
A Outpatient Services

A1 AMBULATORY CARE CENTRE

A1(h) Cancer Centre Radiation Therapy

A1(h) CANCER CENTRE RADIATION THERAPY

A1(h).1 SERVICE DESCRIPTION

A1(h).1.1 Scope of Clinical Services

This section A1(h) sets out the requirements for the self-contained facilities for the Facility's Radiation Therapy treatment modules to be achieved or accommodated by Project Co in providing the Works and the Services. The provision of a separate entry into the Radiation Therapy treatment area will be considered, particularly as it applies to Cancer Centre patients and their need for short routes between ground level parking and treatment facilities. The Radiation Therapy treatment modules are responsible for assessing, planning, treating patients, administration and support functions (i.e., managing and organizing staff, equipment and work processes). In addition, the centralized facilities for dentistry/oral oncology are accommodated within the Radiation Treatment module. The modules are:

- Assessment module (see also section A1(e) Cancer Centre General Clinic)
- Treatment planning module
- Radiation treatment module

The service functions and activities within each module can be categorized as follow:

A1(h).1.1.2 Assessment Module

Consultations in the Cancer Centre General Clinic area will determine whether the patient will be suitable for radiation therapy. If the patient requires radiation therapy, they will be scheduled for a radiation therapy planning session in treatment planning. Patients will be assessed during treatment in the areas designated within the treatment module. Post-treatment the patients will have follow up appointments scheduled in the General Clinic area.

A1(h).1.1.3 Treatment Planning Module

The planning session results in the establishment of a treatment plan which describes the method of treatment, including number of treatment sessions, fields required, etc. for the "course". The main objective of treatment planning is to facilitate the accurate delivery of a predetermined dose of radiation to a prescribed target volume. Detailed planning for dose delivery is accomplished through computer calculations and simulations, preparation of immobilization devices, design and manufacture of radiation compensators and the use of mechanical simulators. Under the direction of medical physicists, the technical staff utilizes measured dosimetry data to devise a custom radiation treatment plan for each patient.

Facility resources in support of radiation treatment planning include:

- Offices/workstations for physicists, physics assistants, electronics service technicians, radiation therapists (working in dosimetry) and physics trainees/grad students
- Treatment planning room and simulator suites
- Brachytherapy high dose rate treatment planning room
- Appliance fabrication room
- Physics laboratory
- Technical support (IT office and work area/storage)
- Electronic shop (adjacent to the treatment planning area)
- Machine shop

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Treatment planning is responsible for monitoring radiation sources to provide data needed for radiation therapy and for ongoing quality assurance and control of radiation sources.

In addition, treatment planning monitors and ensures radiation safety for all staff and patients within the Cancer Centre. This includes monitoring of absorbed doses of radiation received by patients undergoing diagnosis or treatment, and disposal of radioactive materials.

The planning module interfaces with provincial and federal agencies responsible for radiation safety and a radiation safety officer will ensure the proper handling and storage of source material.

Treatment planning is also responsible for systems development, technical services and administration. Medical physics will provide staff and facility resources for the design and construction of treatment planning programs (software systems), and the design and construction of treatment apparatus. IT technical services provides the support and resources to maintain the above activities and the research commitments of the treatment planning, in addition to services in other Cancer Centre departments. Specific resources include an on-site electronics shop, machine workshop, physics lab and storage.

The Cancer Centre machine shop provides an immediate and specialized response to the need for repair, design, manufacture and installation of specialized medical equipment. The first priority of the machine shop is to maintain and/or repair Radiation Therapy treatment machines and accessories, to ensure there is minimal down time. Other priorities include manufacturing and repairing a broad range of equipment used in various other departments within the Cancer Centre. Much of the equipment that is manufactured is for custom purpose, and not commercially available. For example:

- quality assurance services
- converting a regular Varian accessory head into a MLC accessory head (\$6,500 savings)
- manufacturing gold seed eye plaques and electron shielding for individual eye tumour treatments
- planning/design and installation of rigid attachments for patient hoists
- calibration jigs for physics
- safety splash guards for labs
- film chart holders for surgical oncology

In addition, the machine shop works in close collaboration with the physics electronics department on equipment overhauls, and is occasionally requested to machine replacement parts for in connection with the E8 Service Category.

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The table below illustrates the gradual expansion of treatment planning workload from initial opening to 2015.

Table A1(h)-A: Workload Indicators for Treatment Planning for 2007 and 2015

	Projected Year 2007 (Opening)	2015 (Maximum Capacity)
# CT Simulators	2	3

Note: The Project Co will allow for contiguous space for building to maximum capacity for a third simulator and associated change rooms and locker space.

A1(h).1.1.4 Radiation Therapy Treatment Module

The resources from this module include all aspects of radiation therapy treatment and patient review. (In addition, there is also an administration/support function as in other modules). The services provided to each RT patient are determined by their treatment plan recommended by the oncologists and other specialists after the extent and type of cancer has been determined. At the Cancer Centre, the RT patient will be able to access the full spectrum of services that will, stage, and treat the cancer, provide on treatment assessments and regular follow-up assessments.

