Chapter 11
General Oncology Care in Morocco

Saber Boutayeb and Mohammed Anass Majbar

11.1 Morocco Demographics

Morocco is a North African country. The current population of Morocco is estimated to be 37 million based on the projection of the United Nations data [1, 2]. Most of the local population lives in the Atlantic at the Mediterranean coastline. Casablanca is the biggest city with more than 7 million population. The other major cities are Marrakech, Rabat, Fez, and Tangier. The urban population represents around 60% of the entire population. The median age in the Moroccan population is young. Around 25% of the population is aged under 14 years [1]. The economy of Morocco is considered liberal and is the fifth largest African economy. The major Moroccan resources are represented by phosphate, tourism, agriculture, and car manufacturing. The Gross Domestic Product was evaluated at 118 USD billion dollars [3].

11.2 Cancer Statistics in Morocco

Morocco is currently in an epidemiological transition called, "double burden ", with the coexistence of infectious and chronic diseases. The two population-based registries are available in Morocco: Casablanca and Rabat [4, 5]. The registry of Casablanca covers more than 10% of the country's population (around 12%) and is used to

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Table 11.1 Top five cancers in Morocco between 2008 and 2012 according to the register of Casablanca [4]

Men cancers	Percentage	Women cancers	Percentage (%)
Lung	23%	Breast	35.6
Prostate	12.6%	Cervix	11.2
Colorectum	7.9%	Thyroid	8.6
Bladder	6%	Colorectum	5.9
Lymphoma	6%	Ovary	4

extrapolate the cancer incidence in Morocco [4]. These two registries provided descriptive information such as cancer type, histology, age, gender, and stage. To date, survival data is not provided by these registries. Table 11.1 shows the top five cancers in Morocco between 2008 and 2012 according to the registry of Casablanca [4].

The most frequent cancers in men are lung, prostate, bladder, colorectum, and lymphoma. Lung cancer represents 20.8% of all cancers in Men. Among them, the overall frequency of the EGFR mutation is 21%. Mutations were mainly detected in exon 19 (69%), followed by exon 21 (21%) and exon 20 (7%) [4, 6, 7]. Whereas, for women, the most frequent are breast, cervix cancer, colorectum, thyroid, and ovary [4, 5, 8]. Breast cancer is the leading cancer among females (36% of cancers in women) with an age-standardized incidence rate of 40.8 per 100,000. The median age at diagnosis is 49.5 years [9]. According to a large study conducted in Casablanca, the most common molecular phenotype was Luminal A (41.4%) Luminal B, HER2 and triple negatives occurred in 10.4%, 6.3%, and 11.2% [8].

11.3 Cancer Risk Factors

11.3.1 Tobacco

The prevalence in the general population is 18% in adults and 9% in youths. According to WHO, the mortality attributable to tobacco smoking is 8%. In 2008, the smoking prevalence among the Moroccan population was 16% (30% for males and 1% for females) [11–13]. Passive smoking is also high: 32% are exposed in their closed family circles and 60% are exposed in public places [13]. The anti-tobacco law was adopted in 1996 and Morocco signed the WHO Framework Convention on Tobacco Control in 2004 [10]. However, this legislation is poorly implemented, and the Moroccan population has generally not respected these laws.

11.3.2 Alcohol

In Morocco, alcohol is available in restaurants, bars, and hotels. However, drinking in public is strictly prohibited. The office of International Studies and Research on alcoholic beverages and spirits evaluated the Moroccans' alcohol consumption to

nearly 120 liters annually. According to the WHO global status reports on alcohol and health, 95% of the population reported abstaining from alcohol [10, 13].

11.3.3 Obesity

The prevalence of obesity is increasing in the Moroccan population according to data on measured heights and weights. In 1984, 4.1% of the adult population was obese, and the prevalence increased to 13.3% in 2000 [12, 13].

11.3.4 Other Risk Factors

The relevance of BRCA1/2 mutations in the Moroccan population was not studied.

Morocco is one of the low to intermediate endemic areas for hepatitis B virus (HBV) infection. However, no reports have been published on Occult HBV infection [10].

11.4 Cancer Screening Programs

The first Moroccan cancer plan (2010–2019) has given the priority to breast and cervix cancers [10, 13, 14]. For breast cancer, the program is based on clinical breast examination. In case of clinical abnormalities, patients are referred to the provincial diagnostic centers for digital mammography, breast ultrasound, and biopsy. The target age of the early detection program was 45–69 years. But in 2016, the age of initiation was lowered to 40 years [10]. For cervical cancers, the population-based screening program is based on visual inspection with acetic acid [10]. But in the private sector, the population with health insurance has a large access to mammography, cervical smear, colonoscopy, and prostate-specific antigen dosing.

