

Research Article**Towards Development of Excellence in Regional Cancer Centers: Indian Scenario****M. Ashraf Wani¹, Farooq A. Jan², Nazir A Khan³, H.R. Ahangar⁴**¹Senior Resident, Department of Hospital administration, Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Kashmir, India²Addl. Professor, Department of Hospital administration, Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Kashmir, India³Addl. Professor, Department of Radiation Oncology, Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Kashmir, India⁴Assistant Professor, Department of Hospital administration, Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Kashmir, India***Corresponding author**

Dr. Mohammad Ashraf Wani

Email: dmawani19@gmail.com

Abstract: Cancer undoubtedly is becoming an important public health issue. To tackle the problem a large number of cancer centers are needed to be built in the country. National Cancer Control Program established the Regional Cancer Centers to improve availability of cancer treatment facilities. The main objective in establishing these centers was to provide cancer treatment facilities in addition to improve prevention activities across the country. The objective was to study the organization and physical facilities of regional cancer center of Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar. A retro-prospective model utilizing observational study of relevant records and interview technique was used to study the physical facilities and organization of regional cancer center at SKIMS, Srinagar. The study reveals that the design and layout of regional cancer center is in accordance with prescribed engineering norms. The regional cancer center is well equipped though some state of art equipment and staff strength needs to be increased to enhance treatment facilities. The policy and procedure are strictly adhered to. In conclusion, cancer patients require multi disciplinary treatment from medical oncology, surgical oncology and radiation oncology specialties. Besides, diagnosis of disease requires special methods of investigations to identify, to classify the type, severity and spread of disease. Hence, to develop a cancer treatment center special knowledge of disease process, diagnosis and treatment modalities is imperative and it requires the most appropriate physical space, equipment and trained manpower.**Keywords:** Cancer, Regional cancer center, National cancer control program, Oncology, Cancer treatment, Cancer prevention

INTRODUCTION

Cancer undoubtedly is becoming an important public health issue and cancer patients require multi disciplinary treatment [1]. The total world incidence shows the enormous health problem caused by cancer, which is recognized as the second killer disease in humans [2]. Cancers in all forms are causing 9% of deaths throughout the world. One in every four deaths in USA is related to cancer. On the optimistic side, the five year survival rate of cancer patients has increased world over. Better outcomes are due to advances in research and education. Progress will require ongoing advances in cancer prevention, early detection and treatment [3]. It is estimated that there are approximately 2-2.5 million cases of cancer in India at any given point of time, with around 7-9 lac new cases being detected each year. Nearly half of these cases die

each year [4]. This burden is going to be double in 2026. By 2020, up to 70% of the 20 million new cases annually are predicted to occur in the developing countries [5]. Accurate statistics on the occurrence of cancer are not available for the developing countries [6].

Cancer will become an increasingly important challenge to health services of developing countries in coming decades. Anticipating the emergence of cancer as a public health problem, the Indian National Cancer Control Program was initiated in 1975 and then revised in 1984 and 1994. The National Cancer Control Program (NCCP) set itself a very laudable and ambitious goal of reducing the morbidity and mortality from cancer in India. To achieve its goal of reducing the morbidity and mortality from cancer NCCP took the

most pragmatic approach of prevention and along with better treatment and care for common cancers considering the limited resources devoted to nations health, never the less NCCP has proven its utility in three decades and grown beyond a data collection to telecobalt and morphine distribution exercise [1]. National Cancer Control Program established the Regional Cancer Centers (RCCs) to improve the availability of cancer treatment facilities. The main objective in establishing these centers is to provide cancer treatment facilities in addition to prevention activities across the country [7].

Oncology center is expected to take comprehensive care of cancer patients which provides services of prevention, early diagnosis, treatment, disability limitation, and rehabilitation. Beside this education, training of different categories of health personnel, generation of data and research are important components of the organization. Cancer hospitals also provide palliative care and pain relief in the incurable and terminal cases [8].

Interdisciplinary team building approach is the need of hour in oncology in the new millennium. It becomes increasingly clear that a much closer link is essential between scientists and health care professionals in all fields to capitalize on scientific advances in cancer control. Not only is new knowledge required, but also the ability to translate biologic knowledge into clinically relevant questions or therapies, and then to transfer new clinical knowledge to caregivers, the public, and health policymakers [9].

