Toxics Link
for a toxics-free world

DOCUMENTING MERCURY- FREE MODEL HEALTHCARE FACILITIES IN THE COUNTRY

Table of Content

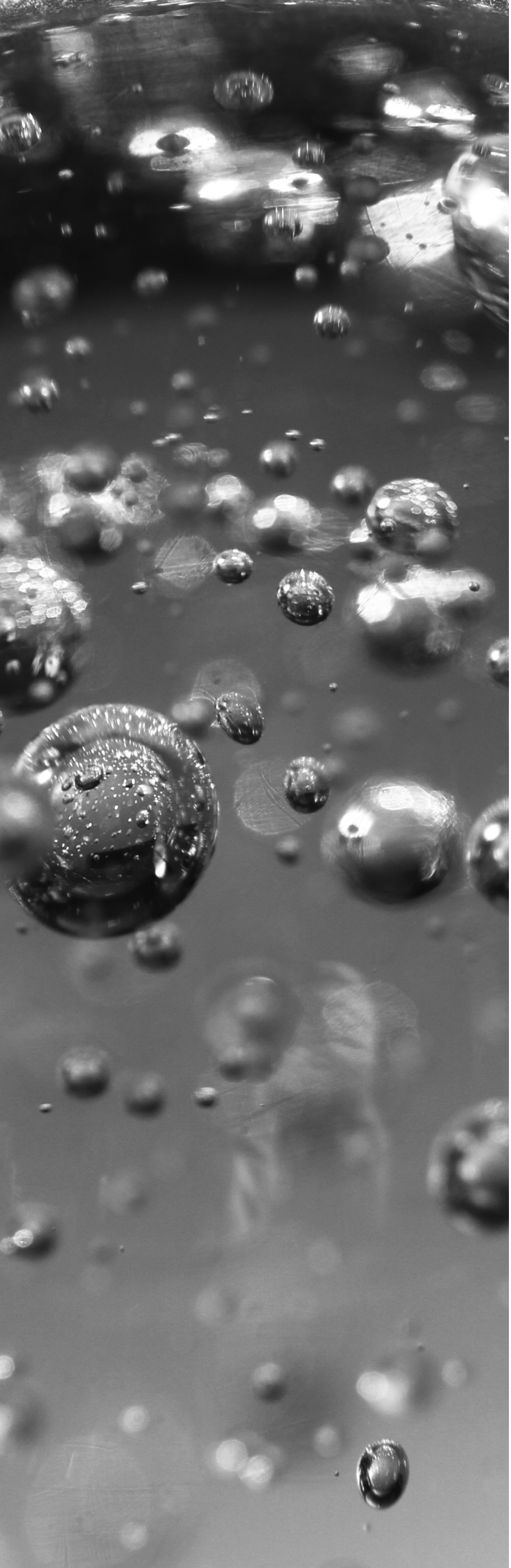
Executive **Summary**

Mercury, a naturally occurring substance in the earth's crust, also known as quicksilver, has been recognised as a chemical of global concern post the Minamata disaster. Recognising the threat, the world adopted a legally binding treaty named the Minamata Convention on Mercury in 2013 to protect human health and the environment. India had deposited its instrument of ratification in June 2018, and become a Party to the Convention on September 16, 2018 and subsequently planned a roadmap to phase out some of the mercury containing products as envisaged in the treaty. The present study is an attempt by Toxics Link, to document the mercury phase-out procedure adopted by the healthcare facilities in selected states of the country in order to understand the challenges faced and strategies adopted to overcome such challenges also to learn lessons and facilitate smoother transition across the country.

As part of the documentation process, thorough survey was conducted in states of Delhi and Goa, through visits to hospitals, interaction with representatives of healthcare facilities also administering questionnaire to both public and private facilities. Two other states of Bihar and West Bengal were identified and selected based on the expertise of Toxics Link to conduct a rapid assessment to understand the status of transition and the challenges associated with such processes.

Delhi was the first State in India to start the process of shift from mercury to non-mercury alternatives, in 2008-2009 well before the Minamata treaty ratification. Invariably, the challenges for Delhi hospitals were unique. Delhi struggled with issues of reliable brands, as there were hardly any options then. To add to it, doctors and nurses used to have huge perception of mercury being the gold standard. The documentation exercise highlights how consistent nurse training and induction at the start of their careers has successfully changed such perceptions. The document also highlights several of best practices adopted by the hospitals to overcome the challenges of accuracy, streamline procurement process and the support by various governments in form of direction and guidance to shift to alternatives. The document highlights the current status of Delhi healthcare facilities being completely mercury-free in both thermometers and sphygmomanometers.

Goa on the other hand initiated this transition journey much later in 2018-2019, almost a decade after Delhi. Therefore, it can be seen that the facilities in Goa are still better placed in terms of choices for mercury-free instruments, willingness of hospital administration and internal policy support.



Goa also confronts and struggles with issues of perception and mindset of doctors who consider mercury instruments as gold standard, these issues are slowly being addressed as hospitals adapt processes and practices to overcome the barriers of mindset and accuracy. The instruments authorised for procurement in public healthcare facilities are non-mercury only, whereas the private facilities are yet in the process of transitioning.

Rapid assessment of Bihar and West Bengal is also worth mentioning, as these two states have scored significantly well in terms of transition to mercury-free alternatives. State procurement departments, individual hospital procurement wing, and doctors at times – all have expressed their satisfaction in terms of shift to mercury-free alternatives. One major reason is the challenges associated with mercury spill management. The transition to non-mercury instruments have helped hospitals overcome this issue. Some doctors have also expressed their satisfaction in terms of reduced time requirement in recording temperature and blood pressure, which is associated with non-mercury-based equipment. In both West Bengal and Bihar, the phase-out process has been facilitated as the state medical department have authorised the procurement of non-mercury instruments in their central procurement process. The process of shift in private facilities have also commenced and there are many examples of facilities being mercury-free. The issues of perception and quality of instruments are still being observed as challenges that need to be addressed.

The overall experience from this documentation gives a positive impression of transition, though the process needs to be hastened and facilitated through regulatory frameworks and guidance by the appropriate agencies. The issue of disposing of replaced mercury instruments also features as a challenge.

Abbreviations

AAMI	Association for Advancement of Medical Instrumentation
AMC	Annual Maintenance Contract
BEMMP	Biomedical Equipment Management & Maintenance
BHS	British Hypertension Society
BIS	Bureau of Indian Standards
BME	Bio-medical Engineering
BMSICL	Bihar Medical Services and Infrastructure Corporation Limited
BP	Blood Pressure
CDSCO	Central Drugs Standard Control Organisation
CHCs	Community Health Centers
CHWTSDF	Common Hazardous Waste Treatment, Storage, and Disposal Facility
CME	Continuous Medical Education
CMS	Centers for Medicare & Medicaid Services
CNS	Clinical Nurse Specialist
CPA	Central Procurement Agency
CPCB	Central Pollution Control Board
DGHS	Directorate General of Health Services
DH	District Hospital
DHS	Directorate of Health Services
DoHFW	Department of Health and Family Welfare
DRS	District Reserve Store
EEL	Essential Equipment List
ESH	European Society of Hypertension
GeM	Government e-Marketplace
GFR	General Financial Rules
GNCTD	Government of National Capital Territory of Delhi
GoB	Government of Bihar
GPCB	Goa Pollution Control Board
GWMC	Goa Waste Management Corporation
IMA	Indian Medical Association
ISO	International Organization for Standardization
JCI	Joint Commission International Accreditation
LCD	Liquid Crystal Display
MCD	Municipal Corporation Delhi
MoEFCC	Ministry of Environment, Forest and Climate Change

MoHFW	Ministry of Health and Family Welfare
NABH	National Accreditation Board for Hospitals and Healthcare Providers
NCT	National Capital Territory
NIBP	Non-invasive Blood Pressure
OEM	Original Equipment Manufacturer
OPD	Outpatient Department
OT	Operation Theatre
PCC	Patient Care Coordinator
PCC	Pollution Control Committee
PHCs	Primary Health Centres
PIC	Prior Informed Consent
POCT	Point-of-Care Testing
SAS	State AYUSH Society
SDMC	South Delhi Municipal Corporation
SPCBs	State Pollution Control Board
TNAI	Trained Nurses' Association of India
UPHC	Urban Primary Health Centre
UT	Union Territory
WBMSCL	West Bengal Medical Services Corporation Limited
WHO	World Health Organization

01 Introduction

1.1 Mercury and Minamata Convention

Mercury is a naturally occurring substance in the earth's crust, which is usually found in the form of cinnabar. Over the years, it has been mined and refined to obtain pure mercury, which has become integral part of human life through everyday rituals and objects, invariably leading to its release in the atmosphere, soil and water.

Mercury, once released can travel long distances, and persists in the environment where it circulates between air, water, sediments, soil and living organisms. Mercury is concentrated as it rises up the food chain, reaching its highest level in predator fish, which are then consumed by humans. It also has serious impacts on ecosystems, including reproductive effects on birds and predatory mammals[1].

The severity and lived experiences of industrial mercury pollution in the 1950s-60s in Minamata Bay in Japan led the world to acknowledge the seriousness of mercury contamination.[2] Since the industrial disaster in Minamata, several studies and scientific evidence on mercury toxicity and its impacts on human health and the environment, have driven towards global action on this chemical. Recognising the threat of mercury, the world finally acted and adopted a legally binding treaty named the Minamata Convention on Mercury in 2013 to protect human health and the environment.

The Convention was adopted on October 10, 2013 at Kumamoto, Japan on the occasion of the Conference of Plenipotentiaries on the Minamata Convention on Mercury, held from October 7 to 11, 2013, and entered into force on August 16, 2017[3]. Major highlights of the Minamata Convention include a ban on new mercury mines, the phase-out of existing ones, phase-out and phase-down of mercury use in a number of products and processes, control measures on emissions to air and releases to land and water, and the regulation of the informal sector of artisanal and small-scale gold mining. The Convention also addresses the interim storage of mercury and its disposal once it becomes waste, sites contaminated by mercury, as well as health issues[4].

1 https://www.unep.org/topics/chemicals-and-pollution-action/pollution-and-health/heavy-metals/mercury/mercury-general

2 https://www.unep.org/topics/chemicals-and-pollution-action/pollution-and-health/heavy-metals/mercury/mercury-general

3 https://minamataconvention.org/en/documents/minamata-convention-mercury-text-and-annexes

4 https://minamataconvention.org/en/about

1.2. Minamata Convention and India

India had deposited its instrument of ratification, accession, approval or acceptance in June, 2018, and become a Party to the Convention on 16th September, 2018[5]. According to the procedural requirement of the Convention, the Annex A of the Convention provides the list of mercury added products to be phased out for manufacture, import and export by 2020 along with exclusion list and measures to be taken for use of Dental Amalgam[6]. Annex B of the Convention provides the list of manufacturing processes in which mercury compounds are used for their phase out by timelines, listed therein and processes for which measures to be taken by parties to restrict the use of mercury or mercury compounds. The convention, among other things, also mandates for establishment of a Prior Informed Consent (PIC) procedure for trade of mercury.

As part of compliance requirements, India had notified and strengthened its trade (export and import) under the PIC procedure, as per the provisions of the Minamata Convention on Mercury. Initially, the Ministry of Environment, Forest and Climate Change (MoEFCC) had developed Form "X" seeking information pertaining to mercury trade and its use from end users/ importers, to obtain approval from the State Pollution Control Board (SPCBs)/ Pollution Control Committees (PCCs). Later, a need arose to further strengthen the PIC procedure in order to ensure that there are no discrepancies in the trans-boundary movement documents and the allowable usage of mercury in the country. Therefore, in 2020, certain actions were proposed to further strengthen the procedure[7].

In terms of Annex A of the Convention, which deals with phasing out of mercury added products, India has registered and updated exemptions for phasing out mercury added products listed in Part 1 of Annex A from 2025 to 2034 from the existing phase-out date of 2020. It has also registered for exemptions for phasing out the manufacturing process for production of Acetaldehyde in which mercury or mercury compounds are used as a catalyst at Part 1 of Annex, by five years (till 2023) from the existing phase-out date of 2018[8].

1.2 Study Objectives and Rationale

The present study is an attempt by Toxics Link, to document the mercury phase-out procedure adopted by the healthcare facilities of India across states. The World Health Organization (WHO) has, through a bid process, selected Toxics Link to bring out this documentation, given its (Toxics Link) long standing credentials and reputation for working with the healthcare sector on phasing out this heavy metal.

The present study has focused on the status of usage vis-à-vis the **products containing mercury such as thermometers and sphygmomanometers in the healthcare sector**. Both these products fall under Part I of Annex A of the Convention, in which India has sought an exemption until 2034 for their phase-out.

This assessment will also be beneficial in bringing out details of the entire transition processes adopted by the healthcare facilities, starting from the policy to on-ground transition practices. This document is expected to provide clarity on stepwise process of transition for the larger healthcare community and facilitate the transition process. This document also highlights the challenges in shifting to alternatives and how they can be overcome.

5 https://minamataconvention.org/sites/default/files/documents/national_report/Report_IND_2019.pdf
6 https://minamataconvention.org/en/about/convention-text
7 https://moef.gov.in/uploads/2021/05/Enclosure-v.pdf
8 https://chemicals.gov.in/minamata-convention

1.3 Scope and Coverage

The study has covered private and government healthcare facilities and clinics in Delhi and Goa, respectively. Delhi, the capital city of India, had initiated the phase-out in 2008-2009, with Maharshi Balmiki Hospital being the first. The office order in this regard, from the Delhi Pollution Control Committee, is referenced here[9]. On the other hand, the state of Goa is a recent addition in phase-out map of mercury-based products, initiating the process of transition in 2018-2019 for the public healthcare facilities in the state.

While Delhi, being the earliest to phase out mercury, has been selected as part of this study, Goa has been selected as a model based on a set of technical and policy priorities. Mercury has been phased out completely from all its public healthcare facilities at Delhi and Goa, ranging from small establishment like clinics to tertiary care hospitals. The situation in private healthcare facilities is at variance to public facilities and an attempt has been made to document the plans and processes adopted in private health care facilities for both states.

While Delhi case studies will highlight the challenges of initial days of shifting decision, which demanded considerable acceptance of newly introduced concept, Goa will present a comprehensive picture of institutional commitment and governance.

1.4 Methodology

A combination of primary and secondary research is followed for this study. The initial secondary research was intended to select the State of Delhi and Goa. Having identified the states, a representative sample of 15 healthcare facilities were selected in Delhi and Goa, which included both private and government healthcare facilities. The detailed list of the healthcare facilities of Delhi and Goa is given in Annexure 1 and Annexure 2 respectively.

Once the healthcare facilities were identified and selected, a comprehensive questionnaire was developed and peer reviewed, following which primary survey at the healthcare facilities were conducted. The findings from the documentation procedure are analysed on qualitative parameters and accordingly presented in the subsequent chapter. On analysing the responses to questionnaires, we identified four key aspects that helped and identified as drivers in the process and are: Internal Policy, Staff Training and Education, Procurement and Quality Check and Calibration.

The methodology also includes detailed interaction with healthcare professionals in various hospital, physical on ground verification of processes. Some of the conversations were recorded and captured on camera wherever possible. Visits were conducted, and interviews were held with relevant personnel at both government and private healthcare facilities. The government facilities include Safdarjung hospital, Lady Hardinge Hospital, South Delhi Municipal Corporation (SDMC) Lajpat Nagar Colony Hospital and one Urban Primary Health Centre (UPHC), whereas private facilities include Sir Ganga Ram Hospital, Indraprastha Apollo, Apollo Spectra, Dharamshila Narayana Superspecialty-Hospital, Max Hospital, Moolchand Hospital and Yupiter Hospital.

The questionnaire, as framed and used, is provided in Annexure 3.