The module includes facilities for the application of ionizing radiation in the treatment of cancer and, to a lesser extent, benign disease. The primary form of treatment involves the use of external beams of high-energy photons or electrons on the cancer site, commonly referred to as external beam radiation therapy. Another type of radiation therapy is brachytherapy in which the radioactive source is delivered internally through a tube or applicators implanted or inserted at surgery. The radiation therapy source is inserted manually or more commonly, performed by a remote after loading machine. Associated with the radiation treatment itself is the ongoing medical care and management of the patient during the course of therapy as well as the complex treatment planning required before therapy is initiated.

Radiation therapy workloads are measured with units defined below as:

- "Course" – a planned series of treatment sessions for either new or repeat patients
- "Treatment visit" or "fractions" – a patient treatment session, representing a single visit for RT treatment
- "Field" – an individual dosage of a specific radiation delivered to a specific area from a specific angle

Once the treatment plan is established, the patient is scheduled for a series of treatments. The "fractionation" of the course of treatment can require up to 6 weeks or possibly longer. Usually 5 treatments per week are administered. As mentioned above, multiple fractions (multiple daily treatments or hyper-fractionation) will increase in the future.

Typically, patients will receive 2 to 4 fields per treatment visit for an average of 18 to 22 fractions. In the future, there will be an increase in the number of multiple daily treatments (hyper fractionation), and an increase in the number of fields received, as conformal

therapy/IMRT becomes a more common practice. (Conformal therapy results in the radiation dose distribution more accurately fitting the tumour area rather than treating the entire region containing the tumour.)

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Patients receiving hyper-fractionated treatments may need to spend a significant part of the day in the unit. A large part of this time will be spent waiting between treatment sessions, and this will likely increase with the trend towards multiple daily treatments. A lounge will be provided for these day patients as well as a holding area/stretching bay where patients can be monitored by nursing staff.

Patients that would be treated on superficial or orthovoltage at the FVCC, will be treated with electrons at this Cancer Centre.

Examination/consultation rooms are included in this component to allow radiation oncologists and other caregivers to meet with patients prior to simulation and during the course of their treatments. Patient/staff conference rooms are used by the Cancer Centre staff to review with the patient and their family the proposed treatment program.

Diagnostic services, including phlebotomy, general radiography and CT scanning, MRI, PET scanning, will be provided by the Abbotsford Hospital.

The table below illustrates the gradual expansion of Radiation Therapy from initial opening to 2015.

Table A1(h)-B: Workload Indicators for Radiation Therapy for 2007 and 2015

	Projected Year 2007 (Opening)	Projection for 2010 (approx)	2015 (Future Capacity)
# Linear Accelerators	4	4	6
Fractions Per Course	19	20	21
Hours of Operation/Day	8 hrs.	10 hrs.	10 hrs.

Note: The Project Co will allow for contiguous space for building to maximum capacity for a fifth and sixth vault for a dual energy linear accelerator and supporting waiting area.

Dentistry

It is anticipated that by 2010, a critical mass of head & neck cancer, leukaemia and lymphoma patients in the BC Lower Mainland will be treated at the Cancer Centre. At such time, the range of services to be provided will include:

- triage patients for RT treatment
- pre-treatment assessment
 - make appropriate referrals for additional consultation
 - arrange for completion of necessary treatment
 - arrange follow-up care
- preventative care

Maintenance and monitoring of patients on treatment, basic operative procedures, restorative and prosthetic care will be referred to the existing Fraser Valley (Surrey) Cancer Centre, Vancouver Cancer Centre, or to a community dentist, consistent with treatment needs and availability of required resources. It is anticipated that a well trained dentist from the community working at the Cancer Centre will be able to provide appropriate triage, referral, patient education, and arrangements for follow-up. These measures are important in avoiding

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associated oral risks that may limit treatment, in maintaining quality of life, and in reducing post-treatment dental expense.

A1(h).1.1.5 Current Trends

In providing the Works and Services, Project Co shall take into account the following trends:

- *Increased use of CT based planning, resulting in an increased amount of information for planning and an increase in time required for 3-dimensional treatment planning.*
- *Greater use of conformal therapy/IMRT and increased complexity of individual treatment plans (and number of plans per patient).*
- *There is an increased requirement for accuracy in treatment (higher machine tolerances and a greater requirement for documentation and monitoring of tolerances in the complete treatment process) i.e., greater demand for quality assurance.*
- *Technological advances in treatment improving the success rate of radiation therapy and expanding number of cancer cases for which radiation therapy can be beneficial.*
- *Increased fractionation and hyper-fractionation of course.*
- *An increase in the number of fields as conformal therapy/IMRT becomes a more common practice.*
- *Capability for long-term future addition of new technologies (e.g., Intensity Modulated Radiation Therapy (IMRT), image guided RT, etc.).*
- *Increase in HDR (High Dose Rate) brachytherapy treatment and radio-immuno therapy (in conjunction with Nuclear Medicine).*
- *Use of endorectal ultrasound for staging/treatment decision making for patients with rectal cancers.*

A1(h).1.2 **Scope of Education Services**

This component will continue to provide radiation therapy clinical teaching for Radiation Therapy students, medical students and residents and physicists' education programs at the Cancer Centre. The program is critical to maintaining a supply of oncology health care professionals for cancer centres in British Columbia. In addition, treatment planning will be involved with in-service training for treatment planning, and selected components for radiation therapist training and may be involved in the training of medical physicists at the university level. Programs continue to involve in-service training modules.

Dentistry/oral oncology will participate in continuing education programs for health care professionals in the community. The program may be called upon to host dental residents who are a part of the general dental practice training programme of the University of British Columbia, and host visiting health professionals who are interested in increasing their proficiency in the management of cancer patients.

