

Chapter 2

General Oncology Care in Algeria



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2.1 Algeria Demographics

Cancer represents a particularly heavy burden because it causes more suffering and tragedy than any other disease at the personal and family level; it is also responsible for the greatest number of years of life lost. Finally, its particularly high and the constantly increasing financial burden risks unbalancing the entire financial structure of the health care system. In this chapter, we will review the state of cancer care in Algeria, after having first presented the determinants of health, i.e., the factors which influence the population's health status, few health indicators (mortality, morbidity, life expectancy) and finally risk factors (tobacco, obesity, diet, physical activity).

Since independence, the Algerian population has undergone a remarkable evolution in terms of demography; from 12 million inhabitants in 1966 to more than 43 million inhabitants in 2019 [1]. Figure 2.1 illustrates the evolution of the Algerian population between 1966 and 2019.

According to the report of the National Statistics Office published in 2020, the natural growth rate of the population is 1.93%, with a resident population in Algeria estimated at 43,900,000 inhabitants on January 1, 2021, including a male population of 50.7% and a median age of about 27.7 years (27.1 for men and 28.3 for women). The population aged over 60 years is estimated at 4,139,000 people, representing 9.5% of the total population [3]. Figure 2.2 shows the distribution of the Algerian population by age.

Life expectancy is estimated to be 77.2 years for men and 78.6 years for women (77.8 years in the overall population). A total of 198,000 deaths were recorded during 2019, with a crude mortality rate of 4.55%. Cancer deaths represent 12% of total deaths in 2016 [4].

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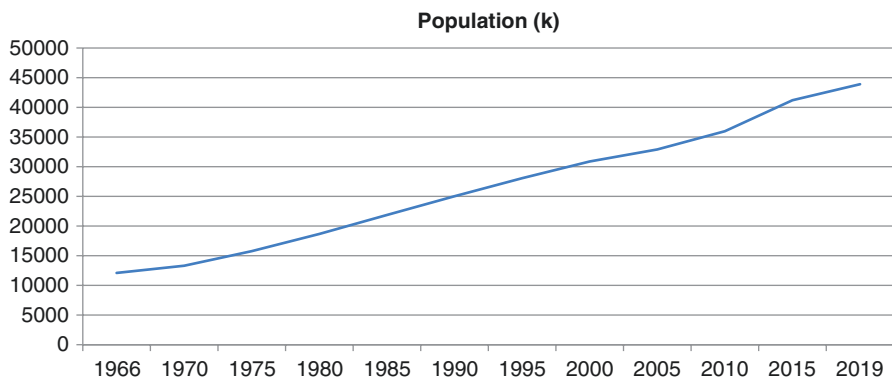


Fig. 2.1 Evolution of the Algerian population between 1966 and 2019 [1, 2]

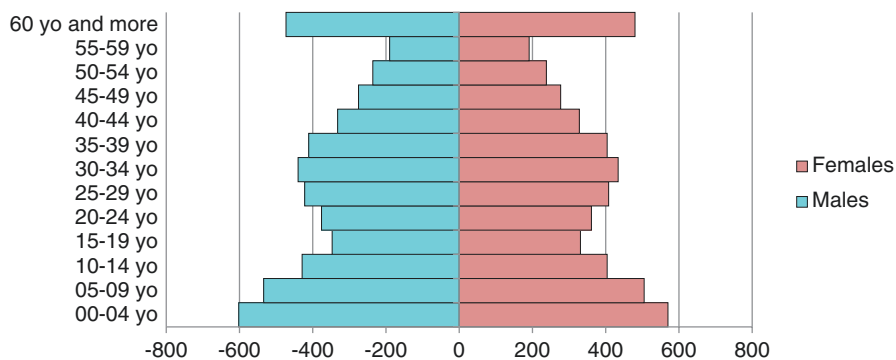


Fig. 2.2 Distribution of the Algerian population by age group and sex in 2019 [3]

2.2 Cancer Statistics in Algeria

2.2.1 Cancer Incidence in Algeria

A National Cancer Registry has been set up in the form of a network, comprising three regional registries covering the Center (13.5 million inhabitants), East (15.8 million inhabitants), and West (9.9 million inhabitants) regions, with coverage rates of 94.3%, 97%, and 86.6% respectively, and an overall coverage rate of 89.6% [1–3].

