

## FIRST Cancer Care summary for PSA Office

### Contents

<b>1</b>	<b>Context</b> .....	1
<b>2</b>	<b>Cancer-specific major challenges</b> .....	1
<b>3</b>	<b>Interventions at a glance</b> .....	2
<b>4</b>	<b>Citizen/Patient Centric Interventions</b> .....	3
4.1	Awareness Generation – Targeted Messaging .....	3
4.2	Screening – Point of Care ( POC) Testing.....	4
4.3	Continual and Easy Access to Care.....	4
<b>5</b>	<b>Provider Centric Interventions</b> .....	4
5.1	Telemedicine.....	4
5.2	Tele Radiology in Cancer Care .....	5
5.3	Telepathology: .....	5
5.4	Automated generation of Patient Health Records and Electronic Health records .....	5
<b>6</b>	<b>Systems Enablement Centric Interventions</b> .....	5
6.1	Health Professionals Knowledge.....	5
6.2	Skilling for Field Workers.....	6
6.3	Comprehensive Insurance Package .....	6
6.4	Increasing Insurance Penetration .....	6
6.5	Public Private Partnership Frameworks .....	6
<b>7</b>	<b>Appendix – Solutions already reviewed along with core group</b> .....	7

#### **1** Context

If India is to realise its goal of universal health coverage (UHC), adding infrastructure and medical professionals alone will not be able to solve India’s huge underserved needs. An effective and innovative use of medical technology, supported by ICT, has the potential of increasing access, significantly reducing the burden of disease and the load on healthcare delivery services through early diagnosis, better clinical outcomes, less invasive procedures and shorter recovery times.

#### **2** Cancer-specific major challenges

- Late diagnosis
- Few centres for treatment and diagnosis
- Financing the expensive care
- Prevention and early detection
- Skill development of health personnel.

### 3 ***Interventions at a glance***

The interventions suggested by the core group are grouped into three categories:

1. Citizen/Patient Centric Interventions
2. Provider Centric Interventions
3. Systems Enablement Centric Interventions

The interventions are summarized here and each of these are briefly elaborated below

S. No	Gaps	Name of the intervention	Code	Broad description of the intervention	Technologies used	Expected impact on health outcomes	Illustrative implementations
<b>Citizen Centric Interventions</b>							
1	Lack of awareness & knowledge about cancer in high risk group and general public	Awareness Generation – Targeted Messaging	C.1	Technology can be used to set up a health awareness platforms to address the health seeking and information needs of consumers.	Digital, AI	Help people recognize the early signs and symptoms of cancer	1.Saathealth, 2.CancerU
2	Absence of Testing in Screening Programmes	Screening – Point of Care ( POC) Testing	C.2	Point-of-care testing allows the patient to have a handheld test that gives the results rapidly.	AI	Early detection and monitorization of the tumour can provide a more effective treatment	1.Niramai, 2. iBreastexam
3.	Absence of care pathways for patients from access to follow ups	Continual and Easy Access to Care	C.3	Continuum of Care can be designed from including screening, early detection and treatment	AI		Karkinos,
<b>Provider Centric Interventions</b>							
4.	Access to Specialised care	Telemedicine	P.1	Early detection, referral and post treatment follow-up of cancer patients at local level	AI	Reduce health-care expense, improve health care service in remote areas.	1.karkinos 2. mFine 3. Wellthy
5.	Absence of low cost diagnostics	Tele Radiology	P.2	Machine learning algorithms detect lung cancer.	AI	Early Detection of lung cancer	Qure.AI
6.	Absence of low cost diagnostics	Telepathology	P.3	Remote viewing of microscopic images	Telecommunications technology, AI	early detection of cervical cancer	Onwardhealth
7.	Data and HMIS, Incomplete patient records	Automated Generation of PHR and EHR	P.4	Automation of patient history, clinical data and findings	AI	complete, efficient data entry and a complete patient record	1.Simbo.AI 2.Zeodoc 3.Comprehend Medical 4. M16 labs
<b>System Enablement Interventions</b>							