In case of Goa, government facilities include Primary Health Centre Loutulim, Hospicio District Hospital, Primary Health Centre Aldona, Urban Health Centre Panaji Sub District Hospital Chicalim, Community Health Centre Bicholim, Community Health Centre Sanquelim, whereas private facilities include Vaatsalya Hospital, SMRC's VM Salgaocar Hospital, Noble Hospital, Victor Apollo Hospital, Mardolkar General Hospital, Adhar Hospital, Healthway Hospital, and Manipal Hospital.

9 https://toxicslink.org/wp-content/uploads/2022/08/Mercury-phase-out-order.pdf

02 Study Finding in Delhi

The findings from the documentation exercise across Delhi and Goa are elaborated separately, focusing on various qualitative insights, considering that both the states have initiated this transition at different time and consequently have had varied experiences and lessons.

2.1 Evolution of Mercury Phase-out in Delhi

Delhi was the first city to initiate phasing out of mercury from the healthcare sector, well prior to India's signing of the Minamata Convention.

The issue of mercury management gained traction through series of publications, round table discussions and workshops conducted by Toxics Link starting since 2006. Such sustained efforts of Toxics Link, through advocacy, research and stakeholder engagement catalysed the progress in mercury management and transition to alternatives.

The first major step of phasing out mercury from its healthcare facilities started in the year 2007. The Delhi Pollution Control Committee passed an Office Order in 2007, under the aegis of the Government of National Capital Territory of Delhi (GNCTD) in 2007, directing to phase out use of mercury from the government hospital by December 2007[10].

This Order directs such shifting in a phased manner, considering the challenges of a complete shifting in one go. Through this Office Order, it was held that, the instruments and consumables containing mercury in its free and hazardous form should be replaced gradually. It further mentioned that, all the Blood Pressure (BP) instruments and thermometer from different sections of the hospital shall be shifted to Outpatient Department (OPD), and these instruments shall then be replaced by portable Non-invasive Blood Pressure (NIBP) monitors and thermometers that are mercury-free.

The Central Government directive, came later in 2010, to gradually phase-out mercury containing equipments (thermometer, BP Instruments etc.) and replace them with good quality non-mercury alternatives, in order to prevent the toxic effects of mercury on patients and health care workers. The directive of March 2010, issued by the Directorate General of Health Services, Ministry of Health and Family Welfare (MoHFW) (Annex 4), Government of India, advised all Central Government hospitals and health centres to develop a mercury phase-out plan, to replace old mercury based equipments with mercury-free equipments. Considering the necessary timelines which could be required for phasing-out mercury, this directive also laid down detailed guidelines for management of mercury waste.

In 2012, the Central Pollution Control Board of India had issued a guideline for

10 https://toxicslink.org/wp-content/uploads/2022/08/Mercury-phase-out-order.pdf

environmentally sound management of mercury waste generated from the healthcare facilities[11]. These guidelines outlined detailed management and handling of mercury spillage in an environmentally sound manner. A set of precautions are proposed to be taken by the health care staff in case of mercury spillage from breakage of mercury-based devices.

The documented process for Delhi transition is present under the heads internal policy, staff training and Education, Procurement and Quality Check and Calibration.

2.1.1. Internal Policy

Policy-level decisions act as the backbone for ensuring the successful transition of healthcare facilities towards mercury-free healthcare facilities. A written policy provides a uniform and enforceable directive that compels all stakeholders, including doctors and visiting consultants, nursing staff, procurement teams, biomedical engineers, and waste pickers to align with transitioning process and modus operandi.

During the site visits to government healthcare facilities as part of the study, availability of such internal policies, administrative orders. The assessment revealed that all the government facilities had drafted and circulated a written policy on mercury and incorporated such policy within their governance structure. However, these documents are no longer actively maintained at the facilities, as they have already achieved and inherited a mercury-free status. As revealed by the interviewees at the healthcare facilities, during initial days of transitioning, these hospitals used to keep that document handy at every possible places. Such practices have however been removed over the years.

The Infection Control Committee/Senior Medical Administration officer were made overall in-charge of the programme and were given with the task of monitoring overall phase-out process.

The private hospitals on the other hand used to have policies in place, though many of them no longer maintain records of specific mercury phase-out policies. In practice, NABH accredited hospitals, such as Max Healthcare and Sir Ganga Ram Hospital have proactively adopted mercury-free instruments.

> **"The posture of patients plays a crucial role while taking BP readings. Thermometers are handed over to patients only after providing them with a proper demonstration of their use."**
>
> - Head Infection control, Sir Ganga Ram Hospital

2.1.2. Staff Training and Education

Staff training promotes behavioural change among practitioners and every other stakeholder within a healthcare facility who have traditionally relied and remained comfortable with mercury-based instruments.

Overview from Government Hospitals

In early 2010, the Department of Health and Family Welfare, the Government of National Capital Territory (NCT) of Delhi, issued a written policy to all government hospitals mandating that mercury breakages be managed through defined procedures and that staff receive appropriate training in spill management. As part of capacity-building proceeding, nearly 10,000 healthcare personnel in Delhi have been trained to date, with programmes continuing on a periodic basis. Furthermore, a national-level training initiative for senior nurses was held in partnership with the Trained

11 https://cpcb.nic.in/uploads/Projects/Bio-Medical-Waste/Guidelines_for_ESM_MercuryW_fromHCFs.pdf

Nurses' Association of India (TNAI), with technical support from Toxics Link, thereby strengthening institutional capacities for a mercury-free transition.

> Discussions with a senior Doctor and Head at Lady Hardinge Government Hospital revealed that the institution, owing to its integrated medical and nursing colleges, incorporates mercury-free instruments into its formal curriculum. As a result, there is no perceived need for additional, standalone training programmes for staff. In contrast, several other hospitals, such as Urban Public Healthcare Centre Mehrauli and SDMC Lajpat Nagar Hospital, lack formalised training mechanisms for newly recruited staff. In these facilities, skill transfer occurs informally, with senior nurses providing on-the-job guidance to new personnel.

Overview from Private Hospitals

Private hospitals on the other hand were mandated to provide timely staff training and education, as part of their accreditation process under National Accreditation Board for Hospitals and Healthcare Providers (NABH) or Joint Commission International (JCI) Accreditation. During the transition to mercury-free instruments, trainings were focused on accuracy verification, spill prevention and operational proficiency to address challenges such as staff resistance and device costs.

Private hospitals employed mixed approaches to train staff, combining hands-on training session and integrated orientation and continuous medical education programme, policy communication, and ongoing evaluation.

Newly hired employees receive mandatory training on non-mercury devices during their onboarding process, through a programme called integrated orientation and CME programme. For example, Dharamshila Narayana super-specialty hospital had trained all its incoming staff and consultants on non-mercury instruments from its inception. For them, it was an easy procedure, considering their status as mercury-free facility, eliminating resistance and ensuring seamless use without having any complaints from the staff nurses. Complaints regarding measurement error, accuracy etc. are addressed via Continuous Medical Education (CME) sessions.

Some of the surveyed private hospitals had also conducted targeted hands-on training for nurses on device usage. Hospitals such as Apollo Hospital, Max Hospital and Moolchand Hospital began training nursing staff on spill prevention in 2003. Sir Ganga Ram Hospital trained 3,000 staff members through a two-phase program starting in 2004, focusing on aneroid sphygmomanometers and distributing digital thermometers to patients to extend education to the community. Both Sir Ganga Ram and Max Hospitals implemented structured training programs for new nursing staff as part of their induction training which continues for 15–30 days. This follows by examinations to evaluate competency. Notably, the Max Hospital established a passing percentage system after training sessions to ensure staff qualification meets all expectations.

2.1.3. Procurement and Cost

In government hospitals, mercury alternative instruments have become part of the approved list of instruments which means, they are now covered by regulation and quality is assured by hospital's procurement department and DGHS.

As observed during the current documentation work, the hospitals in the initial days were struggling with brands of mercury-free devices as there were hardly any good number of brands available in the market. The hospitals had to depend on whatever was available in the market. Over the years, the hospitals

evolved in the process. Alternatives in terms of both thermometer and sphygmomanometer are plenty in numbers in today's market with domestic manufacturing of such instruments, standardised by the Association for the Advancement of Medical Instrumentation (AAMI) and the European Society of Hypertension (ESH) being in use. A range of brands such as Omron, A&D Instruments, Welch Allyn, Beurer, Dr. Morepen and others are now available, as options to select from. However, healthcare facilities prioritise accuracy as an important and deciding factor behind any procurement decision.

It was found that, government healthcare facilities rely on central procurement through tendering process. There are three major ways through which government hospitals procure instruments, each category applying the norm of tender uniquely.

a. Central Government Hospitals
b. State Hospitals
c. District hospitals and dispensaries
d. Municipal Corporation Delhi (MCD) Hospitals

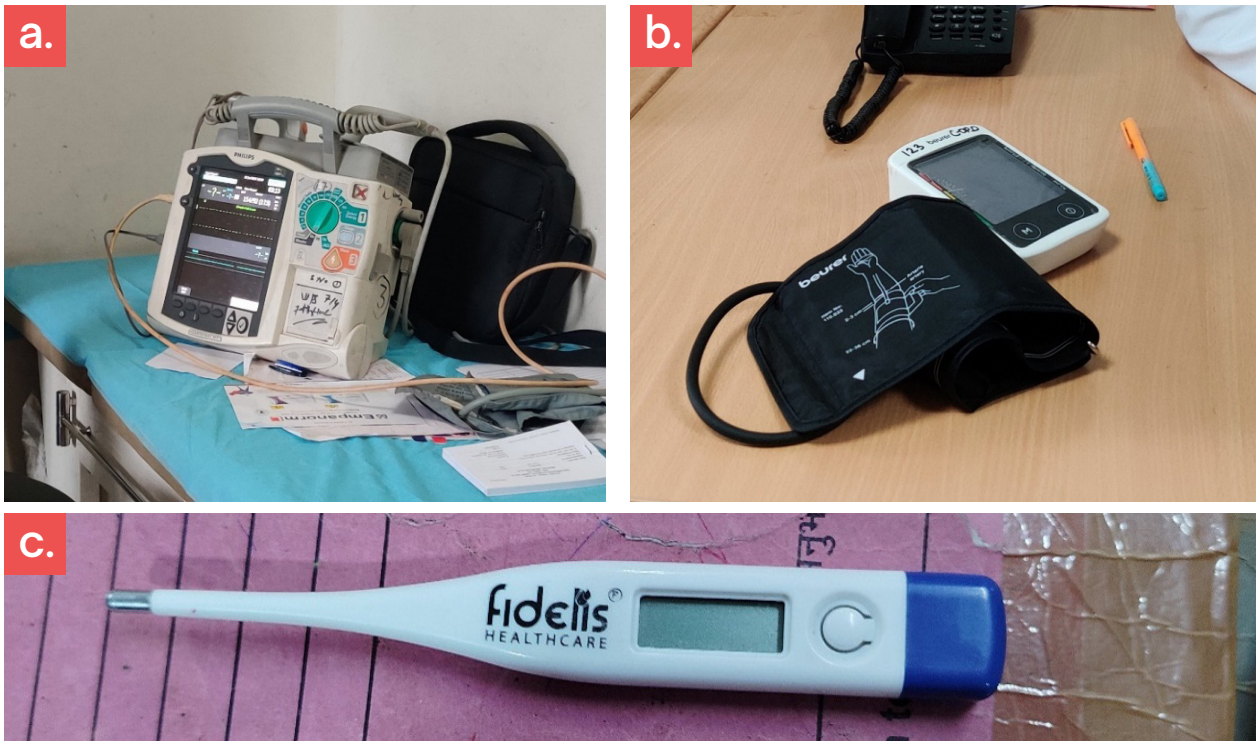
a. Central Government Hospitals

In case of the central government hospitals, procurement of devices follows General Financial Rules (GFR) 2017. At first, the departments submit their specific needs (e.g., digital thermometers and BP instruments) to the procurement cell of specific unit, these demands are then consolidated at the central procurement agency following which the tenders are floated and quotations sought for each equipment. Once received, bids are evaluated for technical compliance (e.g., accuracy, calibration standards) and cost, selecting the lowest qualified bidder (Ref: GFR 2017, AIIMS Procurement Guidelines).

When procuring a medical device, government hospitals typically check the following as observed:

- ☑ Relevant Bureau of Indian Standards (BIS) for the product (mandatory if the product is under a compulsory certification list)[12]. Other relevant standards are provided in Annex 5.
- ☑ Central Drugs Standard Control Organisation (CDSCO) registration / device license (Medical Device Rules, 2017) required for many medical devices; verify the device is legally registered / classified correctly.[13]
- ☑ Performance/validation standards e.g. validation/accuracy protocols for blood pressure devices as per WHO / AAMI / ESH / International Organization for Standardization (ISO) guidance (WHO technical specs for BPMDs).[14]
- ☑ Manufacturer quality systems (ISO 13485), warranty, after-sales service, calibration & spare parts support — commonly required[15] in tender documents.

12 pharma-dept.gov.in
13 https://cdsco.gov.in/opencms/resources/UploadCDSCOWeb/2022/m_device/Medical%20Devices%20Rules,%202017.pdf
14 https://www.who.int/publications/i/item/9789240002654
15 https://nhm.gov.in/New_Updates_2018/Technical_Specifications/PMR.pdf



Mercury free instruments in Safdarjang Hospital- (a) Multiparameter BP monitor; (b) Beurer digital BP apparatus; (c) Fidelis healthcare digital thermometer

b. State Government Hospitals

The state government hospitals are managed by the Health & Family Welfare, Government of NCT of Delhi. All the needs of big government hospitals can be seen on Hospital's Website[16]. For example, if a hospital needs thermometers and sphygmomanometer, they are assessed via inventory checks, following which the bids are invited through state e-procurement portals[17] or Government e-Marketplace (GeM), prioritising Indian-made devices under the Make in India policy. Suppliers are selected based on technical standards, maintenance and cost. In a scenario, when instruments are not available on GeM portal, it can go for Rate Contract where one vendor is selected from three or more vendors, to supply goods under local purchase scheme. Once the process is complete for selection of supplier, tendering details goes in public domain to maintain the transparency.

Some of the examples of current tendering process for BP machines in government hospital are provided in Annex 6.

c. District Hospitals and Dispensaries

In case of district hospitals, procurement is done through centralised portal under the Central Procurement Agency (CPA), which manages rate contracts, tenders and stock for medicines, consumables and instruments.

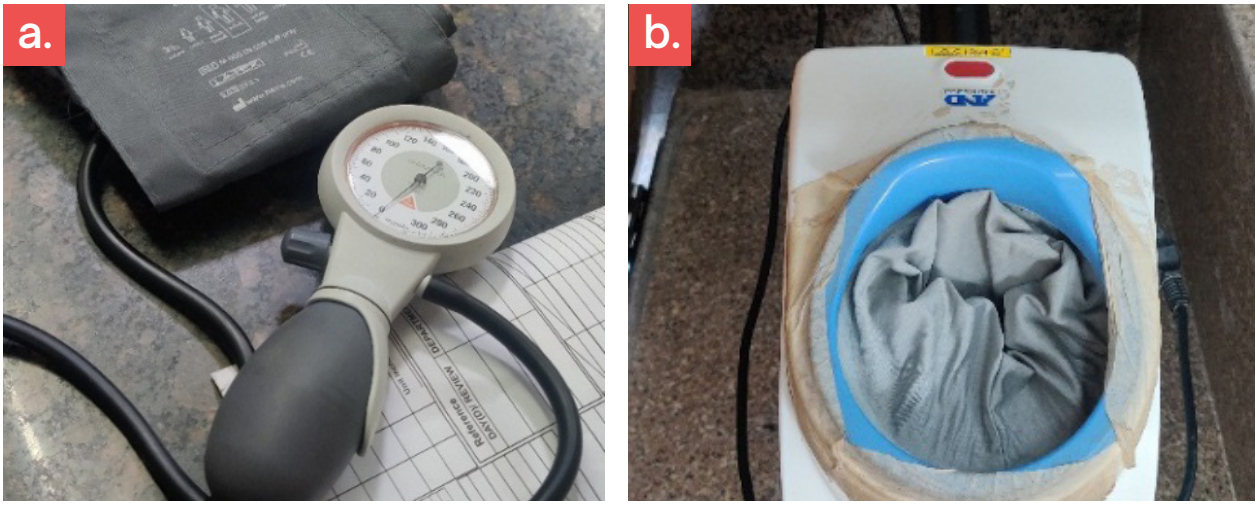
Under this process, hospitals and dispensaries are required to raise their demands via email to the Directorate General of Health Services (DGHS), which compiles requirements across facilities and initiate orders and indent to the Central Procurement Agency (CPA). In case of extreme emergencies and contingencies, hospitals are allowed to borrow stock from other institutions or procure locally, with costs later reimbursed by CPA.

