Cancer care developmental plan 2021 - 2025

Gaza- Palestine 2021

Foreword

Every year hundreds of people are diagnosed with cancer in the Gaza Strip, and many lose their lives to the disease. Cancer is the second leading cause of death in the Gaza Strip, and the survival rate is lower in Gaza compared to neighboring cities.

Death as a result of cancer is often avoidable. It can be detected early in its development stage, treated, and cured. Even with late-stage cancer, pain can be reduced, cancer progression can be slowed, and patients and their families can be helped to cope.

The prevalence of cancer is forecasted to increase, while scientific and technological innovations can enhance our ability to prevent, diagnose, treat and care for affected people. We know that there is a shortage of the required workforce in Gaza, and that they are under pressure. Unless we take action, we may not have sufficient skilled staff to deliver appropriate cancer care.

Based on findings of Mapping Study for Cancer Care in the Gaza Strip to identify Current Services, Challenges, Gaps, Needs, Islamic Relief Palestine recommends developing health facilities and establishing a National Cancer Center (NCC). The NCC aims to increase cancer healthcare quality, improve care results, and increase the efficiency of healthcare resources. The NCC will draw up a significant program of action that links prevention, diagnosis, treatment, care, and research.

This development plan presents advances in local ability to prevent, diagnose and treat cancer, and to embed proven new treatments and tests in one localised hospital. To this end, we recommend establishing NCC across the Gaza Strip, bringing together clinical leaders and teams to transform diagnosis and treatment in one area.

However, patients will not reap the benefits of these new developments unless there is sufficient staff with the right skills. The development plan focuses on the actions needed to ensure that enough teams with the right skills are available to provide the activity set out in the cancer workforce.

Islamic relief interest is to contribute to the alleviation of suffering that cancer patients, and their families, go through because of the scattered and not comprehensive medical services provided to cancer patients in Gaza. We believe such an ambition cannot materialize without a comprehensive and realistic plan that all stakeholders join hands to achieve. We hope that this development plan paves the road towards changing the ambition into an achievable goal.

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Vision

Islamic Relief Palestine (IRPAL) aspires to contribute to achiving the below vision:

Cancer patients should enjoy their full rights of receiving timely quality support and health services.

Definitions

A cancer registry: is an information system designed to collect, store, and manage data on patients with cancer.

Computed Tomography (CT) scan: X-ray image made using a form of tomography in which a computer controls the motion of the X-ray source and detectors, processes the data and produces the image.

Health: This is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity.

Medicalphysicist: A professional who applies the principles and methods of both physics and medicine. They focus on the areas of prevention, diagnosis, and treatment, as well as ensuring quality services and prevention of risks to the patients, and community.

Magnetic Resonance Imaging (MRI): Strong magnetic field and radio waves create detailed images of organs and tissues in the body.

Oncology: The field of medicine that is devoted to cancer. Medical oncology (the treatment of cancer with medication), surgical oncology (the surgical aspects of cancer including biopsy, staging, and surgical resection of tumors), and radiation oncology (the treatment of cancer with therapeutic radiation).

Palliative care: Palliative care is specialised medical care for people living with a severe illness. This type of care focuses on providing relief from the symptoms and stress of the disease. The goal is to improve the quality of life for both the patient and the family.

PET scan: A positron emission tomography (PET) scan is an imaging test that allows the doctor to check for diseases in the body. The scan uses particular radioactive substances. These substances are either swallowed, inhaled, or injected into a vein depending on what part of the body is being examined.

Radiologists: Medical doctors that specialise in diagnosing and treating injuries and diseases using medical imaging (radiology) procedures (exams/tests) such as X-rays, computed tomography (CT), magnetic resonance imaging (MRI), nuclear medicine, positron emission tomography (PET) and ultrasound.

Radiotherapy: The use of high-energy radiation from x-rays, gamma rays, neutrons, protons, and other sources to kill cancer cells and shrink tumors.

Screening is examining a group of usually asymptomatic individuals to detect those with a high probability of developing a given disease.

Tumor markers: Proteins or other substances that are made in higher amounts by cancer cells. These can be found in the blood, urine, stool, tumors, or other tissues or body fluids of some patients with cancer.

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Introduction

IRPAL's venture for cancer care development began with an assessment of cancer services in the Gaza Strip. Due to the expected increase in cancer morbidity and mortality rates, IRPAL develops this plan to improve the quality of care for patients with cancer. The current development plan includes primary and secondary prevention, early discovery, diagnostics and treatment, palliative care, increased knowledge, and dissemination. The plan also includes the matter of strengthening patients' perspective towards their condition.

The cancer plan sets out new hopes for cancer services and the action needed to make these a reality. This plan provides a comprehensive strategy for bringing together prevention, screening, diagnosis, treatment, and care for cancer and the investment needed to deliver these services in improved staffing, equipment, anti-cancer medications, and information systems.

The cancer development plan is a suite of initiatives focused on providing appropriate, efficient, and well-coordinated care for people affected by cancer and their families, from diagnosis to treatment and support and the management of follow-up care and survivorship. These initiatives are of the highest priority, addressing significant gaps in the provision of optimal cancer care and most favourable to national gain.

In the past, health authorities have only paid attention to those most active in cancer services, such as radiologists, oncologists, and histopathologists, thereby neglecting the broader workforce across the cancer care pathway.

By 2025, the cancer care team plan will include the expansion and improvement of supportive care, cancer medications, radiotherapy, surgical intervention, and palliative care

There will also be new approaches to tackling shortages of skilled staff. For example, there will be a training program for surgeons, gastroenterologists, General Practitioners and nurses, to extend the range of health professionals contributing to this fast-growing field, which is essential for diagnosing bowel and stomach cancers.

Goals of the cancer services development plan

The current cancer development plan depends on cancer prevention and cancer management and sets out the first comprehensive cancer program for the Gaza Strip. It has three goals:

Goal 1: To reduce the cancer prevalence.

Goal 2: To achieve optimal care.

Goal 3: To improve health information systems.

Gaza health authorities address the challenges of cancer, including developing a comprehensive national cancer center designed to reduce the number of cancer patients and deaths and improve their quality of life through evidence-based strategies for prevention, early detection, diagnosis, treatment, and palliative care.