8.	Updated cancer specific skills	Health Professionals Knowledge	<b>S.1</b>	Education aids - Massive Online Open Courses, 3D aids	Digital, AI	Skilling of the formal workforce in	1.Medisage, 2.apoQlar
9.	Inadequate skills for cancer diagnosis and care	Skilling for health workers	<b>S.2</b>	1. Monitoring of community visits mentoring 2. support video calling for continuous professional skill upgradation at periodic intervals	Digital tools	Mentoring and monitoring of front line workers	Saathealth
10	Absence of Cancer specific insurance packages for all education groups	Formulation of Comprehensive Insurance Package	<b>S.3</b>	seamless group insurance cover will be offered to all identified individuals/ families who will be facilitated to undergo screening for different cancers based on their risk profile	Digital tools	Seamless integration of risk screening, insurance solution integration and care continuum	To be conceptualised
11	Low penetration of insurance in lower income groups and marginalised	Increasing Insurance Penetration	<b>S.4</b>	Partnerships will be developed with banking and existing insurance agencies to increase penetration in the rural areas and urban slum settlements	Digital tools	Lower out-of-pocket expenditure on cancer care in the identified districts	To be conceptualised
12	Absence of effective PPP frameworks in cancer care	Public Private Partnership Frameworks	<b>S.5</b>	Identify geospatial locations of different service providers both in the public sector and the private for or not-for-profit sector to identify their strengths and previous outcomes using a set of criteria to facilitate and track PPP models of care.	Digital tools, GPS, AI/ML	Inclusive treatment across spectrums	To be conceptualised

#### **4 Citizen/Patient Centric Interventions**

##### **4.1 Awareness Generation – Targeted Messaging**

Technology can be used to set up health awareness platforms to address the health seeking and information needs of consumers. Contents can be designed in the form of audio-visual packages and through these key scientific messages can be disseminated. The content should include – risk of chewing tobacco, genital hygiene, breast self-examination and information on where to seek help.

NGOs can be tapped to use the technology medium and disseminate knowledge further to the community.

#### 4.2 Screening – Point of Care ( POC) Testing

Early detection of the tumour can provide a more effective treatment. Point-of-care testing allows the patient to have a handheld test that gives the results rapidly. No expertise or special knowledge is required which is vital namely when carried out in low-resource areas.

POC cancer diagnostic devices provide promising platforms for cancer biomarker detection as compared to conventional in vitro diagnostics, which are time-consuming and require sophisticated instrumentation, centralized laboratories, and experienced operators. Current innovative approaches in POC technologies, including biosensors, smartphone interfaces, and lab-on-a-chip (LOC) devices are potential gamechangers.

#### 4.3 Continual and Easy Access to Care

A Continuum of Care can be designed from including screening, early detection. Diagnosis, treatment and palliative care and follow ups. Automated reminders and feedback mechanism can be established for

- Screening appointments
- Treatment schedules
- Follow-up assessments

### 5 **Provider Centric Interventions**

#### 5.1 Telemedicine

Based on the need for Tele consultation, it can be used in the following domains in cancer care <sup>2</sup>.

##### I) Prevention & Screening

- i. Screening (Review of reports eg. Mammogram)
- ii. Health Education
- iii. Health Awareness
- iv. Genetic Counselling

##### II) Diagnosis

- i. Ordering investigation
- ii. Review of reports

##### III) Treatment

- i. Virtual tumour board for treatment planning
- ii. Pre-treatment counselling (after first physical visit)
  1. Surgery
  2. Systemic therapy
  3. Radiation therapy
  4. Palliative care

##### IV) Follow-up & Rehabilitation

- i. Post treatment surveillance for long term effects of treatment &

relapse of disease

ii. Physical & psychological rehabilitation of cancer patients

V) Referral

i. Primary or secondary care setup to tertiary care centre for treatment.

ii. Tertiary care centre to secondary or primary care setup for followup

VI) Second opinion

i. Diagnosis – pathology & radiology review

ii. Treatment related consultations for expert opinion

VII) Palliative Care & End of Life Care

## 5.2 Tele Radiology in Cancer Care

Teleradiology addresses the lack of adequate staff to provide radiological coverage, as well as the general lack of expertise in this specialty. The process of teleradiology is based on an essential triad; an image sending station, a transmission network, and a receiving image station that must have a high-quality display screen that has been cleared for clinical purposes.

## 5.3 Telepathology:

Telepathology disrupts the paradigm of physical presence of people skilled in the microscopic examination with the microscopy equipment imaging the glass slides. by allowing remote viewing of microscopic images, essentially decoupling the physical requirement of people skilled in the microscopic examination with the glass slide. Tele pathology can be used in early detection of cervical cancer.

## 5.4 Automated generation of Patient Health Records and Electronic Health records

Technology can be used for automation of the process. E. g - Speech to text software can be used for automated generation of PHR and EHR. This ensures a complete, efficient data entry and a complete patient record.

