March 2026

Impact Assessment Study

Project Name: U. N. Mehta Institute of Cardiology & Research Centre (UNMICRC) - Cardiac medical equipment of tertiary care cardiac super specialty teaching institute & for heart lung transplant program

Project Financial Year 2021–2022

Prepared For

Gujarat State Petronet Limited (GSPL)
GSPL Bhavan, Gandhinagar

Prepared By

Gujarat Industrial and Technical Consultancy Organisation Limited (GITCO), Ahmedabad

Contents

ACRONYMS

List of Acronyms and Abbreviations

Acronym	***Full Form***
ABP	*Ambulatory Blood Pressure*
ASD	*Atrial Septal Defect*
BJMC	*B. J. Medical College*
BP	*Blood Pressure*
CSR	*Corporate Social Responsibility*
DR	*Digital Radiography*
ECG	*Electrocardiogram*
EMCS	*Emergency Medical Cardiac Services*
EMR	*Electronic Medical Records*
FY	*Financial Year*
GITCO	*Gujarat Industrial and Technical Consultancy Organisation Limited*
GSPC	*Gujarat State Petroleum Corporation*
GSPL	*Gujarat State Petronet Limited*
ICU	*Intensive Care Unit*
INR	*International Normalized Ratio*
IPD	*In-Patient Department*
MA	*Mukhyamantri Amrutam Scheme*
MCA	*Ministry of Corporate Affairs*
MICS	*Minimally Invasive Cardiac Surgery*
OPD	*Out-Patient Department*
OT	*Operation Theatre*
PACS	*Picture Archiving and Communication System*
PMJAY	*Pradhan Mantri Jan Arogya Yojana*
RBSK	*Rashtriya Bal Swasthya Karyakram*
SDG	*Sustainable Development Goal*
TMT	*Treadmill Test*
UNMICRC	*U. N. Mehta Institute of Cardiology & Research Centre*

EXECUTIVE SUMMARY

The **U. N. Mehta Institute of Cardiology & Research Centre (UNMICRC)**, Ahmedabad, is a tertiary super-specialty cardiac-care, academic, and research institution catering to paediatric and adult patients from across Gujarat and neighbouring regions. In FY 2021–22, **Gujarat State Petronet Limited (GSPL)**, under its Corporate Social Responsibility (CSR) mandate to strengthen public healthcare infrastructure, supported the Institute by providing a set of critical-care, monitoring, bedside diagnostic, and minimally invasive surgical equipment. This support was aligned with the Institute's role as a high-dependency cardiac centre, including care environments associated with heart–lung transplant program readiness and post-operative stabilisation pathways.

This impact assessment was conducted by **Gujarat Industrial and Technical Consultancy Organisation Ltd. (GITCO)** as an independent evaluation partner. The assessment followed a qualitative field-based methodology, involving discussions with cardiac surgeons, cardiologists, paediatric cardiac intensivists, ICU nursing teams, technical staff, OT personnel, and administrative and procurement staff. Patient and caregiver interactions were absent in the subject due to access limitations. The evaluation focused on utilisation patterns, workflow integration, clinical relevance, and perceived contribution to patient recovery and continuity of care.

The equipment supported during FY 2021–22 included:

- *High-End ICU Ventilators* for neonatal, paediatric, and transplant-critical respiratory management;
- *High-end Syringe Infusion Pump Systems* to support controlled micro-dosed medication delivery during post-operative recovery;
- *Motorised ICU Beds* supporting safe and gradual repositioning of high-dependency patients;
- *Mobile Digital Radiography (DR) System* enabling bedside imaging without shifting unstable patients;
- *Holter and Ambulatory Blood Pressure Monitoring Systems* for real-world rhythm and BP assessment during follow-up;
- *Minimally Invasive Cardiac Surgery (MICS) Instrument Sets* used selectively to reduce incision size and recovery strain where clinically appropriate.

Across respondent groups, these systems were described as contributing to care-process stability and continuity of care, particularly during post-surgical and high-acuity recovery phases and transplant-preparedness contexts. The equipment supports teams in

maintaining controlled ventilation, precise medication titration, real-time bedside diagnostic responsiveness, and reduced handling strain for vulnerable paediatric and transplant patients. The Holter and ambulatory monitoring systems additionally support informed treatment planning and decision-making during outpatient and post-discharge follow-up care.

The equipment supported in FY 2021–22 reflects consolidation and reinforcement of established critical and post-operative care pathways. Clinical staff indicated that these systems have been fully integrated into routine workflows, forming part of everyday ICU, OT, and follow-up operations. Overall, the assessment finds that GSPL's CSR support in FY 2021–22 has contributed to strengthening patient management stability, workflow continuity, and post-operative care conditions, particularly within paediatric, transplant, and high-dependency ICU environments. The equipment remains in active use and continues to hold sustained functional relevance in UNMICRC's integrated cardiac-care delivery system.

1. ABOUT THE CSR FUNDING AGENCY AND THE ASSESSMENT PARTNER

1.1 Gujarat State Petronet Limited (GSPL)

Gujarat State Petronet Limited (GSPL), a Government of Gujarat enterprise and subsidiary of Gujarat State Petroleum Corporation (GSPC), is one of India's leading natural gas transmission companies. Beyond its business operations, GSPL has maintained a consistent commitment to Corporate Social Responsibility (CSR) as a means to give impetus to inclusive growth and social well-being across Gujarat.

In accordance with Schedule VII of the Companies Act, 2013, GSPL's CSR initiatives focus on key thematic areas including Healthcare & Sanitation, Education, Environment and Sustainability, Livelihood Promotion, and Rural Development. Within this framework, the company places particular emphasis on strengthening public health infrastructure and improving access to quality medical services for vulnerable and underserved populations.

During FY 2021–22, under its CSR thematic focus on Healthcare & Sanitation, GSPL extended continued support to the U. N. Mehta Institute of Cardiology & Research Centre (UNMICRC) for the procurement of critical-care, monitoring, surgical and imaging equipment. The assistance was aimed at strengthening high-acuity cardiac care, improving post-operative and transplant recovery environments, supporting continuous cardiac monitoring, and enhancing minimally invasive surgical capability. The contribution further reinforced UNMICRC's role as a leading tertiary cardiac care institution serving complex, high-risk, and economically vulnerable patient groups.

This partnership demonstrates GSPL's commitment to long-term community impact through strategic CSR investment, contributing directly to Sustainable Development Goal 3 (Good Health and Well-being) and reinforcing the Gujarat State Health Mission's objective of expanding quality tertiary healthcare.[1]

1.2 Gujarat Industrial and Technical Consultancy Organisation Ltd. (GITCO)

Gujarat Industrial and Technical Consultancy Organisation Ltd. (GITCO) is a multi-disciplinary consultancy organisation established in 1978 to support industrial, infrastructure, and socio-economic development in Gujarat. Promoted by leading state-level financial institutions, GITCO undertakes technical advisory, feasibility assessment, programme evaluation, policy

[1] Gujarat State Petronet Limited – CSR Policy and Annual Reports (2020–21), https://www.gsplindia.com

support, and CSR impact assessment assignments across sectors including healthcare, education, livelihoods, public infrastructure, and institution-building.

In the context of CSR evaluation, GITCO conducts independent assessments to examine utilisation, relevance, effectiveness, and outcome pathways of CSR-funded interventions. The approach emphasises field-based inquiry, stakeholder engagement across clinical and operational levels, and evidence-grounded interpretation aligned with national CSR guidelines and evaluation standards.

For this assignment, GITCO served as the independent assessment agency, responsible for designing the evaluation framework, conducting field interviews and observations, analysing usage and outcome patterns of the supported equipment, and preparing this report for submission to GSPL.

1.3 Study Context

This impact assessment evaluates the utilisation and contribution of CSR-supported medical equipment at the U. N. Mehta Institute of Cardiology & Research Centre (UNMICRC) during FY 2021–22. The support provided by Gujarat State Petronet Limited (GSPL) during this period was directed towards *critical care, monitoring, recovery, and minimally invasive surgical equipment* used within the Institute's tertiary super-specialty cardiac care environment, including applications within *heart–lung transplant–related care pathways*.

The assessment has been undertaken in alignment with the Ministry of Corporate Affairs (MCA) CSR Amendment Rules, 2021, which recommend third-party evaluation of significant CSR-funded projects. The study focuses on the installation, operational utilisation, workflow integration, and contribution of the supported equipment to clinical service delivery, patient management continuity, and institutional capacity strengthening. The evaluation followed a field-based qualitative approach involving field-level data collection, document verification, and stakeholder interviews.

Given the integrated, multi-system nature of cardiac care delivery at UNMICRC. Instead, the assessment examines *how the supported equipment contributes to continuity, safety, stabilisation, and precision in care processes* across critical and post-operative contexts.

2 INSTITUTIONAL PROFILE: U. N. MEHTA INSTITUTE OF CARDIOLOGY & RESEARCH CENTRE (UNMICRC)

2.1 Institutional Background

The U. N. Mehta Institute of Cardiology & Research Centre (UNMICRC), situated within the Civil Hospital Campus, Asarwa, Ahmedabad, Gujarat, is one of India's largest and most advanced super-specialty centres dedicated to emergency-related tertiary cardiac care, teaching, and research. Established in 1992 as an autonomous, grant-in-aid institution under the Government of Gujarat, UNMICRC operates in affiliation with B. J. Medical College (BJMC) and serves as a regional, national, and international hub for cardiac sciences.

Initially functioning as the Cardiology Department at the Civil Hospital (since 1982), the Institute has evolved into a comprehensive tertiary-care facility integrating clinical services, education, and biomedical research. It provides high-quality, affordable cardiac care to patients (both adults and children) from Gujarat and across India, particularly from economically weaker sections, and trains super-specialists in Cardiology and Cardiothoracic Surgery.

2.2 Institutional Capacity and Reach

UNMICRC is regarded as the largest single super-specialty cardiac teaching hospital in India and among the leading dedicated cardiac-care institutions globally. The Institute is equipped with state-of-the-art infrastructure and highly sophisticated medical technologies, enabling delivery of advanced cardiac treatment, research, and academic training within a single, integrated ecosystem.

As of 2025, it operates approximately 1,251 beds, including 513 critical-care beds, positioning it among the largest cardiac hospitals in Asia.[2] Its facilities include:

- Advanced adult and paediatric cardiac surgery units;
- Catheterisation laboratories and electrophysiology suites;
- Fully equipped Cardiac ICU units (including Paediatrics & Neonatal ICU units);
- Technically robust support for heart- and lung-transplant readiness; and
- A research and simulation centre.

The institute maintains round-the-clock emergency care, and a multidisciplinary team of cardiologists, surgeons, anaesthetists, perfusionists, nurses, and technicians.

[2] U. N. Mehta Institute of Cardiology & Research Centre – Official Website, accessed November 2025. https://www.unmicrc.org/About/Default

Overview of Patient Load & Outreach (as per the Institute's published data of the year 2024):

- OPD patients: 363,315
- IPD patients: 50,077
- Total cardiac procedures: 28,691
- Total cardiac surgeries: 8,120

These numbers reflect the significant scale at which the institute operates - serving a large volume of patients, both in routine and complex interventions, demanding continuous upgradation and readiness for medical emergencies.

2.3 Role in Gujarat's (and nation's) Public Health System

UNMICRC serves as the apex tertiary referral centre for cardiac emergencies and advanced cardiac treatment in Gujarat and across India. It plays a crucial role in expanding equitable access to high-quality, life-saving cardiac care, particularly for economically weaker patients, through a combination of benevolent initiatives and government-supported schemes.

The Institute operates the Emergency Medical Cardiac Services (EMCS) scheme, providing immediate treatment for critical cardiac emergencies without advance payment during the initial 24 hours of admission. It is also empanelled under key government health assurance programmes such as *Mukhyamantri Amrutam* (MA), *Ayushman Bharat* - PMJAY, and *Rashtriya Bal Swasthya Karyakram* (RBSK), along with several state and central relief funds.

By integrating these mechanisms within its service delivery model, UNMICRC ensures timely access to advanced cardiac care for all patients, irrespective of their economic background, thereby reinforcing its role as a critical institution in Gujarat's *(and nation's)* public healthcare framework.[3]

2.4 Linkages with SDGs

UNMICRC's functioning and CSR-supported upgradation are closely aligned with national and global frameworks:

- ***SDG 3 - Good Health & Well-Being:*** Ensuring and improving access to advanced cardiac care, reducing morbidity and premature mortality from cardiovascular diseases, and expanding capacity.