The Ministry of Health and the Lalla Salma Foundation organize annual campaigns called October Rose dedicated to breast cancer screening. Screening by mammography is widely available in all regions. The other cancers do not benefit from regular screening campaigns [10].

11.5 Cancer Prevention Programs

Cancer prevention policies are mentioned in the Moroccan cancer plan. However, so far cancer prevention actions are rare. The Moroccan Health Authorities and The Lalla Salma Foundation launches regular mass media campaigns to promote healthy lifestyles. For tobacco-induced cancers, a specific program exists focusing on promoting the tobacco-free area in the companies, universities, and high schools. For cervical

cancer, the Ministry of Health planned to introduce the HPV vaccination in 2021. Concerning HBV vaccination is free as part of the National Vaccination Program [10].

11.6 Cancer Diagnosis

The diagnostic imaging infrastructure in the public sector includes 75 mammography machines, 56 CT scanners, eight MRI machines, one PET scanner, and seven nuclear medicine services. Endoscopy, bronchoscopy, and cystoscopy are in general available in all the regional public health centers. There are 31 pathology laboratories in the public sector but not all provide the complete panel of immunohistochemistry. Immunohistochemistry is in general more available in university hospitals and in private sectors [13, 14]. Biomolecular testings such as EGFR, ALK, HER, and BRAF are available in the main cancer centers [10].

11.7 Treatment

Cancer treatment is based on four primary disciplines: Surgical oncology, Radiation oncology, Medical oncology, and Palliative care. The cancer health care system (2020) in Morocco includes

- 11 Public Hospitals (6 university clinics), the major ones are the Institut National d'Oncologie (Rabat) and Mohammed VI Cancer Center in Casablanca
- 16 Private centers

The healthcare system is characterized by inequity medical insurance that covers only 40% of the population. A medical assistance plan called RAMED was launched in 2012 by the Moroccan authorities for the benefit of the low-income population with an aim of giving them free access to all health care services provided by public hospitals. Those patients who are not eligible for RAMED and not covered by health insurances need to pay for healthcare in public centers.

11.7.1 Medical Oncology

The medical oncologist specializes in diagnosing and treating cancer using chemotherapy, hormonal therapy, biological therapy, and targeted therapy. Moreover, the physician may coordinate treatment given by other specialists and give supportive care.

In Morocco, Medical Oncology (MO) is a relatively new specialty. Medical Oncology was recognized as a separate specialty by the Ministry of Health in 1994. However, the creation of the first chair of medical oncology at the University of Rabat was done in 2000. In 2020, overall, 150 medical oncologists are working in Morocco (mainly with a mixed training in Morocco and France or Belgium) [15]. The classical chemotherapies, hormonal therapies, and the first generation of

monoclonal antibodies, i.e., Trastuzumab, Rituximab, Bevacizumab, Cetuximab, etc., are widely available for the entire population. Two immunotherapies are available in Morocco: Pembrolizumab and Atezolizumab, though their reimbursement is still conflictual. The access to immunotherapy is accorded based on an individual's assessment for each candidate patient by the National Health Insurance Agency.

Hyperthermic Intraperitoneal Chemotherapy (HIPEC) was first performed in 2014 and is now available at one public center (National Institute of Oncology in Rabat) and two private clinics in Rabat and Casablanca [21]. Stem Cells Transplantation (both autologous and allogeneic) are available in the main cities (Rabat, Casablanca, Fes, and Marrakech).

11.7.2 Radiation Therapy

The radiotherapy infrastructure and human resources available in public health services include 17 linear accelerators (LINAC), 3 brachytherapy units, 9 treatment planning systems, 9 CT simulators. In the private sector, linear accelerators with VMAT or IMRT techniques are available in Casablanca, Rabat, Kenitra, Marrakech, Tangier, Meknes, Fez, and Oujda. Radiosurgery has started with a gamma knife in Rabat. But nowadays, Stereotactic Body Radiation Therapy (SBRT) is operational in major cities [13].