In regional cancer center an integrated approach is used, in which the oncological care is patient centered and multidisciplinary. Successful multidisciplinary care in an integrated, oncological department needs broad support inside the hospital and a well defined organizational plan [10].

In the literature, there is support for the organization of a multidisciplinary oncological care and centralized treatment is favorable to the patient [11, 12].

The department of medical oncology and associated sister departments have been existing and rendering the services to patients suffering from various malignancies since 1980's at SKIMS. It is the only center in state where all the modalities required for treatment of cancer are well developed viz-a-viz radiation oncology, medical oncology, clinical hematology and surgical oncology. SKIMS is a 700 bedded tertiary care teaching hospital which receives patients from all three regions of Jammu & Kashmir. The population of J & K is about 12.5 million. There is no independent cancer hospital in state and regional cancer center-SKIMS, is an integral part of this tertiary care institute. The regional cancer

center-SKIMS was established in October, 2007 under the National Cancer Control Program. In RCC-SKIMS a hospital cancer registry is maintained which provides statistical and surveillance support to researchers.

METHODOLOGY

After permission from ethical committee, a retro prospective study was conducted in 2013 from 1st May to 31st July in Regional Cancer Center of Sher-i-Kashmir Institute of Medical Sciences (SKIMS), Srinagar which is a large tertiary care referral hospital of Jammu & Kashmir. Regional cancer center is an integral part of this tertiary care institute with 65 beds earmarked for cancer patients. A mixed methodology utilizing observational study, study of relevant records and interview technique was used to study the physical facilities and organization of regional cancer center. Interview with relevant functionaries was conducted to obtain information on various organizational aspects of regional cancer center. Physical facilities were observed by investigators themselves by visiting the regional cancer center which includes layout, design, space, staffing, equipments and logistics. This was discussed with coordinator of regional cancer center, medical superintendent and concerned section of engineering department. A drawing of physical and architectural layout was obtained from civil engineering department of SKIMS and verified on spot.

RESULTS

Regional cancer center is located within the SKIMS main hospital building. It has been given the status of RCC in 2007 and expanded to a 65 bedded independent cancer center, primarily catering to cases of different malignancies. The RCC-SKIMS is approved by atomic energy regulatory board (AERB). Different modalities required for the treatment of cancer are well developed viz a viz radiation oncology, medical oncology, clinical hematology, surgical oncology and radiological physics. The center is supported by departments of anesthesiology, radio diagnosis, clinical biochemistry, immunology, pathology, clinical pharmacology, microbiology, immuno-haematology, nuclear medicine, physical and rehabilitation medicine and blood bank of SKIMS. It is also supported by service departments of main hospital like CSSD, drug and pharmacy, medical records department, engineering departments of mechanical, electrical, civil and bioengineering.

Physical Facilities

Regional cancer center is situated on the ground floor of main hospital building near the referral clinics of out-patient department. RCC is located close to radio diagnosis, PMR, blood bank and nuclear medicine departments. In-patient area is located in the 4th and 5th floor of main hospital building. Besides, a 12 bedded day care ward is situated in the 1st floor.

OPD of different specialties is situated within the RCC itself. Bed distribution in RCC is as follows:

Total Bed strength	- 65
Medical Oncology	- 20
Radiation Oncology	- 18
Clinical Hematology	- 09
Surgical Oncology	- 06
Dare care	- 12

Dimensions of Different Areas

Total area	- 36903 sf.
Inpatient area	- 5664 sf.
OPD	- 1585 sf.
Day care	- 1440 sf.
Registration	- 208 sf.
Equipments	- 26342 sf.
Offices and others	- 1664 sf.

Equipments

Some of the important equipments in RCC are:

- Cobalt 60 unit
- CT simulator
- Mammography machine
- Treatment planning system
- Radiation monitoring equipment
- Radiation Physics laboratory for dosimetry and dose calculations.