The first section of the current developmental plan presents the plan to develop pre-existing health facilities and departments that provide cancer health services, based on the gaps and needs explored by the mapping study.

The second section presents an overview of a comprehensive National Cancer Center (NCC), which includes three levels (prevention, early detection, and treatment) embedded within a comprehensive cancer system. Although the development of a comprehensive national cancer center is cost-effective and maintains easy access to patients, and less time-consuming, it needs the political will and aid of the international community.

Goal 1: Reduce the prevalence of cancer

Developing prevention programs will improve symptom awareness in the population, and early diagnosis will reduce the number of cancer cases in the Gaza Strip.

Objectives

1.1. **Promoting healthy behavior, healthy eating, and physical activity and improving symptom awareness.**
1.2. **Enforcing screening programs.**
1.3. **Enhancing early diagnosis.**

Objective 1.1: Promoting healthy behavior, healthy eating, physical activity and improving symptom awareness

1.1.1. Introduction

Cancer prevention should be at the cornerstone of the developmental cancer plan as it offers the most cost-effective, long-term approach for cancer control. Genetic, environmental, and lifestyle factors interact when it comes to developing cancer. Infections such as H. pylori, human papillomaviruses, and hepatitis B virus are linked to cancer. Smoking and poor diet are the most critical factors. Smoking causes lung cancer and is the primary cause of cancers of the mouth, nasal passages, larynx, bladder, and pancreas. It also plays a part in causing cancers of the esophagus, stomach, and kidney, and leukemia. Excess body weight and obesity may contribute to the risk of postmenopausal breast cancer, endometrial cancer, and colorectal cancer. More than one in ten bowel cancers are linked to a low fiber diet. Healthy eating and physical activity confer multiple health benefits and significantly reduce the risk of a range of diseases, including cancer. The purpose of preventive measures is to mitigate the risk of developing cancer.

1.1.2. Activities

- Raise public awareness through social media to highlight the risks of environmental pollutants, smoking, poor diet, physical inactivity, and other environmental pollutants to health.
- Make information available around support available for those who wish to give up smoking or adopt a healthier diet.
- Protect the environement by enforcing and updating the existing regulations and laws around environmental contaminants. Policies must be adapted to minimize the exposure of hazards from medical sources, agricultural pollutants, air pollutants, and industrial contaminants.
- Good nutrition, physical activity, and a healthy body weight are essential parts of a person's overall health and wellbeing. Together, these can help decrease the risk of developing cancer.
- Activate the tobacco-free initiative.
- Provide smoking cessation advice, support, and pharmacological treatment for smokers.
- Implement training related to smoking cessation as a core component of undergraduate health education programs and include smoking behavior change as a routine part of healthcare practice and delivery.
- Enforce the anti-smoking law (ban cigarette sales to children under 18, prohibited smoking in public areas.)
- Run anti-smoking advertisements for young people and implement smoking cessation services.
- Implement health and nutrition programs that advise on healthy eating, physical activity, and combating obesity.
- Increase fruit and vegetable consumption and food low in fat, salt, and sugar and reduce the risk of several cancers such as those of the colon, esophagus, and stomach.
- Advise people on the importance of physical activity as part of stress coping mechanisms.
- Support NGOs and community based organizations (CBOs) partners to increase community awareness about cancer risk factors and implement training programs for their local communities.
- Educate people on recognising early signs and symptoms that could indicate cancer and know when and where to look for advice.
- Reduce the spread of chronic infections such as hepatitis B, C, and H. pylori.
- Run periodic assessments of the prevalence of underlying cancer risk factors.

Table 1: Development of preventive projects

Preventive programs	2021	2022	2023	2024	2025
Environmental protection	✓	✓	✓	✓	✓
Anti-smoking project	✓	✓	✓	✓	✓
Nutrition, physical activity, and obesity Program	✓	✓	✓	✓	✓
Health education programs	✓	✓	✓	✓	✓
Educating people about early symptoms of cancer	✓	✓	✓	✓	✓
Eradication of H. pylori project	✓	✓	✓	✓	✓

1.1.3. Responsibilities

- Ministry of Health (MoH)
- UNRWA
- Ministry of Education and higher education
- Universities and schools
- Multi-media and social media
- Non-Governmental Organisations and Community Based Organisations.

Objective 1.2: To enforce screening programs

1.2.1. Introduction

Screening is an essential method of detecting abnormalities early, allowing treatment when the cancer is most likely to be cured. Therefore, it is crucial to expand the cancer screening programs. The primary aim of cancer screening programs is to detect early cancerous (or pre-cancerous) cells to reduce cancer mortality in an asymptomatic population.

In the Gaza Strip, a well-organised national mammography screening program is unavailable and the service is fragmented. Routine breast screening is provided to women aged 40 and those with risk factors (having dense breasts, personal history of breast cancer or certain non-cancerous breast diseases, family history of breast or ovarian cancer, previous treatment using radiation therapy, etc.), the screening starts at age 35. It is recommended biennial screening mammography for women aged 50 to 74 years. The decision to start mammography screening in women below the age of 50, should be an individual one. Women who place more value on the potential benefit of this screening than the potential harm, may choose to begin biennial screening between the ages of 40 and 49 years (AAFP, 2017).

If colorectal cancer is identified early, it can be cured. However, it is difficult to recognise the condition as symptoms are often not reported at an early stage. Screening for bowel cancer can reduce mortality from the disease. However, it is not available in the Gaza Strip.

1.2.2. Activities

Breast cancer screening

- Enforce the national committee of breast cancer.
- Run routine breast screening mammogram, starting from the age of 50-70.
- Improve breast-screening techniques to increase detection rates.
- Develop standard national breast cancer screening guidelines among healthcare providers in the Gaza Strip.
- Enhance breast health promotion, self- examination, and address stigma and misconception.
- Enforce coordination of breast cancer screening.
- Build the capacity of radiologists by recruitment and training on breast imaging.

Colorectal cancer screening

- Establish the national committee of colorectal cancer.
- Conduct colorectal cancer screening for everyone aged 50 years and older using the Fecal Occult Blood Test (FOBT).
- People will be called for a colonoscopy to look for cancer or other small growths if the initial FOBT is positive.