11.7.3 Surgery

Morocco has made significant progress in the surgical treatment of cancer in the past 30 years. In the 1980s, oncological surgery was performed almost exclusively in two university hospitals in Rabat and Casablanca. In 1985, the National Institute of Oncology was created in Rabat, the first center dedicated to the treatment of cancers in the country. It included the first department specializing in Surgical Oncology, which treated gynecological, digestive, urological, ENT, and Soft tissue cancers. From the mid-1990s, four new university hospital centers were created in Fez, Marrakech, Oujda, and Tangiers. It helped to train more surgeons capable of performing surgical oncology in more areas in the country. In 2018, it was estimated that major oncological surgeries such as breast or colonic resections, could be performed in 35 public centers [16]. In addition, two departments specializing in gyneco-mammary oncological surgery were opened in Casablanca and Rabat, and another specializing in digestive oncological surgery was opened in Rabat. The surgical offer in the private sector has also grown over the past 20 years, with two private university hospitals in Rabat and Casablanca and at least 16 private oncology clinics, mainly in major cities, with more private university hospitals and oncology clinics are under preparation. Advanced surgical techniques and technologies have been introduced in Morocco in the last 20 years. Advanced minimally invasive techniques are now routinely performed for colorectal, liver, gynecologic, thoracic, and urologic cancers [17–20]. The first surgical robot was acquired by the university hospital in Fez in 2019.

There are also ongoing liver transplantation programs in university hospitals in Morocco. The first case of successful liver transplantation performed by a Moroccan team was reported in 2016 [21]. There is an ongoing program for living donor liver transplantation for liver cancers at the National Institute in Rabat.

11.7.4 Pediatric Oncology

Nearly 1000 new cases per year of pediatric cancer are diagnosed in Morocco. Among them, the incidence of leukemia is estimated to be 100 new cases per year [22]. Pediatric cancer patients are mostly managed by public hospitals. The pediatric cancer units exist in university hospitals [23]. Since 2019, the Moroccan Health Ministry has been considering pediatric cancer management as a priority.

11.7.5 Survivorship Track

Data about cancer survival is scarce, and only a few published studies reported survival outcomes of cancer patients. Most of the published data concern breast and rectal cancers. For breast cancer, Mouh et al. compared outcomes between triple-negative and non-triple-negative patients in Rabat. Three years disease-free survival rates for the local disease were 76% and 83%, respectively [24]. Slaoui et al. compared survival outcomes between young and aged patients in Rabat. The 5-year disease-free Survival of patients with local disease was 64.6% in young women and 71.5% in older women with breast cancer ($p = 0.04$) [25]. Finally, the 5-year survival rate of patients with Breast cancer treated at the National Institute of Oncology in Rabat in 2009 was 81.5% [13].

For rectal cancer, Souadka et al. reported in 2015 the survival data for patients who had abdominoperineal resections for low rectal adenocarcinoma at the National Institute of Oncology in Rabat. The 5-year overall survival and disease-free survival rate were 74.6% and 60.3% respectively. Local and distant recurrences occurred respectively in 10 (6.8%) and 29 (20%) patients [26]. In 2019, the same team reported survival after surgery for mid and low rectal cancers. The overall survival rate after 1 year, 2 years, and 3 years are 94%, 89.1%, and 82.8%, respectively. Predictive factors of impaired survival were high age and advanced T stage [27].

11.7.6 Palliative Care Track

The first national plan against cancer identified several issues in access to palliative care in Morocco [10]:

- Insufficient training of healthcare workers in the palliative care field
- Lack of human resources

- Absence of terminal palliative care
- Insufficient follow-up of the patients after return to the home

In 2013, Morocco changed the law concerning the distribution of morphine by increasing the number of days' prescription for opioid analgesic (7–15 days) [24]. However, till now, palliative care activities are rudimentary. Only the city of Casablanca has developed a regional network for palliative and terminal care with the possibility of home care by a mobile team. According to a national survey published by Ettahri et al in 2017, the number of palliative care units in Morocco was only three with a total of 48 beds [28].

11.8 Research and Education

11.8.1 Research

Research in oncology is mainly performed in universities and university hospitals in Morocco. A step forward was made in 2014, by the creation of The Institute for Research in Oncology (IRC), with the goal of promoting and coordinating the national research efforts in oncology. Since its creation, IRC has funded more than 40 research projects and created a network for researchers in oncology called "IRC Research Associates" with a mission to facilitate collaboration and coordination between researchers in oncology in Morocco. More recently, IRC launched the ambitious "Moroccan Oncology Big data" project, a multidisciplinary initiative that includes the creation of the first national biobank, OMICS in oncology research and a digital pathology research platform. Despite these initiatives, oncology research in Morocco is still fragmented, uncoordinated with lower scientific production compared to other countries in the Arab world [30]. Few Phase II trials were published by Moroccan teams. There is no local phase III trial conducted in Morocco, however, the main cancer centers had already participated in international trials.