Algeria recorded 43,920 new cases of cancer in 2017, an incidence of 112.2 new cases per 100,000 inhabitants (93.7 new cases per 100,000 in men and 131.7 new cases per 100,000 in women [1–3]).

With an incidence of 14.2 new cases per 100,000 men, colorectal cancer is the most frequent cancer in men, followed by lung cancer (13.5 new cases per 100,000 men), prostate cancer (11.1 new cases/100,000 men), bladder cancer (10.16 new

cases/100,000 men), and stomach cancer (8.4 new cases/100,000 men). The age of onset is 57, 62, 72, 65, and 60 years, respectively.

In women, the most common cancer is breast cancer with an incidence of 49.3 new cases/100,000 women, followed by colorectal cancer (12.9 new cases/100,000 women), thyroid cancer (9.3 new cases/100,000 women), cervical cancer (7.2 new cases/100,000 women), and stomach cancer (5.9 new cases/100,000 women). The median age of onset for women is 47, 65, 42, 62, and 65 years, respectively [5].

2.3 Oncology Care in Algeria

The fight against cancer in Algeria started during the French colonization. It was in 1928 that the first Anti-Cancer Center of Algiers was created, installed in the premises of the Mustapha Hospital. This center, if it had the merit to constitute the first link in the chain of anti-cancer fight in Algeria, could provide neither the screening nor the treatment of all the observed cancers.

In 1950, the Algerian center for the fight against cancer left the premises of the Mustapha Hospital to move into the buildings of the newly built Pierre and Marie Curie Center (CPMC). From January 1950 to December 1958 (9 years), 8706 cancers were registered in the central file of Algiers, divided according to ethnicity into:

- 5157 cases in the Muslim population, which amounted to 8,449,332 at the time
- 2164 cases in the population of European origin which amounted to 984,031
- 150 cases in the Jewish population

These few figures show that this anti-cancer fight was primarily aimed at the population of European origin and reached only very few Muslims.

After independence, with the development of medical knowledge and better health coverage in the country; the problem of caring for patients with cancer became a public health problem from 1975.

In terms of infrastructure for the treatment of cancer, apart from the CPMC, and until the early 2000s, there were only four Anti-Cancer Centers (ACCs) in Algeria (Algiers, Blida, Oran, Constantine), although the university departments of the various medical and surgical specialties took care of cancer patients within their specialties.

A reflection on what could be a national strategy to fight against cancer was emerging both in the medical community and the authorities in charge of health, to reduce mortality and cancer morbidity.

The epidemiological transition, which makes cancer one of the main causes of morbidity in the country, was however known: 42,720 new cases of cancer were recorded in 2015 in Algeria and 61,000 are expected in 2025 [5–7].

The construction of most of the Anti-Cancer Centers (ACCs) was relaunched in 2013, shortly before the National Anti-Cancer Plan, endowed with 185 billion dinars (about 1.6 billion euros at the time) until 2019 and placed under the supervision of the Presidency of the Republic, was adopted in 2015 [5].

2.3.1 National Cancer Control Plan 2015–2019

With cancer becoming a major public health problem, an anti-cancer plan was developed and implemented in 2014, with the objective of reducing mortality and morbidity of different types of cancers for the period 2015–2019. This plan was based on eight strategic axes [5] which are:

- Improving prevention against cancer risk factors
- Improving cancer screening
- Improving diagnosis
- Reinvigorating anti-cancer treatment
- The organization of the orientation, the accompaniment, and the follow-up of patients
- The development of the information and communication system
- Strengthening training and research
- The reinforcement of financing and care capacities

2.4 Cancer Risk Factors

The following are some known risk factors data [8].

