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ORIGINAL ARTICLE

Documenting Cancer Management and Cancer Care in Gujarat

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Abstract
This is a survey report regarding the Government/trust hospital facilities of Cancer Management in the State of Gujarat, India. Gujarat is a large state with a population of more than six crores. As per the Ahmedabad Cancer Registry, incidence of cancer among males is 98 per 1 lakh people and cancer incidence among females is 78 per 1 lakh people. There are only two cancer-treating hospitals in the state which are comprehensive cancer-treating facilities that offer multi-modality cancer treatment like surgery, chemotherapy and radiotherapy—The Gujarat Cancer Research Institute and Nathalal Parekh Cancer Hospital. Herein, we describe the origins, current facilities and latest developments at these institutes.

Keywords Oncology · Radiotherapy · Gujarat · Chemotherapy

We are writing this survey report to document Government/trust hospital facilities of cancer management in the Indian state of Gujarat. Gujarat is a large state with a population of more than six crores. As per the Ahmedabad Cancer Registry, incidence of cancer among males is 98 per 1 lakh people and cancer incidence among females is 78 per 1 lakh people [1, 2]. Cancers is among the leading causes of morbidity and mortality worldwide; as per GLOBOCAN report, approximately 19.3 million new cases were reported in 2020 and this number is expected to reach 21.5 million by 2030. In India, cancer prevalence is 70–90 cases per one lakh population. As per reports, number of new cancer cases in India will rise to 25 lakhs by 2030 [3]. Cancer has become one of the ten leading causes of death in India and approximately 8 lakh deaths occur annually due to cancer. Data from Ahmedabad urban cancer registry indicates that the prevalence of cancer among male and female is 116 and 85 cases per one lakh population respectively. There are at present only two cancer-treating hospitals in the state which are comprehensive cancer-treating facilities that offer multi-modality cancer treatment like surgery, chemotherapy and radiotherapy—The Gujarat Cancer Research Institute and Nathalal Parekh Cancer Hospital. Details of these institutes are as mentioned below.

The Gujarat Cancer & Research Institute (GCRI)

Conceived as a dream by the ladies of Inner Wheel Club of Ahmedabad and nurtured by the then Governor of Gujarat, this effort to ameliorate suffering and agony of patients with cancer crystalized into formation of Gujarat Cancer Society (GCS) on April 2, 1961 [4].

Following the initial period of intensive spade-work, the first patient was examined on October 2, 1965, and the M P Shah Cancer Hospital was commissioned on December 14, 1965, by the late Prime Minister Mrs. Indira Gandhi [4].

The M P Shah Cancer Hospital grew, developed and underwent metamorphosis into the Gujarat Cancer and Research Institute (GCRI) and for sustaining growth and

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development of the Cancer Hospital, the Gujarat Cancer and Research Institute (GCRI) was formed as an autonomous body in the year 1972 as per agreement between the Government of Gujarat and the Gujarat Cancer Society, which came into force from February 1, 1972 [4]. GCRI is one of the largest comprehensive cancer treatment centres in India and it is recognized as a Regional Cancer Centre by the Government of India. Patients are referred from all over Gujarat, adjoining areas of Rajasthan, Madhya Pradesh, Maharashtra and even Uttar Pradesh, Odisha and Bihar. The institute is also recognized by Union for International Cancer Control, Geneva, Switzerland, as a Comprehensive Cancer Centre. It registers about 30,000 patients every year of which approximately 20,000 are microscopically confirmed for malignancy [5].

The hospital at present has departments of Surgical Oncology, Gynae-Oncology, Medical and Paediatric Oncology, Radiation Oncology and Palliative Medicine and Community Oncology. They are ably supported by departments of Internal Medicine, Hematology, Radio Diagnosis, Anesthesiology, Nuclear Medicine and Onco Pathology Including Blood Bank.

The institute is attached to B J Medical College and Gujarat University, Ahmedabad, for the purpose of teaching. The GCRI operates M.Ch. Surgical Oncology, D.M. Medical Oncology, M.Ch. Gynec Oncology, D.M. Onco-Pathology, FNB in Pediatric Oncology, M.D. Anaesthesiology, M.D. Radiotherapy, M.D. Radiology, M.D. Palliative Medicine and M.D. Microbiology. It is also recognized for Ph.D. by M S University, Vadodara and Gujarat University, Ahmedabad. Short training courses in nursing, laboratory medicine and radiotherapy are also undertaken [5].

GCRI was headed by Stalwarts in Oncology which served as Directors of the institute: Dr. T B Patel (Founder Director), Dr. N. L. Patel Padmashree, Dr. D. D. Patel Padmashree, Dr. P. M. Shah, Dr. Shilin Shukla and Dr. R. K. Vyas. Present Director is Dr. Shashank Pandya.