11.8.2 Education

Undergraduate medical education in Morocco starts after passing a competitive exam. Five public and two private faculties of medicine are offering basic and postgraduate medical education in Morocco. Undergraduate medical education in morocco is organized as follows [29]:

1. 1st cycle is for 2 years and consists of pre-clinical sciences
2. 2nd cycle: 3 years of clinical sciences
3. Sixth year: externship full time at the hospital.
4. Seventh year: internship
5. Thesis

Access to medical specialty training (also called residency) in oncology is possible for:

- Medical oncology (Rabat, Casablanca, Marrakech, Fes, Oujda and Tanger)
- Radiotherapy (Rabat, Casablanca, Marrakech, Fes, Oujda and Tanger)

None of the Moroccan faculties offers direct training in surgical oncology. They provide General surgery certification.

The access to residency training is done in two ways [29]:

- Through Internship Exam: Students who have successfully completed their 5th year and all training should sit for the Internship Exam and complete a 2-year internship at the University Hospital after which they are called residents. They are given priority in choosing the specialty.
- Through the Residency exam: Doctor of medicine after graduation can pass residency entrance exam and can start his/her medical residency training.

The duration of Morocco medical residency training varies from 4 to 5 years (4 years for medical specialties and biology, 5 years for surgical specialties and internal medicine).

11.9 Cost-Effective Cancer Care

The pharmaco-economy is not well developed in Morocco. Despite the existence of a medical society for health technology assessment, published articles in this field are rare.

11.10 Challenges and Advantages

Many achievements in cancer diagnosis and treatment in Morocco were achieved during the past 20 years. The country has improved its infrastructure from primary to tertiary care, allowing a wider part of the population to access specialized cancer care and successful screening programs for breast and cervix cancers were launched. The major achievement was the strong commitment of the Moroccan government to ensure the implementation of the National Plan for Cancer Prevention and Control 2010–2019; an ambitious plan covering all the aspects of cancer care from prevention, diagnosis, treatment, and management. With the collaboration of non-profit organizations such as the Lalla Salma Foundation for Cancer Prevention and Treatment, donors, and international organizations such as the World Health Organization and the International Agency for Research on Cancer, the International Atomic Energy Agency, and the United Nations Population Fund, Morocco ensured a strong political and financial support of the Plan during the past 10 years [13]. Figure 11.1 shows the evolution of the number of public cancer centers from 2004 to 2020.

However, there are still many challenges ahead that need to be addressed. First, cancer patients are still mainly diagnosed at late stages. Early screening programs for breast and cervix cancers should be enhanced to increase population access.

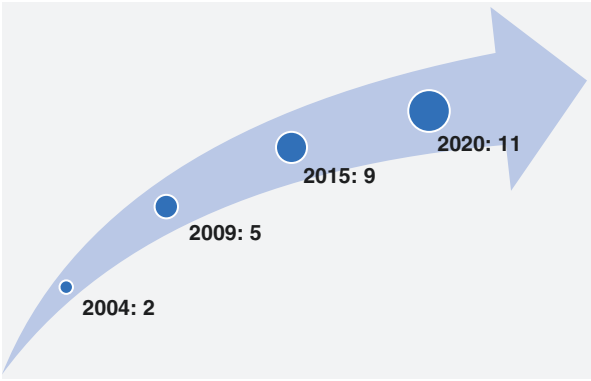

Fig. 11.1 The evolution of the number of public cancer centers from 2004 to 2020

Screening programs should also be expanded to other cancers such as colorectal cancer. Moreover, palliative care also needs to be improved and expanded to more Moroccan cancer patients. Finally, survival data is lacking for most cancers, which does not allow us to adequately evaluate the ongoing cancer programs.

The Moroccan government has recently validated the National Plan for Cancer Prevention and Control 2020–2029 with a specific focus on prevention and screening programs, improvement in national cancer management, investment in information technology, and advanced research programs. The Moroccan Government has committed in 2020 to make cancer care a national priority. A strong decision was made to create a national agency dedicated to the management of cancer care in Morocco under the presidency of the Prime Minister.

11.11 The Future of Cancer Care in Morocco

11.11.1 Quality Improvement

Standardization of cancer care is another challenge to improve patients' outcomes. Few guidelines for cancer management are produced by scientific societies, however, they are not endorsed by the authorities. There is a need for standardization of care to improve patients' outcomes.