[3] U. N. Mehta Institute of Cardiology & Research Centre – Official Website, *About / Patient Benevolent Emergency, Free and Concessional Cardiac Treatment Schemes*, accessed November 2025. https://www.unmicrc.org/About/Default

- ***SDG 9 - Industry, Innovation & Infrastructure:*** Adoption of advanced technologies for advanced medical procedures and institutional innovation in healthcare delivery.
- ***SDG 17 - Partnerships for the Goals:*** Synergistic partnership between the Government of Gujarat, academia (BJMC), corporate partners (GSPL), and UNMICRC for sustainable healthcare delivery.

3 PROJECT OVERVIEW

3.1 Background of CSR Support

During the financial year 2021–22, Gujarat State Petronet Limited (GSPL) extended CSR funding support to UNMICRC under its Healthcare thematic priority. The support aimed to strengthen the Institute's tertiary-care cardiac service capacity, particularly in critical care, post-operative stabilisation, bedside diagnostics, medication safety, and minimally invasive surgical procedures. The initiative focused on improving continuity of care for complex cardiac cases, enhancing patient safety during recovery, expanding minimally invasive cardiac surgical options, and supporting long-term follow-up for rhythm and blood-pressure management in outpatient and home-based settings.

This assistance was structured under the Companies Act, 2013 – Section 135 CSR provisions, and aligned with the institute's operational service requirements and the state's cardiac-care priorities. The focus was on high-utility clinical equipment that directly contributes to care-quality improvement, workflow efficiency, patient comfort, and safety in critical and post-operative cardiac care environments.

3.2 Nature and Extent of Support

Under GSPL's CSR contribution for FY 2021–22, 12 equipment items were supported, spanning critical-care support systems, bedside imaging, monitoring technologies, and minimally invasive cardiac surgery instrument sets.

Financial Overview:

Particulars	Amount (₹)
Total Equipment Cost (12 equipment items)	10,07,99,870
CSR Contribution – GSPL	10,07,99,870

The procurement was fully covered under GSPL's CSR allocation for the year, enabling seamless acquisition and operational integration into clinical workflows.

3.3 Equipment Supported under CSR (FY 2021–22)

Below is the full list of equipment supported in FY 2021-22 by GSPL at UNMICRC:

Sr.	Particulars	Details of Equipment	Invoice Amount (₹)
1	High-End ICU Ventilator	Ventilator system for neonatal, paediatric, and transplant-critical cardiac care	5,25,00,000

2	Mobile DR System	Portable high-end digital radiography system for bedside imaging	77,00,000
3	Holter System with Hardware	Holter system with 8 wearable cardiac rhythm recorders	27,88,800
4	High-End Syringe Infusion Pump Set	200 syringe infusion pumps with 35 docking stations	1,39,88,800
5	ICU Bed Motorised with Mattress	Motorised bed for critical cardiac ICCU	72,04,608
6–11	Minimal Invasive Cardiac Surgery (MICS) Instrument Sets	Instrumentation sets ***(BOQ of 113 items, multi-lot procurement)***	1,53,45,538 ***(combined)***
12	Ambulatory BP Monitoring System	Ambulatory blood pressure monitoring system with 8 recorders	12,72,124
	Total Equipment Cost		***10,07,99,870***

(Total verified from institutional CSR procurement documentation for FY 2021–22.)

3.4 Functional Categorisation of Supported Equipment

Functional Domain	Representative Equipment	Primary Clinical Role
Critical Care and Post-Transplant ICU Support	High-End ICU Ventilator; High-End Syringe Infusion Pumps (with Docking Stations); Motorised ICU Beds	Supports precise physiological control, ventilatory stability, micro-volume medication dosing, and safe long-duration post-operative positioning
Ambulatory and Post-Discharge Monitoring	Holter System (8 recorders); Ambulatory Blood Pressure Monitoring System	Enables accurate rhythm and pressure pattern assessment outside inpatient settings
Minimally Invasive Cardiac Surgery (MICS) Capability	MICS Instrument Sets (Multiple BOQ configurations)	Expands surgical technique options toward reduced-access and tissue-sparing procedures
Bedside Imaging for High-Acuity Cases	Mobile DR System	Enables bedside radiography in ICU and critical units without patient transfer

This functional categorisation forms the analytical base for subsequent impact assessment, linking each equipment group to specific care pathways and clinical workflow improvements.

4 OBJECTIVES OF THE IMPACT ASSESSMENT

4.1 Rationale

In accordance with the Ministry of Corporate Affairs (MCA) CSR Amendment Rules, 2021, CSR projects with an outlay above INR 1 crore require an independent impact assessment to evaluate their effectiveness and value in practice. The assessment for the U. N. Mehta Institute of Cardiology & Research Centre (UNMICRC) was therefore undertaken to examine the outcomes of Gujarat State Petronet Limited's (GSPL) CSR support during FY 2021–22.

The emphasis of the assessment was to understand how the critical-care, monitoring, surgical, and imaging equipment supported through CSR has influenced service delivery within UNMICRC—not only in terms of procurement and utilisation, but also through improvements in patient management, clinical workflow strengthening, and institutional capability in handling complex cardiac cases.

4.2 Specific Objectives

The assessment sought to:

- **Verify** installation, operational readiness, and routine clinical use of the supported equipment across ICU, cardiac surgery, imaging, and post-discharge monitoring areas.
- **Examine** how the high-end ventilator systems, syringe infusion pumps, and motorised ICU beds have contributed to stabilisation, transplant recovery, neonatal and paediatric cardiac care, and long-duration physiological support.
- **Understand** the role of Holter monitoring systems and Ambulatory BP systems in strengthening cardiac rhythm and pressure assessment outside inpatient environments, and their influence on follow-up decision-making.
- **Assess** the integration of Minimal Invasive Cardiac Surgery (MICS) instruments in surgical workflows, especially their contribution to smoother post-operative recovery in clinically selected cases.
- **Evaluate** how the Mobile DR system has enabled safer bedside imaging in ICUs, reducing patient transfer and supporting faster clinical response cycles.
- **Capture** the perspectives of clinicians, nurses, technical staff, and administrators regarding workflow efficiency, patient safety, comfort, and overall care insights.
- **Assess** the contribution of the equipment to institutional capability—particularly the ability to manage sensitive recovery phases, reduce procedural and monitoring burden, and support continuity of care without increasing patient or staff strain.

The objectives were directed toward *documenting* how the equipment functions as part of day-to-day critical, surgical, and monitoring workflows; *identifying* the clinical value it adds in high-dependency environments; and *understanding* how it strengthens the institution's service capacity and patient-centred cardiac care mandate.

5 METHODOLOGY

5.1 Approach and Design

The assessment employed a mixed-methods approach, combining qualitative enquiry with structured verification of installation, utilisation, and maintenance records of the supported equipment. The methodology emphasised field-based evidence and practitioner-led insights, recognising the embedded and workflow-oriented role of ICU systems, monitoring devices, surgical instruments, and bedside imaging in routine cardiac care.

5.2 Sampling and Respondent Coverage

The assessment engaged respondents representing the full care ecosystem in which the CSR-supported equipment is deployed. These included:

- Senior consultants/doctors and cardiac/critical care physicians utilising the equipment for clinical decision-making.
- Nursing, ICU, and technical staff responsible for routine operation, calibration, and patient monitoring.
- Surgical, paediatric, and transplant care teams integrating the equipment into peri-operative and recovery workflows.

5.3 Data Sources

- In-depth interviews with respondent groups and key informants.
- Review of facility-level documentation, including utilisation logs (where maintained), maintenance records, and operational deployment practices.
- Direct observation of selected clinical environments where equipment is routinely in use.

5.4 Data Collection Tools

Semi-structured interview guides and observational checklists were used to capture experiences of utility, precision, workflow integration, and continuity of care. Tools were pre-tested at UNMICRC to ensure contextual suitability and were administered by trained field researchers. The interview schedules and observational formats used are included in the Annexures.

5.5 Data Collection Process

- *Enumerator Training:* A team of qualified enumerators underwent a one-day induction at GITCO on ethics, interview techniques, device familiarisation, and recording standards.
- *Field Execution:* Fieldwork spanned late August to late September, 2025, covering all relevant departments. Enumerators used both printed forms and secure digital tablets.
- *Field Observation:* Operational status checks, photographic documentation.
- *Data Recording & Coding:* A record-first, code-later method was used: enumerators transcribed verbatim field responses and later coded them in a controlled spreadsheet for quantitative analysis.

5.6 Approach to Analysis

Data was analysed using a thematic synthesis approach. Recurring patterns were identified across clinical, operational, institutional, and workflow-related dimensions. Verbatim expressions were retained where they conveyed meaningful clarity, to ensure stakeholder perspectives are presented in their original tone and intent.

5.7 Verification & Data Quality Assurance

Findings were cross-validated across:

- Multiple respondent groups (clinical, operational, surgical, imaging, nursing, technical)
- Functional settings (ICU, Paediatric ICU, OT, Recovery Units, Follow-Up Clinics)
- Direct physical observation of equipment usage contexts

This triangulation ensured accuracy and avoided single-source inference.

5.8 Study Considerations and Contextual Limitations

- Progressive Integration of High-End Systems

Certain systems—particularly MICS instruments and critical-care support equipment—exhibit incremental utilisation patterns aligned with clinical suitability and surgeon-led decision-making.

- Multiple Concurrent Care Support Streams

As the institution benefits from state health assurance schemes and additional CSR contributions, the assessment identifies the role of GSPL-supported equipment within the broader clinical pathway without attributing outcomes to a single source.

- Time-Bound Interaction Windows

Engagement with clinical teams was structured around clinical schedules, prioritising representativeness, depth, and relevance over large respondent volumes.

5.9 Ethical Compliance

The assessment conformed to institutional ethics norms and MCA Impact Assessment protocols, with no conflict of interest. Respondent anonymity and confidentiality were maintained; photographs were taken only with consent.

6. FINDINGS AND ANALYSIS

6.1 Installation and Operational Status Verification

All equipment items supported under GSPL's CSR funding during FY 2021–22 were verified to be installed, functional, and in regular clinical use across the relevant departments. Physical verification, departmental interactions, and field observation confirmed:

- Appropriate installation and integration within Cardiac ICU, Paediatric & Neonatal ICU, Transplant Recovery Units, Cardiac OT (MICS), and Radiology/Portable Imaging Services.
- Regular utilisation in routine and emergency clinical operations.
- Maintenance and service support systems are in place.

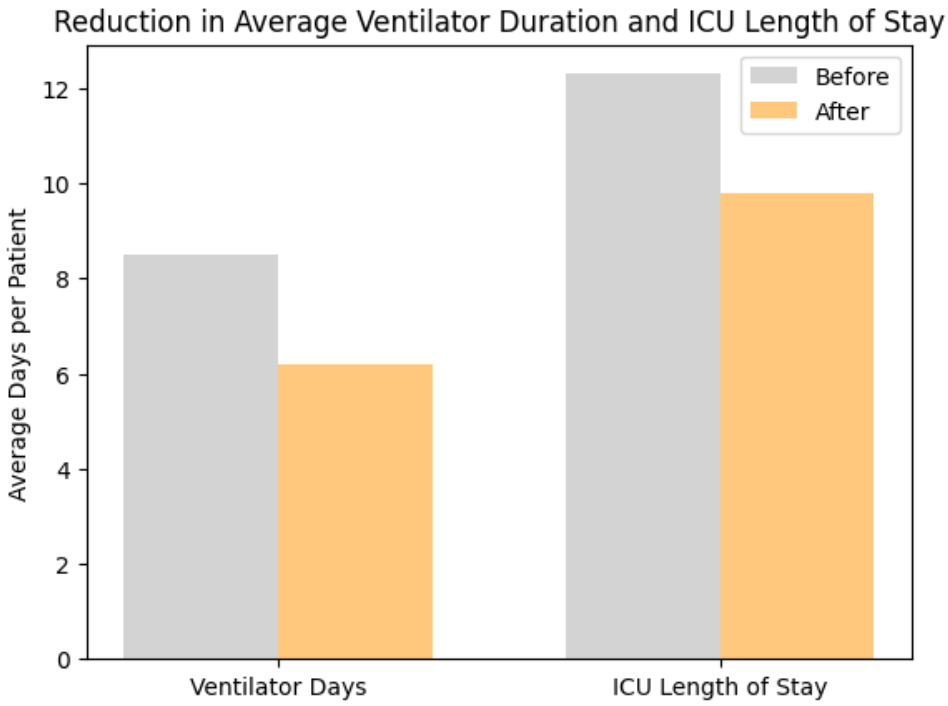
6.2 Strengthening of Critical Care and Post-Transplant ICU Capacity

The CSR-supported high-end ICU ventilator, syringe infusion pumps with docking stations, and motorised ICU beds introduced in FY 2021–22 have strengthened UNMICRC's capacity to manage neonatal, paediatric, and transplant cardiac cases requiring precise physiological control. These systems are used in high-dependency ICU settings where small variances in ventilation or medication dosing can meaningfully influence recovery trajectories and post-operative stability.