- *Tobacco*: It is estimated that 11.22% of the population actively uses smoked tobacco (26.40% in men and 0.43% in women), with daily consumption in 94.81% of smokers (100% in women and 94.73% in men). The average age of smoking initiation is 19.13 years (18.83 years for women and 19.13 years for men). The average daily consumption is 14.77 cigarettes (9.91 cigarettes/day for women and 14.86 cigarettes/day for men).
- *Alcohol*: Alcohol consumption is found in 6.50% of the population (15.27% in men and 0.28% in women). The average consumption is 5.83 drinks/day.
- *Obesity*: Current data suggests that 55.90% of the population has a BMI ≥ 25 (66.52% of women and 41.29% of men). Global obesity (BMI ≥ 30) is found in 21.24% of subjects (30.08% of women and 9.07% of men). The frequency of obesity disease (BMI ≥ 40) is 1.14% with a clear female predominance (1.70% vs 0.38%). It is much more observed in urban areas (1.42% vs 0.65%).
- *Diet*: With a low consumption of fruits (0.6 per day vs. 2 recommended portions), vegetables (0.8 vs. 3 recommended portions), dairy products and animal proteins (1.3 vs. 2 recommended portions), and an excessive consumption of fatty and sugary foods (2.7 vs. 1 recommended portion) and cereals (3.8 vs. 3 recommended portions), the daily food consumption of the Algerian population is not in line with the international recommendations.
- *Physical Activity*: The most important part of the Algerian population's time is represented by low intensity physical activities, i.e., 14 h and 31 min per day (60.5% of the time), while moderate intensity activities represent only 8.35% of the time, i.e. 2 h per day. High intensity activities are very negligible and correspond to only 57 s per day.

2.5 Cancer Screening Programs

2.5.1 Cervical Cancer

A national cyto-diagnostic cervical cancer screening program has been implemented in collaboration with WHO since 1997 and HPV tests have been used since 2015 [8]. Currently, this cervical cancer screening consists of a request for a cervico-vaginal smear to women aged 25–65 years. The first smear is taken in the first year of marriage. It is followed by a second one a year later. If the two smears show no abnormalities, the woman is reassured and will only be asked for a follow-up smear once every 5 years [5]. Screening units located in the various gynecological facilities and departments at the university hospitals and local public health facilities are responsible for follow-up [9]. Smear tests are taken outside the menstrual period for all women, including those who are pregnant or in the menopause.

2.5.2 Breast Cancer

Algeria does not yet have an organized mass screening program for breast cancer, due to epidemiological particularities such as the young age of patients with a peak incidence before 50 years of age [10, 11] and technical difficulties related to the high breast density in Algerian women. Awareness campaigns on the interest in self-cleansing and the promotion of individual screening by mammography, especially among women at risk with a history of breast and/or ovarian cancer in the family, are organized through the media (press, billboards in public places, posters in waiting rooms of public and private health structures, etc.). These events multiply every year, especially during the month of October (pink October) with the participation of associations and private imaging centers.

2.5.3 Colorectal Cancer

The incidence of colorectal cancer in Algeria remains lower than those observed in Europe and the USA. Despite an annual increase of 7%, colorectal cancer screening in Algeria has remained controversial [12]. As the 2015–2019 national cancer program did not deem it necessary to include colorectal cancer as a priority, it was not until the publication of the results of the National Cancer Registry Network (as part of the First Atlas of Cancer in Algeria) in January 2017, that the Algerian National Cancer Screening Committee decided to introduce colorectal cancer screening in the objectives of the cancer plan, taking in consideration the incidence of colorectal (first and second place in men and women, respectively). This led to the launch of pilot studies in three wilayas of the country: Bejaia, Annaba, and Batna [13]. These studies use immunological tests to detect the presence of blood

in the stool. A participation rate of 26% was obtained at a rate of 98% in the case of a positive test.

While some western countries (Europe and the USA) with a high incidence have implemented mass screening programs, in Algeria, recommendations and/or guidelines for oriented screening, i.e., individual screening for high-risk individuals, should be proposed at most. Other preventive measures include maintaining a correct body weight, practicing physical activity, minimizing red meat and alcohol consumption, and stopping smoking.