16 https://health.delhi.gov.in/health/delhi-government-hospitals

17 https://govtprocurement.delhi.gov.in/nicgep/app?component=%24DirectLink&page=FrontEndViewTender

d. MCD Hospitals

MCD hospitals issue open tenders for medical equipment and instruments through the hospital administration or health department. For this type of hospitals, tendering usually involves submission of separate technical and financial bid. Procurement is based on budget allocations by MCD, which may be influenced by standing committees or sanctioning authorities for large-value purchases.



(a) Gamma manual BP apparatus from Sir Ganga Ram Hospital; (b) Standing A&D Medical Multiuser Blood Pressure Monitor from Lajpat Nagar MCD Hospital

In some cases, smaller items or emergency supplies may be procured via local purchases or the Government e-Marketplace (GeM) portal.

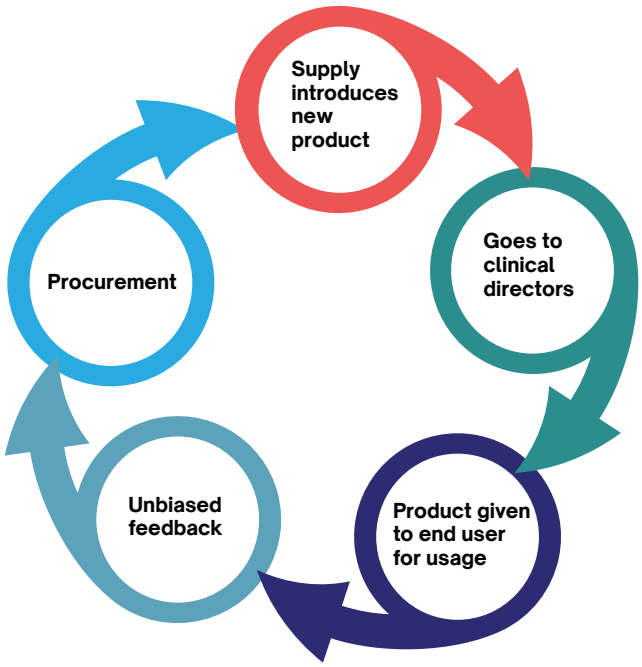
DELHI GOVERNMENT DIRECTIVE – JUNE 4, 2025

- All state-run and MCD hospitals must procure medical devices, consumables, and equipment only through the Central Procurement Agency (CPA).
- Direct or GeM “cart” purchases by hospitals are banned; all demands go through the CPA.
- Even in emergencies, requests must be routed via CPA for urgency assessment and procurement.
- Procurement and tendering responsibilities now lie with CPA to ensure transparency, cost control, and uniform supply across hospitals.

Private hospitals follow either centralised or decentralised procurement systems. In surveyed private hospitals, most chains, such as Apollo and Max Hospitals, use centralised procurement managed across all branches nationwide. Standalone hospitals like Sir Ganga Ram and Dharamshila Narayana also adopt centralised procurement for their individual needs. Sir Ganga Ram uniquely selects medical instruments based on user reviews and case studies, emphasising, (i) brand reputation and (ii) instrument accuracy; selected stocks are handled by the biomedical engineering department.

Hospitals like Moolchand and Yupiter procure high-value instruments through bulk tenders to ensure transparency and competitive pricing.

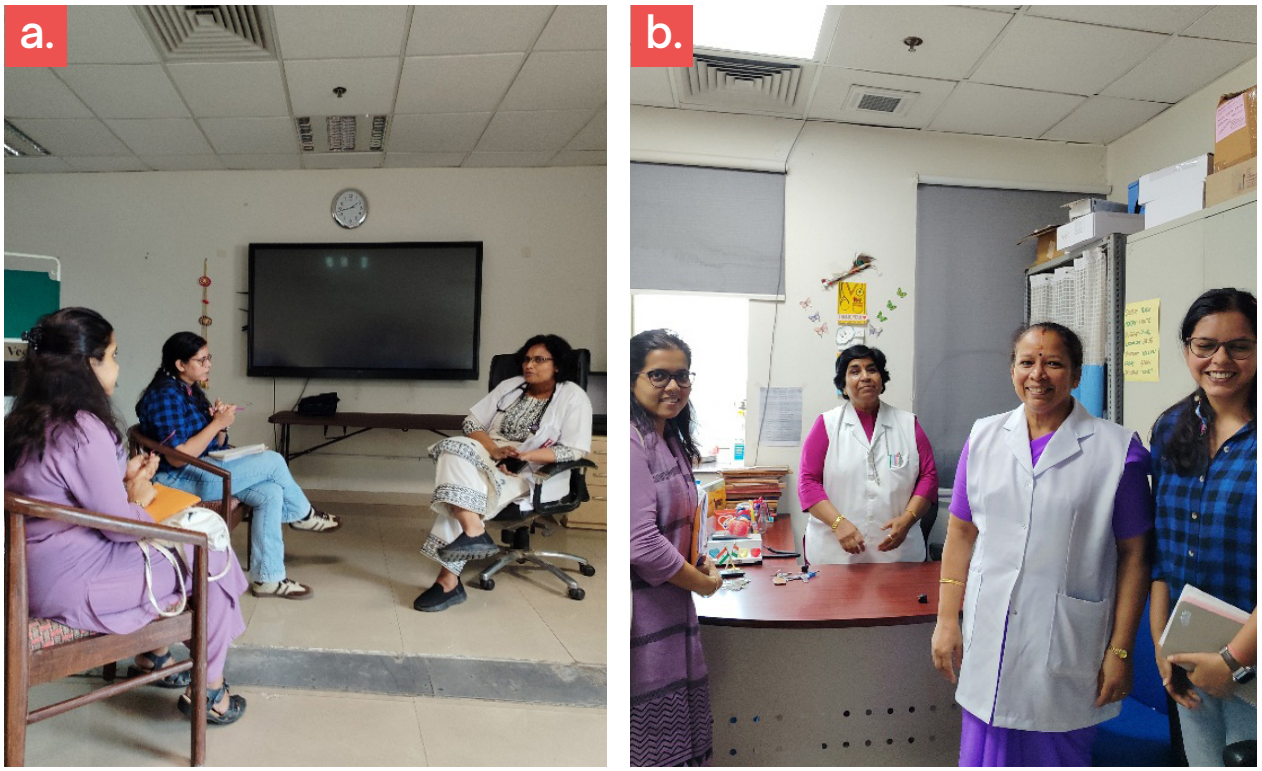
> **Exemplary case - In Apollo hospitals, centralised procurement committee decides products based on technical and financial specifications. Based on unbiased views of different Apollo branches, products are chosen under Annual Acquisition Plan. The process takes place twice a year.**



2.1.4. Quality Check and Calibration

Quality check is a routine process ensuring devices function accurately within acceptable limits, often verified using control samples. It proactively detects and corrects errors before they impact results. Calibration aligns an instrument's readings with a known reference standard through documented testing and adjustment, usually followed by a calibration certificate.

As part of the present study, it was found that, healthcare facilities have evolved their thought process and mental acceptance about the accuracy of the mercury free devices. In the initial days, the accuracy of the mercury free devices was severely questioned by everyone, starting from the medical practitioners to the administrator. During survey, doctors and nursing staff from government hospitals such as Safdarjang and Lady Hardinge Hospitals expressed confidence that, when properly calibrated, mercury-free instruments perform accurately and, in many cases, more efficiently than traditional mercury-based ones. Most respondents believed that half-yearly or quarterly calibration of sphygmomanometers is generally sufficient, although the frequency often varies based on factors such as patient load, instrument-to-patient ratio, hospital size and capacity, and the type of devices in use.



Discussion with doctor and matron Safdarjang Hospital on transitioning to mercury-free medical instruments.

Calibration and quality control practices varied across surveyed hospitals. As observed during the conversation with the respective person at government hospitals, calibration is conducted twice a year by third-party agencies appointed by state governments, with costs covered centrally. Urgent calibration needs are handled through a toll-free helpline for on-site support.

Surveyed private hospitals like Apollo, Dharamshila Narayana, and Sir Ganga Ram maintain Annual Maintenance Contracts (AMCs) with equipment suppliers. All surveyed hospitals have in-house Biomedical Engineering Departments responsible for calibration. Despite the established system,

> **"Doctors and nursing staff are satisfied with the use of mercury-free alternative instruments."**
>
> - Head, Lady Hardinge Hospital-

> **"Accuracy is still a concern with digital BP instruments, which we address by taking multiple readings or cross-verifying with BP multi-parameter monitors or aneroid BP machines."**
>
> - Materan and nursing officer, Safdarjang Hospital

accuracy related issues are reported, especially in digital BP monitors. For devices under warranty, manufacturers provide free calibration services. Once the warranty expires, calibration is typically performed biannually by the Biomedical Engineering (BME) department or as needed to address specific issues. Max Hospital, exceptionally outsources calibration to third-party contractors in some cases.

To ensure reliability, hospitals followed below mentioned practices:

- The staff usually takes multiple consecutive readings, typically three to five times, in order to reach to a verified consistency
- Comparing instrument readings with those of a control device

In contrast to BP machine, thermometers rarely face calibration issues; faulty ones are sent for disposal, though smaller government facilities like UPHC Mehrauli sometimes use local vendors such as Bhagirath Place for repairs.

In private hospitals, BME and Procurement Departments jointly oversee quality assurance, reviewing technical specifications and certifications to ensure consistent performance, regulatory compliance, and diagnostic accuracy. This process ensures that medical instruments meet regulatory requirements on a regular basis and accordingly perform their functions consistently, supporting accurate diagnosis and treatment. In private healthcare facilities, staff typically engage BME personnel to diagnose and rectify issues, instead of maintaining error registers. Moreover, to ensure accuracy, the surveyed hospitals adopt the following practices:

- **Regular Calibration or verification:** Calibration minimises errors, ensures compliance with regulatory standards and maintains consistency across devices. All surveyed hospitals adhere to this practice.
- **Device comparison with other instruments:** Hospitals such as Apollo Spectra, Max Hospital and Sir Ganga Ram Hospital compare readings from digital BP machines with those of manual BP machines to verify accuracy.
- **Multiple readings:** This method is more consistent in case of government hospitals, as compared to private ones. Among the surveyed private hospitals, only Dharamshila Narayana Superspecialty hospital follows this method. They also cross-verify blood pressure readings with patient history to identify patterns, further ensuring diagnostic accuracy.

Hospital staff expressed satisfaction with the responsiveness of manufacturers, noting that company representatives promptly resolve issues when contacted via toll-free numbers. This direct communication ensures timely maintenance and calibration, minimising disruptions to hospital operations.

Case study - Dharamshila Narayan Superspecialty Hospital

Online platform to raise complaint about instruments which is known as PULSE system is followed.

It is a software-based system documenting all complaints. In case server is down or app is not functioning, users can submit complaints manually to the quality department.

Calibration frequency for following instruments which private hospitals are following:

- Aneroid BP apparatus - Calibration in every 6 months
- Digital BP apparatus - Calibration is done annually or biannually
- Thermometers are not needed to be calibrated

> **"The posture of patients plays a crucial role while taking BP readings. Thermometers are handed over to patients only after providing them with a proper demonstration of their use."**
>
> - Head Infection control, Sir Ganga Ram Hospital

CASE STUDY

1. Case Study 1: Lady Hardinge Hospital

Lady Hardinge, an 877-bedded hospital, began replacing mercury instruments with mercury-free alternatives in 2015–2016. Dr. Anupam highlighted key factors for a successful transition: (a) regular calibration to maintain accuracy and durability; (b) addressing misconceptions about digital devices, and (c) promoting awareness and behaviour change among healthcare staff. He also emphasised that regular calibration also helps in increasing the durability of non-mercury BP machines. Dr. Anchal Arora added that patient-specific needs must guide device selection-aneroid BP machines are preferred for cases involving hypertension, pregnancy, paediatric, asthma, or cardiac conditions, while digital instruments suit routine use. Currently, the hospital uses Disha aneroid BP machines and digital devices from BPL, Dr. Morepen, Infi, and Accusure.

Mercury free sphygmomanometers in Lady Hardinge Hospital (a) BPL manual BP apparatus and Infi digital thermometer; (b) Aneroid type and Digital type BP apparatus

2. Case Study 2: Dharamshila Narayana Hospital and Max Hospital

Head of the Quality Team at Dharamshila Narayana Hospital discussed key recommendations including regular CMEs and awareness programs, state monitoring of licenses and policies, inclusion of mercury-free criteria during hospital authorisation renewals, and escalation of error-related issues to the drug approval committee for action based on performance feedback. She further stressed the need for at least four training sessions annually and mandatory, authority-monitored calibration. Similarly, Max Hospital emphasised preventive maintenance and calibration as vital for ensuring accuracy, reliability, and trust in mercury-free instruments. Many hospitals also reported issuing thermometers to patients with proper handling and storage instructions.

> **"Training and awareness programmes play an important role in improving compliance. Appreciation and safety initiatives motivate the staff, and regular CMEs are essential to sustain these efforts."**
>
> - Infection Control Officer, Dharamshila Narayana Hospital

Max Hospital highlighted that preventive maintenance and regular calibration are crucial for accuracy, reliability, and trust in mercury-free instruments. This focus on proactive measures enhances device reliability and supports effective diagnosis and treatment.

Apollo Hospital further emphasised the role of behavioural change through comprehensive staff training and patient engagement, noting that integrated counselling sessions effectively reduce resistance and build confidence in alternative devices.

(a) Visit to Max Vaishali Hospital; (b) Discussion with Procurement Officer, Head, and Doctors at Apollo Indraprastha Hospital on the process of mercury phase-out and adoption of mercury-free instruments.

03 Study Finding in Goa

Goa is a small coastal state with a population of 14, 57,723 and with some of the best health indicators in India. The total geographical area of the district is 1966 sq kms.[18] Government of Goa has attained the goal of "Health for All" by the year 2000, through its various health and medical care programme. Goa is therefore considered as best performing states in health & medical care services. Directorate of Health Services (DHS) has an important role in the administration of health services therefore DHS has extended accountability and service delivery fairly effectively and courteously. Goa's hospitals under the DHS have a total of 1,405 beds, with 463 in CHCs and Primary Health Centres PHCs[19] and list of hospitals for year 2024 under DHS is covered under Annex 7.

3.1. Evolution of Mercury Phase-out in Goa

Goa was selected as a model state for documenting mercury-free healthcare facilities due to its complete phase-out of mercury devices across government institutions, supported by directives, procurement reforms, and capacity-building initiatives. Its compact healthcare network enabled efficient monitoring, standardisation, and policy enforcement, making it a replicable model. Availability of baseline data, proactive health department engagement, and established waste management systems further supported its selection. Telephonic permissions were obtained from PHCs, CHCs, district, and private hospitals for the documentation exercise.

3.2. Current Status of Mercury Phase-out

Government hospitals in Goa have achieved complete elimination of mercury-based medical devices in compliance with DGHS directives and the "Guidelines for Phasing Out Mercury-Containing Medical Devices" (MoHFW, May 2010), which mandate replacing mercury instruments with safe and affordable alternatives. Same is followed by DHS Goa and presented copy in Annex 8.

The phase-out began in 2016 and was gradually implemented between 2018 and 2019 through systematic withdrawal of damaged mercury instruments and substituted with compliant alternatives. Challenges observed during transition included doubts about the accuracy of alternatives, storage and disposal issues, and user resistance. Despite this, all government hospitals are now mercury-free, with minor exceptions - Sub District Hospital Chicalim retains mercury devices for cross-verification in maternity wards, and Goa Medical College uses them in oncology citing accuracy concerns.