A brief information about the functioning of the institute and its various department is given here:

Department of Surgical Oncology

This department operates one of the most important clinical services. There are six General Surgical Oncology Units—2 Head and Neck units, 2 Breast and Thorax units and 2 Gastro-intestinal and Hepato-Pancreato-Biliary units, and seven Superspeciality Oncology Units—Interventional Therapeutic Centre, Musculoskeletal Surgery, Ophthalmic Surgery, Paediatric Surgery, Reconstructive (Plastic) Surgery, Urosurgery Oncology and Neurosurgery [5].

Each General Surgical Oncology units consist of Chief of Unit, Associate Professor, Assistant Professor and Resident doctors registered for the degree of M.Ch. Surgical Oncology. On an average, about 15–20 major and 70–90 minor procedures are performed every day at GCRI. In the last academic year, a total of 4411 major surgeries were performed by General Surgical Oncology.

The Department of Surgical Oncology is very well equipped. Different surgical teams occupy eight major surgical operation theatres. Major operation theatres are centrally air-conditioned and have Xenon track–mounted operating lights and ultraviolet rays–treated scrub rooms. Day stay unit facilities are provided for biopsy, endoscopic procedure and evaluation of lesion before planning of surgery. The department is involved in diagnostic, perioperative care, follow-up and care of terminally ill patients. There is an ultramodern postoperative room, isolation facilities and an intensive care unit for postoperative care. These rooms have senior nursing staff and latest equipment for cardio-respiratory support. The Department also has rigid and flexible fibreoptic endoscopy equipment for laryngoscopy, esophagoscopy, bronchoscopy, gastroscopy, colonoscopy, peritonectomy and cystoscopy. Our Institute was the first in India and South East Asia to have installed Neodymium YAG LASER therapy machine in 1984 for the treatment of cancer at various sites. Thereafter in the modern era, a CO_2 laser was also installed for surgical use in early cancers.

Minimal Invasive Surgery Department was inaugurated by the then health minister Shri I. K. Jadeja on 16–9-2003 and well supported by then Director Dr. Pankaj M Shah. Laparoscopic HD camera, ultrasonic coagulator and dissector and other instruments were procured to start this department. At GCRI from September 2003 onwards, advanced laparoscopic procedures and diagnostic laparoscopies are done quite routinely in these departments which includes diagnostic laparoscopy, minimally invasive esophagectomy, lap-assisted gastrectomy, hemicolectomy, anterior resection, low anterior resection, APR, lap nephrectomy, adrenalectomy, lung lobectomy and pneumonectomy and lap-assisted mediastinal mass excision [6].

This institute also has musculoskeletal surgeons who specialize in bone tumours and soft tissue tumours. The department is aiming for limb preservation surgery for primary malignant bone tumours and soft tissue tumours with preoperative and post-operative chemotherapy and radiation therapy support. The paediatric surgical oncologist has major interest in childhood tumours who has won many accolades in oncology management. Reconstructive surgeons work in partnership with surgical oncology team. Microvascular surgery is an additional tool used by reconstructive surgeons for major reconstructions in the head and neck region. The microvascular work at GCRI was started by Mr. Bruce Bailey, a visiting surgeon from England in 1980s.

Neurosurgery unit is well equipped with two operation theatres. The operation theatre is well equipped with Laminar Air Flow, Microscope with CCTV, Ultrasonic Surgical

Aspirator, Modern Diathermy Generator, C-Arm with DSA facilities, Radio Frequency Lesion Generator, Intensive Care facilities with state-of-the-art cardio-respiratory monitoring system and its own dedicated Central Sterile Supply department [5]. In the last academic year, 434 supramajor, 117 major and 21 minor neurosurgeries were performed. There is also potential to start a DNB course in the speciality of Neurosurgery at the Institute.

Regular lectures and teaching programmes are conducted for M.Ch. Resident Doctors and Fellows in the department in the form of case presentation, seminar, journal reading and region-wise topic presentation. Maintenance of patient records and statistical data analysis is done. The data is presented at national level conferences and published in national/international journals on a regular basis.

Camps for early detection of cancer are conducted at various places in Gujarat and in the neighbouring states, including organizations such as ONGC, Air Force and Armed Forces. The department also participates in GCRI academic meetings.