# 6 Systems Enablement Centric Interventions

## 6.1 Health Professionals Knowledge

A blended or hybrid model of skill transfer has to be initiated with 70% through online mode and 30% through in person hand holding. Content should be developed and training should be imparted by imparted by an identified group of experts who could be pooled together from different institutions providing cancer care, including the Indian Cancer Society. The training programs should be accredited by National benchmarking bodies and the courses should be certified. Assessment of the training programs should use innovative modalities like gamification/ simulation.

The outcomes envisaged are :

1. Development of training material for ASHA and ANMs, NCD Clinic Nurses translated into main Indian languages. Existing material should be sourced and used. <https://we.tl/t-YKHsro9Pka>
2. Skilling 10% of the formal workforce in Year 1 and the remaining 90% covered over the next 3 years (20% per year)

3. Developing a regional and national digital training delivery hub within one year.

## 6.2 Skilling for Field Workers

Currently there is no structured program for mentoring trainees or to assess their skills in a non-formal manner. Digital tools like GPS can be used for effective monitoring of community visits while digital applications can be developed for mentoring and support video calling for continuous professional skill upgradation at periodic intervals. Non formal assessments and motivational support can be delivered through gamification and simulation

Following can be the strategy adopted for skilling:

1. Development of digital content for monitoring and mentoring.
2. Interactions of trained personnel with the community should be captured using GPS tracker
3. Develop a hub-and-spoke model from the district to the State level for effective delivery of digital content.

## 6.3 Comprehensive Insurance Package

Affordability of comprehensive cancer care services is an important determinant of access to cancer care services. There is a need to provide a seamless group insurance coverage to all individuals so that access is enhanced.

In the pilot, seamless group insurance cover will be offered to all identified individuals/ families who will be facilitated to undergo screening for different cancers based on their risk profile. The design of the insurance coverage needs to be discussed further and the pilot study will help in firming up the insurance packages. The following are some options that can be looked at which takes in to account affordability levels of the target groups:

1. In-patient hospitalisation indemnity insurance for INR 3 lakhs or 5 lakhs depending on target group's affordability in select group of network hospitals PPN where cashless hospitalisation can be availed.
2. Fixed Benefit Surgical Cash Benefit for the top 15 Major Surgeries – sum insured of INR 3 lakhs will be paid if the beneficiary undergoes the surgery and submits proof docs including discharge summary
3. Hospital Cash Benefit – Per Day INR 1000 or 2000 paid for inpatient hospitalisation ; annual limit of 15 or 20 days per annum

## 6.4 Increasing Insurance Penetration

The program will be similar to PMJJBY, PMSBY (Term and PA covers) for health insurance coverage. The project can look at PMJAY kind of cover with monthly / quarterly premium payments and implementation of PPN hospital network where cashless hospitalisation can be enabled. In the pilot efforts will be made to initially look at higher penetration of insurance for their in-patient hospitalisation with an option to upgrade to OPD options by introduction of Health Wallets.

## 6.5 Public Private Partnership Frameworks

Some of the models of potential interventions are:

1. Panel establishment of private organizations to undertake overflow care of Public Sector oncology patients. This might take the form of end to end treatment, at Public Sector rates for

patients who are sequentially selected to receive treatment on public panels. Patient care, after diagnosis is referred to the private sector to manage the care pathway, at public sector ongoing remunerated rates in value based care interaction. Benefit for private sector is asset optimisation and additional revenue not otherwise tapped.

2. Utilise private sector diagnostic capacity to expedite patient tests or treatment. Suspected patients with cancer get referred to panel diagnostic suites and treatment to have labs, pathology or radiology, chemotherapy or radiotherapy. Benefit to privates is asset capacity optimisation, including out of hours patient testing, or increased revenue streams.
3. Technology to enable transparency of capacity scheduling across organisations to enable the equitable distribution of capacity through integrated scheduling, integrated records, management of public sector funding and outcomes monitoring.
4. Future phase - partnering of a healthcare organisation with technology partner who can automate and digitalise the end to end of patient cancer screening, diagnosis, treatment planning and monitoring through care continuum. Technology partner works with HealthTech partners to design and deploy (at risk), a unified healthcare platform and interfaces. Cost savings from preventing late-stage patient detection and costly care, help provide reinvestment into the ecosystem. New Industry solutions development, real world evidence gathering, and refinement help provide the return on investment for the technology partner to then deploy in other regions.