Private hospitals have shown steady but uneven progress since 2018–2019. Facilities like SMRC's VM Salgaocar, Victor Apollo, Mardolkar General, Healthway, and Adhar Hospitals report 60–80% mercury-free status (see the table below), with limited use of mercury instruments to meet consultant preferences. The key driver of this transition remains awareness and understanding of mercury toxicity.

18 https://nhm.goa.gov.in/nuhm-in-state/

19 https://dhs.goa.gov.in/cms-gov-be/public/uploads/cms_admin_files/Citizen-charter-2024.pdf

Completely mercury free (Government/ Private)	Partially mercury free (Government/ Private)
PHC Loutulim	SMRC's VM Salgaocar Hospital*
Hospicio District Hospital	Victor Apollo Hospital*
PHC Aldona	Mardolkar General Hospital*
UHC Panaji	Healthway Hospital*
Sub District Hospital Chicalim	Adhar Hospital*
CHC Bicholim	
CHC Sanquelim	
Vaatsalya Hospital*	
Nobel Maternity Hospital*	
Manipal Hospital*	

** Private Hospitals*

The status of the phase-out in Goa's private hospitals is largely bifurcated along the lines of the scale and resources of the respective institution.

Major Private Hospital chains such as Manipal and Apollo Hospitals in Goa have completely phased out mercury instruments, replacing them with alternative instruments for routine use. This transition is driven by corporate policies enforcing India-wide bans on mercury device procurement, aligning with global best practices, strengthening safety standards, and enhancing brand credibility. Risk management considerations also support this shift by minimising mercury exposure and spill hazards.

In contrast, **other standalone private hospitals** and clinics such as Healthway, Victor Apollo hospital etc., shows uneven progress, with some still using old mercury sphygmomanometers and thermometers due to long-held beliefs among veteran practitioners about their superior accuracy and durability. Additionally, gap in law and policy can be another reason, since Goa Pollution Control Board (GPCB) has not passed any strict regulation to manage and phase out mercury instruments, private hospitals keep using them.

> **"The digital ones are easier to use, and we are satisfied with their performance. We collected all the mercury waste and handed over to an SPCB-authorised pollution control agency for safe disposal."**
>
> - Doctors and Nurses, Vatsalya Hospital

3.3. Internal/External Policy

At state level, the DHS has made policies for hospitals and mandated them to become mercury-free. Largely, hospitals went through this process of becoming mercury free over the last 5-6 years. At present, none of the government hospitals that are mercury-free have any internal policy; however, all of these hospitals under the DHS had such policies earlier, when they initiated the phase-out process.
In case of private hospitals, mercury phase-out is a process steered by external policies of NABH, with a notable absence of bespoke internal policy frameworks. There is no internal policy as such; however, NABH insists hospitals to use mercury free instruments in their healthcare facilities, as observed from the two of the NABH accredited hospitals namely Victor Apollo Hospital and Healthway Hospital.

3.4. Staff Training and Education

In most government hospitals, senior nurses informally trained new staff, with few formal sessions. During the transition, targeted awareness programs helped build trust, improve reliability, and familiarise staff with new devices. Initial resistance, especially among nurses, gradually declined as confidence grew. Hospitals also received training on using mercury spill management kits, a practice observed during field visits to CHC Chicalim.

> **"Errors and inconsistencies in readings are observed during the routine night rounds and are reported daily to the third-party calibration agency, Mediciti, for necessary repair or calibration."**
>
> - Matron at SDH Chicalim Hospital

Individual champions - An Exemplary Mercury-Free Practice at Nobel Maternity Hospital-

Nobel Maternity Hospital, established in 2018, stands out as an exemplary case of a successful transition to a mercury-free environment from its inception. The hospital's doctors were fully aware of the toxic effects of mercury and proactively decided to eliminate its use, even in the absence of formal internal policies or NABH accreditation. This demonstrates a strong commitment to patient safety and environmental responsibility.

In Nobel hospital, the choice of medical instrument brands is determined by the doctors themselves, with equipment locally procured as needed. Currently, Nobel Maternity Hospital uses Diamond Manual BP apparatus, Diamond Liquid Crystal Display (LCD) BP apparatus, and Omron Digital BP devices. To ensure accuracy, staff take multiple readings or cross-verify measurements between different instruments whenever discrepancies arise.

Notably, the hospital does not employ dedicated personnel for calibration. Instead, the nursing staff has been trained specifically to calibrate manual BP apparatus, ensuring precise and reliable measurements. This approach highlights an innovative and practical model for small hospitals to maintain high standards of quality and safety while remaining mercury-free.

(a) Mercury spill management kit; (b) LCD Diamond and Omron digital BP apparatus; (c) Diamond Manual BP apparatus

Mercury free LCD monitor Diamond BP apparatus in SDH Chicalim, Goa

Private hospitals recognise training as vital for maintaining patient safety, clinical excellence, and operational efficiency. Across Goa, from small specialty centres to large tertiary chains, hospitals blend structured education with hands-on learning.

- **Induction Programme:** Every new employee, clinical or non-clinical, undergoes a structured induction covering safety protocols such as infection control, biomedical waste management, fire safety, documentation, and accreditation compliance. It includes practical training on handling medical instruments to build confidence and competence, followed by a mandatory assessment or examination. Hospitals like Manipal, SMRC V.M. Salgaocar, and Healthway follow this model.

Individual champions - An Exemplary Mercury-Free Practice at Vatsalya Hospital-

Vatsalya Hospital, a 14-bedded facility, exemplifies a small institution's successful transition to mercury-free practices. In 2020, it replaced all mercury devices with non-mercury alternatives in a single step. Without a dedicated procurement unit, doctors directly select brands ensuring quality and usability, ultimately standardising on Diamond manual BP apparatus and digital thermometers.

Vatsalya Hospital also demonstrates environmental responsibility by systematically disposing of used batteries separately along with municipal solid waste. According to hospital staff, BP machine batteries are replaced approximately every two months, depending on patient footfall and usage. Calibration of instruments is carried out once a year and additionally when required, through an external calibration agency named Ansarika. In case of equipment damage, replacements are handled by the manufacturer if the product is under warranty, while out-of-warranty repairs are outsourced to another authorised service agency namely Ansarika. Staff also maintain error records and routinely cross-verify readings. Nursing staff reported satisfaction with non-mercury devices, noting minor but manageable variations - demonstrating that even small hospitals can adopt structured, sustainable mercury-free practices.

- **Clinical Practicum:** Newly recruited doctors and nurses complete a supervised 2-3 months practicum under senior mentors who oversee procedures, observe techniques, and provide real-time feedback to ensure safe practice. This mentorship-based approach is common in smaller hospitals such as Vatsalya, Nobel, Mardolkar, and Adhar

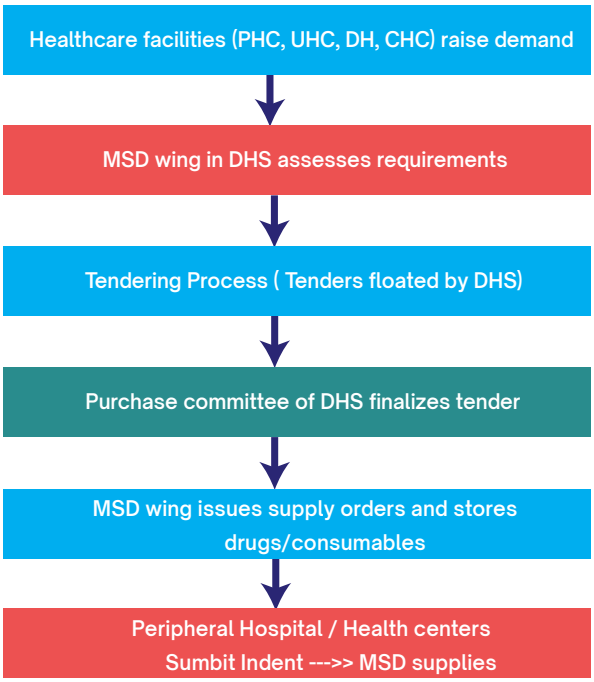
3.4.1. Procurement and cost

In case of government hospitals, procurement is managed through central procurement system where the DHS provides instruments to healthcare facilities. There are two ways in which a hospital can procure instruments:

i. **Through Medical Stores Depot (MSD), DHS**
ii. **Local purchase**

a. Hospitals submit their equipment requirements to the DHS, which consolidates demands and centrally procures instruments through approved suppliers or government agencies. The DHS works closely with the MSD to manage procurement and supply of medicines, equipment, and consumables. Hospitals assess their annual needs, which are compiled by the DHS and forwarded as formal indents to MSD wing. Procurement is carried out through tenders or rate contracts based on lowest bids, after which MSD supplies items to DHS for distribution across government hospitals, CHCs, PHCs, and other facilities. While MSD handles procurement, stock, and replenishment, DHS oversees usage and quality but lacks a formal feedback system from hospitals on product performance. Currently, Diamond BP apparatus is procured by DHS as the L1 bidder. An example can be observed in Annex 9.
b. In urgent cases or for items not covered under DHS procurement, hospitals may directly purchase instruments from local vendors or authorised dealers, following purchase committee approval and within prescribed government financial limits.

In case of private healthcare sector, the approach to procurement is not monolithic, rather is distinctly stratified based on the size, and corporate structure of the hospital. There are two primary procurement pathways - centralised and decentralised procurement system.



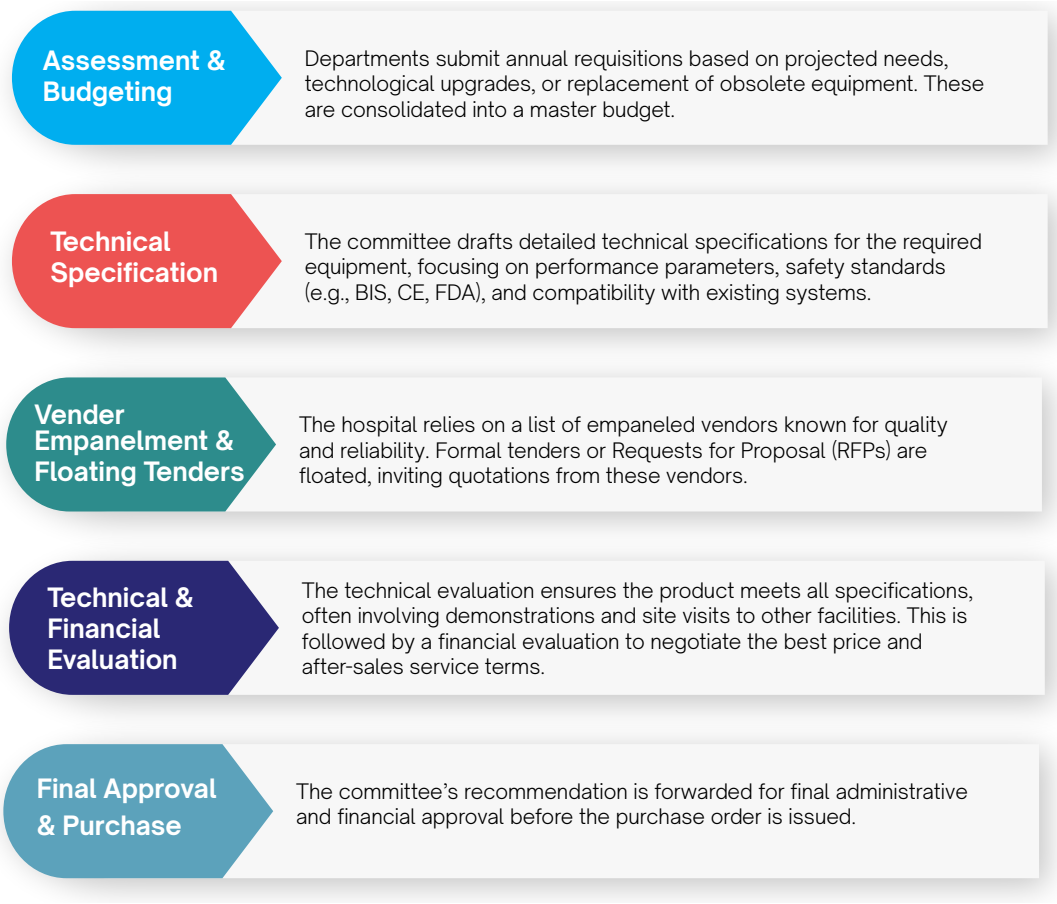
a. Centralised Procurement in Large Private Hospitals

Large corporate hospitals and standalone institutions in Goa, such as Manipal Hospital and SMRC V.M. Salgaocar Hospital, follow a centralised procurement system led by a Hospital Procurement or Materials Management Committee comprising senior doctors, administrators, and biomedical engineers. This system ensures transparency, standardisation, cost-effectiveness through bulk purchasing, and strong long-term quality and service support.

> **Instruments are supplied by DHS; however, in case of emergencies such as lack of stock or breakdowns, hospitals can do a local purchase by raising request to MSD and after obtaining prior NOC from DHS.**
>
> - Sub-District Hospital Chicalim, Goa

b. Decentralised Procurement in Small Private Hospitals

Smaller private hospitals and nursing homes in Goa, such as Nobel Hospital and Vatsalya Hospital, typically employ a more agile and decentralised procurement model. Decisions are primarily made by consulting or owner-doctors based on personal experience and brand preference. Purchases are usually need-based and made "just-in-time" from local vendors. Diamond LCD monitors and manual BP apparatus are preferred locally for accuracy and cost-efficiency, while larger hospitals favour Omron and Dr. Morepen for BP apparatus. Common thermometer brands across both setups include Diamond, Tata 1mg, and Beurer. This approach offers speed and flexibility but often lacks standardisation across facilities.



Typical Centralised Procurement system in private hospitals

3.5. Quality Check and Calibration

During discussions with hospital staff, it was noted that calibration is outsourced to a third-party agency, called **Mediciti,** which calibrates BP apparatus every six months or as needed. Thermometers, however are not calibrated; instead, they are replaced once damaged. Major brands for thermometers are Diamond, Infi, Tata 1mg, Medtech and brands used in case of sphygmomanometers include Diamond LCD monitor, Diamond manual, Omron.

Mediciti's role reflects a broader practice adopted in various states where biomedical equipment maintenance is outsourced through DHS tenders. Contracts are awarded to qualified L1 bidders and formalised via memorandum of understanding (MoU) defining service scope and standards. Mediciti provides preventive and corrective maintenance, calibration, spare part replacement, training & application support, complaint handling, and asset management through its Biomedical Equipment Management & Maintenance Program (BEMMP).

Despite these systems, staff in some hospitals report inaccuracies in digital BP apparatus. Issues are generally raised directly with Mediciti via a toll-free helpline, as most hospitals lack error logbooks.

To ensure accuracy hospitals rely on:

- Repetitive readings
- Cross-verifying readings with another instrument

Private hospitals prioritise quality instruments and follow structured quality assurance and calibration practices. In case of discrepancies, following corrective measures are considered:

- Cross verification using multi-para cardiac monitors/Operation theatre (OT) monitors/ mercury based instruments
- Periodic calibration

Few private hospitals in exceptional cases are using mercury-based thermometers and sphygmomanometers on consultant's demand due to accuracy concern. However, such use is now limited and generally discouraged due to safety and environmental concerns.

Error Reporting- Documenting errors or complaints is an important practice that hospitals can adopt to ensure proper follow-up and corrective action. However, this practice was observed only in a few facilities, such as PHC Aldona and District Hospital Hospicio.

At PHC Aldona, a single logbook is maintained to record all errors, which is adequate for a smaller establishment. In contrast, at District Hospital Hospicio, error reporting registers were maintained separately for each ward.