Department of Gynae-oncology

The department offers services in the following areas: (1) Well Woman Clinic for early detection of gynaecological malignancies, especially Pap smears for cervical cancer. (2) Colposcopy Clinic is run with the help of a state-of-the-art Zeiss colposcope with teaching aid. Colposcopies are performed and directed biopsies taken. In the last academic year, a total of 205 colposcopies were performed. (3) Conservative management of pre-invasive cervical cancer by Large Loop Excision of the Transformation Zone (LLETZ). It is one of the first centres in India to have established facilities of LLETZ, which is considered the best method for the diagnosis and treatment of premalignant cervical lesions. In the last academic year, 15 Large Loop Excision of the Transformation Zone were performed. (4) Referral centre for diagnosis and management of all premalignant and invasive gynaecological malignancies such as cervical cancer, trophoblastic disease, ovarian tumours, vulvar cancer and endometrial cancer [5]. A total of 149 camps were organized at various places in the last academic year. A total of 215 lectures were taken in the department for teaching and academic purpose.

Department of Medical and Paediatric Oncology

The department of Medical Oncology was established in 1972. The goal of the department is to provide best possible comprehensive medical treatment to patients with all socio-economic backgrounds maintaining scientific attitude and humane approach. It has dedicated medical and paediatric oncology wings, bone marrow transplantation (BMT) services and clinical trial services.

This department provides comprehensive care for adult and paediatric patients with solid tumours and haematological malignancies. Every year, approximately 6000 new adult patients are registered under medical department and more than 40,000 patients receive curative or palliative chemotherapy either indoor (127 beds) or in day care centre (46 beds). About 8600 minor procedures are performed annually.

The Indumati Kinariwala Paediatric Oncology centre was established in 1992 and it is one of its kind in India [5]. Approximately 1179 new cancer patients are seen by this Paediatric centre per year. The centre also has special outpatient department (OPD) for care of central lines (peripherally inserted central catheter [PICC] and Hickman catheter).

This department also participates in clinical trials. The clinical research wing was established in 1995 and since then more than 60 International and 25 National/GCS trials have been conducted. The department runs D.M. Medical Oncology course attached to B J Medical College and Gujarat University which was initiated in 1991 with intake of 4 students per year which has increased to 10 students per year since 2010. About > 100 D.M. students have successfully completed the course and are now valuable asset to the society both in India and abroad.

Bone Marrow Transplant (BMT) Unit was established in August 1999. The centre caters to patients from states of Gujarat, Rajasthan and Madhya Pradesh. The BMT centre at GCRI is a 4 bedded Transplant Centre. A total of 232 haematopoietic stem cell transplants have been performed including 139 autologous, 93 allogenic of which 11 were matched unrelated umbilical cord and 3 matched unrelated donors. The centre mainly focuses on conventional fully (6/6) HLA matched sibling allogenic transplantation for thalassemia major, acute leukaemia and aplastic anemia. Autologous bone marrow transplantation performed is mainly for lymphomas (Hodgkin and non-Hodgkin) and multiple myeloma. Transplant-related mortality (TRM) is comparable to any other institute in the world and overall has a high success rate. Average cost of Allogenic Transplant is approximately ₹ 10 lakhs and ₹ 3–4 lakhs for autologous transplant [5].

Department of Radiation Oncology

This department is fully equipped with three 6MV Electa linear accelerators, one Varian 6MV linear accelerator, one cobalt machine, with facilities for three-dimensional conformal radiotherapy (3DCRT), intensity-modulated radiotherapy (IMRT), stereotactic radiotherapy (SRT) and stereotactic radiosurgery (SRC), one contact therapy machine, one low dose rate (LDR) brachytherapy unit, three microselectron high dose rate (HDR) brachytherapy unit, two Electa

Fig. 1 New building of GCRI

simulator machines and one Siemens CT Simulator machine. Recently, we have installed state-of-the-art radiotherapy machines like True Beam linear accelerator and Cyber knife which are first of its kind in any government setup. Regular lectures, seminars twice weekly by PG resident doctors, lectures of CMRT (Course for Medical Radiotherapy Technology) & M.Sc. Medical Physics, students and bed side case presentation by resident doctors are conducted in the department [3, 5].

Department of Palliative Medicine

This department was established in October 2010. Pain management and palliative care are essential components of comprehensive cancer care. It is a highly structured department and delivers care to patients with cancer from diagnosis to death and then moves into bereavement care for the family. It is an interdisciplinary, multi-dimensional team, comprising of doctors, nurses, counsellors, physiotherapists, nutritionists, social workers and volunteers. The department of Palliative Medicine supports outpatient services, homecare services and hospice services. Training courses in pain and palliative care that are conducted by the department include specialization degree course (M.D. Palliative Medicine), 1-year fellowship in Palliative Medicine and courses run by Indian Association of Palliative Care and Pallium India, Trivandrum.