## 7 ***Appendix – Solutions already reviewed along with core group***

<p>S. NO 1.</p>	<p><b>iBreast Exam</b></p>	<p>Screening for breast cancer using hand-held device, and cervical cancer using mobile-based solution. They measure tissue elasticity (different from thermal sensing model of Niramai)</p> <p><b>Deployed in Maharashtra:</b></p> <p>20 medical colleges gynae OPDs, nurses were trained to use device</p> <p>Anyone +ve was followed up with mamography and ultrasound</p> <p>1lakh+ women screened, 5000 women found +ve. Most were thankfully detected very early.</p>
<p>2</p>	<p><b>The Clinician - ZeDoc (AWS)</b></p>	<p>ZEDOC is a cloud-based health outcomes platform that helps healthcare organisations collect and make sense of patient-generated health data.</p> <p>Tightly integrated with EMR systems, ZEDOC communicates remotely with patients to enable the collection and analysis of key data including:</p> <ul style="list-style-type: none"> <li>• <b>Subjective data</b> ⇒ patient-reported outcome &amp; experience measures (PROMs and PREMs)</li> <li>• <b>Objective data</b> ⇒ biometric data from conventional &amp; wearable devices</li> </ul>

		By managing the entire process from patient outreach through to data collection and analysis, ZEDOC generates critical value-based insights that help you enhance patient outcomes, improve care delivery, and contain costs.
3	<b>Comprehend Medical (AWS)</b>	A HIPAA-eligible NLP cloud service that uses machine learning to extract health data from medical text. With a simple API call to Amazon Comprehend Medical you can quickly and accurately extract information such as medical conditions, medications, dosages, tests, treatments and procedures, and protected health information while retaining the context of the information. Amazon Comprehend Medical can identify the relationships among the extracted information to help you build applications for use cases like population health analytics, clinical trial management, pharmacovigilance, and summarization.
4	<b>Niramai</b>	Niramai is a developer of AI-based early-stage breast cancer screening devices. The company has developed products like Thermalytix which is an AI-based diagnostic tool using a cloud-based platform for analyzing thermal images. The 'Smile Tool' developed by the company is a real-time cloud-based diagnostics tool for breast cancer screening.
5	<b>Medisage</b>	on-demand OTT global knowledge platform of curated medical content, poised to become the largest Healthcare Professional (HCP) network in the World. Our intent is to create a vibrant community where leading subject experts can assist HCPs across the world to upskill and upgrade their knowledge through Audio-Video series of contents & CME courses.  They have developed oncology-specific modules for nurses and other medical staff.
6	<b>M16 Labs (NDHM compliant and working as a data platform with iBreast and Niramai)</b>	<b>Their relevant products:</b>  <b><u>MetaHOS</u></b> (for hospitals) makes running healthcare facilities a breeze by bringing your entire hospital together on one Operating System. Patients, Staff, Facilities and Medical Records(EHR) are all connected through an easy to use interface that you can access from everywhere.  <b><u>Digital Clinic</u></b> (for clinics) Secure Two-Way Communication Channel between Doctor and Patient; Security to Safeguard All Sensitive Private Patient Information; Works well with Low Speed Internet; Simple and Easy-to-Use; Prescreen Patients.  <b><u>Camps &amp; Screening</u></b> (for NGOs like ICS) a sleek interface with real-time analytics on metrics such as screening, health camps using Pathology, Imaging / Devices & Rule Based Assessments to Stratify and Provide Treatment Plans.  <b><u>Population Health Module</u></b> (for govts) Deploy the PHM Module to get insights on Disease Control, SDOH & Comorbidities that affect your populations.
7	<b>Onwardhealth</b>	Telepathology platform provides the software, in combination with low cost hardware that we source from partners as well as with external devices available,