11.11.2 Information Systems

The improvement at the national level of cancer care cannot be done without an efficient collection, analysis, and reporting system. The adoption of oncology information systems was late in Morocco. The National Institute of Oncology in Rabat was the first to set up a Hospital Information System (HIS), quickly followed by the regional oncology centers in Casablanca, Tangier, Benimellal, and soon in Agadir

and Laayoune. This has made possible the streamline of the patient pathway, the improvement of traceability and information sharing, and the improvement of prescribing safety, particularly for cytotoxic drugs. The generalization of Hospital Information System (HIS) adoption is a fundamental step to improve patient care. It must include not only tertiary centers but also primary and secondary centers to coordinate the patient pathway from prevention, screening, treatment, and follow-up. This generalization is under evaluation in the country.

11.12 Conclusion

In the last 20 years, Morocco has improved cancer care with strong investments in infrastructure, human resources training, awareness, and screening programs. The adoption of the National Plan for Cancer Prevention and Control 2010–2019 was a major step forward by the Moroccan government to reach these achievements. Many challenges remain, such as early cancer diagnosis, follow-up pathways, investment in information technology, and better national management of cancer care. The strong commitment of the Moroccan Government and substantial collaboration with oncologists and international organizations, are major assets for Morocco to reach the goals of the next National Plan for Cancer Prevention and Control 2020–2029.

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

References

1. High Commission for Planning (HCP). Final results of the national survey on demographic repeated passage in 2014. 2014
2. https://gco.iarc.fr/today/data/factsheets/populations/504-morocco-fact-sheets.pdf
3. https://www.worldbank.org/en/country/morocco/overview
4. Bouchbika Z, Haddad H, Benchakroun N, Eddakaoui H, Kotbi S, Megrini A, Bourezgui H, Sahraoui S, Corbex M, Harif M, Benider A. Cancer incidence in Morocco: report from Casablanca registry 2005-2007. Pan Afr Med J. 2013;29:16–31.
5. Tazi MA, Er-Raki A, Benjaafar N. Cancer incidence in Rabat, Morocco: 2006-2008. Ecancermedicalscience. 2013;7:338.
6. Lachgar A, Tazi MA, Afif M, Er-Raki A, Kebdani T, Benjaafar N. Lung cancer: incidence and survival in Rabat, Morocco. Rev Epidemiol Sante Publique. 2016;64(6):391–5.
7. Errihani H, Inrhaoun H, Boukir A, Kettani F, Gamra L, Mestari A, Jabri L, Bensouda Y, Mrabti H, Elghissassi I. Frequency and type of epidermal growth factor receptor mutations in Moroccan patients with lung adenocarcinoma. J Thorac Oncol. 2013;8(9):1212–4.
8. Khalil AI, Bendahhou K, Mestaghanmi H, Saile R, Benider A. Breast cancer in Morocco: phenotypic profile of tumors. Pan Afr Med J. 2016;6(25):74.
9. Mechita NB, Tazi MA, Er-Raki A, Mrabet M, Saadi A, Benjaafar N, Razine R. Survie au cancer du sein à Rabat (Maroc) 2005-2008 [Survival rate for breast cancer in Rabat (Morocco) 2005-2008]. Pan Afr Med J. 2016;25:144.
10. http://www.contrelecancer.ma/en/le_pnpcc
11. Fakhfakh R. Tobacco control in three north African countries: Tunisia, Algeria and Morocco. Tob Induc Dis. 2019;17(1):44.

