

2020



ASMIRT

Position Statement

Stereotactic Body

Your profession. Your future.



There are a number of protected titles for medical radiation practice. They include:

Medical Radiation Practitioner (MRP)

Diagnostic Radiographer (DR)

Medical Imaging Technologist (MIT)

Radiographer

Nuclear Medicine Scientist (NMS)

Nuclear Medicine Technologist (NMT)

Radiation Therapist (RT).

For the purposes of our documentation we use the broad descriptor Medical Radiation Practitioner (MRP) recognising that it covers a range of areas of practice.



info@asmirt.org

www.asmirt.org

PO Box 16234,

Collins Street West,

VIC 8007, Australia

+61 3 9419 3336

ASMIRT POSITION STATEMENT STEREOTACTIC BODY (ABLATIVE) RADIATION THERAPY

This document provided comments on The Royal Australian and New Zealand College of Radiologists - Faculty of Radiation Oncology: GUIDELINES FOR SAFE PRACTICE OF STEREOTACTIC BODY (ABLATIVE) RADIATION THERAPY - 2015 document.

It is acknowledged that the RANZCR document was authored by a working group of industry leaders, Radiation Therapists, Radiation Oncologists, and Radiation Oncology Medical Physicists.

1. DEPARTMENTAL STAFFING AND RESPONSIBILITIES

It is recognised that SABR/SBRT is a technically complex treatment delivery technique, and adequate multidisciplinary expertise is necessary for delivery of safe treatment. Members of all three disciplines (RO, RT and ROMP) are required for the adequate delivery of SABR/SBRT. Each discipline has both distinct and overlapping roles in the treatment planning process, treatment quality assurance, and treatment delivery. Extra training should be undertaken by all members of staff involved in the planning, QA and delivery of SBRT. If this is not practical within the department, it is recommended that the extra training be provided to the SBRT implementation team.

This training should include, but is not limited to;

- Implementation of departmental credentialing protocol
- Participation in accredited SBRT workshop
- National/international SBRT course attendance
- Site visit to department with an established SBRT program utilizing similar equipment
- Advanced anatomy course
- Advanced IGRT course

It is recommended that ongoing training and maintenance of technical skills of the relevant stakeholders should comprise a core component of an institution's SABR/SBRT program. Best practice guidance for this treatment technique is to be carried out in an organised program. 'One-off' treatments by radiation multidisciplinary teams who do not specialise in the area should not be undertaken. The National Health Service (UK) practice guidelines state that "no department treating patients with SBRT should treat less than 25 patients over a year with this technique, in order to maintain the professional competences of all members of the treating team". It is recognised that a more centralised distribution of resources and larger catchment in the UK supports established, specialised institutions, nevertheless a similar number could be achieved through creating regional networks in the Australian context.

Participation in multi-institutional clinical trials and their associated quality assurance procedures is highly encouraged, as this allows for external peer review of performance. Staffing levels and staffing workloads should enable these activities.





RADIATION THERAPIST ROLES AND RESPONSIBILITIES

RTs are responsible for the following tasks and procedures. They must maintain constant communication with ROs and ROMPs throughout.

- Pre-simulation consultation with patient, including education about requirements of the procedure including identification of any mobility or pain issues that may impact the procedure
- Positioning and immobilisation
- Acquisition and registration of images, including any motion management i.e. 4DCT or Respiration Gated CT
- Registration/fusion of multi-modality diagnostic imaging e.g. PET, MRI, CT
- Construction and evaluation of plan dosimetry
- Participation, consultation and documentation of plan quality assurance in conjunction with ROMPs
- Perform image guidance and assist where necessary in decision making, or lead image guidance decision making with appropriate credentialling
- Treatment delivery
- Training and mentoring of other RTs
- Participate in research and clinical trial activities based on SABR/SBRT practice
- Attendance and contribution to regular multi-disciplinary quality assurance rounds specific to SABR/SBRT
- Contribution to regular and ongoing protocol development and enhancement
- SBRT treatment delivery should be performed by suitably credentialed radiation therapists. An in-house credentialling process should be established to ensure RTs meet specific competence level
- Consideration should also be given to the adaptive radiation therapy component that is increasingly becoming part of the SBRT workflow, particularly with the implementation of the MRL (Magnetic Resonance Linac)

Credentialling process should include, but is not limited to the following:

- Complete available training package
- Demonstrate understanding of SBRT related department policies and procedures
- Demonstrate an understanding of imaging procedures, treatment tolerance limits and decision-making processes

Competency should be assessed by an assigned mentor using a robust credentialling checklist.