2.5.4 Prostate Cancer

To date, there is no organized screening for prostate cancer in Algeria. Only individual screening (voluntary) consisting of a rectal examination and Prostate Specific Antigen (PSA) test is recommended for men between the ages of 50 and 70, when life expectancy is estimated to be ≥ 10 years. Prostate cancer, which is continuously increasing in Algeria [14], is still diagnosed at a locally advanced and/or metastatic stage. In its objectives for 2015–2019, the cancer plan recommends the need to develop and ensure the dissemination by prescribers of clear information on the benefits and risks of individual screening for prostate cancer according to the modalities of management, as well as awareness and training of the attending physician [5]. At present, screening is carried out much more by associations or health structures at the initiative of isolated individuals.

Health professionals and the general population are exposed to a lot of alarming information about the frequency of cancers and their causes. This can lead to behavior without a rational basis. There is a need for a proper analysis of the data on the incidence of cancer and an assessment of the effect of the main causes identified, and of the means put in place by the country's health authorities for their management. Only based on this information, a validated strategy can be proposed for each of the major neoplastic sites.

2.6 Cancer Prevention Programs

A program of prevention (excluding vaccination) and control of risk factors is implemented within the framework of the multisectoral national strategic plan of integrated control of risk factors of non-transmittable diseases from 2015–2019 [8]. It is based on the following four main axes:

- Axis 1—Promotion of healthy nutrition, with the following objectives:
 - Promote nutrition for pregnant women, as well as exclusive breastfeeding up to 6 months and maintaining it up to 24 months
 - Promote healthy eating among children, youth, and adolescents in educational, school, and pre-school settings in order to reverse the trend of obesity

- among children and adolescents, to reduce the prevalence of micronutrient deficiencies and to reduce the incidence of foodborne diseases
- Reduce the daily intake of salt, sugar, and fat in the general population
 - Prevent obesity in the general population.
- Axis 2—The promotion of physical activity, the practice of sports and active mobility, with the following objectives:
 - Promote the practice of physical activity and sport
 - Promote active mobility
 - Axis 3—Tobacco control, with the following objectives:
 - Strengthen tobacco control legislation and regulations in line with the provisions of the WHO Framework Convention on Tobacco Control
 - Create an environment conducive to reducing tobacco use
 - Provide smoking cessation assistance
 - Establish a comprehensive and permanent tobacco monitoring system
 - Axis 4—The coordination framework, with the main objective of institutionalizing a multisectoral coordination framework, ensuring the implementation of actions to prevent risk factors for non-transmittable diseases.
 - Vaccination against hepatitis B was introduced in 2000, with a four-dose schedule: the first, at birth, followed by three doses at 2 months, 4 months, and then 12 months. But, to date, vaccination against HPV has not yet been implemented

2.7 Cancer Diagnosis

Algeria currently has 1400 radiologists, 2500 radiology rooms, 634 CT machines, 180 MRI machines, 2 PET scanners, 250 mammograms, with a total of 13 university hospital radiology services spread over the national territory.

Histopathology diagnosis is performed by the various public and private anatomical pathology departments, including 20 university hospital departments, providing standard and immunohistochemistry or in situ hybridization techniques. Reading committees for rare and atypical tumors have been set up since 2015 to improve the quality and response time of rare and/or complicated cases. Algeria also has five molecular biology platforms for the study of genetic mutations and genomic alterations of tumors, for therapeutic and scientific purposes [5, 6].

2.8 Treatment

Cancer treatment in Algeria is provided by 22 Anti-Cancer Centers, five of which belong to the public sector (liberal). Each center has a medical oncology department, radiotherapy with 52 linear accelerators, surgery, radiology, hematology, an

analysis laboratory, and a pathological anatomy laboratory. There are also ten medical oncology departments, 22 surgical departments, and three hematology departments involved in cancer care and belonging to the various university hospitals and public hospitals in the country. A multidisciplinary discussion of rare and complicated cases is organized in multidisciplinary consultation meetings concerning digestive oncology; thoracic and urological oncology; neuro-oncology, sarcomas, head and neck cancers, and breast cancer.