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A1(h).1.3 Scope of Research Services

Any clinical or basic research activities undertaken in any of the modules will be accommodated within service areas and may be linked to research and resources at BCCRC.

In the future, it can be anticipated that all professional staff will continue to pursue research grants for research related to all aspects of radiation therapy/oncology planning, delivery and care. Radiation therapy/oncology will continue to have an enhanced involvement in clinical trials through affiliations with a radiation therapy clinical trials group. This will entail provision of sufficient clinical trials resources.

Dentistry/oral oncology may initiate or participate in active research co-ordinated through the provincial oral oncology program, and may support research being undertaken by other BC Cancer Agency provincial programs and tumour groups in consultation with the oral oncology program.

A1(h).1.4 Specific Exclusions

This specification excludes radiation therapy services/requirements provided elsewhere, including:

- Total body irradiation at the VCC
- Assessment services (new patient referral, consultation and follow up) in the General Clinic Area (see section A1(e) Cancer Centre General Clinic)
- Services to major radiation therapy equipment
- Superficial/orthovoltage radiation therapy treatment services at the FVCC
- Low dose rate brachytherapy at the FVCC
- Paediatric oncology at VCC and FVCC
- Radiation oncologists offices (see section A1(f) Cancer Centre Professional Staff Offices)
- Medical physics leader and physicists offices (see section A1(f) Cancer Centre Professional Staff Offices)
- Secretarial workstations and RT process leader office (see section A1(f) Cancer Centre Professional Staff Offices)
- Office for dentist (see section A1(f) Cancer Centre Professional Staff Offices)
- Process leader office (see section A1(f) Cancer Centre Professional Staff Offices)
- Second information systems workstation (see section D1 IM)
- PET scanner in Abbotsford Hospital (see section C3 Medical Imaging)
- Dental treatment/operative procedures/prosthetic care at FVCC and VCC

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A1(h).2 OPERATIONAL DESCRIPTION

A1(h).2.1 Minimum Hours of Operation

Initial opening hours will be for an 8-hour day with 4 linear accelerators, and operating hours will be extended to 10 hours per day as required, prior to addition of more accelerators (to a maximum of 6).

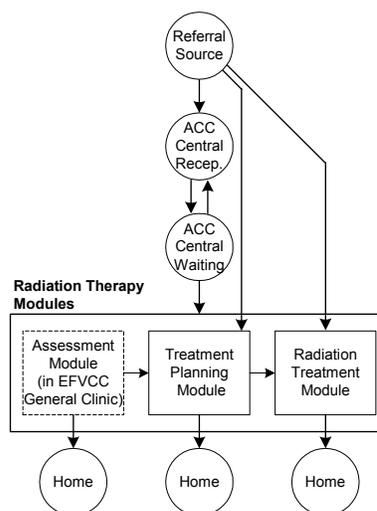
Dentistry/oral oncology hours of operation will vary with workload. Under full workload, the dental clinic will be open from 0830h to 1630h and coordinated with the scheduling of the shared ENT/dentistry procedure room.

A1(h).2.2 Patient Management Processes

A1(h).2.2.1 Central Reception/Registration/Booking

The majority of patients (including dentistry) will access the Radiation Therapy treatment area via the Radiation Therapy entry. Other patients may access the area via the outpatient entrance. New patients are to report to the central reception desk for assistance. The role of the central reception located at the entrance will be to assist with general enquires. Patients will then be directed to the Radiation Therapy area and/or shared ENT/dentistry procedure room.

Patients (including dentistry) arriving early, relatives/carers waiting for patients in Radiation Therapy, and patients in between consultations will utilize the central waiting area adjacent to the central reception in Ambulatory Care.



Patient Flow Diagram¹

A1(h).2.2.2 Reception/Registration/Booking for Radiation Therapy

Once the decision to treat a patient with radiation therapy has been made (which occurs for 90 – 95% of patients after consultations in the A1(f) Cancer Centre General Clinic area), a patient will be scheduled for a radiation therapy planning session in the treatment planning module. The planning session results in the establishment of a treatment plan which describes the method of treatment including the number of treatment sessions, fields, shielding blocks required, etc. for the “course or case”. All patients, clinicians, and visitors to the department are received at the main reception desk. A variety of other tasks, including telephone call handling, appointment scheduling, answering patient queries are also undertaken here.

A1(h).2.2.3 Waiting in Treatment Planning Module

After going to the reception desk, the patient will proceed to the sub-waiting areas associated with the treatment planning rooms (appliance fabrication room and simulation rooms) in this component. Patients will be called from the waiting areas by treatment planning staff, and directed to the simulation or appliance fabrication rooms’ areas to begin treatment planning. Inpatients brought down by stretcher wait in the stretcher bay adjacent to the waiting area.

¹ Note that the assessment module is partially in the General Clinic area and partially in the treatment module area.

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A1(h).2.2.4 Appliance Fabrication Room

Immobilization devices made from a thermoplastic material (e.g., Aquaplast) that is fitted to a patient is manufactured in the appliance manufacture room. The device keeps a patient in the same position during each treatment to ensure that the beam is directed at the targeted area. Patients may require more than one immobilization device. For example, if a tumour shrinks during the course of treatment, the device may no longer be accurate. Patients enter the fitting room, change, and are fitted for their appliance. A therapist will manufacture the required devices in an adjacent workshop. Storage space is required for the large volumes of material used to create the moulds. Once the device has been fitted, the patient changes and returns to the reception desk to make a further appointment if necessary.