2. DEPARTMENTAL PROCEDURES AND EQUIPMENT PROCEDURES PRIOR TO RADIATION THERAPY PLANNING

Given the highly conformal nature of these treatments, it is imperative that a patient being considered for SABR/SBRT has the most appropriate imaging to enable accuracy in target delineation. This may include but is not limited to high resolution magnetic resonance imaging (MRI) or CT scans and/or CT/Positron emission tomography (PET). If specific imaging sequences are required, the imaging team should be instructed directly. If fiducial marker implantation is part of the department's motion management procedure, they should be implanted into or near the target prior to simulation by the appropriate medical personnel.



Given the various types of fiducial markers available for use it is important that there is appropriate engagement of radiology services to provide this service. Any anatomical/functional imaging should be performed at a similar time to radiation therapy planning with the patient immobilised in the simulation/treatment position if possible.

Given the longer simulation and treatment times that may be involved with SABR/SBRT, patient symptoms and co-morbidities should warrant particular consideration prior to planning. Any pain or discomfort should be managed with analgesia prior to simulation and consideration given to methods of relaxation or anxiolytics in patients who find maintaining the required planning/ treatment position difficult and/or experience anxiety. If tumour and organ motion are thought to be a significant factor, then consideration should also be given to the type of immobilisation to be used and to the patient's respiratory stability and whether this is likely to deteriorate during the planning and treatment process.

As the planning procedures for SABR/SBRT are different to other forms of radiation therapy treatment, it is recommended that patients have access to specific written information regarding the nature of the treatment. A pre-planning checklist may be useful on the day at the time of simulation to ensure these key issues are addressed prior to commencing the patient positioning.

SIMULATION PROCEDURES

Given the nature of SABR/SBRT treatment, patient stability for planning and subsequent treatment is paramount. It is recommended that the entire length of the patient be supported comfortably and effectively. Recording and indexing patient position to ensure consistent patient positioning throughout the planning, simulation and treatment chain are recommended.

Adequate immobilisation is required for SABR/SBRT delivery. Stabilisation and immobilisation options should be considered at the time of simulation and will vary dependent on the site of SABR/SBRT (e.g., lung, liver, prostate or spine) and location of the treatment (cervical, thoracic or lumbar spine). As such a department delivering SABR/SBRT should have a range of immobilisation devices to account for these situations. Customised supports such as vacuum bags should be available and are recommended in the treatment of lung, liver and spine SABR/SBRT. Commercially available 'standard' head and neck, knee and foot supports may also be used. Due to the possible extended treatment times patient comfort is paramount. Therefore, in some circumstances arm positioning and support needs to be considered with reference to potential beam or arc placement.

Active participation from the patient is essential. Patients must understand the importance of immobilisation and should be encouraged to advise RTs if they are uncomfortable or feel they need additional support, comfort, or analgesia etc.

Other specialised immobilisation systems may also be considered include but not limited to:

- Evacuated drapes
- Abdominal compression
- Breath hold; passive or active

Due to the generally smaller targets with SABR/SBRT techniques, CT planning slice thickness of 1-3mm (≤ 2 mm is desirable) through the tumour site is recommended for most clinical cases.



Particularly for liver and lung SABR/SBRT, tumour motion assessment must be accounted for at simulation. Four-dimensional computed tomography (4DCT) simulation is strongly recommended for lung and liver SABR/SBRT simulation and allows:

- assessment of the range and nature of tumour motion
- acquisition and binning of the respiratory cycle into the various phases
- accuracy in defining the target so as to minimise margins.

It is important to note that image quality in 4DCT will be very much related to the patient's ability to maintain a steady and consistent respiratory pattern. Respiratory coaching methods can be utilised to enable a patient to achieve stable breathing where they cannot do so initially. Coaching can be facilitated in a variety of ways including a staff-assisted dry run prior to the CT scan, use of a training video or information sheet, or utilisation of video and/or audio feedback displayed prior to and during imaging and treatment. Additionally, Deep Inspiration Breath Hold (DIBH) or End Expiration Breath Hold (EEBH) may also help reduce intrafraction motion (and therefore margins) in body sites that exhibit large respiration induced motion (liver or lower lobe lung). However, patient selection/compliance has a greater impact, compared to that of a 4DCT.

Although motion management is beyond the scope of this document, it is an essential part of the planning, simulation and treatment of SABR/SBRT. For any department undertaking SABR/SBRT a motion management plan is an essential part of delivering these treatments, as outlined in the American Association of Physicists in Medicine (AAPM) Task Group Report 76.

PLANNING PROCEDURES

The planning for SABR/SBRT often requires multimodality image fusion. Therefore, image registration and fusion capability are essential to be able to link the various data sets used in planning. A detailed assessment of appropriate imaging in the radiotherapeutic management of patients with cancer is discussed in 'Imaging in Radiation Oncology - a RANZCR Consensus White Paper'.