Periodic Calibration is performed twice yearly or as required, following WHO (2016) and NABH (2023) standards. Two main crucial methods adopted are:

- **In-House Calibration -** Conducted by Biomedical Engineering Departments for routine instruments like thermometers and sphygmomanometers, typically twice a year or after repairs. This ensures minimal downtime and cost efficiency, and immediate corrective action. Hospitals such as Manipal and Victor Apollo handle most in-house calibration and minor repairs internally, while manufacturers manage calibration during warranty periods as per hospital's policy.
- **Outsourced Calibration -** Outsourced or third-party calibration is conducted by certified external agencies or the OEMs, particularly for complex, high-precision, or life-support equipment. Calibration is usually carried out annually or as required. For instance, SMRC V.M. Salgaocar Hospital follows a hybrid model-performing minor repairs in-house while outsourcing calibration to certified third-party agencies.

3.5. Disposal of Mercury-based Instruments

Safe disposal of phased-out mercury instruments remains a major challenge. Government hospitals lack clear guidelines, so most store mercury waste in storerooms due to limited awareness of proper disposal protocols. For example, District Hospital (DH) Hospicio has stored its mercury waste as it is, intending to dispose it of but are unable to do so, due to absence of guidance from Central Pollution Control Board (CPCB).

In contrast, CHC Bicholim sent mercury waste to the Common Hazardous Waste Treatment, Storage, and Disposal Facility (CHWTSDF) at Pissurlem, with collection costs covered by the government, while e-waste is sent to Goa Waste Management Corporation (GWMC)-authorised dealers.

During discussions with administrative staff and the matron at Hospicio Hospital, we learned that staff are satisfied using non-mercury instruments, noting reduced workload and faster operations. They also suggested that if the DHS could supply the required instruments within 2–3 days, hospitals could avoid local purchases.

Many private hospitals also lack awareness of mercury waste disposal protocols, often storing damaged or unused mercury devices securely rather than channelling them through authorised hazardous waste facilities.

"All the damaged mercury-based sphygmomanometers and thermometers have been kept in storage, as we are not aware of the proper disposal procedure."

- Doctors at Salgaonkar Hospital

QUALITY ASSURANCE

- Manipal Hospital has established a robust system to ensure the accuracy and reliability of medical instruments through a Point-of-Care Testing (POCT) system, where weekly reports are generated, readings from multiple BP devices are cross-verified, and findings are reviewed during monthly quality meetings for corrective action
- Additionally, a Patient Care Coordinator (PCC) conducts all vital checks before consultations, ensuring unbiased and accurate data. This process eliminates potential conflicts of interest between consultants and hospital staff and ensures unbiased and accurate patient data. To maintain standardisation, the hospital supplies consultants with calibrated, approved instruments-an approach that enhances patient safety, data consistency, and clinical reliability.

04 Rapid Assessment Bihar

About Bihar

Bihar is the thirteenth largest state in terms of geographical area and third largest by population[20] in India. In the state, public healthcare delivery system is categorised under the Allopathic and AYUSH (Ayurveda, Yoga, Unani, Siddha and Homoeopathy) systems of medicine and consists of three levels i.e., primary, secondary and tertiary. Health Department, Government of Bihar (GoB) is responsible for the management of the Primary, Secondary and Tertiary Health Care levels. When it comes to health, Bihar has 36 District hospitals, 230 CHCs, 235 PHCs and 80 UPHCs.[21]

Bihar Medical Services and Infrastructure Corporation Limited (BMSICL) serves as the sole agency for procurement and distribution of drugs and equipment, as well as infrastructure development.

Selection of Model Facilities

Bihar was selected for the rapid assessment to document mercury-free instruments in healthcare facilities based on the hypothesis that mercury-based devices are still in use despite national and international guidelines recommending their phase-out. Additionally, assuming that the state has weak enforcement of existing guidelines, resource and high patient loads contribute to the persistence of outdated technologies. These factors make Bihar a critical site for assessing ongoing usage trends, identifying gaps in implementation, and recommending targeted interventions to support a sustainable shift toward safer, mercury-free healthcare for future interventions.

Methodology

A week-long survey was conducted with telephonic consent from medical superintendents. Two private and six government hospitals (PHCs, CHCs, and District Hospitals) were covered (Annex 10). The questionnaire used is provided under Annex 3. Key findings are summarised below.

Findings from rapid Assessment

Internal Policy

Bihar has shown strong commitment to phasing out mercury instruments through centralised actions led by the **BMSICL** which has stopped procuring mercury thermometers and sphygmomanometers since 2016, following government notification banning mercury instruments[22]. The shift was gradual, replacing mercury devices with non-mercury alternatives as they became nonfunctional. This aligns with MoHFW (2010) and WHO (2005) guidelines. Considering the multiple factors

20 https://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-bihar.pdf

21 https://nhsrcindia.org/sites/default/files/practice_image/HealthDossier2021/Bihar.pdf

22 Ministry of Health and Family Welfare (MoHFW). *Guidelines for Phasing Out Mercury in the Healthcare Sector*, 2010

in place, like policy shift and its underlying mandate, subsequent reduction in demand from hospitals, and comparatively longer life span of the alternative sphygmomanometers, hospitals stopped procuring mercury-based sphygmomanometers.

In private hospitals, no written policies exist, but stricter SPCB directives and easier handling of non-mercury instruments have encouraged adoption.

Procurement

Procurement is centralised through BMSICL, which supplies only mercury-free thermometers and BP apparatus (Annex 11). When mercury instruments are used, they are typically **procured locally** at the request of specific departments. Standardised devices from brands like Diamond and Omron are distributed to major hospitals such as LNJP and New Gardiner Road Hospital. Private hospitals, such as Sahyog and Satkriti, follow NABH guidelines and procure independently, relying on brands like Diamond, Helix, and Beurer.

Under the GoB's "Sankalp" initiative, the Essential Equipment List (EEL) standardises medical equipment procurement, promoting uniformity, cost efficiency, and quality (Annex 12). However, gaps remain in regulatory enforcement.

Quality Assurance and Calibration

Calibration is typically conducted biannually or annually depending on equipment type and usage. For instance, District Hospital Chapra outsources calibration services to a third-party agency, called **Mediciti**, which tests each instrument once every six months. Some hospitals, however, continue to cross-verify instrument's readings with old mercury instruments, particularly in facilities such as CHC Rajapakar, CHC Bidupur, New Gardiner Road super specialty hospital and CHC Garkha Saran, due to concerns about the accuracy and battery life of alternate instruments.

In case of private hospitals surveyed, calibration is in-house by biomedical engineering team which conduct the calibration.

Disposal and Waste Management

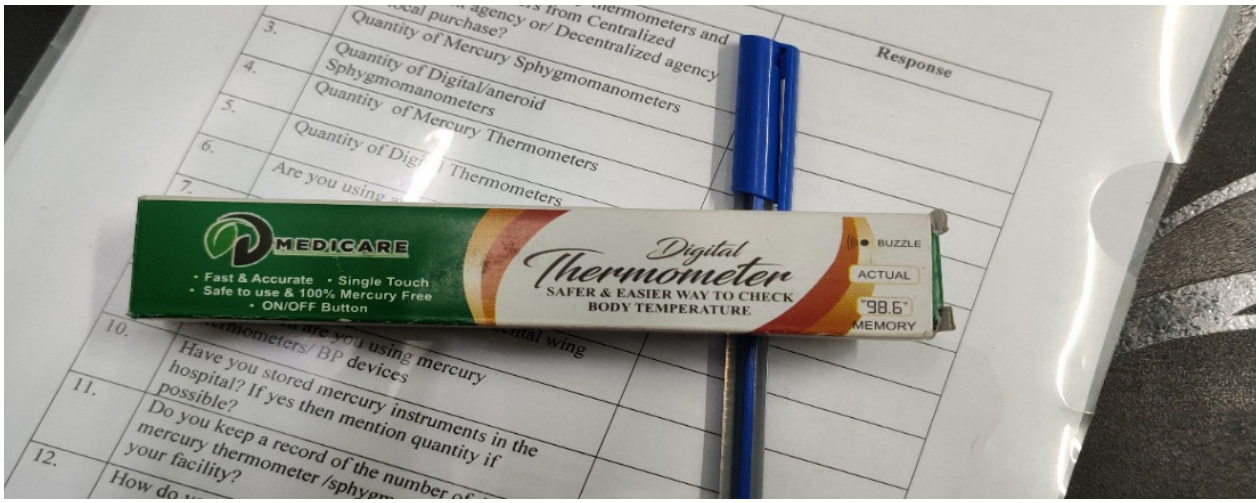
Despite progress, mercury waste disposal remains a key challenge. Many government hospitals including CHC Garkha Saran and CHC Bidupur, lack awareness or standardised protocols and stored damaged instruments in storerooms. Some staff reported that spilled mercury gets collected using cotton, which are then disposed of in general waste bins, indicating a gap in awareness and compliance with the CPCB 2012 and MoHFW (2010) guidelines respectively.

Larger hospitals like LNJP, Patna, use spill kits but remain uncertain about final disposal processes. Private hospitals such as Sahyog, though mercury-free, also lack clarity on waste disposal mechanisms.

Key highlights:

- The surveyed private healthcare facilities in Patna are not using mercury-containing instruments, following the guidelines laid down by the Indian Medical Association (IMA) and the NABH.
- Major brands in private hospitals include Diamond and Beurer for sphygmomanometers and Hicks and Beurer for digital thermometers.
- Mercury instruments were observed being used in government facilities and procured through local purchase since the healthcare professionals still consider mercury as gold standardly.
- Major brands in government facilities are Diamond and Omron for sphygmomanometers and thermometer.
- BMSICL officials confirmed that the purchase of mercury-containing devices had been officially discontinued, following governmental directives. As a result, all thermometers and sphygmomanometers provided by BMSICL are mercury-free.

> **"As per government directives and the phase-out of mercury-based devices, BMSICL has stopped procuring mercury instruments. Procurement of sphygmomanometers has also reduced significantly due to declining demand and the shift toward mercury-free alternatives**
>
> - Manager, Bihar Medical Services and Infrastructure Corporation Limited (BMSICL)



Non-mercury instruments from government hospitals in Bihar- (a) Digital BP apparatus; (b) Medicare digital thermometer

05 Rapid Assessment Kolkata, West Bengal

West Bengal, the eastern state of India is having a multi-tiered network of healthcare system with primary, secondary and tertiary level healthcare establishment. The Health & Family Welfare Department of the State Government has been vested with the responsibility of maintaining and developing the health care system in West Bengal. Public health, sanitation and hospitals are the exclusive responsibilities of the State. State provides financial and managerial support for the basic health care support and infrastructural facilities at the rural level, while the State level super specialty Medical Colleges & Hospitals predominantly provides the ambulatory care services. About 80% of the Government health care services to the citizens are being provided free of cost.

Kolkata, the capital city of West Bengal was selected for the rapid assessment, to document the phase out process from mercury-based to mercury-free instruments in the healthcare facilities. (See Annex 13)

Methodology

A detailed survey was conducted in two private and four government hospitals using a standardised questionnaire to understand the status and process of phase out of mercury-based instruments. Interviews were held with staff nurses, nursing heads, deputy medical superintendents, store and procurement in-charges. Key findings are summarised below.

Findings from rapid Assessment

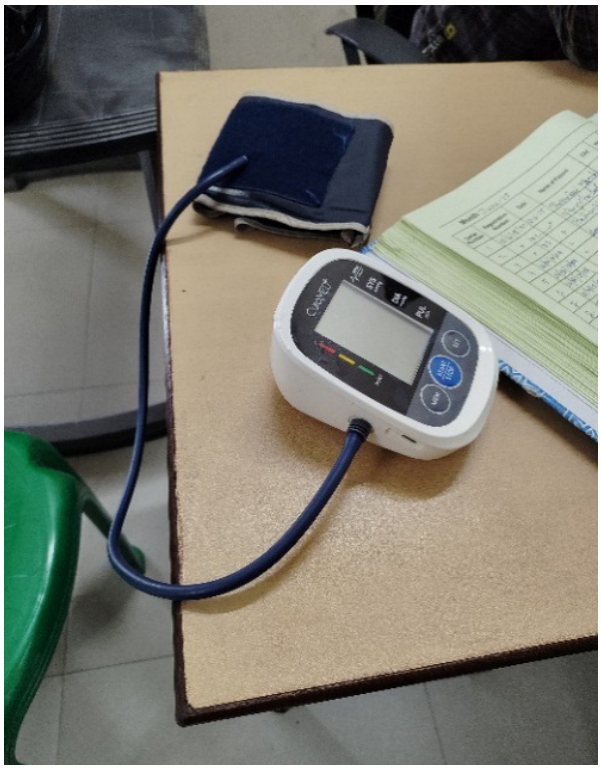
Policy

As observed during the survey, both government and private hospitals lack any in-house policy on mercury phase out. As quoted by the hospital administration, the transition from mercury to non-mercury instruments took place long ago. Therefore non-mercury instruments are now fully integrated into the hospital procurement system. As a result, none of the hospitals consider it necessary to maintain a separate in-house policy document.

Procurement

The government hospitals visited rely on central procurement system through tendering process at the State Health Department level. Prices gets fixed from the Centres for Medicare & Medicaid Services (CMS) of the Health Department. Based on the indent received, order is placed through the CMS and accordingly material stock is sent to the hospital.

A tender notice was issued by the West Bengal Medical Services Corporation Limited (WBMSCL) which serves as an official government invitation for bids to supply specified medical equipment or instruments (see Annex 14 and Annex 15). This process ensures transparent, competitive procurement of quality healthcare devices for public hospitals. This helps hospital to choose vendors efficiently. Other tenders by WBMSCL through their own website and through GeM can be seen in Annex 16 and Annex 17 respectively.



The companies selling thermometer, BP machines and other equipments participate in such tendering process. The quality and price checking is done at the CMS level of the State Health Department. Based on the matched criteria, the State Health department selects the Brand and price gets fixed accordingly. Therefore, the hospital store does not have any data on price of the product. Neither, any quality check takes place through them.

The procurement for sub-divisional hospitals gets done through tendering process from District Reserve Store (DRS), Barasat. Based on the indent received at the main store of the hospital, SMS based order is placed at the Barasat DRS. Once the same is approved for the desired stock and quantity, the main store in-charge collects the devices from there.

They do not have sufficient fund for running their own decentralised system. Therefore, all such procurement is done centrally through DRS. At the DRS, approved brand, price and vendor lists gets decided and fixed.

Private hospitals, such as Manipal Hospital, follow centralised procurement through their corporate office in Bangalore, with additional local purchases made from authorised distributors under rate contracts. New brands are pilot-tested based on user feedback before approval. In cases, when new brands are to be experimented, they are introduced across the wards, and based on the user feedback received, selection is made for newly introduced product. The other hospital reported about procurement through hospital purchase department.

Quality Assurance and Calibration

The private hospitals have reported about in-house presence of Biomedical Engineering Department, who carries out the in-house calibration on a monthly basis. Minor errors like valve replacement, are handled by them; however, in case of a major technical glitch beyond their capacity, companies are contacted.

In terms of quality check, the Clinical Nurse Specialist (CNS) head clarified no such error issues in reading by the instruments. According to the CNS Head and the staff nurses, it is not about the instrument which gives error in reading but rather arise from perception-mostly from the patients. The instrument does not have any quality or error issues. If any error of +/- 10 is recorded, they check with 1/2 other manual BP machines. Both the private hospitals do not have any back-up of mercury-based BP machines for such error rectification. There is no indent of mercury-based BP machines in these hospitals anymore.

In case of government hospital, the system differs across the hospital. One of the Urban Primary Health Centre reported to have a back-up mercury-based BP apparatus. In case of critical patients, where second layer of cross-checking is needed with blood pressure, the mercury-BP apparatus is used. All the other medical college hospital and sub-divisional

> **"One mercury-based BP instrument as a back up is essentially kept within the UPHC, for cross-checking of reading for critical illness patients"**
>
> - Doctor in charge at New Town UPHC

hospital reported to have no in-house calibration system in place. Neither have they had any error reporting system in place. According to the concerned person interviewed, they do not receive any complaints with respect to errors.