Screening of Prostate Cancer

Prostate cancer represents 7.7% of male cancer. The number of male cancer patients in 2018 was 787 and prostate cancer affected around 60 patients in the same year. Prostate-specific antigen (PSA) is the basic screening test for prostate cancer. The discussion about screening should take place at:

- Age 50 for men who are at average risk of prostate cancer and are expected to live at least 10 more years.
- Age 45 for men at high risk of developing prostate cancer. Men who have a first-degree relative (father or brother) diagnosed with prostate cancer at an early age (younger than age 65).
- Age 40 for men at even higher risk (those with more than one first-degree relative who had prostate cancer at an early age).

If PSA is 2.5 ng/ml or greater, testing should be repeated yearly. Men with a PSA of less than 2.5 ng/ml may be tested every other year. The digital rectal exam (DRE) may also be done as part of screening.

Development skills of endoscopists

- Develop skills of clinical endoscopists to support an increase in capacity for earlier diagnosis of bowel cancer by 2025.
- Trained gastroenterologists undertake both diagnostic and therapeutic endoscopy procedures in both service and screening sets.
- Establish an endoscopic bowel program to support the improvement of early diagnosis.
- Install high-quality bowel endoscopies in each government hospital.

Responsibilities

- Primary healthcare centers in the Ministry of Health Primary
- UNRWA
- The non-governmental organization (NGOs)
- International NGOs

Table 2: Development of cancer screening services in MoH facilities 2021- 2025

Screening	Current	Needs for development				
		2021	2022	2023	2024	2025
Breast cancer screening						
Install Mammogram (digital)	Unavailable in North, Middle, Rafah governorate	Indonesian H Aqsa H.	Najjar H	Sorani PHC	Zaiton PHC	Shiekh Radwan PHC
install stereotactic biopsy	Unavailable	Shifa H.	NMC.	EGH	Indonesian	Rafah
Radiologist	Training female radiologist	Shifa H.	NMC.	EGH	Indonesian	Rafah
Colorectal cancer screening						
FOBT	Unavailable for screening	Shifa H.	NMC & Aqsa.	EGH	Indonesian	Rafah
Install bowel endoscopies	Unavailable for screening	Indonesian	Aqsa H.	Najjar H.	NMC	Rafah
Training of endoscopist	Unavailable	2	2	2	2	2
Prostate cancer screening						
PSA	Unavailable	Shifa H.	NMC & Aqsa.	EGH	Indonesian	Rafah

FOBT: Fecal Occult Blood Test, NMC: Nasser Medical Complex, EGH: European Gaza Hospital

Objective 1.3: Enhance Early Diagnosis of Cancer

1.3.1. Introduction

The tumor biology, patient risk factors and the availability of high-quality screening, diagnostic and treatment services determine cancer survival. An early cancer diagnosis is a critical first step to achieving higher survival rates, reducing treatment severity, and improving the quality of patients' life.

Patients who can recognise early symptoms and seek medical advice are generally more likely to have less advanced forms of cancer and better options for treatment. It's critical that healthcare professionals are aware of the importance of early detection. People who recognise symptoms may still delay seeking medical help for a wide variety of reasons, including normalising symptoms, social stigma, fear of a diagnosis, and lack of confidence in the health system. A coordinated program of public education and improved General Practitioner access to relevant diagnostics will be required to address these barriers.

1.3.2. Improving community awareness around unusual or persistent symptom

Raising public awareness around unusual or persistent symptoms, such as unexplained lumps, bleeding, changes in body function, skin lesions, pain, or weight loss, is a critical first step in early diagnosis. Health service providers have an essential role to play in improving public awareness and encouraging people to seek healthcare early. However, many patients do not recognise warning signs. Those who recognise worrying symptoms may still delay seeking medical help for reasons previously stated. Many patients lack confidence in the health system. We must run advocacy campaigns that support the cancer patients' rights to health services and change the mentality of the Gaza community towards cancer patients. It's also important to run public awareness sessions that highlight key symptoms and give specific patient advice. Multi-media campaigns to inform and educate the public are also effective in promoting early diagnosis of cancer.

Activities

- Initiate health professionals to improve community awareness and encourace seeking prompt medical attention.
- Encourage people who recognise symptoms to seek medical help.
- Educate the community around the benefits of early diagnosis of cancer through multi-media.
- Develop a program of targeted multimedia- based public awareness and education campaigns aimed at the early detection of specific cancers and with a particular focus on at-risk people.

1.3.3. Expanding the role of primary care and general practice

General Practitioners (GPs) in the Gaza Strip treat thousands of patients every year; each GP might have patients in their practice who are diagnosed with cancer. GPs usually examine more than a hundred patients per day, at the 1.3 GP/100,000 population in Gaza.Therefore, many GPs are too busy to examine patients thoroughly. Symptoms that may suggest cancer, such as bleeding, unexplained weight loss and lumps, require thorough investigation.

The cancer care team relies heavily on the support of their medical and clinical colleagues. Shortages in the number of GPs, for example, may affect the referral rate for diagnostic tests. Without sufficient pediatricians, specialist doctors will miss the opportunities to diagnose children with cancer. Without adequate support from clinical endoscopists, gastroenterologists cannot increase their diagnostic capacity. Unless we have enough chemotherapy nurses and surgeons, our ability to treat newly diagnosed patients will be compromised.

Many cancers present symptoms, and primary care plays a critical role in assessing these symptoms. It is recommended that patients are referred for investigation if they have specific symptoms that suggests they have a chance of having cancer. Ultimately, the majority of such patients who are investigated will be reassured that they do not have cancer. In the Gaza Strip, there are significant deficiencies in access to diagnostics and specialist opinion in the governmental health system. There are long waits for some specialist services.

Activities

- Integrate primary care and specialist care.
- Expand the role of GPs in cancer care, with significantly increased direct access to appropriate diagnostic services.
- Train and provide continued medical education to general practitioners who work in primary healthcare for:
  - training and education of GPs on the updated guidelines
  - alerting patients to early warning signs of a developing cancer
  - training GPs about taking history, excellent clinical examination, and digital rectal examination
  - GP training on the job
- training nurses
- enhancing urgent referral criteria, protocols, and timelines for direct GP access to cancer diagnostics or specialist opinion.