Organization and Staffing

Regional cancer center is under overall control of Director, SKIMS and head department of radiation oncology is chairman who functions as a coordinator of RCC.

a. Medical Oncology

-Professor	-03
-Additional Professors	-01
-Senior Residents	-03
-DM Student	- 01
-Chemotherapy (oncology) Nurses	-02
-Staff Nurses	- 10

b. Radiation Oncology

-Professor	-03
-Additional Professors	-01
-Assistant Professors	-03
-Senior Residents	-05
-Post graduate students	-12
-Technologist/Technicians	-11
-Tutor	-01
-Oncology Nurses	-02
- Staff Nurses	-12

c. Clinical Hematology

- Addl. Professor	-01
-Associate Professor	-01
-Assistant Professor	-01
-Senior Residents	-02
-Oncology Nurses	-01
-Staff Nurses	-05

d. Surgical Oncology

-Assistant Professors	-04
-Senior Residents	-02
-Staff Nurses	-02

e. Day Care Ward

-Oncology Nurse	-01
-Staff Nurses	-08

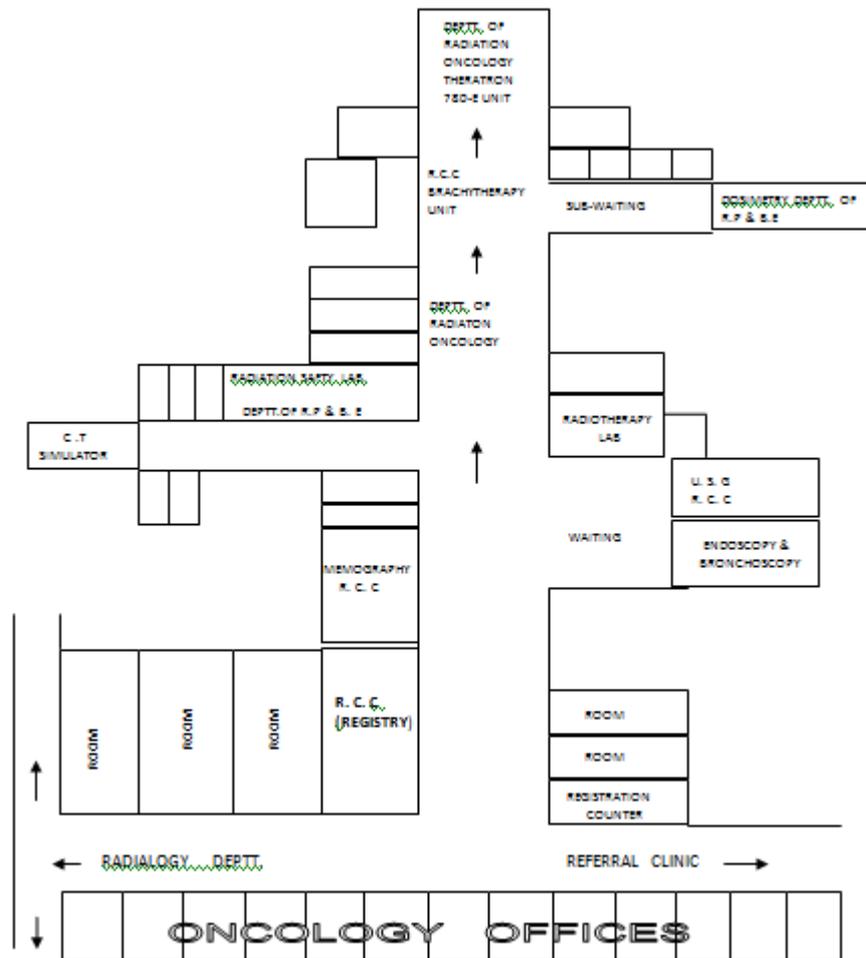


Fig. 1: Lay out of Regional Cancer Center, SKIMS

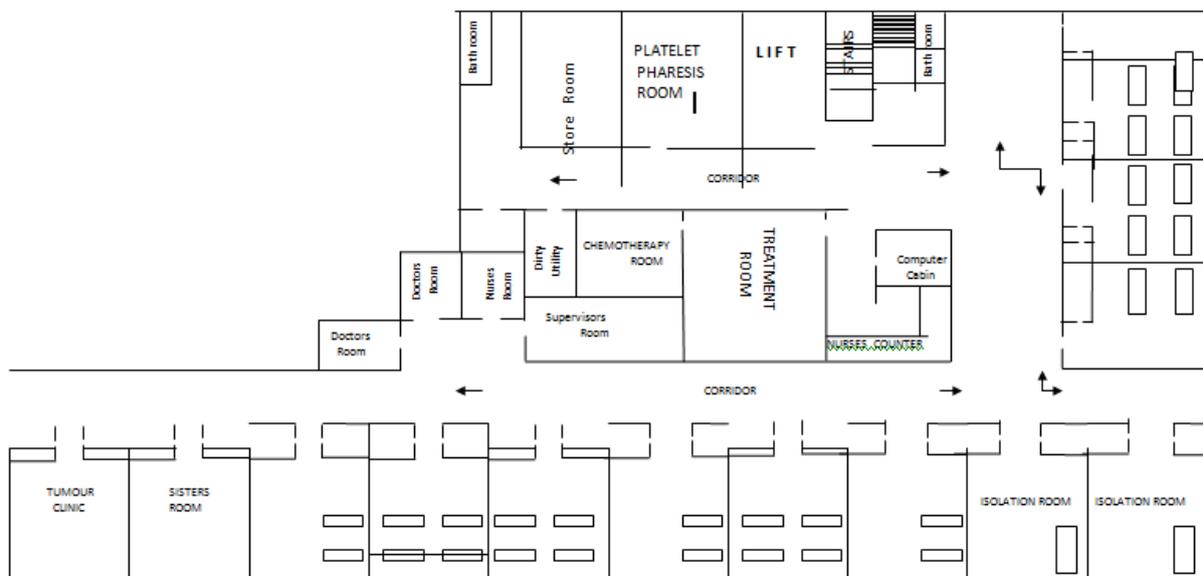


Fig. 2: Layout of Medical Oncology Ward, SKIMS

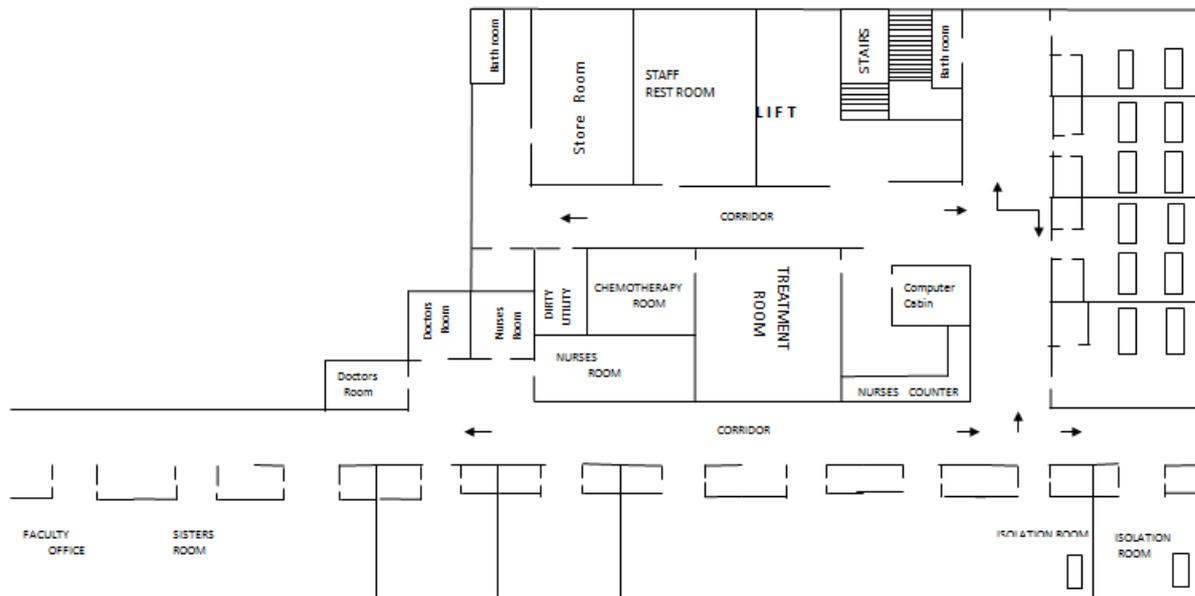


Fig. 3: Layout of Radiation oncology ward, SKIMS

Policy and Procedure

Patients are being referred to regional cancer center from various specialties of SKIMS, medical colleges of state and other hospitals including state health services and private clinicians.

