning for improved accessibility and resource allocation.

4.2.2 Strengthen Follow-up Mechanisms

It is suggested to establish a dedicated patient follow-up system. It is crucial to ensure timely treatment post-diagnosis. It is also recommended to establish a structured patient feedback system to gather insights on service quality, identify areas for improvement, and enhance the overall patient experience.

4.3 Conclusion

The “Procurement of Video Endoscope Cart and Video Endoscope Cart with Stroboscopy System” project at TMH has made an impact on cancer diagnostics, particularly for economically disadvantaged patients. It enabled early-stage detection. The project would have improved treatment outcomes and survival rates by reducing diagnostic delays. The provision of free endoscopic services has eliminated financial barriers, ensuring that underprivileged patients receive timely and high-quality care. The integration of advanced endoscopic machines into the OPD has optimized hospital resources by reducing dependence on minor OTs. It enabled same-day diagnostic procedures under local anesthesia. The project’s sustainability is reinforced through institutional integration, where these diagnostic services have become a core part of TMH’s healthcare delivery system. The project has set a benchmark in equitable cancer care, paving the way for broader adoption of similar equipment in other cancer hospitals across India.

5. List of Abbreviations

- KSL - Kotak Securities Limited
- SDGs - Sustainable Development Goals
- CSR - Corporate Social Responsibility
- OECD - Organization for Economic Co-operation and Development
- DAC - Development Assistance Committee
- REECIS - Relevance, Effectiveness, Efficiency, Coherence, Impact, Sustainability
- KII - Key Informant Interview
- TMH - Tata Memorial Hospital
- RAN - Rashtriya Arogya Nidhi
- NPCDCS - National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke
- MRI - Magnetic Resonance Imaging
- CT - Computed Tomography
- PET CT - Positron Emission Tomography–Computed Tomography
- ACTREC - Advanced Centre for Treatment, Research and Education in Cancer
- FY - Financial Year
- NC - Non-Concessional
- VEC - Video Endoscopic Cart
- VECSS - Video Endoscopic Cart with Stroboscope System
- OT - Operation Theatre
- OPD - Outpatient Department
- HNCs - Head and Neck Cancers
- SPTs - Second Primary Tumors
- EMR - Electronic Medical Records
- IR - Impact Report
- HNSCC - Head and Neck Squamous Cell Carcinoma
- ASEAN - Association of Southeast Asian Nations
- SPECT - Single Photon Emission Computed Tomography
- TMC - Tata Memorial Centre
- SLP - Speech Language Pathologist
- ToR - Terms of Reference
- GeM - Government e-Marketplace
- AMC - Annual Maintenance Contract
- DMG - Disease Management Group
- TAT - Turn Around Time
- GA - General Anesthesia
- Ayushman Bharat - Ayushman Bharat Pradhan Mantri Jan Arogya Yojana
- CAPEX - Capital Expenditure
- OPEX - Operational Expenditure

About NuSocia

NuSocia is an impact advisory firm, headquartered at Pune and having its consultants working across Delhi, Mumbai, Bangalore, Kolkata and Pune and at locations outside India at Dubai, Toronto and Muscat.

Established in 2017 and incubated at IIM Bangalore NSCRCEL, NuSocia is working with the mission to enable the Social ecosystem with impact that is evident. The team comprise of consultants, researchers, social sector professionals and data scientists with a common passion to generate ideas that matter for the people and the planet. It work with Corporates, Governments, Foundations, and Non-profits to help them maximize, manage, measure, and communicate their social impact.

Clients select us for our expertise to bring the best of the global framework and marry it with the ability to connect at the grassroots level and thus creating and delivering practical solutions to the unique client requirements. As a knowledge driven organization, NuSocia focus on research and collaboration to design innovative solutions and work across the entire social impact lifecycle offering services in CSR strategy, needs assessment, program design, implementation, monitoring & evaluation, impact assessments, communication, and more.

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