1.3.4. General Practitioner (GP) referral guidelines and processes

Activities

- Develop GP learning programs in cancer, with the support of specialist cancer teams.
- Develop GP referral guidelines and standardised referral processes for common cancers.
- Develop performance indicators for the target time within which the specialist should see patients.
- Identify and solve barriers in referral pathways, including delays in patient presentation, unequal access, and communication difficulties .
- Form hospital committees with unified management structures in order to enable more efficient use of available diagnostic resources within each committee to facilitate timely GP access under agreed referral guidelines.

Initiatives to assist in the early diagnosis of cancer

- Increase community awareness of early cancer symptoms
- Earlier patient presentation to GP is essential.
- There should be direct access to radiology.
- Healthcare workers should agree on referral criteria for suspected cancer.
- There should be ,eaningful GP representation in hospitals.
- Healthcare staff to agree on the criteria for assessment of high-risk individuals.

Responsibilities

- Ministry of Health (MoH)
- UNRWA
- Multi-media and social media
- NGOs and CBOs.

Goal 2: Achieving provision of optimal care

Objective 2.1: Providing an Integrated Model of Care

Objectives

1. Ensure effective and equitable treatment throughout the care pathway to improve outcomes.
2. Develop treatment facilities and infrastructure.
3. Maintain a strong focus on patient safety and quality assurance.
4. Ensure that appropriate palliative care support systems are in place.

2.1.1 Introduction

A broad objective of this development plan is to have models of care that ensure that patients receive the necessary care, in a timely fashion, from an expert clinical team in the optimal location. Multidisciplinary Team (MDT) care should be at the cornerstone of cancer care: patients should have their diagnosis confirmed and their treatment planned in designated cancer centers by MDT doctors and other professionals appropriate to the cancer type. The formation of cancer management MDTs in designated cancer centers is important. Cancer patients should have access to high-quality care provided by specialists.

2.1.2 Activities

- Provide the capital infrastructure to support the Model of Care.
- Develop Comprehensive Cancer Center.
- Plan for service delivery to address future demand as well as current needs.
- Integrate services across and within the primary, secondary, and tertiary care.
- Enforce referral pathways to be timely, and promote the prompt diagnosis and treatment.
- Help patients and their families to be active partners in their care pathway and inform patients about choice of the treatments.

Objective 2.2: Getting the diagnosis right

2.2.1. Introduction

Early diagnosis is arguably the most effective means and the first step in improving survival rates. Cancer diagnosis is a complex process, and the systems, structures, and clinicians must be in place to deliver the required services. Specialists in radiology, endoscopy, and pathology must be involved in MDT meetings to confirm the diagnosis. This developmental plan aims to strengthen the various processes for cancer diagnosis.

2.2.2. Development of Radiology Diagnostic Services

High-quality diagnostic radiology services are a critical requirement for the effective management of cancer patients and for diagnosing and treating cancer patients. Imaging capacity, particularly for MRI, CT, and PET scanning, will be increased in Gaza hospitals. This will require additional equipment and staff. The development of diagnostic radiology services depends on upgrading the equipment and improving the skills and number of radiologists. Radiology services are capital intensive, and there are substantial deficiencies in the Gaza Strip.

Activities to upgrade diagnostic radiology departments

- Expand and modernise the equipment radiology departments in Gaza.
- Guided by standards of some countries, where the number of CT scanners reaches 1 per 100,000 population, the Gaza Strip will need about 24 CT devices by 2025 (MoH, 2021). However, the CT devices need for only cancer patients are 16 distributed by hospitals in Gaza (Table 3).
- Using the availability of five MRI machines for every million people as standard, the Gaza Strip will need at least twelve devices by the year 2025 (MoH, 2021) (Table 3).
- Design and construct department for radiotherapy and functional imaging and equip it with: PETs CT scan, Gamma camera, fixation tools, CT simulator, treatment planning system, and four linear accelerators, and quality control tools. Besides, to procure radioisotopes and radiopharmaceuticals.

Table 3: Development of diagnostic radiology departments in the Gaza Strip

Development radiology	Need	2021	2022	2023	2024	2025
Increase the surface area of the radiology department at Nasser Medical Complex						
Install CT scans	16	2 Shifa 2 Prince Naif	2 Indonesian 2 Rantisi	2 EGH 2 NMC	2 Najjar	2 Aqsa
MRI machine	8	1 Shifa 1 Prince Naif	1 Indonesian 1 Rantisi	1 EGH 1 NMC	1 Najjar	1 Aqsa
Ultrasound machine	9	One in each level four PHC center				
Digital x-ray	1	NMC				
PETs CT scan	2	1 at Shifa H.		1 at EGH.		

Activities to upgrade the capacity and skills of radiologists

- Increase the number of radiography training at undergraduate and postgraduate level
- Provide sub-specialty radiology services
- Upgrade for the radiologist, which is essential for the diagnosis of cancers.
- Find fellowships for radiology sub-specialties
- Find scholarship for radiology specialty
- Develop and invest in 30 radiologists by 2025 to support an increase in the capacity for earlier diagnosis to assure quality and consistency (Table 4).

Table 4: Development of diagnostic radiologists

Cancer care team	Current	2021	2022	2023	2024	2025
Diagnostic radiologists	18	6	6	6	6	6
Radiology sub-specialties						
Neuroradiologist	0	1 fellow				
Musculoskeletal radiologist	0		1 fellow			
Breast radiologist/radiographer	0			1 fellow		
Pediatric radiologist	0				1 fellow	
Chest radiologist	0					1 fellow
Abdominal radiologist	0	1 fellow				

2.2.3. Development of histopathology services

Histopathology plays a crucial role in the multidisciplinary approach to cancer care, underpinning diagnosis and guiding treatment. Therefore, it is essential that histopathology services at designated cancer centers are adequately resourced, both in staffing and equipment. The development of pathology services depends on upgrading equipment, improving the skills and number of the pathologist, and providing pathology materials. Pathologists are considered the core in the confirmative diagnosis of cancer on which a management plan is built.

Activities to upgrade histopathology labs

Develop pathology labs by introducing new technology such as molecular pathology, which needs new equipment, new materials, and staff training. We must also develop immunohistoloy and establish a new pediatric pathology lab, as these are very different from general pathology labs. This means pathologists specialize in pediatric pathology. Enforce the frozen section technique The purpose of a frozen section is to provide the surgeon with information that will help with decision making during the surgery. (Table 5).