Department of Community Oncology

This department, started as Late Harigangadas Dwarkadas Cancer Detection Centre and Hospice complex on Jun 21 1986 [4], works largely in four different areas—(1) Cancer Registry Programme, (2) Cancer Control Programme, (3) Cancer Epidemiology and (4) HPV Vaccine Project. This department works on cancer prevention, cancer epidemiology and cancer awareness. The department also runs cancer registry which helps state government to design cancer-related policies. Department conducts cancer screening and early detection camps and has also started cancer screening OPD for relatives of cancer patients coming to GCRI [5].

Fig. 2 Hon'able Prime Minister Narendra Modi inaugurating new building of GCRI and radiotherapy machines

Molecular Diagnostic Testing [3]

Currently, the molecular diagnostic services at GCRI are being managed by using PCR and RT-PCR technology and are being performed in several solid and liquid malignancies such as lung cancer, breast cancer, brain malignancies, hereditary breast and ovarian cancer and blood cancers along with HLA typing for bone marrow transplantation. Since the current era demands a need to stratify individuals who are at a higher risk for development of cancer, and for personalized medicine of diagnosed cancer, the implementation of "Next Generation Sequencer platform" will contribute remarkably with the clinical demand in identification of actionable molecular diagnostic, prognostic and therapeutic targets at gene level and provide meaningful knowledge to unravel the genetics of disease, diagnostic and treatment strategies to a new level.

GCRI Milestones in the Last Decade

GCRI is now recognized as a State Cancer Institute (SCI) by the Government of India since 2015 [3, 6]. Under the SCI umbrella, the Government of India has given a grant of Rs. 120 crores to the GCRI to construct new block building 1-A, 1-B and 1-C (Fig. 1). Inauguration of new building 1-A and B was done by Hon'ble Prime Minister on 04.03.2019 (Fig. 2). 1-A and 1-B are functional. High-end radiotherapy equipment installed in 2nd basement of 1-C building, i.e. (1) Truebeam, (2) Cyberknife, (3) Tomotherapy, (4) High-Dose Rate Cobalt Brachytherapy (HDRCB) and (5) CT simulator (Fig. 3) [5, 7] 2nd basement of 1-C is functional at present. Building 1-C will be fully functional within 3–4 months of this manuscript.

Other achievements at GCRI [3, 5]:

- GCRI got entry level NABH accreditation (02.06.2020 to 01.06.2022)

Fig. 3 Latest additions of radiotherapy machines and simulators in Department of Radiation Oncology at GCRI

- Across India, GCRI has been nominated as 2nd best performing Public Hospital (Large State) under PMJAY (NHA) network – 23.09.2021
- GCRI has been awarded with "Shyam Bharadwaj Memorial Cancer Awareness Award" by Bharat Vikash Parishad – 23.01.2022
- The "WEEK" Magazine has ranked GCRI as the 9th best Hospital under oncology category in 2021.

We have started the following new courses:

- MD Palliative Medicine – 2 seats per year started in 2019
- DM Oncopathology – 8 seats per year started in 2019
- M. Ch. Gynae-Oncology increased seats 1 to 4 per year in 2020
- M. Sc. Medical Physics 10 seats per year started in 2020
- FNB Pediatric Hematoncology 2 seats per year permission given in 2021

The GCRI now also runs satellite cancer centres in Gujarat at Siddhpur as Siddhpur Cancer Centre, North Gujarat (2011), Rajkot (2018) as The Saurashtra Cancer Care & Research Centre and Bhavnagar (2021) [3, 8].

In near future, GCRI would like to start new courses.

1. M. Ch. Head & Neck Oncology
2. P.G. in Nuclear Medicine
3. DM in Hematology
4. DM in Pediatric Oncology

Nathalal Parekh Cancer Hospital (NPCH)

Rajkot Cancer Society was established in 1969 as a Cancer Diagnostic Centre and now is running a Comprehensive Cancer Hospital with all facilities of Surgical Oncology, Radiation Oncology, Medical Oncology, advanced Pathology Laboratory and Radiology Departments. It registers about 4500 new cancer cases every year. Seven major operations are performed. One hundred thirty patients are treated daily in Radiation Oncology and around 50 patients take

Chemotherapy daily. Recently, it has added a Kundaria Cancer Prevention wing which performs camps for early diagnosis and vaccination for prevention of Cancer Cervix. A team of 250 manpower including 40 medical team provides world class comprehensive treatment facilities to cancer patients of Saurashtra and Kutchh.

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Declarations

Conflict of Interest The authors declare no competing interests.

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