A1(h).2.2.5 Simulation Area

The next step in the patient's progress through radiation therapy planning is the design of the treatment, or treatment planning. Several tools are used for this purpose:

- There will be CT simulators which will have an x-ray imaging system with fluoroscopy capabilities, which reproduces the mechanical operation of the treatment machines. The images allow the physician/therapist to view and document the coverage of the proposed treatment beams. Patient body measurements are often taken in this area as well (e.g., outline of the patient's external body contour). In addition, a PET scanner located in Diagnostic Services in Abbotsford Hospital will produce diagnostic images that would also be utilized for treatment planning purposes.
- The planning system displays images from the CT simulator, allowing the proposed beams to be adjusted and displayed on these images, in addition to the calculation and display of the resulting dose distribution. The planning system also enables the calculation of the machine settings required to achieve the specified distribution.

Patients enter the simulation area and are directed to the change facilities. Patients are then escorted to the simulator suite by a radiation therapist. The therapist returns to the control area adjacent to the simulator room where they can directly view the patient. Patients will be able to communicate with staff in the control area through an intercom system. Each simulator room has an associated control room. Digital images of the patient will be taken during simulation and images will be reported from high resolution monitors, stored on a fast access digital system and made available for viewing throughout all areas within the modules. Once the images have been verified, the patient changes and returns to the reception area to make further appointments if necessary.

A1(h).2.2.6 Reception/Booking in Radiation Therapy

After going to the main reception desk in the treatment module, the patient will proceed to the main waiting area in this module, from which point he/she will be directed by the unit clerk to a sub-waiting area associated with the treatment rooms. Inpatients brought down by stretcher wait in the stretcher bay adjacent to the waiting area. Patients will be called from the waiting areas, and escorted to the examination room, or changing facilities. Changing and toilet facilities will be provided to service each sub-waiting area, and following changing, and immediately following examination, patients will wait in the sub-waiting area closest to their treatment area. Family members will be permitted to accompany patients to the sub-waiting area, subject to available space. Inpatients will be taken directly to the treatment area.

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A1(h).2.2.7 Radiation Therapy Treatment

Patients are escorted to the treatment units by a radiation therapist who positions the patients using the immobilization device on a treatment couch. The therapist returns to the control area outside the treatment room to administer the treatment. Each treatment room has an associated control room. Patient radiation treatment records and planning images may be displayed in the control room area for each treatment unit throughout the course of the therapy. Patient viewing cameras, treatment delivery computers and intercom allow the radiation therapist to monitor and communicate with the patient during treatment when the patient is alone into the treatment room.

Patients arriving for brachytherapy will be directed to the changing facilities, and will be subsequently escorted to the brachytherapy procedure room. The procedure room will have an associated control room.

A1(h).2.2.8 On-treatment Assessment and Care

Patients are assessed weekly by a radiation oncologist throughout the course of their treatment. They may also see a nurse or other disciplines for the following:

- Education
- Support
- Dressing changes
- Medication delivery
- IV start and monitoring

Consultation/examination rooms (immediately adjacent to the simulator and accelerator areas) will be available for multi-disciplinary staff to discuss with patients any other issues pertinent to their treatment program and care, assess their condition and alter the treatment program as necessary.

Consultation/examination rooms (immediately adjacent to the simulator and accelerator areas) will be available for multidisciplinary staff to discuss with patients any other issues pertinent to their treatment program and care, assess their condition and alter the treatment program as necessary.

Dentistry patients will be called from the waiting area by the CDA, and escorted to the dental chair. Patients required to re-book will be directed to the main reception desk (shared with RT) of this treatment module. It is assumed that a dedicated outpatient scheduling system is available to co-ordinate the booking of clinics and support services.

A1(h).2.2.9 Post-Treatment

Following radiation therapy treatment, the majority of patients will change back into the street clothes and leave the department. Inpatients, transport patients and patients from other hospitals will need to wait until porters or transport is available in the waiting area.

Following brachytherapy, the patient will recover in the recovery bay area.

A1(h).2.3 Patient Information Management

Refer to Output Specifications, Section 3: Non-Clinical Services, subsection D1 Information Management; Section 5: Design and Technical, subsection 5.3.17 Technology and

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Communication Systems; and Section 6: IT/Tel Services.

A1(h).2.4 Staff Work Processes

A1(h).2.4.1 Preparation for Radiation Therapy Treatment

For brachytherapy procedures, staff will prepare sterile trolleys and instruments in a clinically clean environment.

Prior to undertaking a radiation therapy treatment sessions, the radiation oncologist or radiation therapist will review the treatment with the patients in a consultation/examination room. This area will be configured as a standard examination room with image viewing facilities, a reporting desk and be stretcher accessible. A central workroom for radiation therapists will be provided for staff communications, computer access, dictation etc .

A1(h).2.4.2 Treatment

Each treatment room will have an associated control room that can accommodate up to 6 people throughout the day. Radiation therapists will perform all control functions and monitor patients in the treatment room from this area. The control areas will require space to house equipment (patient viewing monitors, portal imaging computers and all other equipment, workstations associated with the running of the accelerator) and in addition a workstation for image and chart viewing, access to the scheduling system, and space to store treatment records (if not electronic). Treatment rooms will require space and an appropriate environment for equipment, storage, easy access for patients on stretchers, etc.