Since, there is only one functional regional cancer center in whole Kashmir province, so the number of patients that are being registered in RCC depicts the overall incidence of cancer in the valley.

Patients are being registered under a proforma which has been specially designed for cancer patients. After that patients are being evaluated for confirmation of diagnosis and staging of disease and then decision regarding treatment is being undertaken by the team of specialists. There is a tumor clinic going on between radiation oncology, medical oncology, surgical oncology, plastic surgery and other specialties every week where patients with diagnostic dilemma and difficult treatment protocols are being discussed. Several research projects are going on jointly in the RCC with other departments wherein patients are being put on neo-adjuvant, adjuvant and concurrent chemo-radiotherapy protocols. RCC is also engaged in the academics conducting seminars, journal clubs and other teaching programmes for M.D and DM students. Every year five post graduate M.D students are admitted for training in radiotherapy department. Besides, department is providing training to B.sc and M.sc laboratory technicians. DM program has been recently started in medical oncology and two students are admitted for this purpose every year.

Stoma Clinic

A stoma care clinic which is a part of general hospital also caters to the needs of cancer patients who have undergone such procedure and is staffed by a trained

stoma care nurse. Poor patients are provided ostomy bags free of charges.

Surgical Oncology

Surgical oncology department has recently been commissioned and it was initially started with a solitary faculty member with six beds earmarked for this specialty making total bed strength 65 in RCC. Later three more faculty members were appointed in late 2013. With this the head and neck oncology program was also undertaken in surgical oncology department. The department of surgical oncology is yet in infancy.

Hospital Cancer Registry (HCR)

Cancer registry at RCC-SKIMS is hospital based where in all the cancer patients, who are being referred from different institutions and periphery are being registered. A proforma which is designed specially for these patients is being filled by the medical record technician. It includes demography, diagnosis and staging of cancer patients. A case file is made to which permanent RCC number is allotted. Medical record section is engaged in maintaining cancer registry where two trained persons are engaged for this purpose permanently. Registration section is fully computerized.

DISCUSSION

Cancer undoubtedly is becoming an important public health issue [1]. To tackle the problem a large number of cancer centers are needed to be built in the country. Planning and designing of oncology center is an integral part of planning and designing of a general and superspeciality hospital. Like other superspeciality hospitals, cancer treatment center requires specific facility designing, because of complex nature of disease and complexity of treatment. Cancer patients require multi disciplinary treatment from medical oncology, surgical oncology and radiation oncology. Besides,

diagnosis of disease requires special methods of investigations to identify, to classify the type, severity and spread of disease. Hence, to develop a cancer treatment center special knowledge of disease process, diagnosis and treatment modalities is imperative and it requires the most appropriate physical space, equipment and trained manpower. Oncology center designing follow the norms of general hospital planning with special consideration to palliative care, radiotherapy facility and radiation safety measures. The development of a new cancer treatment center is a large, complex undertaking, and a great deal of information and understanding is required by all the interested stakeholders before significant effort, time, and money are spent [8].

Regional cancer center-SKIMS is part of a tertiary care superspeciality hospital and is supported by departments of radio diagnosis, clinical biochemistry, immunology, pathology, clinical pharmacology, microbiology, immuno-haematology, nuclear medicine, physical and rehabilitation medicine and transfusion medicine of SKIMS. It is also supported by service departments of main hospital like CSSD, drug and pharmacy, medical records department, engineering departments of mechanical, electrical, civil and bioengineering.

Cancer treatment center may be developed as an extension part of already functioning general hospital, so that the support services of the main hospital may be utilized or it may be developed as a stand alone center. Then provision for support services must be made at the planning stage.

A multidisciplinary oncology institution whether attached to the general hospital in a separate building or developed stand free, should have the following departments and facilities [8].