2.8.1 Medical Oncology

Medical oncology is a specialty in full development in Algeria, with an increase of the future medical staff. The enumeration of medical oncologists was carried out by crossing files of practitioners provided by various organizations and learned societies, which allowed us to count approximately 1000 medical oncologists distributed on the whole territory. The duration of the training in this field is 4 years, with a total of 60 trainees counted in the fourth year.

2.8.2 Radiation Therapy

Currently, there are 600 active radiation oncologists. The initial training in radiotherapy takes place over 4 academic years. The number of trainees has been considerably growing in recent years, to keep up with the growing demand for new radiation therapy facilities and the acquisition of new equipment.

2.8.3 Surgery

Even if to date, there is no training in oncological surgery, surgical treatment is provided, depending on the neoplastic locations by organ specialists in university hospitals, Anti-Cancer Centers (CAC), and in the private sector also.

2.8.4 Pediatric Oncology

At present, there is no specialized training in pediatric oncology; the care of children and adolescents with cancer is done jointly by pediatricians and oncologists, either in pediatric or radiotherapy departments, in dedicated pediatric oncology units. The number of pediatricians trained in oncology is expected to increase with the creation of cross-disciplinary training in pediatric hematology and oncology.

2.8.5 Survivorship Track

The available data regarding cancer survivorship in Algeria suggests an estimated standardized net survival for adults (15–99 years) of 59.8% (95% CI: 48.6–71.1) for breast cancer, 58.5% (95% CI: 51.2–65.9) for prostate cancer, 57.2% (95% CI: 45.6–68.9) and 45.5% (95% CI: 36.3–54.8) for colon cancer and rectum cancer, respectively, 55.1% (95% CI: 49.8–60.4) for cervix cancer, 41.8% (95% CI: 22.2–61.4) for ovary cancer, and 14.8% (95% CI: 11.2–18.4) and 10.3% (95% CI: 6.7–14.0) for lung and stomach cancer, respectively [15].

2.8.6 Palliative Care Track

In Algeria, palliative care is still in the process of development, with only two units (the Anti-Cancer Center in Blida and the Pierre and Marie Curie Center in Algiers) currently treating patients with cancer at this stage of the disease. Palliative care in oncology is one of the objectives of the Cancer Plan, which has been gradually translated in recent years into various incentives for the organization and structuring of emerging units, thus increasing the possibilities for patients to benefit from it.

2.9 Research and Education

2.9.1 Clinical Trials and Research

At present, Algeria's participation in clinical trials represents 0.026% of the world's participation, with a total of 95 trials conducted until March 2021 [16]. Clinical trials in oncology represent 28.42% of all clinical trials conducted in Algeria, with a remarkable improvement from 10 trials in 2019 to 27 in 2021 [16, 17].

Interventional trials represent 62.96% of total trials, of which 70.59% are phase 3 (23.53% for phase 2 and 5.88% for phase 4). The total number of patients to be included in the 27 trials is 16,962, of which 52.8% are observational trials, 44.58% are phase 3, and 1.77% and 0.84% are phase 2 and 4, respectively [16]. Table 2.1 summarizes the clinical trials conducted in Algeria by cancer site.

More than 25% of the clinical trials in cancer in Algeria focused on breast cancer, with a total of 7317 patients to be included, i.e. 43.14% of the patients to be included in the clinical trials on cancer [16]. The number of patients to be included in clinical trials in Algeria is shown in Fig. 2.3.