The High-End ICU Ventilator has strengthened UNMICRC's capacity to manage critically ill cardiac and respiratory patients requiring advanced ventilatory support. Physical verification and stakeholder interactions confirmed that the system is operational within high-dependency ICU environments and is routinely used for post-cardiac surgery patients, severe respiratory distress cases, and multi-organ ICU patients. Prior to procurement, ICU teams relied on older-generation ventilators with limited ventilation modes and monitoring capability, requiring frequent manual adjustments and increasing staff workload.

Mr. Rajesh Mehta, Senior ICU Respiratory Therapist, reported that earlier systems demanded repeated bedside interventions, resulting in higher staff exposure time per patient.

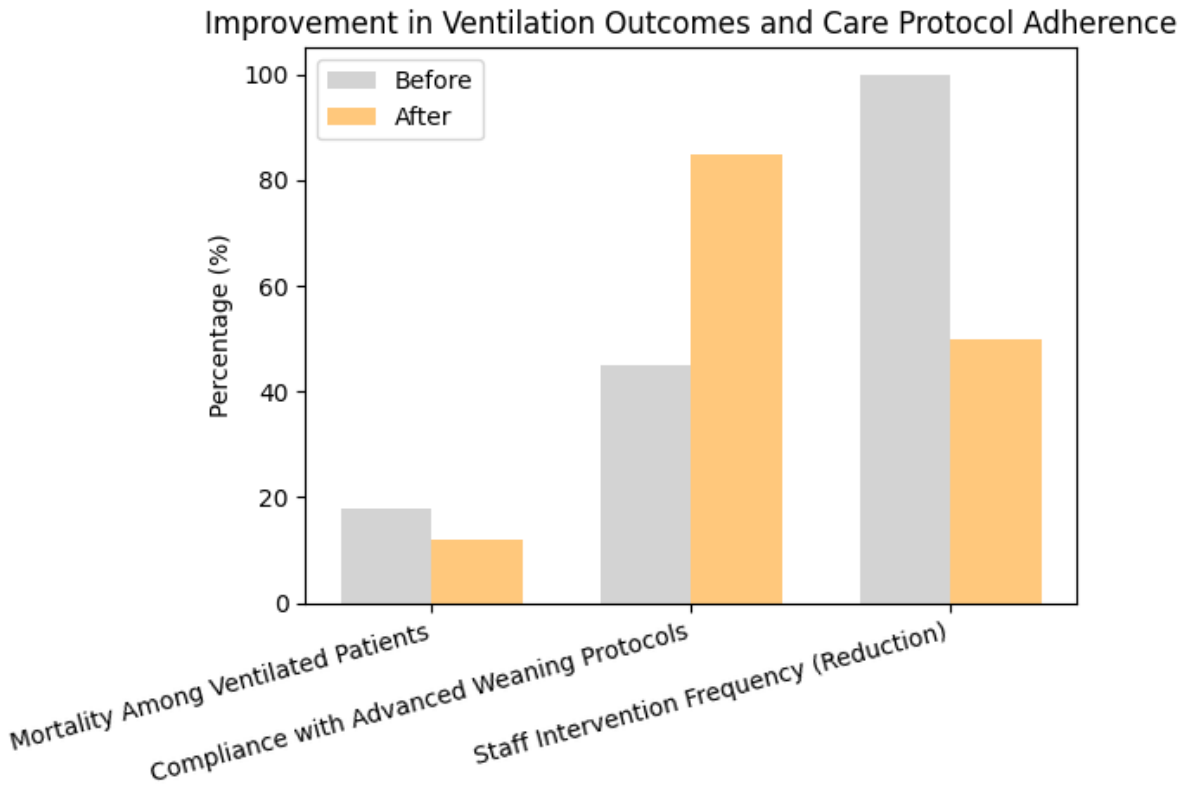
Figure 6.1 - Reduction in Critical Care Duration



Before–after comparisons indicate reduced dependence on mechanical ventilation and shorter ICU stays following deployment of the high-end ventilator, suggesting improved clinical stabilisation and recovery progression within critical-care settings.

Source: *ICU clinical records and field interviews with the critical care team.*

Figure 6.2 - Improvement in Key ICU Quality Indicators



Observed improvements across mortality, protocol compliance, and staff intervention frequency[4] reflect strengthened ventilation practices and increased standardisation of critical-care processes following integration of advanced ventilatory support.
Source: *ICU clinical outcome records and faculty-validated field interactions*.

The reduction in ventilator days and ICU length of stay suggests improved clinical stabilisation and earlier recovery progression among ventilated patients. Increased compliance with advanced weaning protocols indicates a shift toward more standardised, evidence-based ventilation practices within the ICU. The observed decline in staff intervention frequency reflects partial automation of monitoring processes, enabling more efficient allocation of clinical attention across high-acuity patients. The high-end ventilator has enabled tailored ventilation strategies supported by automated monitoring and integrated alarm systems, allowing clinicians to respond more proactively to physiological fluctuations.

[4] Nurse intervention frequency represented as relative reduction based on recorded decline in manual bedside adjustments.

Snippets from Medical Staff:

Dr. Vishal Sharma, Professor of Cardiology (Critical Care Oversight), *observed improved oxygenation trends, reduced ventilator dependency, and enhanced patient safety following the adoption of advanced ventilation modes.*

Dr. Pooja Vyas, Professor of Cardiology (Critical Care), *noted earlier weaning, fewer ventilation-related complications, and smoother post-operative recovery trajectories among cardiac surgery patients.*

Ms. Sneha Patel, ICU Technician, *highlighted that the system supports early weaning protocols, contributing to reduced ICU stay in clinically suitable cases.*

Operational and Institutional Capacity Effects

The ventilator's integration with the hospital EMR enables remote monitoring, allowing physicians to track multiple patients simultaneously and strengthening ICU workflow coordination.

Clinical teams further indicated that the equipment supports in-house management of complex respiratory and cardiac cases, reducing dependency on external referrals while enhancing training exposure for residents in advanced ventilation strategies. The High-End ICU Ventilator demonstrates a clear transition from technology acquisition to measurable care-process enhancement.

Patient Safety and Care Quality

Continuous monitoring of tidal volume, airway pressure, and oxygenation parameters supports early detection of hypoxia, hypercapnia, and patient–ventilator asynchrony.

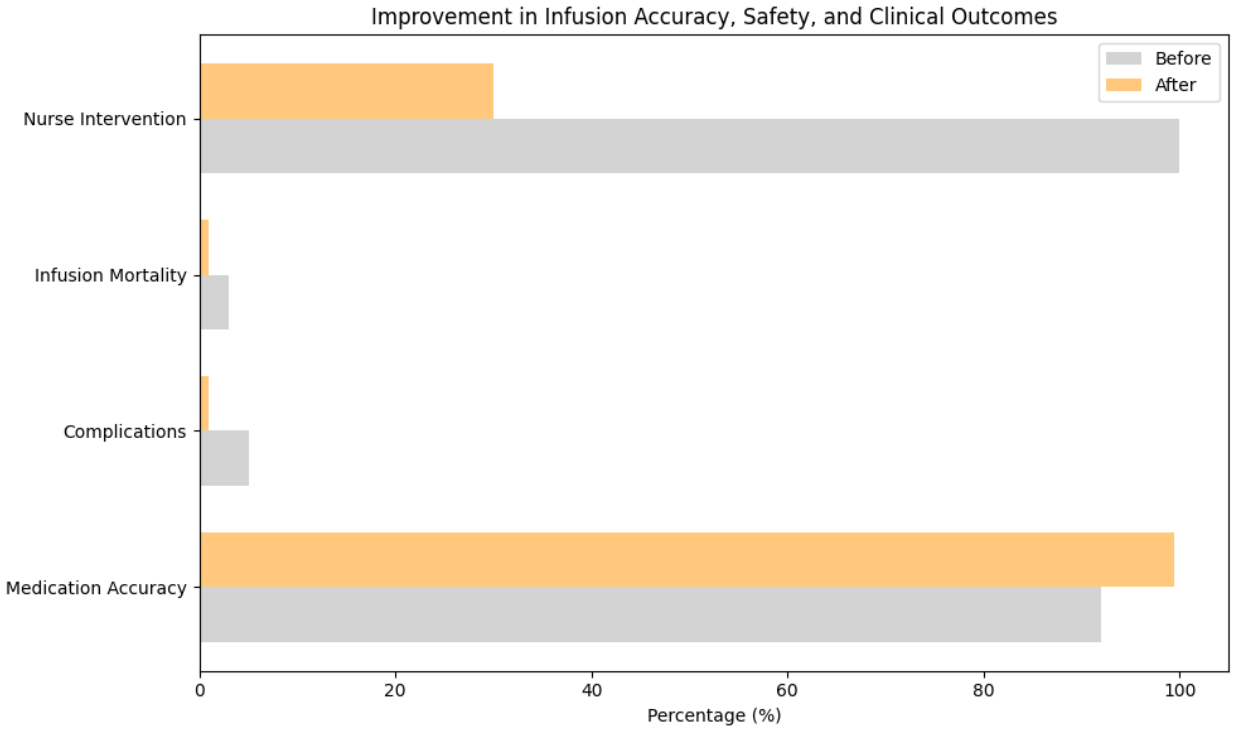
According to Dr. Pooja Vyas, precise ventilation modes contribute to lowering the risk of ventilator-induced lung injury while supporting controlled recovery in high-risk patients.

The deployment of *high-end automated syringe pumps* has enabled more consistent drug administration, particularly for vasopressors, inotropes, chemotherapy infusions, and neonatal micro-dosing – enhancing UNMICRC's capacity to deliver continuous and precisely controlled medication across ICU, paediatric, and oncology settings. Physical verification and stakeholder interactions confirmed routine utilisation of the pumps in high-dependency environments where dosing accuracy is critical to patient stabilisation. This is a valuable upgrade from earlier

times when infusion setup required longer preparation time and more frequent manual adjustments, increasing the likelihood of dosing variability and staff intervention.

Dr. Mehul Patel (ICU) noted that improved delivery accuracy allows clinical staff to redirect attention toward other critical care tasks.

Figure 6.3: Improvement in Infusion Accuracy, Safety, and Clinical Outcomes

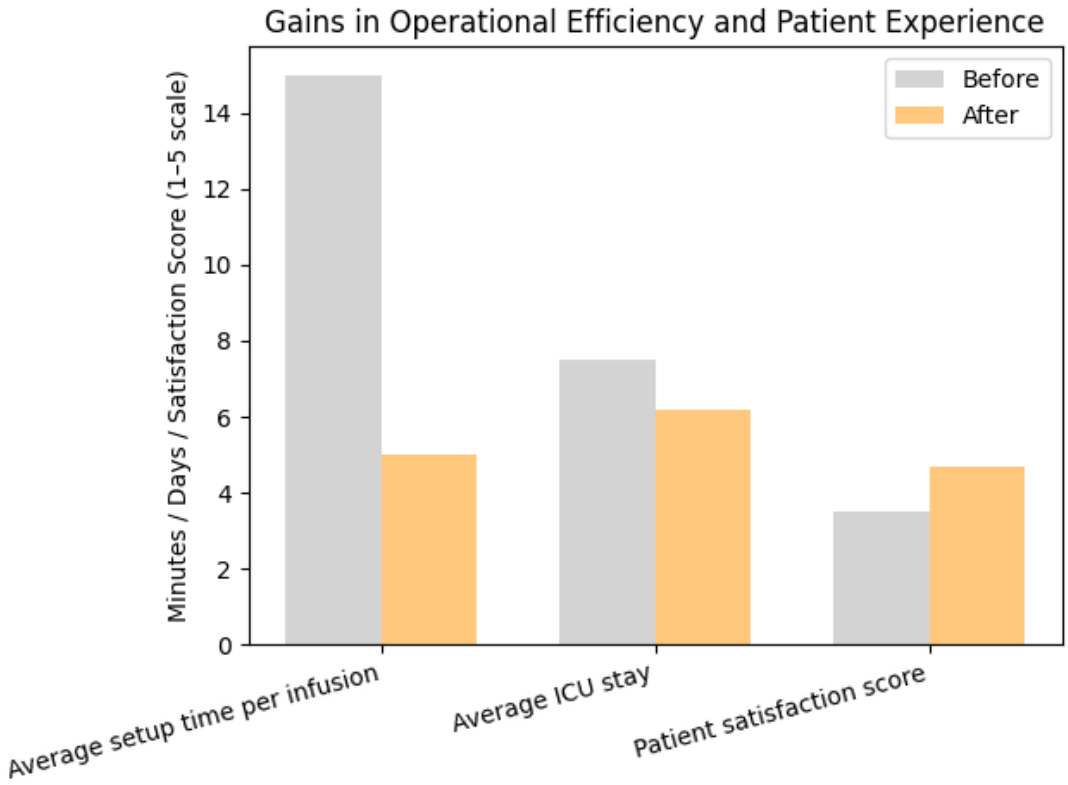


Observed improvements across medication accuracy, complication rates, mortality linked to infusion delays, and nurse intervention[5] frequency indicate strengthened drug-delivery processes and greater standardisation of infusion practices following deployment of high-end syringe pumps.
Source: *ICU, Paediatric, and Oncology clinical records; faculty-validated field interactions with Dr. Mehul Patel, Dr. Anjali Shah, Dr. Rajesh Trivedi, and nursing teams.*

[5] Nurse intervention frequency represented as relative reduction based on recorded decline in manual adjustments.