		<b>TelePath Dx</b> is a TelePathology workflow platform that enables Labs and Pathologists to manage workflow for timely turnaround of case reporting (of glass slides), as well as better productivity from available LabTech and pathologist resource
<b>8</b>	<b>SaathHealth</b>	Educational Messages for patients
<b>9</b>	<b>Simbo.ai</b>	Recognized in NASSCOM's health innovation challenge. Available product - A voice based doctor assistant that acts like a secretary to create EMR in less than 30 seconds Technology in development stage - Listens and understands the conversation between doctor and patient using Brain-Inspired Spoken Language Understanding (BISLU). A digital assistant acting like a real doctor helping in pre-screening and documentation.
<b>10</b>	<b>mFine</b>	Mfine is a provider of a mobile application for an online doctor consultation, appointment booking, and medicine delivery. It facilitates online consultation with doctors from nearby hospitals. Featured specialties include pediatrics, gynecology & obstetrics, and general medicine. It also offers home services like examination and sample collection for lab tests are available. Other services include medicine delivery, online medical records, and reminders for appointments that are provided through the app.
<b>11</b>	<b>Wellthy</b>	Wellthy Therapeutics is a provider of a health monitoring app for chronic health patients and providers. The platform allows integration with smart devices for tracking and monitoring the health vitals of patients. The data can be remotely visualized by providers, caregivers for tracking patients' diabetic health, hypertension, heart failure, and more. It provides a lifestyle management program for people with chronic diseases. It offers solutions like lifestyle tracker, interactive lessons, expert coaching, personalized feedback, emergency alert, and assistance, detailed lifestyle reports, and many more. It also offers the provider dashboard to keep track of their patient's progress.
<b>12</b>	<b>Pallexcare</b>	Pallexcare ( <a href="http://pallexcare.com/">http://pallexcare.com/</a> ). It is founded by a Pune-based doctor with 15 yrs+ experience in palliative care (team of 12 full time doctors, nurses, psychologists etc and many volunteers). They are unfunded and started their own venture three years back. They don't have a product as of now, but do have good domain experience and extensive tech understanding inspired from some US based startups.
<b>13</b>	<b>Karkinos</b>	Karkinos healthcare is a platform built on 1. State of the art technology curated for oncology, 2. Knowledge network with medical protocols, surgical skills, digital pathology center 3. and with distributed care centers. The substantive portion of the economic interest accrued will be deployed across similar societal causes and in advancement of research, education, and patient care.
<b>14</b>	<b>4baseCare</b>	Strongly recommended by Sheetal Ranganathan (Roche). Asia's first genomics start-up to have qualified in the Illumina Accelerator program, with an Indian and south Asian gene panel (in collaboration with ACTREC). They give a somatic genomic test kit to determine personalized therapy for the patients.

15	<b>Cancer U</b>	Cancer U is the only platform in the marketplace designed like an online university with a holistic approach that educates with courses, empowers with coaching, and engages through community. The unique platform allows cancer patients and caregivers the ability to access their personalized, curated curriculum at any time on any device. With most patients receiving their treatment at community and rural hospitals, Cancer U provides a necessary and valuable tool that combines courses, community, and coaching.. For our B2B customers, numerous studies show the more educated and engaged patients are in their treatment decisions, especially with serious diseases like cancer, the more costs go down.
16	<b>Qure AI</b>	Focuses on Lung cancer. Analyzing diagnostic images. Its radiology solution can detect disease from CT Scans, MRIs and X-rays as well as outline and quantify regions of interest such as tumors or lung disease patterns. Also, offers digital pathology solution which can distinguish malignant from benign biopsies, and grade a variety of tumor types
17	<b>Daytoday health</b>	Because the majority of care journeys reach beyond hospital walls, patients are often inadequately supported in the preparation and recovery phases that will determine the quality of their treatment outcomes. DayToDay Health™ equips hospitals to unleash the full potential of their caregiving teams to transform patients' lives.
18	<b>OncoStem Diagnostics</b>	Oncostem analyses the critical biomarkers in the tumour and classifies the patients into "low- risk" or "high-risk" for cancer recurrence. Based on the risk scores, the oncologists can frame an informed and personalized treatment plan wherein the low-risk patients can safely avoid chemotherapy.
19	<b>Optimal Oncology</b>	<p>A clinical decision support system called "NAiOmi" (Novel AI &amp; omics) for oncologists to facilitate precision cancer diagnosis and evidence based treatments, ensuring improved treatment outcomes at an affordable cost for patients. NAiOmi also has all the other facets of an EHR, including a GP screening module for early diagnosis.</p> <p>Our distinctive offering is, deployment of NAiOmi in our soon-to be-launched asset-light comprehensive cancer treatment centers located inside mid size hospitals across 20 towns in India with an objective to treat 30000 patients in 5 years and create a highly valuable structured database.</p>
20	<b>Connected Life</b>	
21	<b>apoQlar</b>	German startup. apoQlar provides a VR-based learning device for surgeons. It provides medical information such as patient information, CT, MRI, SPECT data, etc as well as ultrasound, microscope and endoscope screens are displayed as holograms in mixed reality (MR) glasses. The main product is virtual surgery intelligence