Table 2.1 Clinical trials conducted in Algeria until March 2021 [16]

Trial Area	Number	Number of subjects
Breast cancer	7	7317
Prostate cancer	1	1533
Rectal cancer	2	434
Ovarian cancer	1	248
Nasopharyngeal cancer	2	141
Renal cancer	2	283
Lung cancer	1	919
Gastric cancer	1	1000
Multiple myeloma	2	2455
Thyroid cancer	1	667
Cervical cancer	1	40
Bone metastasis	1	650
Lymphoma	2	694
Others	3	581
<i>Total</i>	27	16,962

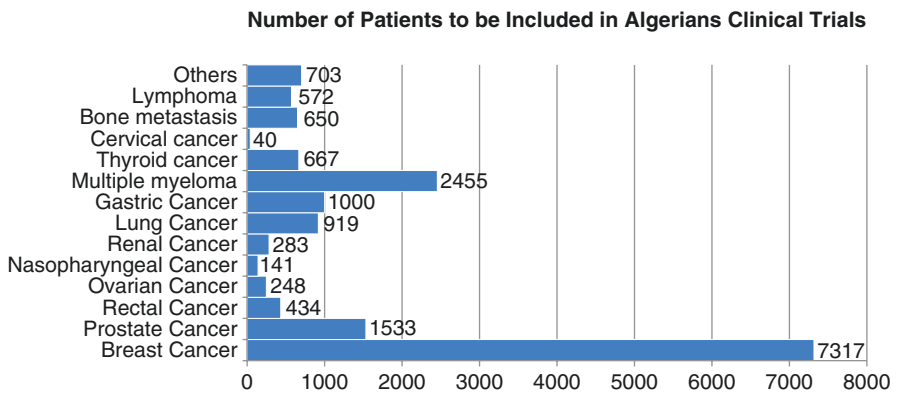


Fig. 2.3 Patients included in the clinical trials in Algeria in 2021 [16]

2.9.2 Scientific Publications

The scientific publications of Algeria have seen an interesting improvement in recent years, reaching 89 articles published in 2020 [18]. There are currently 1718 articles published by Algeria available on PubMed since 1963. The share of oncology in scientific publications represents 5.3%, corresponding to 91 articles since 1963 [18]. Figure 2.4 illustrates the evolution of Algerian oncology papers available on PubMed since 1963.

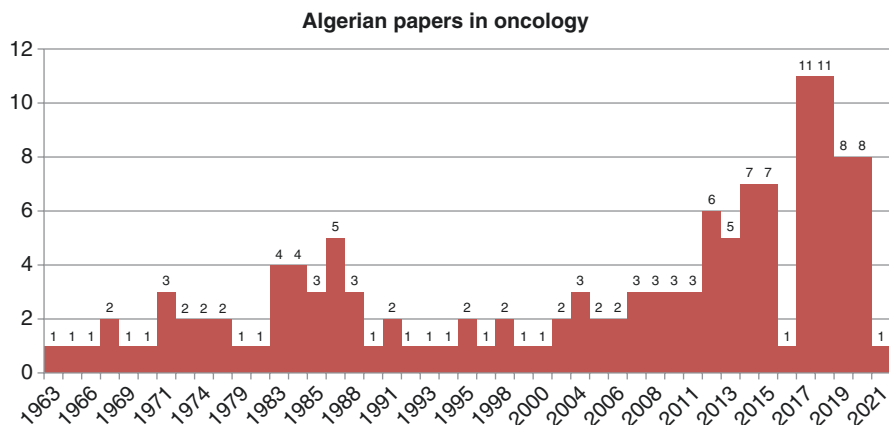


Fig. 2.4 Distribution of scientific publications from Algeria available on PubMed by year of publication since 1963 [18]

2.9.3 Training and Education

The training of medical personnel specialized in cancer (medical oncology, radiotherapy, and surgery) is ensured by 11 of the 14 faculties of medicine spread over the national territory. A total of 124 professors (medical oncology: 21.77%, radiotherapy: 9.68%, and surgery: 68.55%), 62 senior lecturers A (20.97% in medical oncology, 8.06% in radiotherapy, and 70.97% in surgery), 34 senior lecturers B (26.47% in medical oncology, 2.94% in radiotherapy, and 70.59% in surgery), and 197 assistant professors (20.90% in medical oncology, 10.66% in radiotherapy, and 62.44% in surgery) oversee providing the necessary medical education in cancer care. The Algerian faculties of medicine provide training for more than 1500 residents in the three specialties (24.4% for medical oncology, 8.49% for radiotherapy, and 67.11% for surgery), with more than 200 cancer specialists graduating each year (40.40% in medical oncology, 10.10% in radiotherapy, and 49.49% in surgery).