- **Clinical Departments**

- Surgical oncology
- Pediatric oncology
- Community Oncology
- Medical Oncology
- Radiation oncology

- **Para-clinical departments**

- Department of Medical Physics
- Pathology and Hematology
- Nuclear Medicine
- Laboratory Medicine
- Radio-diagnosis
- Blood Bank (Transfusion Medicine)

- **Other Infrastructures**

- Onco-Nursing
- Medico-Social workers
- Pharmacists
- Speech therapy

- Day care
- Psych-oncology
- Dieticians
- Occupational / Physical therapy
- Palliative care

- **Research**

- Medical records
- Basic Research and Radio-Biology
- Epidemiologist and Cancer Registry
- Basic Research and Radio-Biology

- **Support Services**

- Stores department
- House keeping
- Manifold
- Security and Fire services
- Kitchen Dietary services
- Hospital Mortuary
- Communication Services
- Laundry services
- CSSD
- Ambulance and Vehicle department
- Engineering Department
- Bio-Medical Waste management services

- **Hospital Administration**

- Accounts Department
- Human resource department

The RCC-SKIMS is well equipped and needs some state-of-art equipment especially in the modality of radiation therapy that will strengthen its already existing equipment. Small and large linear accelerators with multileaf collimators, moulding equipment, high dose and low dose brachytherapy, contact therapy and digital mammography needs to be installed in radiation oncology department. Besides, PET scan, interventional radiology, bone density scan and chemoembolization need to be installed. Medical oncology department has recently started bone marrow transplantation. DM program in medical oncology has recently been started. Bed strength needs to be increased in RCC and there should be a separate OPD complex, ICU and OT for cancer patients. Gamma knife and cyber knife should be part of OT equipment.

A passive follow up system is followed in hospital cancer registry (HCR) section. A life time follow up needs to be adopted in HCR which will provide descriptive statistics to researchers. For this purpose staff strength in HCR section needs to be increased.

It is expected that a cancer center as an organized program will offer following services [13].

- Diagnosis, treatment and follow up
- Surveys of mortality and morbidity
- Training of personnel both medical and paramedical
- Preventive measures with emphasis on mass examination, health education and industrial hygiene

- Research – fundamental and applied.

General building principles and considerations are as follows.

- Evidence based design
- Healthy architecture
- Green architecture (Environment friendly/Eco-friendly)
- Intelligent building
- Ergonomically designed building (Disabled/Physically handicapped friendly)
- Barrier free building
- Value added services.

Cancer patients are psychologically disturbed thus are always accompanied with more than one attendant; while designing the waiting area, corridors and facilities this aspect needs to be taken care of. [8]

Cancer requires primarily surgical and radiotherapy treatment. Hence state of art

- Operation theatre is to be planned in modular way with intra operative radiotherapy measures
- Gamma knife and cyber knife are advancement in radio-oncology which requires amalgamation in onco-surgery
- Radiotherapy is modality of treatment which has to be planned as per AERB guidelines
- Disposal of radioactive waste is another necessity, which requires designing accordingly since inception.

Radiotherapy equipments are massive and heavy in character, so their planning requires special designs at initial stages with the help of physicists incorporating AERB guidelines [14].

All incurable and terminal cases require special facility designing like palliative care suit and pain relief centers. Worldwide scenario of patient care is changing because of escalating cost of treatment. Prevention is considered as a cost effective measure, therefore, for cancer prevention different epidemiological factors have to be taken into account. Separate wing for preventive function, and a small peripheral referral unit should be planned whose function include public education so as to bring changes in life style and screening of high risk population. Medico social workers and information, education and communication should regulate these works [8].

CONCLUSION AND SUGGESTIONS

Cancer patients require multi disciplinary treatment from medical oncology, surgical oncology and radiation oncology. The diagnosis of disease requires special methods of investigations to identify, to classify the type, severity and spread of disease. Hence, to develop a cancer treatment center special knowledge of disease process, diagnosis and treatment modalities is imperative and it requires the most appropriate physical space, equipment and trained manpower.

The study reveals that the design and layout of regional cancer center is in accordance with prescribed engineering norms. The RCC is well equipped though it needs some state-of-art equipment like small and large linear accelerators, moulding equipment, brachytherapy, contact therapy, gamma knife and cyber knife that can enhance the treatment facilities. The policy and procedure are strictly adhered to. Staff strength needs to be increased in hospital cancer registry section and in nursing. Hospital cancer registry (SKIMS) should be given the status of population based cancer registry.