In case of R G Kar Medical College and Hospital, the linen department is maintaining a tendering process for manual android, through which one company got fixed for minor repair works like Valves change, small error in the clock body etc.

Key Highlights

- Non-mercury instruments are authorised items to be procured by the state health departments.
- Only non-mercury instruments are being procured by the health departments for use in government facilities.
- The transition to mercury alternatives has commenced though not achieved fully.
- There are examples of shifts in private sectors too and many corporate hospitals have transitioned.
- There is a need to overcome barriers of mindset and accuracy of instruments.

06 Conclusion

This documentation exercise conducted across private and government healthcare facilities of Delhi and Goa clearly demonstrates that a complete transition to mercury-free healthcare is a comprehensive outcome of internal policy, capacity strengthening of staff nurses and administrative willingness of the hospital management. While the government healthcare facilities were moved by the State Health Department orders, private hospitals in most of the cases prompt themselves towards transition, owing to hazardous and toxic nature of mercury, its handling and its spillage management.

It can be stated, Delhi and Goa both showcased that, when there is a will, there is a way. This is especially true for Delhi, being the first state to undergo such a transition. Simple knowledge enhancement about mercury toxicity has helped Delhi to transition to mercury free alternatives, and that too in a time when choosing quality instrument itself was a challenge. Goa stepped in when the healthcare equipment market became mature in terms of having supply of more than one reliable mercury-free sphygmomanometer and thermometer respectively. Therefore, it can be stated that, the journey of both Delhi and Goa is full of rich repository of learnings.

The study concludes that success hinges on a synergistic approach combining top-down policy directive with bottom-up implementation. Key enablers include strong administrative will, strategic procurement and staff training and capacity building.

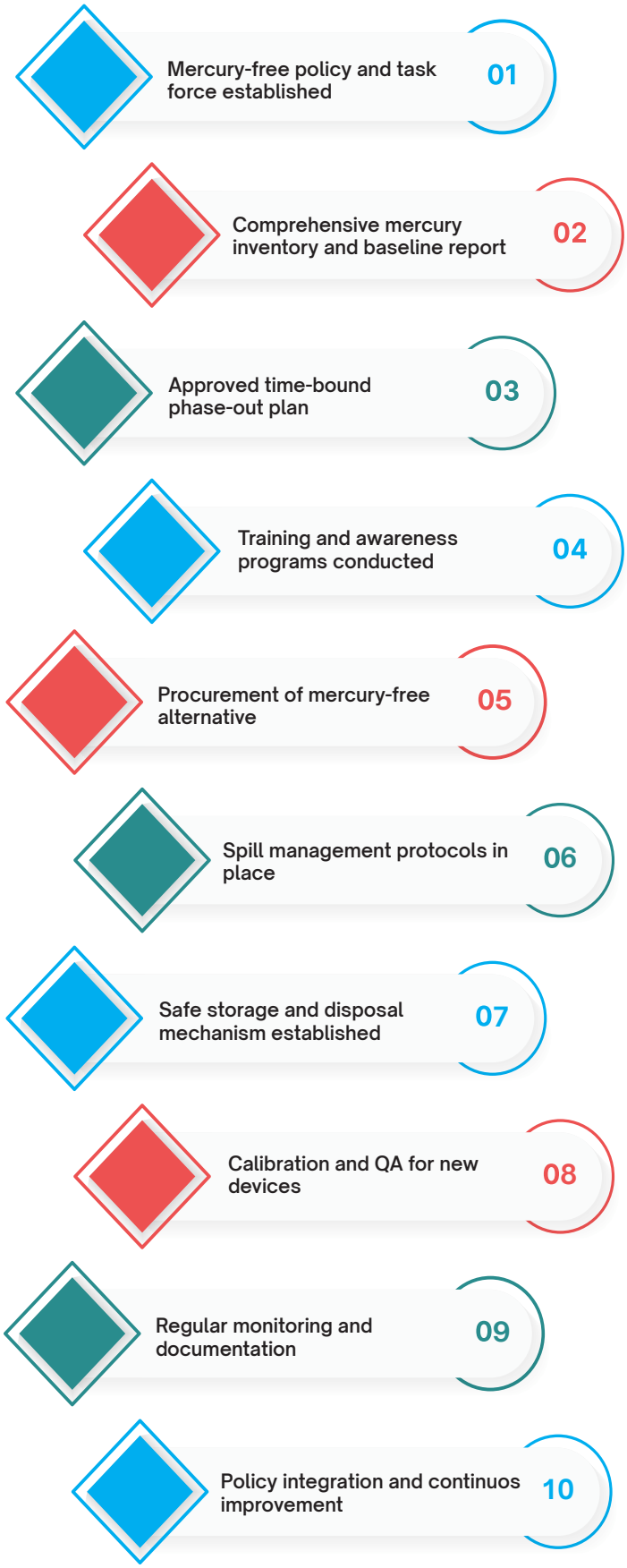
While challenges around the disposal of legacy waste, perceptions of accuracy, and the need for consistent calibration persist, the models of Delhi and Goa offer a clear, actionable, and doable blueprint.

Similar inferences can be established from the rapid assessment of Bihar and West Bengal. One can see the advancement not just in reliable product availability, but also in the systemic thinking. Transition to mercury-free alternatives showcased significance in larger mind set-up change among doctors, and senior medical officers and nursing department. Starting from a notion of inaccuracy back in 2009-2010, many state across India have now reached to a level where they have overcome issues related to accuracy, brand shortfall, and price-fixing.

Facilities which used to have a specific internal policy in place, are now confident to acknowledge that they do not need any such internal policies, given the adoption of these non-mercury products within their system-level thinking.

These case studies will definitely be a torch-bearer for other states to accelerate the shift, safeguarding healthcare workers, patients, and the environmental health from the toxicity of mercury.

Diagram below depicts step wise process for the hospitals to go mercury free.



Annexure 1

Surveyed hospitals in Delhi

Sr. No	District	Hospital	Type	No. of beds
1	Central Delhi	Lady Hardinge hospital, Shivaji Stadium, Connaught Place, New Delhi, Delhi 110055	Government	877
2	South Delhi	Urban Primary Health Centre(UPHC), Ward Number 4, Nai Basti, Mehrauli, New Delhi, Delhi 110030	Government	5
3	South West Delhi	Safdarjung hospital, Ansari Nagar East, near to AIIMS Metro Station, New Delhi, Delhi 110029	Government	1531
4	South East Delhi	SDMC Lajpat Nagar Colony Hospital, Veer Savarkar Marg, Block L, Lajpat Nagar II, Lajpat Nagar, New Delhi, Delhi 11002	Government	6
5	New Delhi	Sir Ganga Ram Hospital Marg, Old Rajinder Nagar, New Rajinder Nagar, Delhi, 110060	Private	800
6	South East Delhi	Indraprastha Apollo Hospital, NH-19, Jasola Vihar, New Delhi, Delhi 110020	Private	710
7	South Delhi	Apollo Spectra Hospital near Nehru Place Flyover, Greater Kailash-1, Chirag Enclave, Greater Kailash, New Delhi, Delhi 110048	Private	20
8	East Delhi	Dharamshila Narayana Superspeciality Hospital, Vasundhara Enclave, Delhi, 110096	Private	350
9	East Delhi	Max Hospital, 108A, IP Extension, I.P.Extension, Patparganj, Delhi, 110092	Private	500
10	South East Delhi	Moolchand Hospital, Block M, Lajpat Nagar III, Lajpat Nagar, New Delhi, Delhi 110024	Private	400+
11	South Delhi	Yupiter Hospital, J 4, Green Park Ext Rd, CH Harsukh Marg, Green Park Extension, Green Park, New Delhi, Delhi 110016	Private	55

Annexure 2

Surveyed hospitals in Goa

Sr. No	District	Hospital	Type	No. of Beds/ strength
1	South Goa	Primary healthcare Center Loutulim, Goa 403718	Government	Non-bedded
2	South Goa	Hospicio Hospital, South Goa District Hospital, Fatorda, Margao, Goa 403602	Government	260
3	North Goa	Primary Healthcare Center Aldona, Naicavaddo, Aldona, Goa 403508	Government	Non-bedded
4	North Goa	Urban Helath Center Panaji, 18th June Rd, Altinho, Panaji, Goa 403001	Government	Non- bedded
5	South Goa	Sub District Hospital Chicalim, 5/11, Alto Chicalim, Bogmalo, Goa 403802	Government	120
6	North Goa	CHC Bicholim, Sarvan, Goa 403529	Government	30
7	North Goa	CHC Sanquelim, Desai Nagar, Sanquelim, Goa 403505	Government	58
8	South Goa	Vaatsalya Hospital, 501, D Mello Building, Swatantra Path, Vaddem, Vasco Da Gama, Goa 403802	Private	14
9	South Goa	SMRC's VM Salgaocar Hospital, Off, Airport Rd, Chicalim, Bogmalo, Goa 403711	Private	86
10	South Goa	Noble Hospital, Near, St Joaquim Road, Borda, Madgaon, Goa 403602	Private	24
11	South Goa	Victor Apollo Hospital, Old Station Rd, near Carmelite Monastery, Malbhat, Madgaon, Goa 403601	Private	150
12	North Goa	Mardolkar General Hospital, Nagzarwada, Dicholi, Goa 403504	Private	-
13	North Goa	Adhar Hospital, Sanquelim Bridge, Karapur, Dicholi, Sarvan, Goa 403505	Private	-
14	North Goa	Healthway Hospital, Ella Village, Kadamba Plateau, Old Goa, Goa 403402	Private	170
15	North Goa	Manipal Hospital, Dona Paula, Dr E Borges Rd, Goa, Durgavado, Goa 403004	Private	235

Annexure 3

Questionnaire used to collect data:

Data Collection form to assess the usage of mercury and non-mercury medical measuring devices:

Experiences with use of mercury free medical devices-Goa

1. Email

   _____

2. Name of your Hospital/ Healthcare facility

   _____

3. Number of beds

   _____

4. Have you started any type of substitution of mercury products in your HCF *

   ◯ YES ◯ NO

5. When did you start substituting Hg added products? (approximate year)

   _____

6. Is your facility completely mercury free? If yes, then for how many years? What all have you substituted?

   _____

7. If your HCF is partially Hg free, what are you using and what have you substituted, what is the status of the shift? When did you start?

   _____

8. Does the hospital have a written policy or guideline on phasing out mercury-based medical devices?

   _____

9. Which departments are involved in assessing or approving the quality of new medical devices (e.g., biomedical engineering, clinical departments, and procurement committee)?

   _____

10. Are there any technical specifications or certifications required for selecting mercury-free devices? If yes, what standards are followed? (e.g., ISO, CE, BIS

    _____

11. How do you procure thermometers and sphygmomanometers?

_____

12. Which brands of thermometers and sphygmomanometers have you tried, and which are you using finally

_____

13. What according to your experience is the average life of a digital thermometer?

_____

14. How often is the battery replaced?

_____

15. What is the average price of the thermometer

_____

16. What is the average price of the battery

_____

17. How is the battery disposed? Any separate collection mechanism?

_____

18. Do these thermometers need any calibration?

_____

19. What according to your experience is the average life of a digital/an aneroid sphygmomanometer?

_____

20. Which sphygmomanometers are you using?

_____

21. What is the average cost of a device?

_____

22. How often do they need to be calibrated?

_____

23. What is the cost of calibration? Are they done in-house? Or is it given to an outside agency.

_____

24. Was the hospital staff trained before introducing these devices. Was there any resistance? If yes, which agency was involved in these trainings? was it part of CME/CDE/CDP/ other...Please mention

_____

25. Approximately how many days did it take for staff to become comfortable and efficient with using digital devices?

_____

26. How do staff members handle or report errors or inconsistencies in readings from digital instruments?

_____

27. Is there a log or documentation system to track device errors or complaints?

Yes / No
If yes, how often is it reviewed? _____

28. What practices are followed to ensure that readings from digital instruments are accurate?

☐ Regular calibration or verification
☐ Staff training/refresher courses
☐ Periodic internal audits
☐ Device comparison with control instruments
☐ Manufacturer's servicing schedule
☐ Others (specify): _____

29. How and where did you dispose your old mercury equipment?

_____

30. How do you rate your overall experience with the mercury free devices?

1 2 3 4 5

31. Have you ever worked out the financial implication of using mercury/ non-mercury? If yes, how does it fare. If, no, what is your gut feeling

_____

32. What is your overall experience? Anything that you want to share with policy makers/ authorities to make things better

_____

33. Have you ever worked out the financial implication of using mercury/ non-mercury? If yes, how does it fare. If, no, what is your gut feeling

_____

Remarks

34. What is your overall experience? Anything that you want to share with policy makers/ authorities to make things better

_____

Annexure 4

Directive by Directorate General of Health Services, MoHFW[23]

F.No.Z.28015/24/09-MH II
Directorate General of Health Services
Ministry of Health and Family Welfare
Government of India
(MH II Section)

Nirman Bhawan, New Delhi.
Dated: 8th March, 2010

Sub.:- **Minutes of Meeting**

Minutes of the meeting held under the Chairpersonship of Dr. (Mrs.) L. Sonar, DDG (P) on 10.12.09 at 3.00 PM in Resource Centre, Nirman Bhawan regarding issue of Mercury and E-waste in Central Government Hospitals are sent herewith for information and necessary action.

Approved Guidelines to Reduce Environmental Pollution due to Mercury and E-waste and the list of E-waste recyclers authorized by Central Pollution Control Board are enclosed along with.

(Dr.Anil Kumar)
Chief Medical Officer (AK)
Telefax : 23062940
Email: dr.anilkumar@nic.in

To

1. Dr. G.K. Sharma, Director, Lady Harding Medical College, New Delhi
2. Dr. N. C. Das, Addl.Medical Superintendent, Dr. RML Hospital, New Delhi
3. Dr.H.P.Singh, Acting Head, Dental Department, Dr. RML Hospital, New Delhi
4. Dr. A.K.Agarwal, CMO(NFSG), Medical Stores Organization, West Block No.1, Wing No. 6, R.K. Puram, New Delhi-66.
5. Dr.Sunita Singhal, CMO, Safdarjang Hospital, New Delhi
6. Dr.Pravesh Mehra, Associate Professor & Head, Dental Department, LHMC and associated Hospitals, New Delhi
7. Dr.Anurag Jain, Dental Department Safdarjang Hospital, New Delhi
8. Ms. Anu Agarwal, Toxics Link, H-2, Jungpura Extension, New Delhi-110049.
9. Ms.Priti Mahesh, Toxics Link, H-2, Jungpura Extension, New Delhi-110049.

Copy to

1.Medical Superintendent, Dr. RML Hospital, New Delhi
2. Medical Superintendent, Safdarjang Hospital, New Delhi
3. PS to DDG (P).

23 https://toxicslink.org/wp-content/uploads/2022/08/Mercury-phase-out-order.pdf

Guidelines to Reduce Environmental Pollution due to Mercury and E-waste in Central Government Hospitals and Health Centers

1. All Central Government Hospitals and health centers are advised to gradually phase out mercury containing equipments (thermometer, BP Instruments etc.) and replace them with good quality non mercury equipments, in order to prevent the toxic effects of mercury on patients and health care workers. It is recommended that a mercury phase-out plan be developed, to start procurement of new equipment which is mercury-free.

2. Until the mercury based equipments are fully phased out, following guidelines will be used for management of Mercury waste

    a. As mercury waste is a hazardous waste, the storage, handling, treatment and disposal practices should be in line with the requirements of Government of India's Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules 2008, which may be seen at website www.cpcb.nic.in.
    b. Mercury-contaminated waste should not be mixed with other biomedical waste or with general waste. It should not be swept down the drain and wherever possible, it should be disposed off at a hazardous waste facility or given to a mercury-based equipment manufacturer.
    c. Precaution should be taken not to handle mercury with bare hands and as far as possible; jewellery should be removed at the time of handling mercury. After handling mercury, hands must be carefully washed before eating or drinking. Appropriate personal protective equipment (rubber gloves, goggles / face shields and clothing) should be used while handling mercury.
    d. Mercury-containing thermometers should be kept in a container that does not have a hard bottom. Prefer a plastic container to a glass container, as the possibility of breakage will be less.
    e. In case of breakage, cardboard sheets should be used to push the spilled beads of mercury together. A syringe should be used to suck the beads of mercury. Mercury should be placed carefully in a container with some water. Any remaining beads of mercury will be picked up with a sticky tape and placed in a plastic bag, properly labeled.