Table 5: Development of diagnostic pathology labs in the Gaza Strip

Development	Current	2021	2022	2023	2024	2025
Change lab place	Unfit place	Pathology lab at Shifa				
Pediatric pathology lab	Unavailable	Shifa hospital				
Install pathology labs	Unavailable	Indonesian H	Aqsa H	Najjar H.		
Backup equipment	Unavailable				Shifa H	NMC
Flow cytometry	Unavailable	Shifa H	NMC			
Install gene lab	Unavailable			Shifa H.		
Molecular pathology	Unavailable					

NMC: Nasser Medical Complex

Development of clinical pathology labs

Identification of cancer cells includes initial laboratory testing. Advanced molecular and chemical testing by clinical staff has become integral to cancer diagnostic workups by pathology professionals. Routine screening tests, such as the complete blood count (CBC) and general chemistry testing, produce abnormal or suspicious results that can help lead the physician to follow-up testing which may identify tumor growth. Tumor markers are produced by cancer cells in higher amounts. These can be found in the blood, urine, stool, tumors, or other tissues or body fluids. Listed at Annex 1 tumor markers for diagnosis or progress of cancer that are in everyday use

Activities to upgrade the capacity and skills of histopathologists

- A minimum of two consultant histopathologists must deliver histopathology services
- Upgrade or train pathologists into subspecialties, such as pediatric pathologists, hepatic pathologists, urogenital pathologisst, and neuropathologists.
- Find fellowships for different pathology subspecialties, gene labs and flow cytometer, and to develop tissue culture.
- Increase the skills of lab technicians and develop the Palestinian board in pathology.
- The total number of pathologists in the Gaza Strip is seven (0.35 per 100,000 population). Six at governmental hospitals and one at a private lab. The Gaza Strip needs 35 pathologists to reach 2.1 per 100,0000 population, which is the rate in Germany (the lowest rate in Europe). However, in the next five years, the plan aims to increase further to 10 pathologists by 2025 to support the capacity of pathological diagnosis. (Table 6).

Table 6: Development of pathology workforce in MoH hospitals

Cancer care team	Current	2021	2022	2023	2024	2025
Pathologists	6	1	1	1	1	1
Pathology subspecialties	2	1	1	1	1	1
Pediatric pathologist	0		1			
Molecular pathologist	0			1		
Palestinian Board for pathology	0	2	2	2	2	2
Pathology technicians	5	2	2	2	2	2

Responsibilities

- Ministry of Health (MoH)
- International NGOs

Objective 2.3: Getting the treatment right

Surgery, radiation oncology, and medical oncology are the primary treatment methods for cancer. The development of a fully integrated model of care requires cooperation and communication between many different facets of the health service.

2.3.1. Developing surgical oncology

Surgery plays a pivotal role in managing non-hematological cancer. One of the significant pillars of cancer care and control is preventive, diagnostic, curative, supportive, palliative, and reconstructive. While the primary benefit of successful surgery is improved survival and quality of life, it also reduces ongoing treatment costs in many cases.

Upgrading the surgical department for cancer surgery

- Designate operating room for cancer surgery in each governmental hospital.
- Implement advances in surgical techniques.
- Centralise complex cancer surgery .
- Establish liver cancer surgery.
- Enforce laparoscopic techniques.

Upgrading the capacity and skills of surgeons

- Enforce the breast cancer committee.
- Establish a colorectal cancer committee.
- Training of all general surgeons on surgical oncology.
- Find a fellowship for the reconstructive surgeon and hepatobiliary surgeon.
- Find scholarships for surgical sub-specialties on surgical oncology, upper gastrointestinal (GIT) surgeons, colorectal surgeons, breast surgeons, endocrine surgeons, neurosurgeons, orthopedic surgeons, and gynecological surgeons.

The number of surgeons in governmental hospitals is 82. Develop and invest in 25 surgeons to be specialised in surgical oncology (Table 7).

Table 7: Capacity building of surgeons

Surgical sub-specialties	Current	2021	2022	2023	2024	2025	Total
Reconstructive surgery	0	1	1	1	0	0	3
Breast surgery	0	1	1	1	1	1	5
Hepatobiliary surgery	0	1	1	0	0	0	2
Upper GIT surgery	0	0	1	1	0	0	2
Colorectal surgery	0	1	1	1	1	1	5
Endocrine surgery	0	0	0	1	1	0	2
Neurosurgery	0	0	0	0	1	1	2
Orthopedic surgery	0	0	0	0	1	1	2
Gynecological surgery	0	0	0	1	1	0	2
Total	**0**	**4**	**5**	**6**	**6**	**4**	**25**

2.3.3. Development of radiation oncology

Radiation oncology (or radiotherapy) is a primary curative modality in several cancers (prostate, cervix, head and neck, and early lung). It increases cancer survival as adjunctive therapy in others (e.g., breast cancer). Radiation oncology is also a highly effective palliative treatment. Demand for radiation oncology is expected to increase in line with increases in cancer incidence. Currently, radiation oncology treatment is unavailable in the Gaza Strip. The radiology diagnostic services currently offered in the Gaza strip suffer from a significant shortage of the needed equipment, poor maintenance support, and lack of spare parts, which lead to a delay in leading treatment and thus increase patients' suffering.

There is an absence of clear legislation to protect physicians and technicians working in the field of medical imaging. We must protect staff by offering effective devices used to detect the amount of radiation the radiology technician is exposed to.

- Design and construct a department for radiotherapy and functional imaging and equip it with PETs CT scans, Gamma camera, fixation tools, CT simulator, treatment planning system, four linear accelerators, and quality control tools. Besides, to procure radioisotopes and radiopharmaceuticals (Table 8).

Table 8: Development of radiotherapy departments in the Gaza Strip

Development radiotherapy	Need	2021	2022	2023	2024	2025
Construct radiotherapy and functional imaging department close to Palestinian Turkish Friendship H.						
PETs CT scan	1	One at Shifa H.				
Linear accelerator	6	Two Shifa	Two Shifa	Two Shifa		
Gamma camera	1	At the designated center for functional imaging				
CT simulator	2	One CT simulator				
Radioisotopes		As needed				

Establish the radiotherapy center with four linear accelerators, CT simulator, Gamma camera, fixator. We have two radiation therapists, but they are not practicing their job, so they refreshment courses. We also in need of nurses specialised in radiotherapy to manage patients—the Gaza radiotherapists need intensive courses about radiotherapy and handling of radioisotopes..