However, for medical oncology and radiotherapy, it is a training dedicated to cancerous disease, it is not a specific training in cancer surgery. Thus, any organ surgeon can manage a cancer patient in his or her specialty, which can be a loss of chance for the patient if the surgical procedure is incomplete or not indicated. In addition, in the Anti-Cancer Centers with a cancer surgery department, the surgeons are general surgeons who can manage cancers of the digestive tract, the gynecological sphere, and the thyroid. For cancers of other parts of the human body, it is always the surgical departments of specialties that are in charge.

2.9.4 Paramedical Training

Paramedical training is provided by 24 National Institutes of Higher Paramedical Training, seven paramedical training institutes, and one paramedical training school, spread throughout the country.

2.10 Cost Effective Cancer Care

The cost of cancer care in hospitals is about 500 million dollars. Cancer surgery represents more than one third of expenses. The remaining two thirds are represented by chemotherapy and radiation therapy since they are mostly given in multiple consecutive sessions. All treatment costs in the public sector are covered by the Algerian state with full medical coverage. Only 5% of the treatments are insured in the private sector and financed on an individual basis.

2.11 Challenges and Advantages

2.11.1 Access to Innovative Treatments

Algerian patients have free access to new technologies and innovative oncological treatments, such as monoclonal antibodies, tyrosine kinase inhibitors, and more recently immunotherapies, with a delay of around 2–3 years between obtaining the drug, Marketing Authorization in the USA and Europe, and registration of the drug in Algeria. This deadline is linked to the procedures for submitting and reviewing files at the level of the Ministry of Health.

2.11.2 Cancer Care

Cancer care in Algeria is financed by the Algerian state, free care has been a fundamental right since independence [5, 6].

2.12 The Future of Cancer Care in Algeria

The fight against cancer focuses on cancer care in general, with access to prevention, screening, palliative, and treatment services. The treatment of cancer continues to rest largely on three major modalities: surgery, radiotherapy, and systemic

therapies, including chemotherapy and other approaches such as immunotherapy, targeted therapy, and gene therapy.

Future investment in the field of cancer should strengthen the impact of the national capacities; the performance should be more than ever on the agenda of the national health authorities to achieve two goals: reducing cancer related mortality and reducing cancer incidence.

The main objective is to stress the importance of being as close as possible to healthcare professionals and help them treat their patients better through training, not just new products, and technologies, to think about sustainable strategies that look towards the future lying in precision and individualized healthcare.

2.13 Conclusion

Colorectal, lung, prostate, and bladder cancers in men; breast, cervical, and thyroid cancers in women are the main cancers in adults in Algeria. Demographic changes in the population will have a major influence on the expected number of cancer cases in the future. In addition to the increase in cancer incidence due to demographic changes, changes in incidence and mortality rates for specific cancers will impact the future burden of these diseases. Since the implementation of the five-year plans to fight cancer, Algeria is catching up in terms of management of cancer patients, especially in terms of radiotherapy. Efforts remain to be made to develop multidisciplinary collaboration between the different specialists in charge of cancer disease, to introduce in the training cycle of surgery a subspecialty of cancer surgery after obtaining the surgeon's diploma, as it is done in most of the developed countries, to arrive at a care of cancer patients in dedicated centers provided with an adequate technical platform where the medical staff has an exclusive exercise in cancer care. Finally, to insist with the authorities to make the project of the Cancer Institute which was to be built in Oran and which would be the national reference center.

Conflict of Interest Authors have no conflict of interest to declare.

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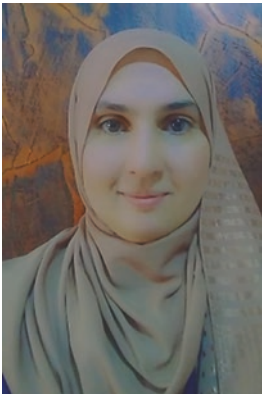
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