12. El Rhazi K, Nejjari C, Zidouh A, Bakkali R, Berraho M, Gateau PB. Prevalence of obesity and associated sociodemographic and lifestyle factors in Morocco. Public Health Nutr. 2011;14(1):160–7.
13. Selmouni F, Zidouh A, Belakhel L, Sauvaget C, Bennani M, Khazraji YC, Benider A, Wild CP, Bekkali R, Fadhil I, Sankaranarayanan R. Tackling cancer burden in low-income and middle-income countries: Morocco as an exemplar. Lancet Oncol. 2018;19(2):93–101.
14. Basu P, Selmouni F, Belakhel L, Sauvaget C, Abousselham L, Lucas E, Muwonge R, Sankaranarayanan R, Khazraji YC. Breast cancer screening program in Morocco: status of implementation, organization and performance. Int J Cancer. 2018;143(12):3273–80.
15. Boutayeb S, Taleb A, Belbaraka R, Ismaili N, Berrada N, Allam W, et al. The practice of medical oncology in Morocco: the National Study of the Moroccan Group of Trialist in medical oncology (EVA-Onco). ISRN Oncol. 2013;2013:1–4.
16. Hrora A, Majbar AM, Elalaoui M, Raiss M, Sabbah F, Ahallat M. Risk factors for conversion and morbidity during initial experience in laparoscopic proctectomies: a retrospective study. Indian J Surg. 2017 Apr;79(2):90–5.
17. Majbar AM, Abid M, Alaoui M, Sabbah F, Raiss M, Ahallat M, Hrora A. Impact of conversion to open surgery on early postoperative morbidity after laparoscopic resection for rectal adenocarcinoma: a retrospective study. J Laparoendosc Adv Surg Tech A. 2016;26(9):697–701.
18. Serji B, Souadka A, Benkabbou A, Hachim H, Jaiteh L, Mohsine R, et al. Feasibility and safety of laparoscopic adrenalectomy for large tumours. Arab J Urol. 2016;14(2):143–6.
19. Benkabbou A, Souadka A, Serji B, Hachim H, El Malki HO, Mohsine R, Ifrine L, Belkouchi A. Laparoscopic liver resection: initial experience in a north-African single center. Tunis Med. 2015;93(8–9):523–6.
20. Rabiou S, Lakranbi M, Ghizlane T, Elfatemi H, Serraj M, Ouadnouni Y, Smahi M. Quelle chirurgie pour quelle tumeur du médiastin: expérience du service de chirurgie thoracique de CHU Hassan II de Fès [Which surgery for mediastinum tumor: experience of the Department of thoracic surgery of CHU Hassan II of Fès]. Rev Pneumol Clin. 2017;73(5):246–52.
21. Benkabbou A, Awab AM, Koraichi A, Souadka A, Alilou M, Sbihi L, Moatassim N, Rhou H, Afifi R, Essaid A, Belkouchi A. First case of successful liver transplantation performed by a Moroccan team. Arab J Gastroenterol. 2016;17(1):1–2.
22. Howard SC, Zaidi A, Cao X, Weil O, Bey P, Patte C, Samudio A, Haddad L, Lam CG, Moreira C, Pereira A, Harif M, Hessissen L, Choudhury S, Fu L, Caniza MA, Lecciones J, Traore F, Ribeiro RC, Gagnepain-Lacheteau A. The my child matters programme: effect of public-private partnerships on paediatric cancer care in low-income and middle-income countries. Lancet Oncol. 2018;19(5):252–66.
23. Hessissen L, Madani A. Pediatric oncology in Morocco: achievements and challenges. J Pediatr Hematol Oncol. 2012 Mar;34(Suppl 1):S21–2.
24. Mouh FZ, Slaoui M, Razine R, El Mzibri M, Amrani M. Clinicopathological, treatment and event-free survival characteristics in a moroccan population of triple-negative breast cancer. Breast Cancer (Auckl). 2020;14:1178223420906428. https://doi.org/10.1177/1178223420906428. eCollection 2020
25. Slaoui M, Mouh FZ, Ghanname I, Razine R, El Mzibri M, Amrani M. Outcome of breast cancer in Moroccan young women correlated to clinic-pathological features, risk factors and treatment: a comparative study of 716 cases in a single institution. PLoS One. 2016;11(10):e0164841.
26. Souadka A, Majbar MA, El Harroudi T, Benkabbou A, Souadka A. Perineal pseudocontinent colostomy is safe and efficient technique for perineal reconstruction after abdominoperineal resection for rectal adenocarcinoma. BMC Surg. 2015 Dec;15(1):40.
27. Essangri H, Majbar MA, Benkabbou A, Amrani L, Belkhadir Z, Ghennam A, Al Ahmadi B, Bougtab A, Mohsine R, Souadka A. Predictive factors of oncological and survival outcome of surgery on mid and low rectal adenocarcinoma in Morocco: single center study. J Med Surg Res. 2019;1(1):627–35.
28. Ettahri H, Berrada N, Tahir A, Elkabous M, Mrabti H, Errihani H. Palliative care, a reel challenge in income and middle countries. Example of Morocco. J Palliat Care Med. 2017;7(5):316.
29. Fourtassi M, Abda N, Bentata Y, Hajjioui A. Medical education in Morocco: current situation and future challenges. Med Teach. 2020;42(9):973–9.
30. https://www.irc.ma/en

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