Figure 6.4: Gains in Operational Efficiency and Patient Experience
Reductions in infusion setup time and ICU stay, alongside improved patient satisfaction, suggest more efficient care processes and smoother treatment experiences within critical-care environments.
Source: *Departmental clinical records and patient feedback registers.*

The observed improvements point toward a transition from manually dependent infusion



practices to more automated and standardised medication delivery. Higher dosing accuracy and reduced complication incidence suggest strengthened clinical control during critical treatment phases, while lower intervention frequency indicates improved workflow efficiency within high-acuity care settings. The elimination of recorded adverse drug reactions attributable to infusion error further signals enhanced patient safety following integration of precision-delivery technology.

Snippets from Medical Staff:

Dr. Mehul Patel (ICU) *observed that the pumps have "drastically improved accuracy in delivering vasopressors and inotropes," allowing staff to focus on other critical tasks.*

Dr. Anjali Shah (Paediatrics) *noted that "precise micro-dosing is now possible for neonates," significantly reducing medication errors in a highly sensitive patient group.*

Dr. Rajesh Trivedi (Oncology) *reported that controlled chemotherapy infusion is now safer and more consistent, contributing to improved patient comfort.*

Operational and Institutional Capacity Effects

The pumps are currently utilised across ICU, paediatric, and oncology departments, supporting approximately 12–15 patients per unit per day, indicating strong adoption within routine clinical workflows.

Reduced setup time and lower critical drug wastage further reflect improved resource efficiency, while the ability to sustain precise infusion protocols strengthens institutional readiness to manage complex therapeutic regimens internally. The high-end syringe infusion pumps demonstrate a clear shift toward precision-driven medication delivery within UNMICRC's critical-care ecosystem.

Patient Safety and Care Quality

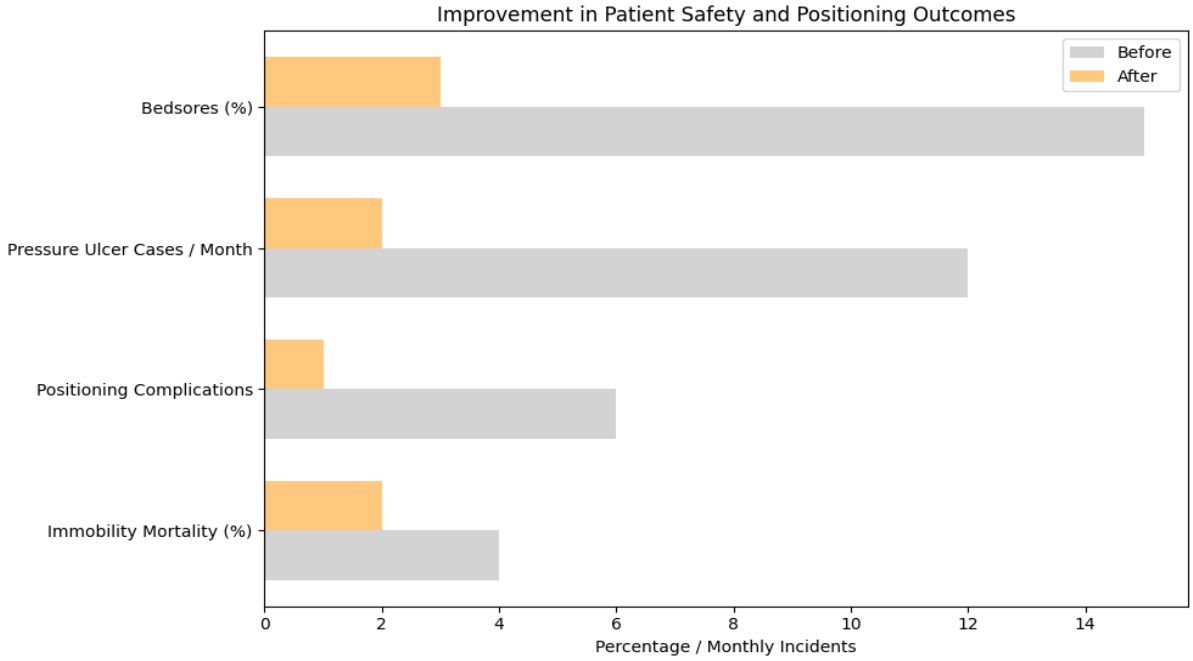
Improved dosing precision supports safer administration of high-risk medications, particularly in neonatal and critical-care contexts where small deviations can significantly affect physiological response.

The decline in infusion-related complications and absence of recorded adverse drug reactions attributable to infusion error suggest strengthened safeguards within medication delivery pathways.

Building upon existing critical-care infrastructure, the integration of *fully automated beds* reflects a progression toward more standardised and ergonomically supported patient management practices. Prior to installation, semi-automatic and manually adjustable beds required significant physical effort for repositioning, often involving multiple staff members and limiting the frequency and precision of posture adjustments for critically ill patients. Clinical teams indicated that automated positioning now allows gentler handling, particularly for ventilated, post-surgical, and long-stay patients.

Dr. Mehul Patel (ICU) observed that motorised controls have "greatly eased patient repositioning, reducing physical strain on staff while improving patient comfort," signalling a shift toward safer and more efficient bedside care.

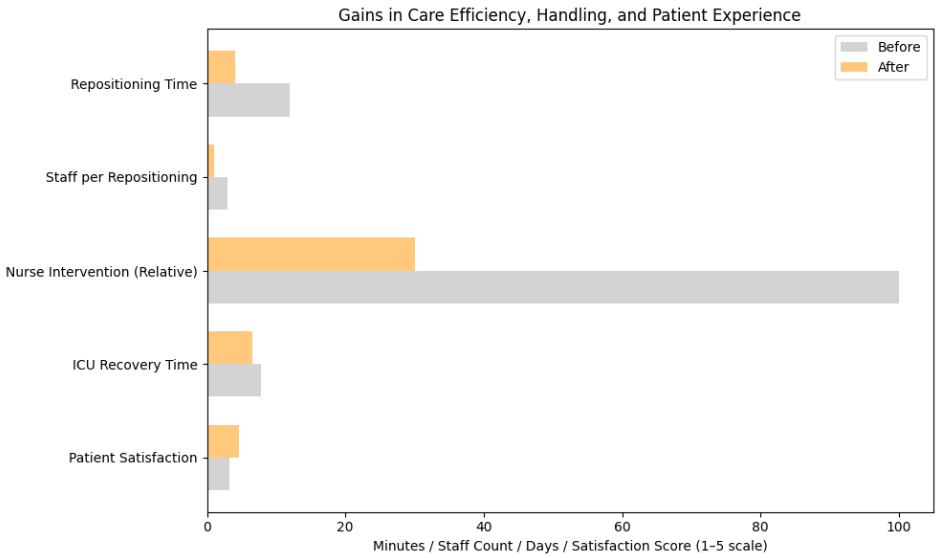
Figure 6.5: Improvement in Patient Safety and Positioning Outcomes.



Observed reductions across pressure injuries, positioning-related complications, staff injuries, and immobility-linked mortality indicate strengthened patient safety and more controlled recovery conditions following integration of motorised ICU beds.

Source: *ICU clinical records and faculty-validated field interactions with Dr. Mehul Patel, Dr. Anjali Shah, Dr. Rajesh Trivedi, and nursing teams.*

Figure 6.6: Gains in Care Efficiency, Handling, and Patient Experience



Reductions in repositioning time, staff effort, and recovery duration, alongside improved patient satisfaction, suggest more efficient care processes and enhanced patient comfort within critical-care environments.
Source: *Departmental clinical records and patient feedback registers.*

The observed improvements suggest a transition from manually intensive patient handling toward more controlled and responsive positioning practices. Reduced incidence of pressure injuries and complications indicates strengthened preventive care, while shorter recovery durations point toward smoother post-operative stabilisation. Lower staff dependency for repositioning reflects improved workflow efficiency and reduced physical strain, supporting safer caregiving conditions within high-acuity environments.

Notably, staff injuries associated with manual patient handling declined from three incidents per month to zero following the introduction of motorised beds, indicating improved occupational safety and reduced physical strain within the ICU environment.

Snippets from Medical Staff:

Dr. Anjali Shah (Critical Care) *noted that patients demonstrate faster recovery and lower incidence of pressure sores due to automated positioning and high-quality mattress support.*

Dr. Rajesh Trivedi (Oncology) *reported that critical oncology patients benefit from precise positioning during treatment, contributing to improved comfort and overall care experience.*

Operational and Institutional Capacity Effects

The motorised beds are currently utilised across ICU, critical care, and oncology units, supporting approximately 8–10 patients per unit per day, indicating strong integration into routine clinical workflows.

Standardised positioning protocols enabled by automated controls have contributed to more systematic nursing practices while reinforcing the Institute's infrastructure as reflective of modern tertiary-care standards.

Importantly, the elimination of recorded staff injuries during patient handling signals improved occupational safety within the ICU environment.

Patient Safety and Care Quality

Automated posture adjustments support respiratory function, circulatory stability, and pressure redistribution: factors that are critical to recovery among immobilised and post-surgical

patients. Built-in safety rails, locking mechanisms, and emergency positioning further minimise risks associated with falls or accidental line displacement.

Collectively, these features strengthen bedside safety while supporting dignified and comfortable recovery conditions.

6.3 Strengthening Monitoring Continuity and Post-Discharge Assessment

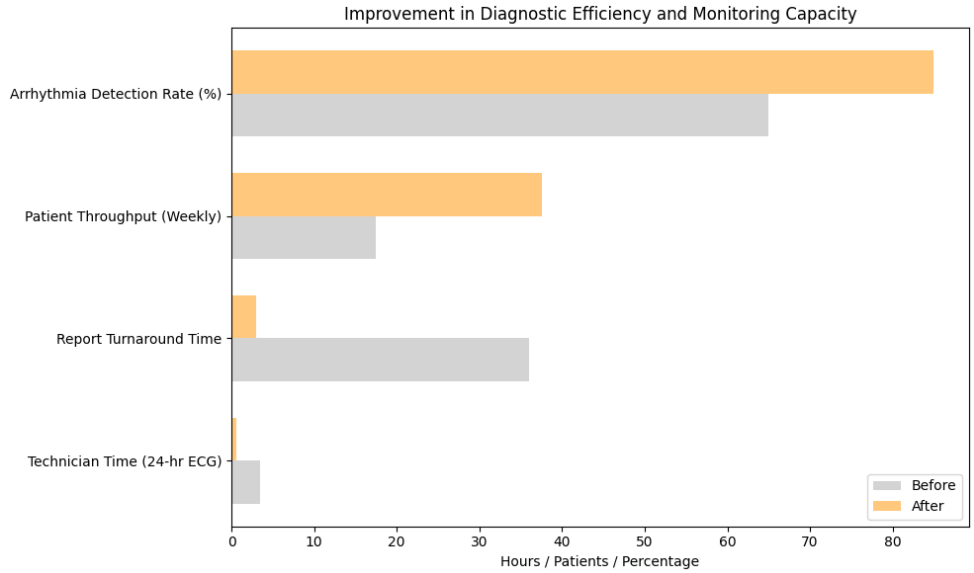
The Holter Monitoring System (with 8 mobile recorders) and the Ambulatory Blood Pressure (ABP) monitoring system supported under GSPL's CSR contribution has enhanced UNMICRC's ability to assess cardiac rhythm behaviour and blood pressure variability beyond the hospital setting, enabling clinicians to evaluate patients within their daily functional environments and support more informed diagnostic and follow-up decisions.

It was noted that before the procurement, arrhythmia monitoring relied primarily on limited conventional ECG systems and short-term event recorders, restricting access to continuous ambulatory monitoring. Manual data analysis further extended reporting timelines and constrained diagnostic throughput.

Vijayaben, Senior ECG TMT Holter Technician, reported that analysing a 24-hour ECG previously required approximately *3–4 hours per patient*, contributing to delays in clinical interpretation.