The treatment planning system (TPS) should enable a range of planning options that include static beams, dynamic arcs and intensity modulated beams or arcs and combinations of same. The TPS should include at least a superposition/convolution type dose algorithm and/or a Monte Carlo dose algorithm, particularly where beams will traverse interfaces between tissues of significant variation in their electron densities (including lung and bone).

Dose prescriptions in SABR/SBRT are often specified at low isodoses (eg $\leq 80\%$ isodose) with small or no margins for beam penumbra at the target edge. Hot spots within the target volumes are generally viewed to be clinically desirable, as long as there is no spillage into normal tissue. The use of multiple non-opposing beams (including non-coplanar beams) may help to achieve the sharp dose fall-off required in SABR/SBRT applications. Modulated arc plans may also be helpful in achieving appropriate dose distributions that can be delivered efficiently.





TREATMENT

Within Australia and New Zealand, treatment systems used to deliver SABR/SBRT include linear accelerators (linacs), Magnetic Resonance Imaging Guided Linear Accelerator (MRI-linac), Tomotherapy, Gamma knife and Cyberknife units. Each will possess advantages and disadvantages that are well described in National Radiotherapy Implementation Group (NRIG) UK guidelines, Canadian Association of Radiation Oncology (CARO) guidelines and TG101-SBRT AAPM guidelines.

To deliver the high doses per fraction involved in SABR/SBRT, image guidance capability should be carefully considered. The ability to have online correction and evaluation and correction for intra-fraction errors is a minimum standard. Therefore, an effective image guidance system will have capabilities for volumetric or stereoscopic imaging that provides 3D information on target and Organ at Risk (OAR) positions, real time or near “real time” imaging capability to enable on-line correction and the ability to image intra-fractionally due to long treatment times. Imaging technology is evolving rapidly, and systems already include MV and kV cone beam CT (CBCT), linac and/or Tomotherapy units, MRI, on-board gated or 4-dimensional CBCT, stereoscopic planar imaging and potential for digital tomosynthesis in the future. To ensure a safe SABR/SBRT program, well defined imaging protocols that include consideration of tolerances, action levels and frequency of imaging both intra and inter fractionally should be adhered to. This also highlights the need for additional training for all RTs involved in the treatment delivery of SBRT/SABR.

For linac-based SABR/SBRT, the treatment delivery unit itself should meet the AAPM TG101 tolerances on linear accelerator performance including the following: high degree of accuracy of mechanical rotation around the isocentre (<2mm diameter), ability to deliver high dose rates, and an effective means of monitoring patient stability during treatment. Many clinical sites will also benefit from beam modulation, 6 degree of freedom couch correction, increased dose rate from flattening filter free beams, and patient respiration monitoring equipment. As most SABR/SBRT applications use multileaf collimator (MLC) collimation, a ≤ 5 mm MLC leaf width is required for most applications.

Non-linac based SABR/SBRT will have additional requirements.

Contingency plans should be given to treatment delivery redundancy, such that in the event of catastrophic machine breakdown SABR/SBRT treatment courses would be completed. This should be incorporated into risk management and contingency planning at the planning stages.

IMPLEMENTATION OF SABR/SBRT SERVICES AND NETWORKS

In this section of the guidelines, we address issues particular to Australian and New Zealand centres wishing to implement SABR/SBRT, with relatively low caseloads of patients, and/or those that are geographically isolated from experienced SBRT/SABR centres.

In comparison with many international centres, Australian centres tend to be small with the majority having between 2-5 linear accelerators. This poses particular issues in terms of the development of specialist expertise in SABR/SBRT. The treatment requires intensive efforts by medical physicists and radiation therapists to develop the technical infrastructure and protocols required for safe planning and delivery, particularly during the early implementation



phase. This is highly resource-intensive and, given the relatively small size of centres in Australia, means that these efforts are likely to benefit only a relatively small number of patients. In international guidelines, such as the NCRIG guidelines from the United Kingdom, a minimum departmental caseload of 25 per annum is specified; this would not be achievable by the majority of Australasian radiation therapy departments. Restricting SABR/SBRT to high volume radiation therapy centres may also exacerbate radiation therapy access concerns, which is already faced by patients in regional and remote communities. Furthermore, there is a risk that centres in any setting implementing SABR/SBRT without external guidance and support may develop inadequate processes for the safe delivery of SABR/SBRT treatment.

Australian centres require innovative approaches to streamline the education and training of radiation therapy staff delivering SABR/SBRT and to make the complex quality assurance required feasible. As such, it is recommended that centres implementing SABR/SBRT actively seek collaborations with more experienced centres. Where possible, it is recommended to seek site visits to departments with similar equipment.

This process of collaboration may be enabled by the development of clinical trials and formal networks to support the clinical, technical and data collection needs for SABR/SBRT departments.