Gaza needs three dosimetrists and ten medical radiation therapists (MRTs)

(Table 8).

Table 9: Development of radiology subspecialties

Cancer care team	Current	2021	2022	2023	2024	2025
Breast radiologist	1	0	1	1	1	1
Intervention radiologist	1	1	1	1	1	1
Medical radiation therapist	2	4	4			
Domsimetrist	0	3	0			
Medical physicists	3	Refreshment courses for three months				
Nuclear medicine specialist	1	Refreshment courses for three months				
Radiotherapist technician	12	Refreshment courses for two weeks				
International missions to training national staff						

2.3.4. Development of medical oncology

Medical oncology involves treating cancer with medicine and chemotherapy is commonly referred to as Systemic Anti-Cancer Therapy (SACT). They also play a crucial role in combination with other treatment methods such as surgery or radiotherapy. Systemic anti-cancer medication services are currently provided at two governmental hospitals and one private hospital in the Gaza Strip.

key things to ensure when developing medical oncology are:

- The development of dispensing protocols and training programs for hospital pharmacists will ensure that these medications are dispensed in a consistent, effective manner.
- Increase staffing in medical oncology units.
- Staffing of hematology services
- Staffing medical oncology nursing resources
- Staffing oncology pharmacists

Expansion of skills to support growth and transformation

In total, there are eight oncologists in Gaza responsible for treating patients. Eight further oncologists will be developed, including four medical oncologists, two pediatric oncologists, and two oncologist- hematologist.

Oncology and hematology nursing

Nurses are ideally placed to play a variety of essential roles in cancer care, some in highly specialised posts and others contributing to multiple phases of the patient pathway. In the cancer setting, these include generalist nurses, specialist oncology, and hematology nurses.

Table 10: Development of hemato-oncologist

Oncology sub-specialties	Current	2021	2022	2023	2024	2025
Medical oncologist	4	1	1	0	0	1
Pediatric oncologist	2	0	1	1	1	0
Hematologist	2	0	0	0	1	1

2.3.5. Developing palliativecCare

Palliative care is an approach that improves the quality of life of patients and their families facing life-threatening illness. Palliative care services addressing patients' needs from the time of diagnosis can influence their quality of life and ability to cope effectively.

Developing and training palliative care teams

We must upgrade the capacity of the palliative care team, which includes:

- General Practitioner
- Palliative care nurse
- Palliative care specialist
- Cancer specialist
- Psychologist
- Spiritual or religious care practitioner
- Social worker
- Physiotherapist
- Occupational therapist
- Pharmacist
- Oncology dietitian
- Respiratory therapist.

We must develop other support teams for cancer patients and their families. Supportive care includes supportive counseling, group or peer counseling, rehabilitation, financial advocates, integrative medicine, including physical activity, massage, and strength and conditioning and psychiatric care. It also includes speech and language therapists and occupational therapists.

Fertility preservation

Cancer treatments can affect fertility in some ways. Some chemotherapy medications destroy ova. Radiation therapy to the pelvis or whole abdomen may also destroy the ova. Ova freezing is a procedure in which mature ova are removed from the ovary to be frozen and stored for possible use in the future. They can be frozen as unfertilized eggs or fertilized with sperm and frozen as embryos. Specially trained gynecologists perform these procedures.

Responsibilities

- Ministry of Health (MoH)
- UNRWA
- Non Governmental Organizations and Community Based Organizations.

Goal 3: Development of health management information for cancer

The mapping study finds that the Gaza Strip has not developed a well-functioning health management information system for cancer patients with a suitable data collection and reporting culture. Also, it faces challenges related to the ;ack of appropriate cancer registry, framework, shortage of computers, networks, and adequate human resources.

Objectives

1. To set up a well-functioning Health Information System for cancer with defined authority, roles, responsibilities, and functions for designing, developing, and supporting integrated data management and disseminating official information.
1. To enhance the availability and accessibility to quality information.
1. To provide accurate, relevant, complete, and timely health information for decision-makers.
1. To strengthen data collection, analysis, dissemination, and utilisation at all levels.

Activities:

- Strengthening the human resources capacity of the Health Information System at all levels.
- Establish and strengthen the cancer registry to avoid service duplication, especially while implementing the breast-screening program.
- Review existing reporting tools to limit paper-based records.
- Review and develop an appropriate legal framework for health information.
- Install Picture Archiving and Communication System (PACS) at radiological departments.

Responsibility:

- MoH
- International NGOs

Establishment of National Cancer Center

The MoH plan to develop a National Cancer Center (NCC) at the Palestinian Turkish Friendship Hospital, and the MoH will form a National Committee to discuss this issue. This idea depends on a comprehensive early detection, diagnostic, treatment, palliative, and rehabilitation cancer care under one center.

The NCC will offer comprehensive care for all types of cancer in children and adults. MoH will rely on the expertise of the most skilled oncologists and the latest technology to provide the most advanced treatment to each patient.

NCC should provide diagnostics, treatment, and training, characterised by multidisciplinary case management, and run from a comprehensive perspective.

The National Cancer Center will consist of the following departments:

1. Awareness, screening, and early detection
2. Histopathology department
3. Clinical pathology department
4. Diagnostic radiology department and radiotherapy
5. Breast cancer unit
6. Colorectal cancer unit
7. Lung cancer unit
8. Hepatobiliary cancer unit
9. Renal cancer unit
10. Brain and spinal cord tumors unit
11. Endocrine related cancer unit
12. Gynecological cancer unit
13. Musculoskeletal cancer unit
14. Blood diseases and leukemia, and lymphomas
15. Pediatric oncology department
16. Supportive services and palliative therapy
17. Research and quality control department
18. Continued medical education and training unit

Gaza health authorities must develop comprehensive national cancer centers with public and private resources. Patients can be managed directly at the national cancer centers. Comprehensive cancer centers educate health care professionals and the public, and they research the causes, prevention, diagnosis, and treatment of cancer.