A1(h).2.4.3 Post-Treatment

Following treatment, patients will be escorted by radiation therapy staff to the change facilities.

Following brachytherapy procedures, staff will be required to clear away sterile trolleys and instruments.

A1(h).2.4.4 Radiation Therapy Meetings

A conference/meeting room for education, conferences and meetings of Radiation Therapy staff and affiliated groups will be able to accommodate up to 15 people and appropriate number of monitors for viewing of patient images will be provided. In addition, a training/meeting room will be provided for Radiation Therapy staff. The location of meetings rooms will be within 2 to 3 minutes of treatment areas.

A1(h).2.4.5 Maintenance

Electronics service technologists are responsible for (under the direction of a medical physicist) the maintenance and repair of all major radiation therapy equipment) they are also involved in the design, construction and installation of electronic systems as attachments to radiation therapy equipment or as special projects requested by medical physicist. Tool and die makers/machinists also participate in the maintenance and repair of the mechanical



Process Flow Diagram

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functions of the radiation therapy equipment. They are also responsible for the construction of some patient immobilization devices.

A1(h).2.4.6 Dentistry/Oral Oncology Reception/Registration/Booking

All scheduled and unscheduled patients (and/or accompanying porters and escort staff), clinicians, and visitors to the clinic are received at a reception/registration desk in the Radiation Therapy treatment component. All outpatients will register with the unit clerk. Inpatient will be portered to the component by porters. Patient information is checked against existing computer and manual records, and examination details are entered on the computer system. At the RT reception desk in a private area such as an acoustic workstation or other private area, where the reception/billing clerk can discuss dental insurance coverage and billing with dentistry patients.

A1(h).2.4.7 Dentistry/Oral Oncology Exam/Consult

Staff will then execute the examination, consultation, etc., with the patients.

A1(h).2.5 Materiel Services

Refer to Output Specifications, Section 4: Facility Management Services, subsection E7 Materiel Services, and Section 2: Clinical Services, subsection C8 Sterile Processing Services.

A1(h).2.6 Linen/Housekeeping Services

Refer to Output Specifications, Section 4: Facility Management Services, subsections E5 Housekeeping Services and E6 Laundry/Linen Services.

A1(h).2.7 Equipment Asset Management

Cancer Centre physics/electronics and machine shop staff will provide full services for Radiation Therapy equipment.

Also refer to Output Specifications, Section 4: Facility Management Services, subsection E2 Biomedical Engineering; and Section 7: Equipment.

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A1(h).4 ACTIVITY INDICATORS

The table below summarized the projected activity for radiation therapy services which must be addressed by Project Co in performing the Works and the Services.

A1(h).4.1 Hospital Activity (Incl. in Cancer Centre Activity below)

A1(h).4.2 Cancer Centre Activity

Unit	4 Accelerators at 10 hours per day	Maximum capacity – 6 accelerators at 10 hours per day
<u>Radiation Therapy Planning / Treatment</u>		
Simulator Visits	2,878	3,857
Appliance Fabrication Room Visits	632	874
Plans Generated	1,654	2,289
Courses	1,858	2,571
Fractions Required	37,164	54,000
Fractions Per Course	20	21
RT Patient Review Visits	7,433	10,800
<u>Dentistry / Oral Oncology</u>		
New Patient Consultations		125

A1(h).4 PEOPLE REQUIREMENTS

This component will have a total staff complement in the range of 80 FTE, consisting of 1 chief therapist (treatment module leader), 29 radiation therapists, 1 RT education/development/practise, 6 resource therapists, 7 physicists, 2 physics assistants, 3 electronics service techs, 1 IT support person, 2 tool/die maker, 1 assessment module leader, 1 CDA/clerk receptionist, 7 RT registered nurses, 5 RT unit clerks, 3 LPN's, and 10 RT clerks 4 (image management reception/RT booking).

It is anticipated that the key functional areas in the component will need to accommodate the following maximum number of people.

Functional Areas	Patients	Staff	Visitors	Others	Total
Treatment Planning	0	15-27	0	1-2	16-29
Technical Area	0	4-6	0	1-2	5-8
Simulation Areas	4-6	4-8	4-6	1-2	15-22
Appliance Fabrication Room Area	3-5	3-4	1-2	1-2	8-13
RT Review Area (incl. Dentistry)	16-18	12-18	10-15	4-5	42-56
Radiation Therapy Area	16	16-18	8-10	1-2	41-46
Brachytherapy Area	1-2	5-10	2-3	1-2	9-17
RT Administration Area	0	18-20	0	5-10	23-30

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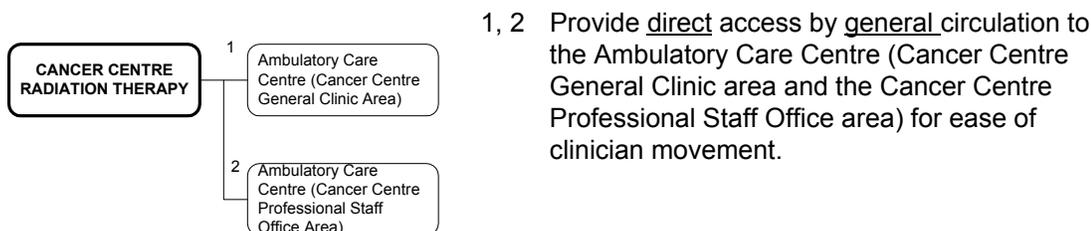
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A1(h).5 DESIGN CRITERIA