3. Reporting formats must be used to report and register any mercury spills / leakages.
4. Hospitals and health centres should work to create awareness among health workers and other stakeholders regarding the health and safety hazards of mercury and E-waste (electrical and electronic waste).
5. A clause for Buy back policy may be included at the time of tendering for purchase of electronic equipments for minimization of E-waste.
6. E-waste recyclers authorized by Central Pollution Control Board may be contacted for collection and disposal of E-waste.

Annexure 5

BIS/ IS standards for mercury free sphygmomanometer and thermometer

Key BIS / IS standards for (BP machines and thermometers)

A. Aneroid (manual) sphygmomanometer

IS 7652:1988 — "Sphygmomanometer, aneroid type" (First Revision). This is the BIS standard that specifies dimensions, materials, performance and testing for aneroid (non-electronic) sphygmomanometers. Product manuals and BIS certification guidance exist for IS 7652. (https://law.resource.org/pub/in/bis/S09/is.7652.1988.pdf).

B. Electronic / Automated (Non-Invasive) Blood Pressure Monitors

Automated / electronic NIBP devices (Oscillo metric cuff devices, patient monitors with NIBP) are covered by the IS 13450 series (which adopts IEC 60601-2-30 / other IEC parts). Relevant parts include: IS 13450 : Part 2 : Sec 30 (essential performance of automatic cycling NIBP equipment) and other sections of IS 13450 that adopt IEC standards for medical electrical equipment. For invasive BP monitoring there is IS 13450-2-34 (IEC 60601-2-34). For procurement one shall refer the appropriate IS 13450 part that matches the device class.

C. Clinical thermometers

IS 3055 (Part 2): Enclosed scale type clinical thermometers- covers other types; see BIS product manual and IS text. Note: some IS documents refer to mercury thermometers historically, but procurement should now require mercury-free clinical thermometers that meet equivalent accuracy specifications or BIS standards for clinical thermometers (digital thermometers will follow relevant device/EMC standards and manufacturer calibration claims). (https://law.resource.org/pub/in/bis/S09/is.3055.2.2004.pdf)

Annexure 6

Few examples of current tendering processes in State Government Hospitals

BURARI HOSPITAL

GOVT. OF NCT OF DELHI
DEPT. of HEALTH & FAMILY WELFARE
Kaushik Enclave, Burari, DELHI – 110084
Email – burarihospital@gmail.com

F. No 4(116)/24-25/BH/PUR/Proc. of Automated BP Apparatus Dated

Regarding the procurement of AUTOMATED BLOOD PRESSURE APPARATUS(high end, extensive usage)

Kindly find enclosed notice regarding the procurement of AUTOMATED BLOOD PRESSURE APPARATUS at BURARI HOSPITAL Kaushik Enclave, Burari, Delhi – 110084. Hospital has initiated the process to procure Automated Blood pressure measuring high end machines for extensive usage in OPD/casualty/ANC/ Old age patients/NCD clinic with facility of print and powered by 100-240V AC 50-60Hz.

Details r/o above is attached for information and for display on notice board of their institute BURARI HOSPITAL for information to public as well as for other institutes, so that if anyone has any information regarding this (approved open tender rate with validity and terms & condition regarding the proprietary) may intimate accordingly within 7 working days.

Purchase Officer
Burari Hospital

DR RAJEEV

OFFICE OF THE MEDICAL SUPERINTENDENT
RAO TULA RAM MEMORIAL HOSPITAL, GNCT OF DELHI,
JAFFAR PUR, NEW DELHI-73.

No. RTRMH-/III/19/Eq.Maint/25/12-13/Pt-II Date-

Notice Board,
All Hospitals/Depts.

SUB:-Quotations are invited for Repair of Medical equipment's (Tabulated as below).

Sir,

Quotations are invited for **Repair of Medical equipment's as below of** this hospital. If your firm is interested for the same you a requested to kindly inspect the physically and submit the estimate before **dated. 17/10/2025 upto 1.00 PM.**

Other terms & Condition: -

1. No advance payment will be made until repair is completed to the satisfaction of the end user.
2. Replacement parts will submit to the Repair and Maintenance dept.
3. Firm should provide warrantee minimum three months on parts.
4. The spare parts must be manufactured by reputed firm & rate below then MRP.

SN	Name of Item	Quantity	Department
1)	Slit Lamp	01	Polyclinic Najafgarh
2)	Drill Machine (Ortho)	03	MOT
3)	Digital Weighing Machine	02	OPD
4)	Plaster Cutting Saw (Ortho)	02	OPD
5)	Boiler Machine (ARKO)	01	GOT
6)	Autoclave Machine (YORKO)	01	GOT
7)	Hydraulic OT Table (ARKO)	02	GOT
8)	Pt. Shiffting Trolley	01	GOT
9)	Coutery Machine	01	GOT
10)	LED View Box	03	OPD
11)	BP Apparatus	02	OPD
12)	NIBP Monitor A&D medical	02	OPD
13)	Wheel Chair	05	OPD

(Dr. Someshwar Bordoloi)
Chairman, R&M Committee
Date- 8/x/

No. RTRMH-/III/19/Eq.Maint/25/12-13/Pt-II /5216
Copy for information
Notice Board,RTRM Hospital,New Delhi -73
Notice Board, PWD office,RTRM Hospital,New Delhi -73
Notice Board, ITI Jaffar Pur,New Delhi -73
Notice Board,CBPE College,New Delhi -73
Notice Board, MLA Office ,Najafgarh,New Delhi -43
Notice Board,BDO office , Najafgarh,New Delhi -43
Notice Board,MS/MD Delhi Govt. Hospitals through Email
I/c IT, to upload the notice on Website of RTRM Hospital,

DA, IT 09/10/25

(Dr.Someshwar Bordoloi)
Chairman, R&M Committee

Annexure 7

List of Government Hospitals, Health Centers with Beds under DHS in Goa (2024)

Sr. No	Hospitals/centre	No. of beds
	HOSPITALS	
1	North Goa District Hospital, Mapusa	250
2	South Goa District Hospital, Margao	359
3	Sub District Hospital, Ponda	174
4	T.B.Hospital, Margao	68
5	Sub District (Cottage) Hospital, Chicalim	100
	CHC	
1	Canacona	70
2	Curchorem	50
3	Pernem	40
4	Valpoi	30
5	Sankhali	58
6	Bicholim	30
	PHC	
1	Aldona	12
2	Balli	14
3	Betki	12
4	Candolim	10
5	Casaulim	18
6	Cansarvarnem	12
7	Curtorim	12
8	Dharbandora	15

Sr. No	Hospitals/centre	No. of beds
9	Marcaim	12
10	Sanguem	20
11	Shiroda	24
12	Siolim	12
13	Quepem	12
14	Chinchinim	0
15	Cortalim	0
16	Colvate	0
17	Corlim	0
18	Loutolim	0
19	Ponda	0
20	Porvorim	0
21	Chimbel	0
22	Mayem	0
23	Navelim	0
24	Saligao	0
	UHC	
1	Margao	0
2	Mapusa	0
3	Panaji	0
4	Vasco	0

Annexure 8

Directive Goa DHS is following to phase out mercury from healthcare system

Guidelines to Reduce Environmental Pollution due to Mercury and E-waste in Central Government Hospitals and Health Centers

1. All Central Government Hospitals and health centers are advised to gradually phase out mercury containing equipments (thermometer, BP Instruments etc.) and replace them with good quality non mercury equipments, in order to prevent the toxic effects of mercury on patients and health care workers. It is recommended that a mercury phase-out plan be developed, to start procurement of new equipment which is mercury-free.

2. Until the mercury based equipments are fully phased out, following guidelines will be used for management of Mercury waste

    a. As mercury waste is a hazardous waste, the storage, handling, treatment and disposal practices should be in line with the requirements of Government of India's Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules 2008, which may be seen at website www.cpcb.nic.in.
    b. Mercury-contaminated waste should not be mixed with other biomedical waste or with general waste. It should not be swept down the drain and wherever possible, it should be disposed off at a hazardous waste facility or given to a mercury-based equipment manufacturer.
    c. Precaution should be taken not to handle mercury with bare hands and as far as possible; jewellery should be removed at the time of handling mercury. After handling mercury, hands must be carefully washed before eating or drinking. Appropriate personal protective equipment (rubber gloves, goggles / face shields and clothing) should be used while handling mercury.
    d. Mercury-containing thermometers should be kept in a container that does not have a hard bottom. Prefer a plastic container to a glass container, as the possibility of breakage will be less.
    e. In case of breakage, cardboard sheets should be used to push the spilled beads of mercury together. A syringe should be used to suck the beads of mercury. Mercury should be placed carefully in a container with some water. Any remaining beads of mercury will be picked up with a sticky tape and placed in a plastic bag, properly labeled.

3. Reporting formats must be used to report and register any mercury spills / leakages.
4. Hospitals and health centres should work to create awareness among health workers and other stakeholders regarding the health and safety hazards of mercury and E-waste (electrical and electronic waste).
5. A clause for Buy back policy may be included at the time of tendering for purchase of electronic equipments for minimization of E-waste.
6. E-waste recyclers authorized by Central Pollution Control Board may be contacted for collection and disposal of E-waste.

Annexure 9

Digital thermometer and sphygmomanometers tender by DHS Goa; tender notice no. 102/PT/DHS/MSD/2023-24/1599 dated 16/02/2024

20.	Stich removal scissor	100
21.	Cord cutting Scissors	200
22.	Sims Speculum Medium	100
23.	Cuscus Speculum Large	200
24.	Cuscus Speculum Medium	100
25.	Cuscus Speculum Small	200
26.	Hot Water Bag	50
27.	Ice Cap	50
28.	Focus Lamp (Pedestal)	100
29.	Sponge holders	1000
30.	Oxygen manometer with flowmeter & humidifier bottle	1000
31.	Stethoscope Adult	500
32.	Stethoscope Paediatric	2000
33.	Sphygmomanometer without mercury	200
34.	Mucus Sucker	1000
35.	Weighing Scale Digital Adult	1000
36.	Weighing Scale Digital Baby	500
37.	S. S. Drum small 6" x 6"	1000
38.	S. S. Drum Medium 8" x 8"	1000
39.	S.S. Drum Big Size Heavy Duty 15" x 12"	1000
40.	Nebulizer	500
41.	Male Urinals	500
42.	Female Urinals	50
43.	Foetoscope	50
44.	Baby receiving tray Enamel 18 x12 x 3	2000
45.	Thermometer Digital	2000
46.	**Needle Destroyer** Specification: Portable Electrical Needle and Syringe Destroyer, to destroy the used injection needles. Equipments shall be destroying the needles by instant electro melting process and syringe tips by manual cutter, suitable for operation on 230V +/- 10% 50 Hz. +/- 3% A. C. supply. 1. Principal Operation: Electro-Melting types.	

(Dr. Geeta Kakodkar)

Director of Health Services

Annexure 10

List of Selected Districts and Healthcare Facilities – Bihar

Following is the list of government and private hospitals, which were covered during the survey

Sr. No	District	Hospital	Type
1	Patna	Sahyog Hospital, 40, Patliputra Colony, Patna, Bihar 800013	Private
2		Satkriti Hospital, Ashiyana Nagar, Ashiana Nagar Phase 1, Kautilya Nagar, Patna, Bihar 80002	Private
3		Lok Nayak Jaiprakash Narayan Hospital, Shastri Nagar Road, Rajbansi Nagar, Patna, Bihar 800023	Government
4		New Gardiner Road Super Specialty Hospital, Bailey Road, Income Tax Chauraha, Patna, Bihar 800001	Government
5	Vaishali	CHC Bidupur, Chak Mangar Rd, Bidupur, Bulan Sarae, Bihar 844503	Government
6		CHC Rajapakar, Raja Pakar, Vaishali District, Bihar, 844504	Government
7	Chapra	CHC Gorkha Saran Hospital, NIC, District Centre Collectorate, Saran Chapra, Bihar-841301	Government
8		District Hospital Sadar Hospital, Near Saran Jail, Chapra - 841301	Government

Annexure 11

In a BMSCIL bid BMSICL/2025-26/ME-399 document to procure instrument dated June 2025 below

Technical Specification of CAL LAB

1. **FOR CAL LAB ESTABLISHMENT**

   COMPUTER – 25 With Standard Configuration and Connected to internet (Broadband) along with an AV aids (Multimedia Projector and Screen). The PC Should be installed with CAL Program and Software for teaching experimental Pharmacology. Bio-Assyy of Drugs. ANIMAL SIMULATOR KIT -25 (Software for Computer Assisted Learning -CAL

2. **FOR SKILL LAB, CLINICAL PHARMACY**

   1. Special Drug Delivery System like Metered dose Inhaler Spacer, Rota inhaler Nasal spray Trans dermal Patches insulin Pumps, Insulin Pen ten Piece each
   2. Manikins- 25 , for Demonstration of IV injection , Enema, Local Intramuscular injection, Intra cardiac injection and other routes of drug administration.

3. **FOR CLINICAL PHARMACOLOGY**

   i. Digital Sphygmomanometer 05

   ii. Critical flicker fusion apparatus-05

   iii. Pupillometer -05 sets

   iv. Stop Watch digital -25

   v. Video System to illustrate the Pharmacokinetic and Pharmacodynamic Properties of drugs ADR and Drug administration technique.