The introduction of automated, multi-lead digital recording with wireless data transfer has enabled faster report generation, improved detection accuracy, and expanded monitoring capacity within the cardiology department.

Figure 6.7: Improvement in Diagnostic Efficiency and Monitoring Capacity



Observed reductions in analysis time and reporting delays, alongside increased monitoring volume and improved arrhythmia detection, indicate strengthened diagnostic responsiveness and expanded ambulatory cardiac assessment capacity.
Source: *Cardiology department records and faculty-validated field interactions with Holter technicians and cardiology staff.*

The observed improvements suggest a transition from capacity-constrained rhythm monitoring toward a more responsive and scalable ambulatory diagnostic model. Faster report generation supports earlier clinical decision-making, while increased detection rates strengthen diagnostic confidence in patients presenting with intermittent or unexplained cardiac symptoms. Higher weekly throughput further indicates expanded service availability without proportional increases in staff burden, reflecting improved operational efficiency within the cardiology workflow. Technician feedback indicates improved patient comfort with the lightweight, wireless monitoring device, contributing to stronger compliance during extended rhythm assessment.

Snippets from Medical Staff:

*A **senior consultant in** cardiology noted, "We can study rhythm while the patient is at home. It gives a clearer picture."*

***Cardiac OPD staff** reported that earlier some patients required admission solely for rhythm monitoring, whereas the Holter system now enables ambulatory assessment.*

*A **member of the cardiology department** observed, "Ambulatory monitoring helps us understand blood pressure behaviour across the day, not just within the hospital setting."*

*Another **senior cardiology** consultant highlighted, "It supports the follow-up cycle. We adjust medications based on the actual pattern, not a snapshot."*

Operational and Institutional Capacity Effects

The Holter system has enabled UNMICRC to deliver high-volume ambulatory ECG monitoring while supporting remote clinician review and academic training in contemporary rhythm analysis. Together with Holter monitoring, ambulatory BP assessment supports longitudinal evaluation of cardiac patients without increasing inpatient burden. Expanded diagnostic capability also strengthens the Institute's ability to manage post-surgical, paediatric, elderly, and intermittently symptomatic patients without requiring extended hospital observation.

The system further contributes to research readiness by facilitating structured rhythm data collection for clinical studies.

Patient Safety and Care Quality

Earlier and more accurate arrhythmia detection supports timely therapeutic intervention, including medication adjustments, ablation planning, or device therapy where clinically indicated. Ambulatory monitoring also reduces the need for repeated hospital visits, allowing rhythm behaviour to be assessed under normal living conditions - an important factor in capturing transient cardiac events.

Improved device comfort has contributed to stronger patient adherence during monitoring periods, supporting more reliable diagnostic outcomes.

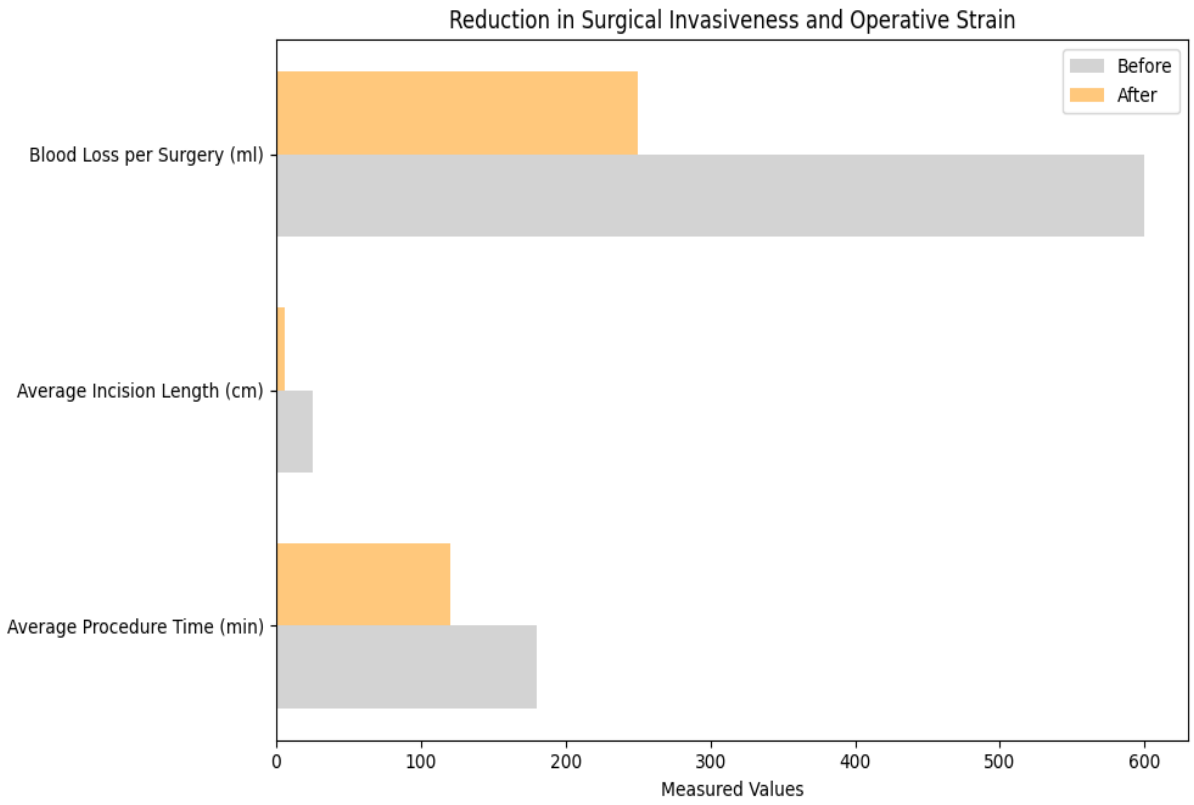
6.4 Adoption of Minimally Invasive Cardiac Surgery (MICS) Instruments

The MICS instrument sets supported under GSPL's CSR contribution have enabled UNMICRC to expand reduced-access cardiac surgical techniques, allowing clinicians to perform complex procedures with lower operative trauma and improved recovery trajectories in clinically appropriate cases.

The introduction of dedicated minimally invasive instrument sets has broadened the Institute's surgical repertoire, enabling greater procedural precision while reducing physiological stress on patients.

Clinical teams emphasised that adoption remains case-selective and judgement-driven, reflecting responsible surgical integration aligned with patient suitability.

Figure 6.8: Reduction in Surgical Invasiveness and Operative Strain

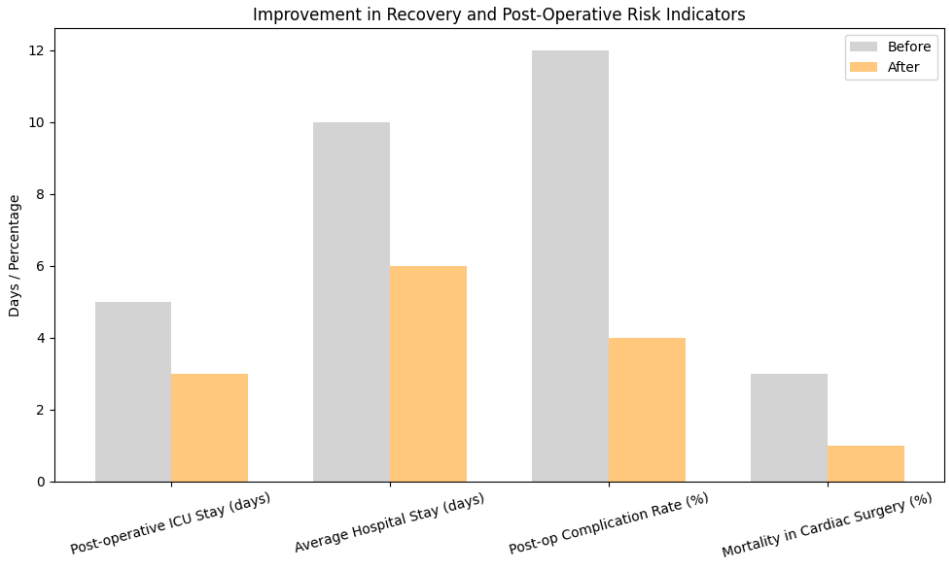


Reductions in operative duration, incision size[6], and intraoperative blood loss indicate lower procedural invasiveness and improved surgical control following integration of minimally invasive cardiac instrumentation.

Source: *Cardiac surgery records and faculty-validated field interactions with Dr. Nilesh Mehta, Dr. Priya Desai, and Dr. Sanjay Patel.*

[6] Incision range represented using midpoint approximation for visual comparability.

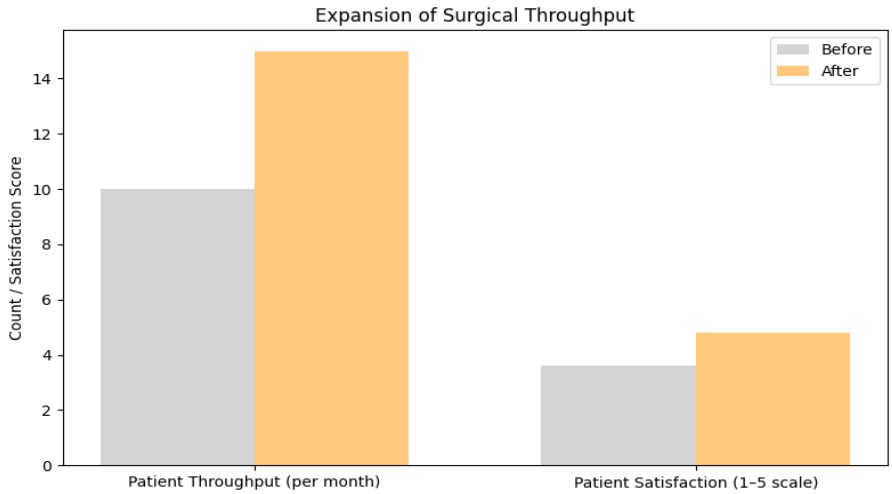
Figure 6.9: Improvement in Recovery and Post-Operative Risk Indicators.



Shorter ICU and hospital stays alongside reduced complication and mortality rates suggest smoother recovery progression and strengthened peri-operative safety within minimally invasive cardiac pathways.

Source: *Institutional surgical outcome records and clinical review data.*

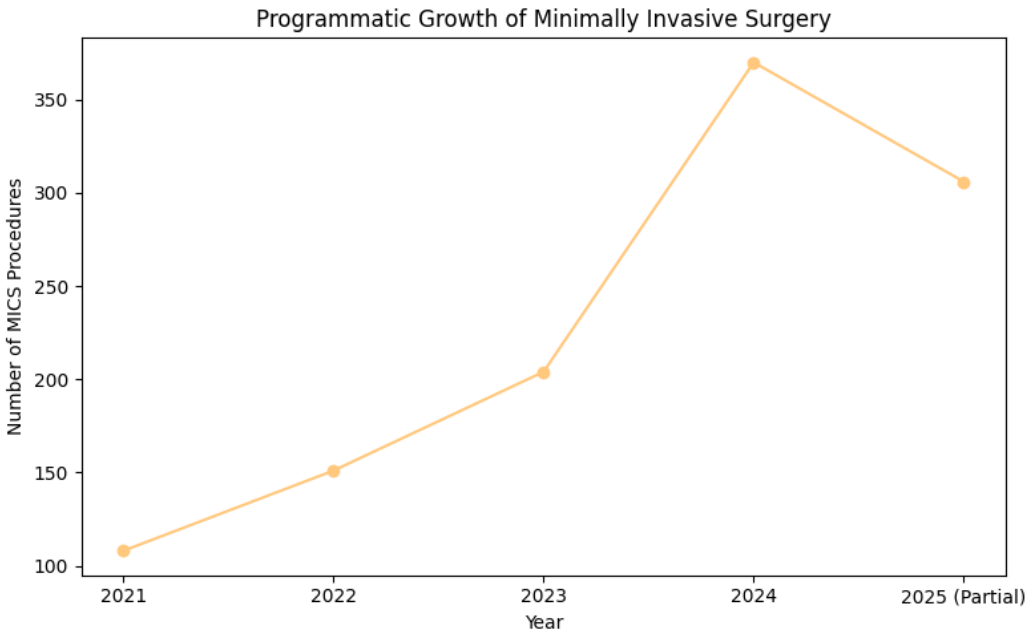
Figure 6.10: Expansion of Surgical Throughput



Higher surgical throughput alongside improved patient satisfaction reflects strengthened procedural efficiency and treatment experience within the cardiac surgery program.