A1(h).5.1 Key External Relationships

The following key relationships will be achieved in the priority order as numbered for the purposes stated:



A1(h).5.2 Key Internal Relationships/ Environmental Considerations

The following will be achieved:

A1(h).5.2.1 Zoning of Activity

This component is one of 3 zones for the modules responsible for assessing, managing, planning and treating patients, organizing staff and equipment. The modules are:

- Assessment module zone (see also section A1(e) Cancer Centre General Clinic)
- Treatment planning module zone
- Radiation treatment module zone

A1(h).5.2.2 Patient Control

Provide for the control/reception of all incoming patients from a single location.

A1(h).5.2.3 Patient Waiting Areas

Given the large numbers of patients being treated daily, the various physical conditions (ranging from ambulatory to very ill) and the introduction of multiple daily treatments, the waiting areas must be designed to afford privacy and yet maintain a very high level of efficiency.

The following waiting areas will be provided:

- A large public waiting area for patient and family or friends when they first enter the component and are waiting to be directed to their treatment area or treatment planning room. Patients will carry their valuables with them
- A sub-waiting area related to the treatment units, with adjacent change facilities
- An additional sub-waiting area will be located adjacent to the simulator suites
- Holding area for patients on stretchers that is close to and can be monitored from a care station

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A1(h).5.2.4 Visitor Waiting

Patient escorts will be encouraged to wait for fast turn-around patients in order to be available to take them home following a procedure.

A1(h).5.2.5 Access

Provide controlled access to the instrument storage room for the protection of expensive and sensitive pieces of equipment. Within workshop areas, the number of doors between shop areas will be kept to a minimum to facilitate the movement of equipment; double doors will be provided to all workshop areas.

A1(h).5.2.6 Noise Control

Provide for the control of noise associated with activity in the appliance fabrication room so as not to disturb patients or staff. All examination, consultation rooms and offices will be acoustically private.

Also refer to Output Specifications, Section 1: Key Site and Building Design Criteria, subsection 1.2.5.4 Acoustics.

A1(h).5.2.7 Access & Circulation

Provide generous and direct circulation systems in all patient areas to allow for the efficient movement of both ambulatory and wheelchair/stretchers/bed patients. The requirement for bed access (usually a 1.20 m door) will be carefully addressed.

The treatment and planning areas should not be used as a thoroughfare. Some access routes and circulation systems must allow delivery paths for large pieces of equipment. Height, width, and floor loads must be considered in the design of these access routes.

Wherever possible, a separation between patient circulation and staff/materials circulation within the component will be attempted. Avoid needless traffic by locating higher-volume treatment areas closest to the patient entry/reception point. This will also help maintain a certain degree of visual and acoustic privacy in the procedure areas.

A1(h).5.2.8 Patient Privacy

Provide visual and acoustic privacy for patients in all changing, consultation, examination and treatment spaces. Changed waiting areas will be screened from the adjacent circulation spaces. The function of patient changing/undressing in a public area and the invasion of privacy associated with this activity needs to be addressed at every level of design. Ideally, changed patients should not have to cross public circulation space in order to access procedure rooms from changed waiting areas.

Dentistry/oral oncology patients will require privacy to discuss dental insurance coverage and billing with staff.

A1(h).5.2.9 Simulator Room Considerations

Provide adequate storage space for machine accessories and up to 7.5 meters of work space.

Provide 4 – wall and ceiling mounted lasers that require a steel plate mounted to the building stud fixed at the floor and ceiling to ensure stability when mounted.

The design/layout should anticipate the addition of new technologies and space requirements that may be greater than currently programmed.

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A1(h).5.2.10 Flexibility/Expandability

Space for two additional vaults (bunkers) will be planned for this facility. The additional space will be located in an area contiguous with the 4 vaults in this project and should include sufficient space for all the required support areas.

In addition, space for an additional CT simulator and associated support areas will be planned as well. The additional simulator will be located in an area contiguous with the other 2 simulators in treatment planning. In the event that the Abbotsford Hospital's Medical Imaging department does not acquire a PET scanner, the additional simulator will be a PET/CT simulator.

All bunkers will be designed to the BC Cancer Agency standard, able to accommodate dual energy (6-18 MV) machines and IMRT.

Also refer to Output Specifications, Section 1: Key Site and Building Design Criteria, subsection 1.2.3.3 Flexibility and Expandability.

A1(h).5.2.11 Interior Design Considerations

Refer to Output Specifications, Section 1: Key Site and Building Design Criteria, subsection 1.2.5.1 Healing Environment.

A1(h).5.2.12 Special Technical Requirements

Provide fully dimmable lighting in all patient areas.

Provide patient vital signs monitoring capabilities in procedure areas and pre- and post-recovery areas.

Provide intercom between control rooms and simulator/treatment rooms.

Provide supports for heavy ceiling-mounted equipment such as frames of data monitors.

Provide sufficient power capacity, air conditioning capacity, and compressed air in radiation treatment rooms, and access for future expansion of service.

Provide a minimum 3.0 metres ceiling height in procedure rooms, with a minimum 1 metre space above for heating, ventilating and air conditioning systems.