Availability of modality of surgical oncology would definitely help to improve the out come of cancer treatment and bring down the cost of treatment by saving time. This modality needs to be upgraded in manpower, bed strength, ICU and theatre facility. Provision for at least 200 in-patient beds and 50 day care beds is the need of hour as the patient load is increasing.

To provide more comprehensive cancer treatment services for the people of Jammu & Kashmir it is imperative that this center should augment its facilities and improve the quality of its programs.

For spreading awareness in the community a community oncology division (social oncology) should be started. This specialty is of immense utility in regard to early detection and prevention of cancer. Department of cancer epidemiology should be started with the aim of studying epidemiological determinants of cancer and prevention strategies in this region. Palliative care facility should be provided to these patients at SKIMS.

To make it a centre of excellence, Optimal staffing and service provision should include adequate human resources, across all disciplines so that people of Jammu & Kashmir receive the quality healthcare.

ACKNOWLEDGEMENTS

The authors express their gratitude to Firdous Ahmad Wani and Mudasir Ahmad Wani for their work in compiling and processing the data; to Zubaida Akhter for her efforts in gathering data for this work; to Mr. Nazir Ahmad and Mr. Abdul Rashid of engineering department for offering help in mathematical calculations and to Jawahira Akhter for the valuable comments during the final touch of this work.

REFERENCES

1. Sarin R; Indian National Cancer Control Programme: Setting Sight on Shifting Targets. J Can Res Ther., 2005; 1(4): 240-248.
2. Stewart BW, Kleihues P; World Cancer Report. Lyon: IARC Press, 2003.
3. Stone MJ, Aronoff BE, Evans WP, Joseph FW, Lieberman ZH, Mathews CM *et al.*; History of the Baylor Charles A-Sammons Cancer Centre. Proc (Bayl Univ Med Cent), 2003; 16(1): 30-58.

4. Park K; Epidemiology of Chronic Non-Communicable Diseases and Conditions. In Park's Text Book of Preventive and Social Medicine. 21th edition, Volume 6, M/S Banarasi Das Bhanot Publishers, Jabalpur, MP, India: 2009: 332-35.
5. Indian Council of Medical Research (ICMR); Non-Communicable Diseases: In Annual Report 2003-2004. Volume 6, New Delhi, 2004: 98-105.
6. Rath GK, Mohanti BK; Introduction. In Principles and Practice of Radiation Oncology. 1st edition, New Delhi. B.I. Churchill Livingstone Pvt. Ltd. (Reprint), 2007: 1-24.
7. Guidelines for New Regional Cancer Centres; National Cancer Control Programme Guidelines. Ministry of Health and Family Welfare, Govt. of India, 2005; 1: 1-13.
8. Health Building Note 54: Facilities for cancer services and HBN 12: OPD. NHS, Ministry of Health, London, 1991.
9. Batist G, Shinder GA; The McGill University Department of Oncology: structure depicts the shape of evolving knowledge. *Curr Oncol.*, 2008; 15(3):143-150.
10. Meiss-de Hass CL, Falkman H, Douma J, van Gassel JG, Peters WG, van Mierlo R *et al.*, Organizational Design for an Integrated Oncological Department. *Int J Integr Care*, 2001; 1:1-14.
11. Harding MJ, Paul J, Gillis CR, Kaye SB; Management of Malignant Teratoma: Does Referral to a Specialist Unit Matter? *Lancet*, 1993; 341(8851): 999-1002.
12. Abu-Own A, Sachs R, Loudon C, Linnard D, Buckland J, Murphy S *et al.*; Vascular Surgical Society of Great Britain and Ireland: Integrated Pathways for Vascular Surgery. *British Journal of Surgery*, 1999; 86(5): 703.
13. Bruder P; Reducing costs: Who really wants to? *Hosp Top.*, 1993; 71(2): 7-10.
14. Report of the RBE Committee to the International Commission on Radiological Protection and on Radiological Units and Measurements. *Health Phys. ICRU*, 1963; 357-360.