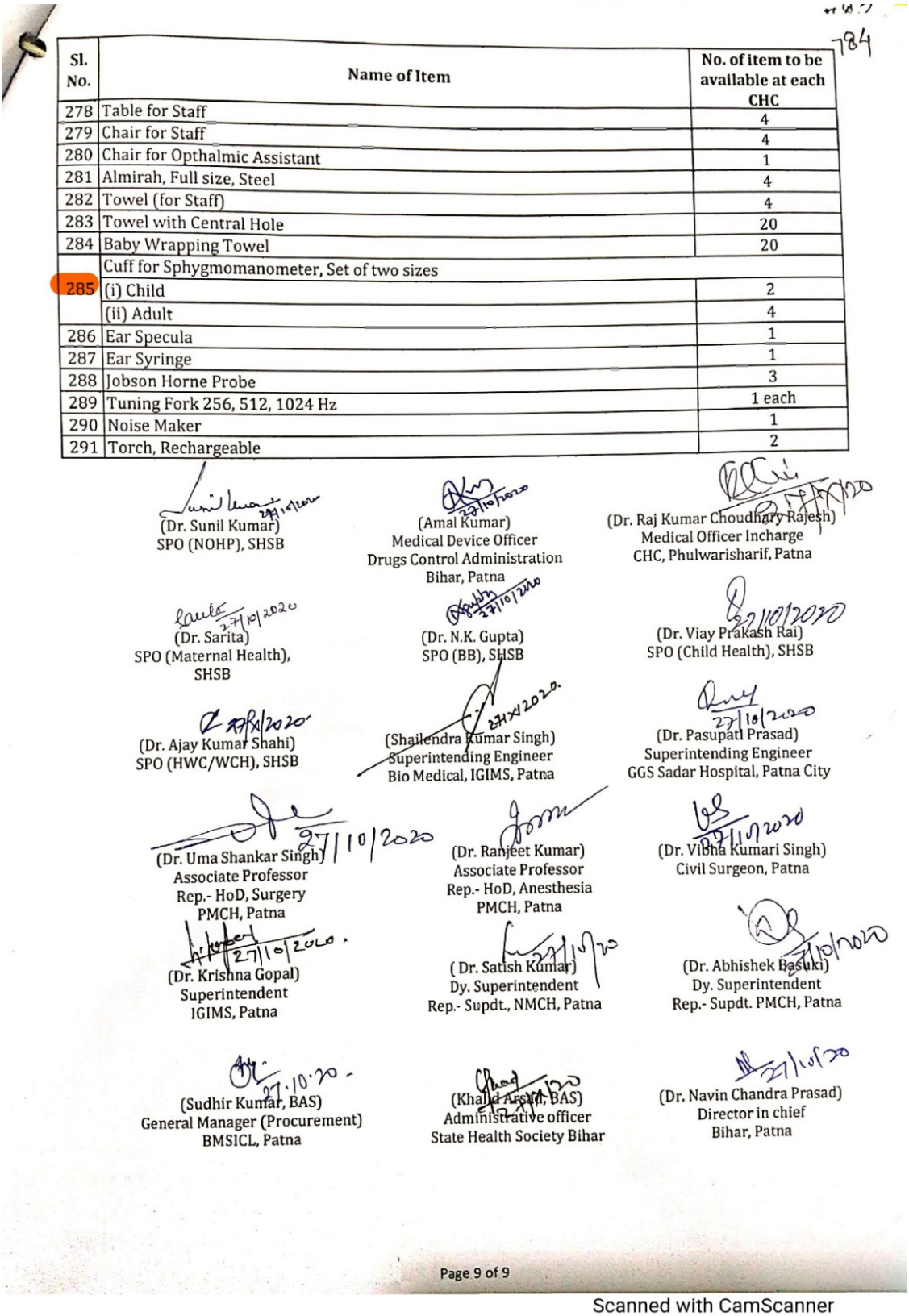
   vi. LAPTOP-01

4. REQUIREMENT & DEFICIENCY OF EQUIPMENTS FOR PG RESEARCH LAB

i. Analgesiometer-04Pc.
ii. Assembly perfusion apparatus for Mammalian heart -04Pc
iii. Cooks Pole climbing Apparatus for behavioural study-04 Pc
iv. Digital PH Meter-04 Pc
v. Electroconvulsiometer-04 Pc
vi. Photo-actometer-04Pc
vii. Rota-Rod -04Pc
viii. Plethysmograph-04Pc
ix. Flame Photometer-04Pc

Annexure 12

Essential equipment lists (EEL) approved by Health Department, Bihar for procurement for CHCs in Bihar. Reference no. SHSB/PM/515/2016/Part-1 dated 23.12.2020



Sl. No.	Name of Item	No. of item to be available at each CHC
278	Table for Staff	4
279	Chair for Staff	4
280	Chair for Opthalmic Assistant	1
281	Almirah, Full size, Steel	4
282	Towel (for Staff)	4
283	Towel with Central Hole	20
284	Baby Wrapping Towel	20
	Cuff for Sphygmomanometer, Set of two sizes	
285	(i) Child	2
	(ii) Adult	4
286	Ear Specula	1
287	Ear Syringe	1
288	Jobson Horne Probe	3
289	Tuning Fork 256, 512, 1024 Hz	1 each
290	Noise Maker	1
291	Torch, Rechargeable	2

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(Amal Kumar)
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Drugs Control Administration
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General Manager (Procurement)
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Administrative officer
State Health Society Bihar

(Dr. Navin Chandra Prasad)
Director in chief
Bihar, Patna

Page 9 of 9

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Annexure 13

List of Selected Healthcare Facilities in Kolkata

Sr. No	Hospital	Type
1	R. G. Kar Medical College and Hospital	Government
2	Bidhan Nagar Sub-divisional Hospital	Government
3	Calcutta Medical College	Government
4	New Town Urban Primary Health Centre	Government
5	Neotia Bhagirathi Women and Child Care Centre	Private
6	Manipal Hospital	Private

Annexure 14

Tender issued by West Bengal Medical Services Corporation (WBMSC) inviting bids for the procurement of essential medical equipment, ensuring transparent, standardised, and quality-driven supply to strengthen healthcare facilities across the state. Reference no. GEM/2021/B/980430 dated 25.01.2021

Sl	Participant (a)	Existing specification / tender clause (b)		Suggested amendments (c)	Recommendation / Suggestion / Clarification of the Tender Committee (d)	Justification (e)
		Clause	Description			
7	M/s Variety Vyapaar Pvt. Ltd (Via e-mail dated 25/01/2021)	-	Splitting of quantity of 15000 as the delivery timeline is 7 days	Splitting of quantity	No change	Not in terms of State Financial rules
8	M/s Variety Vyapaar Pvt. Ltd (Via e-mail dated 25/01/2021) & M/s Indo Scientific and Surgicals Pvt. Ltd.	-	Whether quotation should be with or without batteries	Clarification	Quote should be with batteries	-
9	M/s Indo Scientific and Surgicals Pvt. Ltd. (Attended virtually)	Technical Specifications	"Different backlight colours to differentiate between the fever ranges" - from Features available under Technical Specifications	Omission of the feature	No change	Set by GeM by default
10	M/s Indo Scientific and Surgicals Pvt. Ltd. (Attended virtually)	Delivery Days	7 Days	15 Days	**40%** of the tendered quantity : within 7 days; **40%** of the tendered quantity : within next 7 days; **20%** of the tendered quantity: within next 7 days	The requirements are urgent
11	M/s Dynamic Tracom (Attended physically)	Exemption of EMD	Exemption of EMD for MSE	EMD exemption for all MSEs	EMD exemption of WB State based SSI units in terms of FD GO no. 10500 F(Y), dated 19.11.2004	To abide by the set Financial rules of the State of West Bengal
12	M/s Dynamic Tracom / M/s Indo Scientific and Surgicals Pvt. Ltd. (Attended physically)	Clause no. 2 under Bid specific additional Terms and Conditions	Actual delivery	22 Districts of the State of West Bengal	WBMSCL Central Store, Sector-V, Salt Lake, Kol-91	-
13	M/s Dynamic Tracom & M/s Variety Vyapaar	Special terms and conditions for category Infrared Medical Thermometer For Measuring	Legal Metrology Consider	To allow Legal Metrology License obtained for Digital Thermometer for Infrared Medical	No Change	Special Terms and Conditions set by GeM for the item

Page 4 of 5

Annexure 15

Tender from West Bengal for the procurement of digital and infrared thermometers is given below:

MEMO NO-WBMSC/PROC/0610 DATE-10/02/2021

PROCUREMENT OF INFRARED MEDICAL THERMOMETER FOR MEASURING BODY TEMPERATURE FOR SMOOTH COVID MANAGEMENT DURING ELECTION TO WBLA 2021

[Bid Reference No. GEM/2021/B/1020731, Dated 06/02/2021]

Amendments

The following amendment has been made in the bid document,

Sl	Existing specification / tender clause		Amended Clause/ Specification	Reason
	Clause	Description		
1	Bid splitting	..... L1 would be awarded contract for quantity as indicated in the bid splitting clause above. For the rest of the bid quantity, the L-1 rates / lowest accepted rate will be counter offered to the other higher quoting bidder(s) for price matching.....	Any bidder participating in the tender should offer minimum 10,000 pcs of Infrared Thermometer; bidder should upload one undertaking on the minimum quantity of IR Thermometer offered to supply within the stipulated timeline in the tender	To ensure supply of a minimum quantity from a bidder
2	Turnover	OEM Average Turnover (Last 3 years): Rs. 1500 lakh	OEM Average Turnover (Last 3 years); 10 Crore	To facilitate more bidders to participate
		Bidder Turnover(Last 3 years): Rs. 300 lakh	Bidder Turnover(Last 3 years): no change	
3	Timeline for supply	To increase delivery period from 7 days to 21 days	50% of the tendered quantity should be delivered within 14 days; Remaining 50% of the tendered quantity should be delivered within next 7 days	To facilitate more bidders to participate
4	Past Performance	The Bidder or its OEM {themselves or through re-seller(s)} should have supplied same or similar Category Products for 10% of bid quantity.....	Digital Blood Pressure measuring instrument, Digital body temperature measuring Thermometer, Digital weighing scale or any other digital measuring equipment used in medical purpose and require legal metrology licence for manufacturing.	To facilitate more bidders to participate
5	Power source under Specification	Number of batteries supplied (Inclusive in the scope of supply) – 2	Number of batteries supplied (Inclusive in the scope of supply) – 4	One set of battery for backup power

Addl. General Manager

Annexure 16

Tender issued by West Bengal Medical Services Corporation Limited (WBMSCL) for supply and commissioning of medical equipment. Tender reference no. WBMSCL/NIT-005/2022 dated 04.01.2023

Section I: Instructions to Tenderers

A. Important information at a glance

(The item suffixed by "E" in bracket indicates Eligibility Criteria for a bidder)

1. Item wise Tender Details

Sl. No.	ITEM	QTY	Warranty
1	Sphygmomanometer with Pediatric cuff	16	2 Years
2	Torch	16	
3	Knee hammer	16	
4	Tuning Fork	16	
5	Magnifying glass	8	
6	Denver Developmental Screening Test (Denver II)	8	
7	Developmental assesment scale for Indian Infant (DASII)	8	
8	Vineland Social maturity scale	8	
9	Developmental screening (DST) by Bharat Raj	8	
10	Malin's Intelligence scale for India children	8	
11	Seguin form board	8	

2. Tender Fees : Exempted

3. Earnest Money Deposit (EMD) (E)

Sl. No.	ITEM	AMOUNT IN INR	INSTRUMENT
1	Sphygmomanometer with Pediatric cuff	5,500	(Online)
2	Torch		
3	Knee hammer		
4	Tuning Fork		
5	Magnifying glass		
6	Denver Developmental Screening Test (Denver II)		
7	Developmental assesment scale for Indian Infant (DASII)		
8	Vineland Social maturity scale		
9	Developmental screening (DST) by Bharat Raj		
10	Malin's Intelligence scale for India children		
11	Seguin form board		

4. Annual Turnover requirements: (E)

The Tenderers should have annual sales turnover (i.e. total turnover of the company) of minimum on an average of last three financial years (2018-19, 2019-20, 2020-2021) as per the Audited Accounts of the Organization as mentioned in the table below:

2. TECHNICAL SPECIFICATION

Item – 1

Sphygmomanometer with Pediatric cuff

1. Patient Type-Pediatric /Child
2. Sphygmomanometer type-Aneroid
3. Cuff size – Child cuff 18-26cm arm circumference
4. Bladder size: 9.8x18cm
5. Certification: BIS and ISO certificate

Item - 2

Torch

Pencil battery torch and large battery torch.

Item - 3

Knee hammer

1. Circular cane type medical hammer
2. Certification: BIS/ISO certificate

Item - 4

Tuning Fork

1. Tuning Frok set (128Hz, 256Hz and 512Hz)
2. Made of High grade of stainless steel

Item - 5

Magnifying glass (Medical Grade)

1. Material – Metal
2. Big diameter 100 mm size
3. Item Dimension: 22X15X7 cm
4. Certification: BIS/ISO certifacte

Item – 6

Denver Developmental Screening Test (Denver II)

- The DENVER II is a revision and update of the Denver Developmental Screening Test, DDST.
- It is designed for use by the clinician, teacher, or other early childhood professionals to monitor the development of infants and preschool-aged children (up to 6 (Six) years).
- Used to monitor children at risk for developmental problems;
- 125 performances based and parent report items are used to screen children's development in four areas of functioning: fine motor-adaptive, gross motor, personal social, and language skills
- Time: 10 to 20 minutes

Item – 7

Developmental assesment scale for Indian Infant (DASII)

- Application: assessment of mental and motor development, diagnosis and location of delayed development, evaluation of the effectiveness of intervention program.

Annexure 17

Tender issued by West Bengal Medical Services Corporation Ltd. (WBMSCL) for procurement and supply of 15,190 aneroid sphygmomanometers to various primary and sub-health centres across the state, ensuring standardised, mercury-free, and quality-assured BP measuring devices under transparent procurement through the GeM portal. Reference no. GEM/2024/B/5269981 dated 12.08.2024

MII Purchase Preference/एमआईआई खरीद वरीयता

MII Purchase Preference/एमआईआई खरीद वरीयता	No

1. The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be as indicated above in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the bidder is less than 3-year-old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria.
2. Experience Criteria: In respect of the filter applied for experience criteria, the Bidder or its OEM {themselves or through reseller(s)} should have regularly, manufactured and supplied same or similar Category Products to any Central / State Govt Organization / PSU for number of Financial years as indicated above in the bid document before the bid opening date. Copies of relevant contracts to be submitted along with bid in support of having supplied some quantity during each of the Financial year. In case of bunch bids, the category of primary product having highest value should meet this criterion.
3. Estimated Bid Value indicated above is being declared solely for the purpose of guidance on EMD amount and for determining the Eligibility Criteria related to Turn Over, Past Performance and Project / Past Experience etc. This has no relevance or bearing on the price to be quoted by the bidders and is also not going to have any impact on bid participation. Also this is not going to be used as a criteria in determining reasonableness of quoted prices which would be determined by the buyer based on its own assessment of reasonableness and based on competitive prices received in Bid / RA process.

4. Reverse Auction would be conducted amongst all the technically qualified bidders except the Highest quoting bidder. The technically qualified Highest Quoting bidder will not be allowed to participate in RA. However, H-1 will also be allowed to participate in RA in following cases:

i. If number of technically qualified bidders are only 2 or 3.
ii. If Buyer has chosen to split the bid amongst N sellers, and H1 bid is coming within N.
iii. In case Primary product of only one OEM is left in contention for participation in RA on elimination of H-1.
iv. If L-1 is non-MSE and H-1 is eligible MSE and H-1 price is coming within price band of 15% of Non-MSE L-1
v. If L-1 is non-MII and H-1 is eligible MII and H-1 price is coming within price band of 20% of Non-MII L-1

Pre Bid Detail(s)

Pre-Bid Date and Time	Pre-Bid Venue
14-08-2024 12:00:00	Conference Hall 2nd Floor WBMSCL

Blood Pressure Recording Units (15190 pieces)

Technical Specifications/तकनीकी विशिष्टियाँ

* As per GeM Category Specification/जेम केटेगरी विशिष्टि के अनुसार

Specification	Specification Name/विशिष्टि का नाम	Bid Requirement/बिड के लिए आवश्यक (Allowed Values)/अनुमत मूल्य
CONFIGURATION DETAILS	**Type Of SPHYGMOMANOMETERS or Blood Pressure recording unit:**	Aneroid
	Conformity to Indian Standrad for SPHYGMOMANOMETERS	IS:3390 latest for Mercurial, IS 7652 latest for Aneroid, NA for digital

Specification	Specification Name/विशिष्टि का नाम	Bid Requirement/बिड के लिए आवश्यक (Allowed Values)/अनुमत मूल्य
	Measuring device	Mechnical
	Type	Portable
	ISI MARKED	Yes, NA for digital
	Measurement Method	Oscillometric, Auscultatory method
	Display for Digital BP instrument:	LCD(Liquid Crystal Digital) Display, NA for others
	Inflation	Manual
	Deflation and rapid Air Release	Manual
	Cuff Range	Medium (22-32)cm
Power	**Power Source:**	AA size chargeable battery set, Either Charageble Battery Set Or {220 Volt, 50 Hz AC Supply]
	Type of AA Size chargeable Battery (AA Size)	Alkaline, Lithium, Ni-cd
WARRANTY, CERTIFICATIONS, TEST REPORTS	**Warranty Period (in Year)**	1, 3

Additional Specification Parameters - Blood Pressure Recording Units (15190 pieces)

Specification Parameter Name	Bid Requirement (Allowed Values)
Certification	CE/US-FDA/BIS
1.Conformity to Indian Standrad for SPHYGMOMANOMETERS 2.ISI MARKED 3. Display for Digital BP instrument 4. Power Source 5.Type of AA Size chargeable Battery (AA Size)	To be ignored
Measurement Method	"Auscultatory method" only To ignore Oscillometric
Warranty Period	3 years.To ignore 1

* Bidders offering must also comply with the additional specification parameters mentioned above.

Consignees/Reporting Officer/परेषिती/रिपोर्टिंग अधिकारी and/ तथा Quantity/मात्रा

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