Provide a maximum distance of 7.5 meters for the cable run between the simulator and the generator, however minimal distances are preferable to minimize the degradation of cable operation.

ENT/dentistry procedure room requires appropriate plumbing and lighting, i.e., dry compressed air at >80 psi, high volume wet-dry suction, water and overhead lighting unit.

Also refer to Output Specifications, Section 5: Design and Technical.

A1(h).5.2.13 Treatment Room Design Considerations

Provide treatment rooms with a maze like corridor at the entrance of the unit for radiation protection. The maze, entrance and entry to the treatment room must allow access for the treatment machine, service equipment, hospital beds, and gantry frames.

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A1(h).5.2.14 Shielding Measures

Provide appropriate radiation shielding in compliance with the Canadian Nuclear Safety Commission (CNSC) regulations throughout the area and matched with machine functionality and beam-on-time.

Also refer to Output Specifications, Section 5: Design & Technical, subsection 5.3.13.2 Radiation Protection.

A1(h).5.2.15 Control Room Considerations

Provide a standing height (37") for the counter adjacent to the treatment bunker wall with a foot rail.

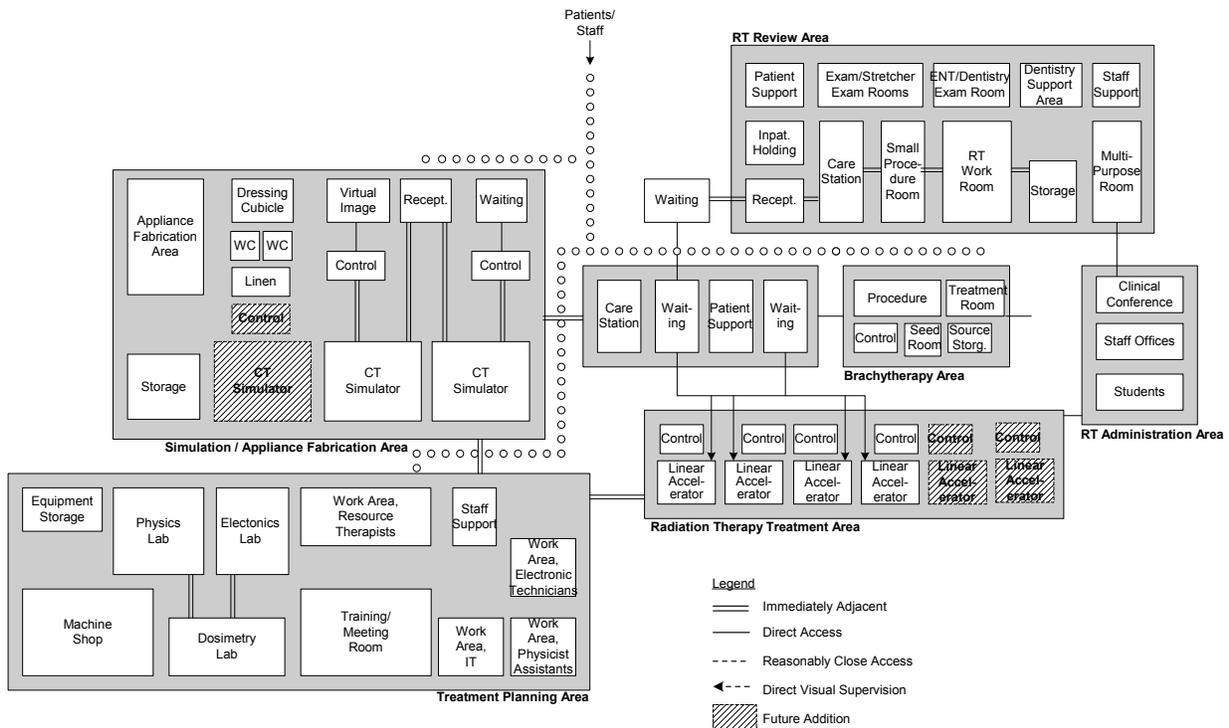
Provide a sitting height (30") work counter directly opposite the above counter.

Or any other design that is compatible with the installed equipment and work processes.

A1(h).5.2.16 Component Functional Diagrams

The spatial organization of this component will be generally as shown in the diagram below.

A1(h).5.2.16.1 Micro Relationship Diagram



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A1(h).5.3 Schedule of Accommodation (Note: Spaces listed in parentheses () are spaces supporting services provided by Project Co and are included in the total net square metres.)

Ref	Space	Area Requirements		
		units	nsm/unit	nsm
	Treatment Planning Module			
	<u>Treatment Planning</u>			
01	Work Area, Physicist Assistant and Information Systems	1		24.0
02	Work Area, Resource Therapist	1		18.0
03	Unassigned Reference Number	0		0.0
04	Training/Meeting Room	1		38.0
05	Dosimetry Laboratory	1		72.0
06	Washroom, Staff	1		2.5
	Subtotal			154.5
	<u>Technical Area</u>			
07	Work Area, Electronic Technicians	1		24.0
08	Electronics Laboratory	1		42.0
09	Physics Laboratory	1		42.0
10	Storage, Equipment/Material	1		20.0
11				
11-1	Machine Shop Area	1		104.0
11-2	Office	1		8.0
	Subtotal			240.0
	<u>Simulation Area</u>			
12	Reception/Booking Area	1		9.0
13	Waiting Area, Patients	1		21.0