Tablle 11: Cancer Improvement Plan, Gaza Strip State of Palestine - Budget

Cancer Investment Plan					
#	**Activity**	**Item**	**# items**	**Item cost**	**Total**
1	**Rehabilitation and refurbishment of health facilities in Gaza**				
1.1	Rehabilitation of the pathology lab	Building	1		
1.2	Establish pathology labs	Building	3		
1.3	Establish pediatric pathology labs	Building	1		
1.4	Establish gene and molecular labs	Building	1		
1.5	Rehabilitation of the radiology department at NMC	Building	1		
1.6	Establish radiotherapy department	Building	1		
2	**Provide furniture of radiology, pathology, and oncology departments**				
2.1	Patients beds at ultrasound unit	Furniture	10		
2.2	Recovery beds at radiology departments	Furniture	5		
2.3	Patient unique bed used while taking a stereotactic biopsy	Furniture	2		

#	Activity	Item	# items	Item cost	Total
3	**Medical equipment and tools**				
3.1	CT scan	Machine	16		
3.2	MRI	Machine	8		
3.3	Digital Mammogram	Machine	5		
3.4	Digital x- ray	Machine	1		
3.5	Ultrasound	Equipment	9		
3.6	Colored Doppler ultrasound	Equipment	2		
3.7	Endoscopic ultrasound	Equipment	2		
3.8	Intraoperative ultrasound	Equipment	2		
3.9	Digital panorama	Machine	1		
3.10	Linear accelerator	Machine	6		
3.11	CT simulator	Machine	2		
3.12	Gamma camera	Machine	1		
3.13	Fixator	Tool	1		
3.14	Pathology backup equipment	Equipment	2		
3.15	Fluorescence In Situ Hybridization (FISH)	Equipment	1		
3.16	Flow cytometry	Equipment	1		
3.17	Automated immunohistology	Equipment	1		
3.18	Bowel endoscopies	Equipment	5		
3.19	Cholangiopancreatography	Equipment	1		
3.20	Ultrasonic wave for surgery	Device	1		
3.21	Coagulation electrode knife	Tool	1		
3.22	Ligasure ultrascissor is an electrosurgical bipolar vessel sealing system	Tool	1		
3.23	Wire guided excision biopsy	Tool	50		
3.24	Breast tissue marker (clip)	Tool	50		
3.25	Magseed	Tool	50		
3.26	Endo-stapler and staples, articulate stapler,	Tool	30		
3.27	Stereotactic software program and tools for biopsy	Tool	3		
3.28	Thermoluminescent Dosimeter (TLD) for the safety of radiologists	Tool	50		

#	Activity	Item	# items	Item cost	Total
4	**Materials**				
4.1	Materials for the immunostainer	Annual stock			
4.2	Radioisotope materials for positron emission tomography (PET) scan	Annual stock			
4.3	Radioactive iodine for thyroid scans	Annual stock			
4.4	Radioactive substances used to biopsy axillary lymph nodes	Annual stock			
4.5	Radiopaque substances and injectable apparatus	Annual stock			
4.6	Stains for the automated immunohistochemical equipment	Annual stock			
5	**Essential Pharmaceuticals, supplies**				
5.1	Cancer medications and palliative drugs	Annual stock			
5.2	Antibiotics & antifungal Based on an interview with the pediatric oncologist	Annual stock			
6	**Capacity Strengthening in delivery of service packages**				
6.1	Training of general practitioners in early detection of cancer	GPs	100		
6.2	Training for different specialist	Specialist	50		
6.3	Training of the hematologist/ oncologist: Surgeons	Specialist	30		
6.4	Training of surgeons on conducting surgery for cancer patients	Surgeons	40		
6.5	Training surgeons on cosmetic and reconstructive surgery	Surgeons	5		
6.6	Training pathologist in molecular biology, gene diagnosis, flow cytometer	Pathologist	5		
6.7	Training radiologist on different body imaging	Radiologist	5		
6.8	Training radiologists to be specialised in radiotherapy	Radiologist	5		
6.9	Training of nurses in application of the cancer service package	Nurses	60		
6.10	Training pharmacist	Pharmacist	20		
6.11	Training Social worker	Pharmacist	40		
6.12	Training psychologist	Psychologist	20		
6.13	Registered dietitian	Dietitian	20		
6.14	Rehabilitation specialist	Specialist	5		
6.15	Training for palliative care personnel	Specialist	10		

#	Activity	Item	# items	Item cost	Total
7	**Capacity building in equipment maintenance**				
7.1	Training of engineers and technical personnel in equipment maintenance	Engineer	5		
8	**Update protocols, guidelines, quality assurance standards**				
8.1	Development of the guidelines, protocols and quality assurance standards	Day			
9	**Revise existing health information system in health facilities**				
9.1	Development of the MIS software	Software	1		
9.2	Train health facility personnel in application of the software and reporting	Participant	30		
9.3	Provide internet connection to the health facilities	Monthly	60		
9.4	Install Picture Archiving and Communication System (PACS)	Software	1		
9.5	Develop cancer registry	Software	1		

Annex 1: Tumor Markers

Tumor marker	Cancer types	Analysis sample	Use
ALK gene rearrangements and overexpression	Non-small cell lung cancer & anaplastic large cell lymphoma	Tumor	To help determine treatment and prognosis
Alpha-fetoprotein (AFP)	Liver cancer and germ cell tumors	Blood	To help diagnose liver cancer and follow the response to treatment, to assess stage, prognosis, and response to treatment of germ cell tumors
B-cell Ig gene rearrangement	B-cell lymphoma	Blood, tumor tissue	To help in diagnosis, to evaluate effectiveness of treatment, and to check for recurrence
Beta-2-microglobulin (B2M)	Multiple myeloma, chronic lymphocytic leukemia,	Blood, urine, or cerebrospinal fluid	To determine prognosis and follow response to treatment
Beta-human chorionic gonadotropin	Choriocarcinoma and germ cell tumors	Urine or blood	To assess stage, prognosis, and response to treatment
Bladder Tumor Antigen (BTA)	Bladder, kidney and ureter cancers	Urine	As surveillance with cytology and cystoscopy of patients already known to have bladder cancer
BRCA1 and BRCA2 gene mutations	Ovarian and breast cancers	Blood and/ or tumor	To determine whether treatment with a particular type of targeted therapy is appropriate
BCR-ABL fusion gene (Philadelphia chromosome)	Chronic myeloid leukemia, acute lymphoblastic leukemia,	Blood or bone marrow	To confirm diagnosis, predict response to targeted therapy, determine whether treatment with a particular type of targeted therapy is appropriate, and monitor disease status