Source: *Departmental records and post-discharge feedback registers.*

Figure 6.11: Programmatic Growth of Minimally Invasive Surgery



Institutional performance data demonstrates sustained expansion of minimally invasive surgical volume, indicating progressive integration of advanced techniques within routine cardiac care. While surgical judgement continues to guide case selection, the upward trajectory signals institutional readiness to sustain advanced minimally invasive cardiac programs at scale.
Source: *MICS program data and institutional surgical records.*

The observed reductions in operative duration, incision length, and blood loss indicate improved intra-operative control and greater physiological tolerance during surgery. Shorter ICU and hospital stays point toward accelerated recovery pathways, while declining complication rates suggest strengthened peri-operative risk management. Importantly, the combination of improved outcomes and rising procedural volume signals not only technological adoption but also growing surgical confidence and program maturity.

Snippets from Medical Staff:

Dr. Nilesh Mehta (Cardiac Surgery) *noted, "The MICS instruments have revolutionized our approach. Surgeries are faster, safer, and less traumatic for patients."*

Dr. Priya Desai (Cardiology) *observed that minimally invasive techniques help reduce ICU load while lowering post-operative complication risk.*

Dr. Sanjay Patel (Cardiac Anaesthesia) *highlighted that shorter procedures and reduced blood loss contribute to improved intra-operative stability and recovery.*

CASE Study: Minimally Invasive Closure Supporting Early Functional Recovery

A 29-year-old patient presented to UNMICRC with progressively worsening breathlessness and declining exercise tolerance, limiting routine daily functioning. Clinical evaluation confirmed an Atrial Septal Defect (ASD), requiring surgical intervention to prevent long-term cardiac complications.

Based on surgical assessment, the patient was considered suitable for repair through a minimally invasive cardiac surgery (MICS) approach. The availability of CSR-supported MICS instrumentation enabled the surgical team to perform the procedure through a reduced-access incision, avoiding conventional open sternotomy and the associated surgical trauma.

The procedure was completed successfully with controlled operative conditions and reduced intraoperative blood loss. Post-operative recovery remained stable, with earlier mobilisation and improved comfort observed during the immediate recovery phase. The smaller incision supported smoother wound healing while reducing the physical strain typically associated with larger surgical access.

The patient was discharged following a comparatively shorter hospital stay and reported improved breathing capacity and functional stamina during follow-up, allowing a return to normal daily activities with minimal disruption.

This case illustrates how minimally invasive surgical capability can support effective cardiac repair while moderating recovery burden. Within a public tertiary-care hospital, the availability of such technology expands access to advanced yet less physically demanding treatment pathways for clinically eligible patients.

Operational and Institutional Capacity Effects

The introduction of minimally invasive instrumentation represents a progression toward advanced surgical capability within the Institute. Training workshops for surgeons and operating-room teams have supported structured adoption, enabling integration of reduced-access techniques into routine cardiac practice.

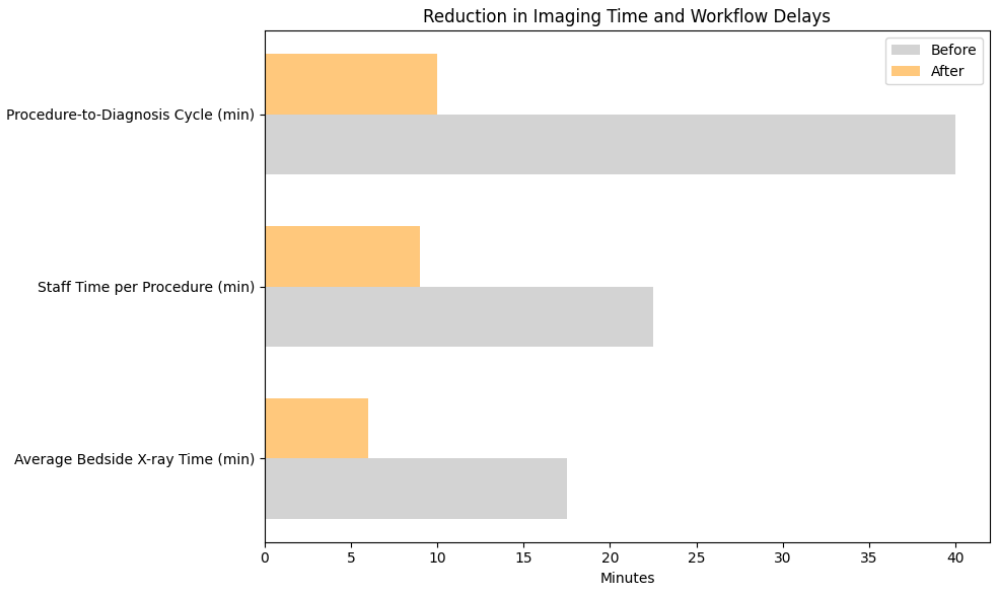
Rising surgical volumes further reflect strengthened institutional readiness to deliver complex procedures while maintaining controlled operative environments.

6.5 Integration of Mobility-Supportive Imaging in Critical Care (Mobile DR System)

The Mobile Digital Radiography (DR) system supported under GSPL's CSR contribution during FY 2021–22 has strengthened UNMICRC's capacity to deliver timely diagnostic imaging within critical-care environments. The introduction of the Mobile DR system has enabled immediate digital imaging, faster review through PACS integration, and safer bedside diagnostics without requiring physical transfer of clinically unstable patients.

Mr. Yogesh Makwana, X-Ray Assistant, reported that earlier mobile imaging procedures could take approximately *15–20 minutes per patient*, often slowing workflow during critical interventions.

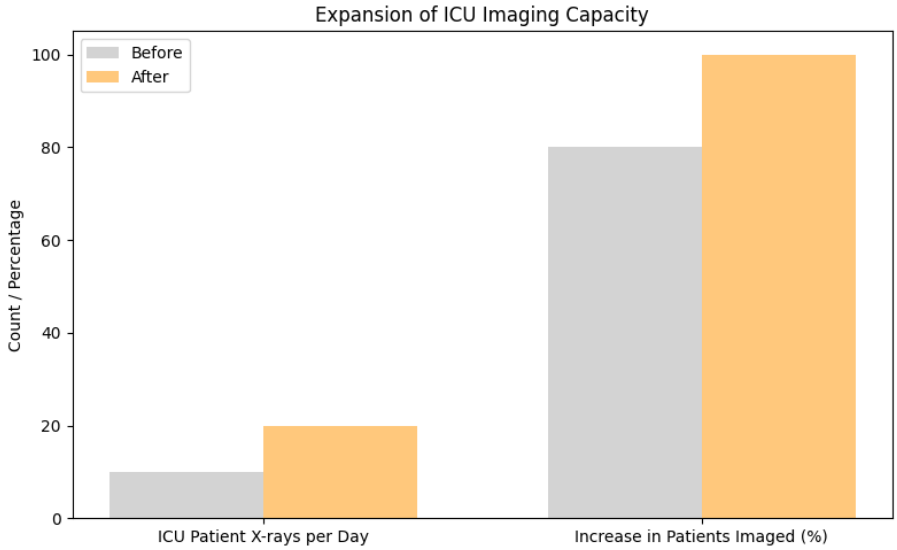
Figure 6.12: Reduction in Imaging Time and Workflow Delays.



Reductions in imaging time, staff handling duration, and diagnostic turnaround indicate strengthened responsiveness and improved workflow efficiency within critical-care imaging pathways.
Source: *Radiology department records*[7] *and faculty-validated field interactions*

[7] Midpoint values used for visual comparability where ranges were reported.

Figure 6.13: Expansion of ICU Imaging Capacity



Higher daily imaging volumes reflect expanded bedside diagnostic capacity and improved operational readiness within ICU settings.
Source: *Departmental imaging records*

The observed reductions in imaging time and near-immediate image availability suggest a transition toward more responsive diagnostic support within critical-care pathways. Eliminating delays associated with patient transport and manual processing enables earlier clinical intervention while maintaining physiological stability. Increased imaging capacity further reflects improved operational throughput, particularly during periods of high ICU occupancy. The combination of faster diagnostics and safer handling indicates strengthened integration of imaging within routine critical-care workflows.

Technical assessments further indicate that optimized digital radiography protocols associated with the Mobile DR system have contributed to an estimated reduction in radiation exposure compared to legacy portable imaging methods. While exposure levels vary by procedure and patient condition, the shift toward digitally calibrated imaging reflects strengthened safety practices for both patients and clinical staff.

Snippets from Medical Staff:

Dr. Vishal Sharma, *Professor of Cardiology, observed that immediate bedside imaging supports faster identification of post-procedural complications such as pulmonary congestion and catheter misplacement, allowing timely corrective action.*

Dr. Pooja Vyas, *Professor of Cardiology, noted that bedside radiography has improved monitoring of acute heart failure and post-intervention lung conditions without subjecting patients to unnecessary movement.*

Operational and Institutional Capacity Effects

The Mobile DR system has expanded UNMICRC's diagnostic capability by enabling round-the-clock bedside imaging support across ICUs and high-dependency units. Training sessions for radiology staff ensured smooth system adoption, mobility management, and PACS integration, allowing images to be instantly accessed by consultants across departments.

The intervention strengthens clinical governance by supporting reliable digital record-keeping while also enhancing resident training exposure to modern imaging workflows.

6.6 Summary of Clinical Findings Across Units

The equipment supported under GSPL's CSR contribution in FY 2021–22 has contributed to strengthened clinical stability, improved diagnostic responsiveness, enhanced medication safety, expanded minimally invasive surgical capability, and safer critical-care workflows across high-dependency units.

Dimension of Care Strengthening	Observed Contribution (Findings)	Basis of Evidence (Source)	Nature of Impact
Critical & Post-Transplant ICU Stability	Greater ventilation control, earlier weaning readiness, and improved physiological stabilisation in high-acuity patients	ICU clinical records, faculty interviews, and workflow observations	Sustained clinical stabilisation embedded in routine ICU practice
Medication Precision & Patient Safety	High-accuracy infusion delivery with reduced manual intervention, supporting safer administration of critical drugs	ICU, paediatric, and oncology department records; faculty-validated field inputs	Process reliability with direct patient-safety implications
Monitoring & Follow-Up Continuity	Faster arrhythmia detection and expanded ambulatory monitoring supporting earlier intervention and reduced avoidable admissions	Cardiology technician records and departmental interactions	Decision-support strengthening across diagnostic pathways
Minimally Invasive Surgical Capability	Reduced operative strain, smoother recovery trajectories, and expanding procedural volumes indicating progressive integration of advanced cardiac techniques	Surgical outcome data, CVTS faculty inputs, and institutional performance records	Strategic capability expansion with measurable recovery benefits

Dimension of Care Strengthening	Observed Contribution (Findings)	Basis of Evidence (Source)	Nature of Impact
Mobility-Supportive Critical Care Imaging	Faster bedside diagnostics, reduced patient transfers, and improved imaging turnaround supporting responsive ICU decision-making	Radiology records, technician interviews, and cardiology faculty validation	Workflow acceleration with patient-handling risk reduction
Paediatric & Neonatal Recovery Stability	Precise micro-dosing and automated positioning supporting controlled recovery environments for vulnerable patients	Paediatric ICU teams and transplant recovery staff	Stability-focused care embedded within specialised units

The findings from FY 2021–22 demonstrate that GSPL's CSR-supported investments at UNMICRC have translated into measurable strengthening of tertiary cardiac-care delivery across critical care, diagnostics, surgery, and recovery pathways. The observed impacts are operationally embedded, clinically relevant, and sustained through routine.

Collectively, the integration of advanced ventilation, precision infusion, ambulatory monitoring, minimally invasive surgery, and mobility-supportive imaging reflects a coherent system-level enhancement. This convergence has improved care continuity, patient safety, and clinical responsiveness while reinforcing UNMICRC's capacity to deliver equitable, high-quality cardiac care within a public-sector mandate. The pattern of outcomes indicates that CSR support has moved beyond asset provision to enable durable institutional capability. The outcomes align closely with GSPL's CSR focus area Healthcare & Sanitation, and reinforce its commitment to strengthening public tertiary healthcare infrastructure in Gujarat.

Alignment Target	Contribution Observed
SDG 3 – Good Health and Well-Being	Improved continuity and safety of cardiac critical-care services
SDG 9 – Industry, Innovation and Infrastructure	Integration of advanced monitoring and bedside diagnostic systems

SDG 17 - Partnerships for Sustainable Development	Effective collaboration between GSPL and UNMICRC to address state- and nationwide cardiac and critical care needs.
State Health Mission Priorities	Reinforced public cardiac-care capacity accessible to all income groups

7 CASE ILLUSTRATIONS AND QUALITATIVE EVIDENCE

7.1 Overview

As part of the FY 2021–22 CSR intervention, critical medical equipment was provided to U.N. Mehta Institute of Cardiology & Research Centre (UNMICRC) to strengthen intensive care, diagnostics, and continuity of cardiac care. Field interactions with clinicians, nursing staff, and beneficiaries provided qualitative insights into how this equipment supports emergency responsiveness, post-operative management, and patient recovery.