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Ref	Space	Area Requirements		
		units	nsm/unit	nsm
14	Stretcher Area	1		2.5
15	Control Room	2 ¹	14.0	28.0
16				
16-1	Simulator, 2 dimensional	1	44.0	44.0
16-2	CT Simulator, 3 dimensional	1	44.0	44.0
17	Virtual Simulation Room	1		26.0
18	Dressing Cubicle, Patient Assisted	2	2.5	5.0
19	Washroom, Patient, Wheelchair Type	2	4.5	9.0
20	Patient Locker Area	2	2.0	4.0
21	Storage Area	1		20.0
22	Housekeeping Closet	1		(5.0)
23	Linen Alcove	1		(1.5)
	Subtotal			219.0
	<u>Appliance Fabrication Area</u>			
	Reception/Booking Area			0 ²
	Patient Waiting Area			0 ²
24	Appliance Fabrication Area	1		24.0
25	Storage	1		20.0
	Washroom, Patient			0 ²
	Dressing Cubicle			0 ²
	Subtotal			44.0

¹ Shared with simulation area.

² Locate adjacent to brachytherapy area.

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Ref	Space	Area Requirements		
		units	nsm/unit	nsm
	Total, Treatment Planning Module			657.5
	Radiation Therapy Module			
	<u>RT Review Area</u>			
26	Reception/Booking Area	1		18.0
27	RT Workroom	1		56.0
28	Dictation Cubicles	4	1.5	(6.0)
29	Stretcher/Wheelchair Alcove	1		6.0
30	Patient/Family Waiting Area			24.0
31	Exam Rooms	8	11.0	88.0
32	ENT/Dentistry Exam Room	1		14.0
33	Lab/Prep and Chart Storage Area	1		14.0
34	Workstation, CDA	1		6.0
35	Stretcher Exam Room	2	13.0	26.0
36	Multi-Purpose Room	2		15.0
37	Small Procedure Room	1		13.0
38	Care Station	1		24.0
39	Unassigned Reference Number	0		0.0
40	Office Equipment Room	1		7.0
41	Patient Stretcher Holding Area and Nurse Station	1		22.5 ³
42	Washroom, Patient, Wheelchair Access	3	3.5	10.5
43	Emergency Supply Cart Alcove	1		2.0
44	Clean Supply Holding Room	1		(15.0)

³ 4 stretcher bays and 1 small nurse control desk.

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Ref	Space	Area Requirements		
		units	nsm/unit	nsm
45	Soiled Utility Room	1		(11.0)
46	Soiled Holding Room	1		(11.0)
47	Housekeeping Closet	1		(5.0)
	Subtotal			394.0
	<u>Radiation Therapy Area</u>			
48	Control Work Area	4	18.0	72.0
49	Dual Energy Linear Accelerator	4	87.0	348.0
50	Patient/Family Waiting Area	2	20.0	40.0
51	Dressing Cubicle, Patient	8	1.5	12.0
52	Dressing Cubicle, Patient Assisted	2	2.5	5.0
53	Coat Closet	1		3.0
54	Washroom, Patient, Wheelchair Access	2	3.5	7.0
55	Washroom, Patient, Wheelchair Type	1		4.5
56	Linen Cart Alcove	1		(2.0)
57	Storage, Linen/Paper	1		8.0
58	Storage, Equipment	1		10.0
59	Washroom, Staff	2	2.5	5.0
	Subtotal			516.5
	<u>Brachytherapy Area</u>			
60	Treatment Room	1		37.0
61	Soiled Utility Room	1		(8.0)
62	Procedure Room	1		18.0
63	Seed Room	1		10.0

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Ref	Space	Area Requirements		
		units	nsm/unit	nsm
64	Control Area	1		10.0
	Patient Stretcher Recovery Area			0 ⁴
65	Storage, Source Material	1		9.5
	Subtotal			92.5
	<u>RT Administration Area</u>			
66	Office, RT Education Development Practice	1		9.0
67	Office, Assessment Module Leader	1		9.0
68	Office, Treatment Module Leader	1		9.0
69	Workstation, Clerk/Secretary	1		6.0
70	Work Area, Resource Therapists	1		18.0
71	Student Workroom	1		11.0
72	Clinical Conference Room	1		52.5
	Subtotal			114.5
	<u>Staff Support Area</u>			
73	Staff Locker Room	1		8.0
74	Washroom, Staff	1		2.5
	Subtotal			10.5
	Total, Radiation Therapy Module			1128.0

⁴ Refer to patient stretcher holding area in RT review area.

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Summary	units	nsm/unit	nsm
Treatment Planning Module	1		657.5
Radiation Therapy Module	1		1128.0
Grand Total			1785.5

A1(h).6 DESIGN GUIDANCE

Project Co shall comply with:

- Radiation Protection regulations
- Atomic Energy Control Board
- Canadian Nuclear Safety Commission (CNSC) regulations
- Nuclear Safety and Control Act
- General Nuclear Safety and Control regulations
- Consultative Document C-120, parts F, G, & H
- National Council on Radiation Protection and Measurements (NCRP) reports 49, 51, 79

A1(h).7 OTHER SPECIFICATIONS

Radiation Therapy treatment services are based in the RT treatment unit, however, other specifications that will be consulted are:

- A1(e) Cancer Centre General Clinic
- C3 Medical Imaging