Tumor marker	Cancer types	Analysis sample	Use
BRAF V600 mutations	Cutaneous melanoma, colorectal, and non-small cell lung cancers	Tumor	To select patients who are most likely to benefit from treatment with certain targeted therapies
C-kit/CD117	Gastrointestinal stromal tumor, mucosal melanoma, acute myeloid leukemia	Tumor, blood, or bone marrow	To help in diagnosing and determining treatment
CA15-3/CA27.29	Breast cancer	Blood	To assess whether treatment is working or if the cancer has recurred
CA19-9	Pancreatic, bile duct gallbladder, gastric cancers	Blood	To assess whether treatment is working
CA-125	Ovarian Cancer	Blood	To help in diagnosis, assessment of response to treatment, and evaluation of recurrence
CA 27.29	Breast cancer	Blood	To detect metastasis or recurrence
Calcitonin	Medullary thyroid cancer	Blood	To aid in diagnosis, check whether treatment is working, and assess recurrence
Carcinoembryonic antigen (CEA)	Colorectal cancer and some other cancers	Blood	To check treatment effectiveness and whether cancer has returned or spread
CD20	Non-Hodgkin lymphoma	Blood	To determine whether treatment with a targeted therapy is appropriate
CD22	Hairy cell leukemia and B-cell neoplasms	Blood & bone marrow	To help in diagnosis
CD25	Non-Hodgkin (T-cell) lymphoma	Blood	To determine whether treatment with a targeted therapy is appropriate
CD30	Mycosis fungoides & peripheral T-cell lymphoma	Tumor	To determine whether treatment with a targeted therapy is appropriate
CD33	Acute myeloid leukemia	Blood	To determine whether treatment with a targeted therapy is appropriate

Tumor marker	Cancer types	Analysis sample	Use
Chromogranin A (CgA)	Neuroendocrine tumors	Blood	To help in the diagnosis, assessment of treatment response, and evaluation of recurrence
Chromosome 17p deletion	Chronic lymphocytic leukemia	Blood	To determine whether treatment with a certain targeted therapy is appropriate
Chromosomes 3, 7, 17, and 9p21	Bladder cancer	Urine	To help in monitoring for tumor recurrence
Circulating tumor cells of epithelial origin	Metastatic breast, prostate, & colorectal cancers	Blood	To inform clinical decision making, and to assess prognosis
Cytokeratin fragment 21-1	Lung cancer	Blood	To help in monitoring for recurrence
Des-gamma-carboxy prothrombin (DCP)	Hepatocellular carcinoma	Blood	To monitor the effectiveness of treatment and to detect recurrence
DPD gene mutation	Breast, colorectal, gastric, and pancreatic cancers	Blood	To predict the risk of a toxic reaction to 5-fluorouracil therapy
EGFR gene mutation	Non-small cell lung cancer	Tumor	To help determine treatment and prognosis
Estrogen receptor (ER)/ progesterone receptor (PR)	Breast cancer	Tumor	To determine whether treatment with hormone therapy and some targeted therapies is appropriate
FGFR2 and FGFR3 gene mutations	Bladder cancer	Tumor	To determine whether treatment with a certain targeted therapy is appropriate
Fibrin/fibrinogen	Bladder cancer	Urine	To monitor progression and response to treatment
FLT3 gene mutations	Acute myeloid leukemia	Blood	To determine whether treatment with certain targeted therapies is appropriate
Gastrin	Gastrin-producing tumor (gastrinoma)	Blood	To help in diagnosis, to monitor the effectiveness of treatment, and to detect recurrence
HE4	Ovarian Cancer	Blood	To plan cancer treatment, assess disease progression, and monitor for recurrence

Tumor marker	Cancer types	Analysis sample	Use
HER2/neu gene amplification or protein overexpression	Breast, ovarian, bladder, pancreatic, and stomach cancers	Tumor	To determine whether treatment with certain targeted therapies is appropriate
5-HIAA	Carcinoid tumors	Urine	To help in diagnosis and to monitor disease
IDH1 and IDH2 gene mutations	Acute myeloid leukemia	Bone marrow and blood	To determine whether treatment with certain targeted therapies is appropriate
Immunoglobulins	Multiple myeloma and Waldenström macroglobulinemia	Blood and urine	To help diagnose disease, assess response to treatment, and look for recurrence
JAK2 gene mutation	Certain types of leukemia	Blood & bone marrow	To help in diagnosis
KRAS gene mutation	Colorectal & non-small cell lung cancer	Tumor	To determine whether treatment with a particular type of targeted therapy is appropriate
Lactate dehydrogenase	Lymphoma, leukemia, melanoma, and neuroblastoma	Blood	To assess stage, prognosis, and response to treatment
Neuron-specific enolase (NSE)	Small cell lung cancer and neuroblastoma	Blood	To help in diagnosis and to assess response to treatment
Nuclear matrix protein 22	Bladder cancer	Urine	To monitor response to treatment
PCA3 mRNA	Prostate cancer	Urine	To determine need for repeat biopsy after negative biopsy
46-Gene signature (Prolaris®)	Prostate cancer	Tumor	To predict the aggressiveness of prostate cancer and to help manage treatment
Prostatic Acid Phosphatase (PAP)	Metastatic prostate cancer	Blood	To help in diagnosing poorly differentiated carcinomas
Prostate-specific antigen (PSA)	Prostate cancer	Blood	To help in diagnosis, to assess response to treatment, and to look for recurrence
Soluble mesothelin-related peptides (SMRP)	Mesothelioma	Blood	To monitor progression or recurrence

Tumor marker	Cancer types	Analysis sample	Use
Somatostatin receptor	Neuroendocrine tumors affecting the pancreas or GIT	Tumor (by diagnostic imaging)	To determine whether treatment with a particular type of targeted therapy is appropriate
T-cell receptor gene rearrangement	T-cell lymphoma	Bone marrow, tissue, body fluid, blood	To help in diagnosis; sometimes to detect and evaluate residual disease
Thyroglobulin	Thyroid cancer	Blood	To evaluate response to treatment and to look for recurrence
Urine catecholamines: VMA and HVA	Neuroblastoma	Urine	To help in diagnosis

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