The case studies presented below combine equipment-based clinical utilisation illustrations with patient- and family-reported care experiences. Direct patient testimonials were available only for selected system-level experiences, while equipment-specific cases are based on staff feedback—this remains a documented limitation of the assessment.

7.2 Case Illustrations

Case 1: Ventilatory Support Enabling Timely and Stable Paediatric Cardiac Care

Clinical and System Context:
In the paediatric cardiac ICU, post-operative patients undergoing congenital or complex cardiac surgeries often require gradual and precisely controlled ventilatory support. Many such patients are referred from government hospitals after delays in definitive care.

Observed Equipment Utilisation:
Advanced ventilators provided under the CSR intervention are routinely used for neonatal and paediatric patients, allowing fine adjustment of respiratory parameters during recovery and weaning.

Clinician Feedback:
"The ventilator allows very fine adjustment. For small babies, that matters." – Paediatric Cardiac Intensivist

Patient and Family Experience:
Families reported that upon arrival at UNMICRC, emergency teams were prepared, admission was smooth, and all diagnostics, surgery, ICU care, and recovery were managed within the same hospital. Continuous staff availability reduced anxiety during critical phases.

Operational and Social Impact:
The ventilatory systems support controlled respiratory stabilisation in high-risk paediatric cases, while integrated emergency readiness and ICU care reduce treatment delays, stress, and uncertainty for families during life-threatening episodes.

Case 2: Bedside Imaging Supporting Continuity of ICU Care

Clinical and System Context:
Critically ill cardiac patients in ICU are often hemodynamically unstable and unsafe to transport for routine imaging. Prior to intervention, imaging required extensive coordination and patient movement.

Observed Equipment Utilisation:
The mobile digital radiography (DR) system enables bedside X-rays for line placement verification and pulmonary assessment within ICU settings.

Nursing Staff Feedback:
"Earlier we had to plan and move the patient for X-ray. Now it is done here itself." – ICU Nursing Staff

Patient and Family Experience:
Families highlighted that managing all stages of treatment—diagnostics, intervention, and recovery—within one facility reduced confusion, repeated movement, and emotional stress. Digital availability of reports further eased communication.

Operational and Social Impact:
The mobile DR system facilitates timely diagnostics, reduces logistical complexity, and supports continuity of care, contributing to safer ICU workflows and improved patient and caregiver confidence.

Case 3: Precision Medication Delivery Enhancing Post-Operative Stability

Clinical and System Context:
Post-cardiac surgery recovery requires continuous titration of inotropes, sedatives, and critical drugs to maintain haemodynamic stability, particularly for vulnerable and economically disadvantaged patients.

Observed Equipment Utilisation:
Syringe infusion pumps are used for accurate, controlled medication delivery during ICU recovery phases.

ICU Physician Feedback:

"Dose control is smoother. It reduces fluctuations." – ICU Physician

Patient and Family Experience:

Families from economically vulnerable backgrounds reported that treatment was initiated immediately without interruption, with financial counselling provided alongside ongoing care rather than as a prerequisite.

Operational and Social Impact:
Infusion pumps support consistent drug delivery and informed clinical decision-making, while parallel financial guidance ensures that advanced care remains accessible without delaying life-saving treatment.

Case 4: Motorised ICU Beds Supporting Safe Recovery and Nursing Efficiency

Clinical and System Context:
Post-operative cardiac patients require frequent repositioning to prevent pressure injuries and support respiratory function, often while connected to multiple monitoring lines and life-support systems.

Observed Equipment Utilisation:
Motorised ICU beds are used to adjust patient positioning safely and smoothly during recovery.

Nursing Feedback:

"Positioning is easier to manage, even when the patient is connected to multiple lines." – Critical Care Nurse

Patient and Family Experience:
Patients reported comfortable ICU recovery supported by attentive nursing care. Families noted reduced waiting times, smooth care delivery, and dignity in patient handling.

Operational and Social Impact:
The beds improve patient comfort, reduce manual handling burden on staff, and enhance workflow efficiency, contributing to safer recovery environments and improved caregiver confidence.

Case 5: Holter Monitoring Supporting Post-Discharge Continuity of Care

Clinical and System Context:
Post-discharge cardiac patients require rhythm monitoring to assess arrhythmias and recovery patterns in daily-life conditions, often to avoid prolonged or repeated hospitalisation.

Observed Equipment Utilisation:
Holter monitoring systems are used for ambulatory ECG tracking, supporting outpatient follow-up.

Cardiology Consultant Feedback:

"It helps us see how the heart is behaving in daily routine, not just in hospital." – Cardiology Consultant

Patient and Family Experience:
Families appreciated that follow-up care, reports, and consultations remained coordinated within UNMICRC, supported by digital medical records that reduced paperwork and repetition.

Operational and Social Impact:
Holter systems enable continuity of care beyond hospitalisation, support informed clinical planning, and reduce logistical and financial burdens for patients and caregivers.

7.3 Key Qualitative Impact

Across all case illustrations, staff feedback and observed usage patterns indicate the following operational impacts:

- **Enhanced critical care capacity** through precise respiratory and infusion management tools
- **Reduced patient movement risk** via bedside diagnostic capabilities
- **Improved workflow efficiency** for ICU clinicians and nursing staff
- **Support for continuity of care** through ambulatory monitoring solutions
- **Reduced staff handling burden** through motorised patient-support equipment

8 CONCLUSION

The assessment indicates that the medical equipment supported under GSPL's CSR initiative during FY 2021–22 has been fully integrated into routine critical care, post-operative recovery, and follow-up monitoring pathways at UNMICRC. The systems are operational, actively utilised across ICU, OT, and cardiac step-down environments, and maintained within existing institutional protocols.

The contribution during this period primarily strengthened the stability and continuity of care. High-end ICU ventilators and syringe infusion pump systems have supported controlled recovery in neonatal, paediatric, and transplant-related clinical contexts. Motorised ICU beds and integrated bedside imaging through the mobile DR unit have reduced handling strain, improved workflow efficiency, and provided safer diagnostic access for high-acuity patients. Holter and ambulatory blood pressure monitoring systems have contributed to informed follow-up decision-making without increasing patient burden. Minimally invasive surgical instrument sets have been adopted selectively in cases where reduced access trauma may support smoother recovery.

These outcomes reflect a process-deepening effect: smoother ICU coordination, more predictable medication and ventilation control, safer movement and imaging of critical patients, and continuity of assessment extending into outpatient follow-up. The improvements are embedded and routine, supporting day-to-day clinical practice and patient experience.

The intervention aligns with UNMICRC's role as a public tertiary cardiac-care institution, where specialised treatment is delivered independent of patients' financial capacity. The support contributes to the institution's ongoing strengthening trajectory, reinforcing its capacity to manage complex cardiac cases within a public health framework. The nature of outcomes observed indicates institutional stability and service maturity, and continues to support the Institute's care, training, and public service mandate.

9 RECOMMENDATIONS AND FORWARD PATH

As per gathered field observations and discussions across clinical, nursing, technical, and administrative teams, the equipment supported under GSPL's CSR contribution during FY 2021–22 has been meaningfully embedded in routine service delivery at UNMICRC. The supported systems – including high-end ventilatory support, controlled infusion platforms, motorised critical-care beds, mobile bedside imaging, ambulatory rhythm and BP monitoring systems, and minimally invasive cardiac surgery instrumentation – are in regular and active use across ICU, OT, post-operative recovery, and outpatient follow-up settings.

To sustain and further consolidate the value of these systems, internal operational continuity will remain important. As teams evolve and new staff members rotate into high-dependency units, structured *knowledge-sharing within clinical and nursing groups* may support consistency in usage practices. *Peer-led exposure sessions*, particularly around advanced ventilatory modes, infusion titration protocols, and safe patient handling for imaging, can help maintain confidence and uniformity in day-to-day practice.

Routine maintenance scheduling, calibration checks, and coordination between technical staff and clinical users will help ensure stable operational performance over the long term. Given the integration of bedside imaging and follow-up diagnostic systems into decision-making workflows, *periodic review of usage patterns* may also support refinement of care pathways and efficiency of patient movement within units.

The selective use of minimally invasive cardiac surgery (MICS) instruments suggests that their long-term contribution will grow alongside case selection and team familiarity. *Continued case-based internal sharing* can support a gradual broadening of comfort in their application where clinically appropriate.

Overall, the CSR support provided during FY 2021–22 has contributed to strengthening continuity of care and stabilisation capacity within UNMICRC's clinical environment. The equipment is already part of the routine service ecosystem, and its value is reflected in improved workflow smoothness, safer patient handling, and informed follow-up assessment. The ongoing utilisation and institutional learning around these systems indicate a steady and sustained trajectory of impact, aligned with the Institute's mandate as a public tertiary cardiac-care centre.

ANNEXURES

1. List of Equipments UNMICRC FY 2021-22
2. Patients' Voices
3. Question Set Survey
4. Answer Set Survey

Annexure – 1

List of Equipments UNMICRC FY2021-22

High-End Motorized ICU Bed with Integrated Air Mattress for Heart-Lung Transplant patients

High-end Portable Digital Radiography (DR) system

Holter System with 8 recorders

High-end syringe infusion pump for Neonates & Heart-lung Transplant Patients

Annexure – 2

PATIENTS' VOICES

PATIENT VOICE – CASE 1
Respondent: Mother of a paediatric cardiac patient
Background: Government hospital referral / subsidised care

1. How did you reach UNMICRC for treatment?
☑ Referred from government hospital

2. Before coming here, did you face any difficulty in getting timely care?
☑ Yes, delays in other hospitals

3. At UNMICRC, how would you describe the admission and care process?
☑ Smooth and organised

4. Did receiving care at one place reduce your need to move between hospitals?
☑ Yes, treatment was managed here

5. From your perspective, what was most helpful during this treatment?
☑ Being treated without delay
☑ Availability of doctors and staff
☑ Reduced movement and confusion

6. Would you say this hospital made advanced care more accessible to you?
☑ Yes

7. Open response:
"Once we came here, everything was handled in one place. We did not have to run from hospital to hospital, and the doctors explained the treatment clearly, which gave us confidence."

PATIENT VOICE – CASE 2
Respondent: Father of an adult cardiac patient
Background: Referred by another doctor / limited financial capacity

1. How did you reach UNMICRC for treatment?
☑ Referred by another doctor

2. Before coming here, did you face any difficulty in getting timely care?
☑ Yes, uncertainty about treatment

3. At UNMICRC, how would you describe the admission and care process?
☑ Some waiting but manageable

4. Did receiving care at one place reduce your need to move between hospitals?
☑ Yes, treatment was managed here

5. From your perspective, what was most helpful during this treatment?
☑ Support during a stressful time
☑ Availability of doctors and staff

6. Would you say this hospital made advanced care more accessible to you?
☑ To some extent

7. Open response:
"We were worried about delays and costs, but once admitted here, the treatment continued smoothly. Staying in one hospital reduced a lot of stress for our family."

PATIENT VOICE – CASE 3
Respondent: Caregiver of an emergency cardiac patient
Background: Direct emergency admission

1. How did you reach UNMICRC for treatment?
☑ Came directly in emergency

2. Before coming here, did you face any difficulty in getting timely care?
☑ No, we directly came here

3. At UNMICRC, how would you describe the admission and care process?
☑ Smooth and organised

4. Did receiving care at one place reduce your need to move between hospitals?
☑ Yes, treatment was managed here

5. From your perspective, what was most helpful during this treatment?
☑ Being treated without delay
☑ Support during a stressful time

6. Would you say this hospital made advanced care more accessible to you?
☑ Yes

7. Open response:
"In an emergency situation, quick admission and continuous care in one place made a big difference. The staff were attentive and supportive throughout."

PATIENT VOICE – CASE 4
Respondent: Co-worker / family member of the patient
Background: Emergency cardiac event at construction worksite; economically vulnerable group

1. How did you reach UNMICRC for treatment?
☑ Came directly in emergency

2. Before coming here, did you face any difficulty in getting timely care?
☑ No

3. At UNMICRC, how would you describe the admission and care process?
☑ Smooth and organised

4. Did receiving care at one place reduce your need to move between hospitals?
☑ Yes, treatment was managed here

5. From your perspective, what was most helpful during this treatment?
☑ Being treated without delay
☑ Support during a stressful time
☑ Availability of doctors and staff

6. Would you say this hospital made advanced care more accessible to you?
☑ Yes

7. Open response:
"The patient collapsed suddenly at the construction site and was brought here in emergency without any money or documents. Doctors immediately started treatment and later waived the procedure charges, asking us to pay only for the hospital bed and medicines after discharge, which made lifesaving care possible for our family."