Processes which may help to facilitate the safe implementation of SABR/SBRT include:

- Standardisation of technical and clinical protocols at a state or national level
- Formal processes to audit technical quality assurance
- State or nationally based data collection through the development of registries to formally document disease control and toxicity outcomes
- Participation in multicentre clinical trials with centralised quality assurance and peer review and/or credentialing mechanisms
- Development of institutional, state, or national level credentialing.

MAINTENANCE OF EXPERTISE

In the absence of large caseloads, innovative approaches to maintaining skills in SABR/SBRT are required. Ongoing case reviews with individual case discussion and documentation, which could usefully be performed at a network level, would support clinicians responsible for SABR/SBRT treatment. The development and maintenance of skills in plan evaluation and IGRT skills could also be assessed by the development of credentialing and audit processes. Developing a library of practice cases on the TPS may allow new or inexperienced planners to hone their SABR/SBRT planning. These practice plans should be assessed with similar quality assurance procedures as clinical case.

Careful organisational consideration will need to be given to how expertise is to be attained and maintained for RTs working in centres who have low caseloads.

Given the paucity of high-level evidence for the efficacy of SABR/SBRT in all clinical sites, enrolment in clinical trials is recommended. It is recognised that clinical trials are associated with significant costs and additional administration. The additional imposts associated with collaborative trials may prevent many individual centres from trial participation. However, the rigorous quality assurance and auditing processes proposed above, coupled with network level support for trial participation may help to overcome this problem. Therefore, departmental



participation in trials, where available, is strongly encouraged. The development of network level trial coordination centres to streamline the processes of ethical approval and data collection may reduce the onerous administrative burden on small radiation therapy centres. In the absence of multi-institutional clinical trials, treatment using institutional clinical protocols are necessary to assist in standardisation of treatment delivery should be practiced. If no appropriate clinical trials are recruiting, following the trial design of a high-quality stage two or three clinical trial may provide useful guidance.

It is recommended to develop a SABR/SBRT programme that is representative of a department's case load/demographics. It may be appropriate to NOT offer SABR/SBRT to particular sites of the body, if suitable case numbers are predicted to be too low. The inherent difference, nuances and difficulties that different SABR/SBRT body-sites possess are well known. Departments should develop body-site specific SABR/SBRT protocols and guidelines.

Departments should develop strict inclusion/exclusion criteria. This includes risk escalation protocols; where dose, technique, margins etc. can be modified based on clinical factors (target size or proximity to OARs)

CREDENTIALLING

To ensure a high-quality, safe and equitable SABR/SBRT service, departments are encouraged to develop institutional credentialling protocols. Credentialling processes should be a complete training package that enables the RT at the completion of the program to demonstrate an understanding of SABR/SBRT related department policies and procedures and imaging procedures, treatment tolerance limits and decision-making processes. Competency should be assessed by an assigned mentor using a robust credentialling checklist.

Credentialling programs should include, but are not limited to:

- Demonstrated theoretical knowledge and practical skill in SABR/SBRT
- Credentialling processes that cover simulation (4DCT, motion management, multi-modality image registration), planning (isocentre placement, field arrangement, dosimetry), and treatment delivery (IGRT, soft tissue identification – OAR and targets). These processes should also include the ability to identify issues and concerns and troubleshooting.
- Body-site specific credentialling
- Participation/observation of SABR/SBRT processes with credentialled RTs
- Proven ability to produce clinically appropriate SABR/SBRT dosimetry (body-site specific)
- Proven ability to self-identify issues/concerns and ability to troubleshoot.
- Observation and appreciation of multidisciplinary involvement. This may include observing ROMP QA, RO contouring and multidisciplinary case discussion.
- Departments new to SABR/SBRT should consider external training for all RTs involved in the planning, QA and delivery of SABR/SBRT. If this is not practical, then extra training to be provided to the SABR/SBRT implementation team. This implementation team can then educate and credential other RTs. Training may be interdepartmental, vendor training, or conference/workshop attendance.
- It is recommended that a minimum of two credentialled RTs are present for simulation and treatment delivery.





Additional Recommendations/Future Directions:

1. Recommend that a multidisciplinary (RTs, ROMPs, ROs, nursing) approach be taken to all recommendations around stereotactic service delivery.
2. Recommend that ASMIRT forms a working party with a specific focus on stereotactic radiotherapy with radiation therapists who are leaders in this area in Australia.
3. The working party in consultation with similar groups from RANZCR and ACPSEM create recommendations for departments administrating stereotactic radiotherapy as a way of benchmarking practice. Recommended steps for initial credentialing and a process for ongoing practice benchmarking. RANZCR 2015 document to be updated.
4. The working party works with ASMIRT to promote the important role of radiation therapists in stereotactic radiotherapy practice on an ongoing basis.
5. The working party working with ASMIRT and other professional international organisations to produce educational material to enable radiation therapists to upskill in this area.
6. Identification and facilitation of SABR/SBRT related areas of research by the working party.