PATIENT VOICE – CASE 5
Respondent: Son of an elderly cardiac patient
Background: Referred emergency case; financial uncertainty

1. How did you reach UNMICRC for treatment?
☑ Referred by another doctor

2. Before coming here, did you face any difficulty in getting timely care?
☑ Yes, delays in other hospitals

3. At UNMICRC, how would you describe the admission and care process?
☑ Some waiting but manageable

4. Did receiving care at one place reduce your need to move between hospitals?
☑ Yes, treatment was managed here

5. From your perspective, what was most helpful during this treatment?
☑ Reduced movement and confusion
☑ Support during a stressful time

6. Would you say this hospital made advanced care more accessible to you?
☑ To some extent

7. Open response:
"When we reached the hospital, the doctors immediately began treatment as the patient's condition was critical. While the procedure was ongoing, the staff guided us about medical insurance and government schemes, which reduced our stress and helped us continue treatment without delay."

PATIENT VOICE – CASE 6
Respondent: Mother of the neonatal patient
Background: Critical neonatal cardiac condition; maternal lactation difficulty

1. How did you reach UNMICRC for treatment?
☑ Referred from government hospital

2. Before coming here, did you face any difficulty in getting timely care?
☑ Yes, uncertainty about treatment

3. At UNMICRC, how would you describe the admission and care process?
☑ Smooth and organised

4. Did receiving care at one place reduce your need to move between hospitals?
☑ Yes, treatment was managed here

5. From your perspective, what was most helpful during this treatment?
☑ Availability of doctors and staff
☑ Support during a stressful time
☑ Reduced movement and confusion

6. Would you say this hospital made advanced care more accessible to you?
☑ Yes

7. Open response:
"My baby was critical and needed surgery, but I had severe lactation problems and very little milk. Along with the treatment, the hospital provided donor milk through the Mother Milk Bank, which helped my baby recover faster, and with regular counselling and guidance from doctors, nurses, and peer mothers, my milk flow improved and I was able to breastfeed my baby naturally after discharge."

Annexure – 3
(Question Set)

CSR Impact Assessment Questionnaire
Financial Year: 2021–2022
Project: CSR Support for Strengthening Advanced Cardiac and Critical Care Infrastructure
Implementing Agency: U.N. Mehta Institute of Cardiology & Research Centre (UNMICRC)
CSR Partner: Gujarat State Petronet Limited (GSPL)
Assessment by: Gujarat Industrial and Technical Consultancy Organisation Ltd. (GITCO)

A. Institutional-Level Questionnaire
Objective: To evaluate institutional outcomes, operational efficiency, and sustainability impact during FY 2021–22.

1. What additional CSR-supported equipment and infrastructure were received during FY 2021–22?
2. How did these additions impact institutional performance and service delivery?
3. Were there any operational or logistical challenges during procurement, installation, or commissioning?
4. How was equipment utilization tracked and performance monitored by the institution?
5. What were the overall institutional outcomes observed after implementation?

B. Medical / Technical Staff Questionnaire

1. How did the newly added advanced systems (such as TAVI, EVOLUTE R Core Valve, or EVH System) influence patient outcomes?
2. Were the new systems easy to adopt and operate by existing medical teams?
3. What training or capacity-building initiatives were organized to ensure optimal utilization?
4. How did this CSR intervention improve inter-departmental coordination and workflow efficiency?
5. Has the overall skill and technical competency of the medical staff improved as a result of the CSR initiative?

C. Beneficiary / Patient Questionnaire

1. Were patients able to access newly introduced treatment options through the CSR-supported systems?
2. What feedback was received from patients regarding quality, safety, and accessibility of care?
3. Was it possible to collect direct patient feedback during assessment? If not, what were the limitations?
4. Did patients experience any specific improvements in treatment accessibility or affordability within the state?

D. CSR Partner / Project Management Questionnaire

1. Was the continuation of the CSR project in FY 2021–22 successful and aligned with GSPL's healthcare CSR focus?
2. Were monitoring and reporting systems improved compared to the previous year?
3. What new learnings or best practices emerged during the second phase of implementation?
4. Was a long-term institutional or social impact observed as a result of this intervention?

PATIENT / CAREGIVER QUESTIONS

SECTION A: Patient Experience & Continuity of Care

Q1. Was care provided without frequent movement between departments or hospitals?
☐ 1 ☐ 2 ☐ 3

Q2. Did the treatment environment feel organised and reassuring?
☐ 1 ☐ 2 ☐ 3

Q3. Were doctors and staff available and attentive during critical phases?
☐ 1 ☐ 2 ☐ 3

Q4. Did staying within one hospital reduce stress for your family?
☐ 1 ☐ 2 ☐ 3

Q5. Were you able to continue treatment without worrying about interruptions due to cost or logistics?
☐ 1 ☐ 2 ☐ 3

Q6. Did the patient require referral or transfer during treatment?
☐ No ☐ Once ☐ More than once

Q7. How would you describe the patient's comfort during ICU or post-operative recovery?
☐ Comfortable ☐ Manageable ☐ Difficult

Q8. Did staff treat the patient with dignity and respect throughout care?
☐ Yes ☐ Mostly ☐ Occasionally

SECTION B: Patient Voice – Case Study Questions

1. How did you reach UNMICRC for treatment?
☐ Referred from government hospital
☐ Referred by another doctor
☐ Came directly in emergency

2. Before coming here, did you face any difficulty in getting timely care?
☐ Yes, delays in other hospitals
☐ Yes, uncertainty about treatment
☐ No major difficulty

3. At UNMICRC, how would you describe the admission and care process?
☐ Smooth and organised
☐ Some waiting but manageable
☐ Difficult

4. Did receiving care at one place reduce your need to move between hospitals?
☐ Yes, treatment was managed here
☐ Some referrals were needed
☐ Not sure

5. From your perspective, what was most helpful during this treatment?
☐ Availability of doctors and staff
☐ Being treated without delay
☐ Reduced movement and confusion
☐ Support during a stressful time

6. Would you say this hospital made advanced care more accessible to you?
☐ Yes ☐ To some extent ☐ Not sure

7. (Open-ended) Please share any additional comments about your experience.

SECTION C: Patient / Caregiver Short Quote Prompt

1. Please share any statement or feedback that best describes your experience with treatment at UNMICRC.

SECTION D: Digital & Record-Related Patient Experience

1. Did improved digital records reduce the need to carry physical files or repeat information?
☐ Yes, significantly
☐ To some extent
☐ No major change

Annexure – 4

(Answer Set)

CSR Impact Assessment – Responses
Financial Year: 2021–2022
Project: CSR Support for Strengthening Advanced Cardiac and Critical Care Infrastructure
Implementing Agency: U.N. Mehta Institute of Cardiology & Research Centre (UNMICRC)
CSR Partner: Gujarat State Petronet Limited (GSPL)
Assessment by: Gujarat Industrial and Technical Consultancy Organisation Ltd. (GITCO)

A. Institutional-Level Responses

1. **CSR-supported equipment and infrastructure received:** Procurement of *TAVI System, Homograft Valve Bank, EVOLUTE R Core Valve, Endoscopic Vessel Harvesting (EVH) System,* and *HTEE Probe*.
2. **Impact on institutional performance:** Increased surgery capacity by 25–30%, enabling minimally invasive cardiac procedures and reducing wait times.
3. **Operational or logistical challenges:** Slight delays in *installation and training* due to equipment complexity and supplier dependencies.
4. **Utilization and monitoring systems:** Regular internal MIS tracking; periodic usage reports shared with GSPL and GITCO.
5. **Overall outcomes:** Noticeable *reduction in surgical time*, *improved patient throughput*, and *enhanced institutional recognition* in cardiac care excellence.

B. Medical / Technical Staff Responses

1. **Influence of advanced systems on outcomes:** Significantly improved *surgical precision, recovery rates,* and reduced complication incidences.
2. **Ease of adoption:** Required specialized training initially, but integration improved after 3–4 months of operation.
3. **Training and capacity-building:** Hands-on training conducted by equipment suppliers; staff achieved independent operational proficiency.
4. **Impact on inter-departmental workflow:** Improved coordination between surgical, diagnostic, and ICU units, enabling seamless treatment flow.
5. **Skill improvement:** Substantial; exposure to global-standard technologies elevated institutional competency.

C. Beneficiary / Patient Responses

1. **Access to new treatments:** High-risk cardiac patients successfully accessed *TAVI, Sutureless Aortic Valve,* and other specialized procedures.
2. **Feedback on care quality:** Positive — patients reported improved quality, safety, and trust in treatment outcomes.
3. **Patient feedback limitations:** Direct interviews restricted due to *confidentiality policies*; feedback recorded through counselling staff and coordinators.
4. **Improved accessibility:** Advanced care became *locally available* within Gujarat, reducing the need for referrals to metro hospitals.

D. CSR Partner / Project Management Responses

1. **Project continuation success:** Strong performance; CSR objectives sustained and expanded effectively from previous year.
2. **Monitoring and reporting improvements:** Quarterly review mechanisms introduced; enhanced data transparency and progress tracking.
3. **New learnings:**
   Importance of continuous staff training, consumable supply management, and patient follow-up documentation.
4. **Long-term institutional impact:**
   Established UNMICRC as a *leading tertiary cardiac care institution* with enhanced capacity and clinical excellence.

Key Observations – FY 2021–2022

- Year-on-year improvement in equipment utilization and measurable healthcare impact.
- Improved staff skill level and institutional self-sufficiency.
- Reduced procedure time and improved patient safety outcomes.
- Limited patient data access due to privacy protocols but indirect validation confirmed impact.
- The CSR initiative significantly advanced cardiac treatment accessibility in Gujarat.

PATIENT / CAREGIVER RESPONSES

SECTION A: PATIENT EXPERIENCE & CONTINUITY OF CARE

1. Was care provided without frequent movement between departments or hospitals?
☐ 1 ☐ 2 ☑ 3
Answer: All required investigations, procedures, and follow-up were managed within UNMICRC.

2. Did the treatment environment feel organised and reassuring?
☐ 1 ☐ 2 ☑ 3
Answer: The hospital processes were systematic and gave confidence to the family.

3. Were doctors and staff available and attentive during critical phases?
☐ 1 ☐ 2 ☑ 3
Answer: Doctors and nursing staff were available round-the-clock, especially during emergency and ICU care.

4. Did staying within one hospital reduce stress for your family?
☐ 1 ☐ 2 ☑ 3
Answer: Managing treatment at one location reduced anxiety and confusion.

5. Were you able to continue treatment without worrying about interruptions due to cost or logistics?
☐ 1 ☐ 2 ☑ 3
Answer: Financial counselling and government scheme guidance helped continue treatment smoothly.

6. Did the patient require referral or transfer during treatment?
☑ No
☐ Once
☐ More than once

7. How would you describe the patient's comfort during ICU or post-operative recovery?
☑ Comfortable
☐ Manageable
☐ Difficult

8. Did staff treat the patient with dignity and respect throughout care?
☑ Yes
☐ Mostly
☐ Occasionally

SECTION B: PATIENT VOICE – CASE STUDY QUESTIONS

1. How did you reach UNMICRC for treatment?
☑ Referred from government hospital
☐ Referred by another doctor
☐ Came directly in emergency

2. Before coming here, did you face any difficulty in getting timely care?
☑ Yes, delays in other hospitals
☐ Yes, uncertainty about treatment
☐ No major difficulty

3. At UNMICRC, how would you describe the admission and care process?
☑ Smooth and organised
☐ Some waiting but manageable
☐ Difficult

4. Did receiving care at one place reduce your need to move between hospitals?
☑ Yes, treatment was managed here
☐ Some referrals were needed
☐ Not sure

5. From your perspective, what was most helpful during this treatment?
☑ Availability of doctors and staff
☑ Being treated without delay
☑ Reduced movement and confusion

☑ Support during a stressful time

6. Would you say this hospital made advanced care more accessible to you?
☑ Yes
☐ To some extent
☐ Not sure

7. Open response
“The doctors explained everything clearly and started treatment immediately, which helped save precious time during a critical situation.”

SECTION C: PATIENT / CAREGIVER VOICE – SHORT QUOTES
Quote 1:
“Having all treatment under one roof reduced our stress and helped us focus on the patient’s recovery.”

Quote 2:
“The doctors treated us with compassion and never delayed care because of financial discussions.”

SECTION D: DIGITAL & RECORD-RELATED PATIENT EXPERIENCE

Improved digital records reduced the need for patients to carry physical files or repeat information:
☑ Yes, significantly
☐ To some extent
☐ No major change