RAYSTATION 11B

RayTreat 5B Instructions for Use

RayTreat
RayStation

Safety notices

This user documentation contains WARNINGS concerning the safe use of the product. These must be followed.

> **WARNING!**
>
> The general warning sign informs you of a risk for bodily harm. In most cases the risk is related to mistreatment of the patient.

Note: *The note gives additional information concerning a specific topic, for example, things to consider when performing a certain step in an instruction.*

Printed material

Hard copies of Instructions for Use and Release Notes related documents are available upon request.

TABLE OF CONTENTS

1   INTRODUCTION

About RayTreat

RayCare together with the RayTreat application provide a comprehensive system capable of managing patients' treatments all the way from when the patient is registered for radiation treatment to when the radiation treatment is delivered.

This manual describes the parts of the workflow that are directly related to the delivery of treatment plans:

- Managing treatment plans in RayStation for treatment delivery in RayTreat

- Performing plan-specific QA delivery in RayTreat

- Performing treatment delivery in RayTreat

About this manual

It is possible to install RayTreat both as an application and as a Service (RTaaS). The way RayTreat is installed depends on the machine vendor software for which it integrates with. RayTreat connects to RayStation and RayCare the same way both when it is installed as an application and as a Service.

Before using RayTreat clinically with a new machine or after an upgrade of any relevant software or hardware, the test cases in the Treatment Device Integration Test Specification shall be run on at least an evaluation environment to verify the correctness of the clinical integration:

- *RSL-D-RS-11B-RTTDITS, RayStation 11B RayTreat 5B Treatment Device Integration Test Specification* - if RayTreat is installed as an application.

In addition, the Installation Test Specification must be run on the clinical environment to verify the correctness of the clinical installation:

- *RSL-D-RS-11B-RTITS, RayStation 11B RayTreat 5B Installation Test Specification* - if RayTreat is installed as an application.

This document is an addition to *RSL-D-RS-11B-USM, RayStation 11B User Manual* and summarizes some of the most important features of the RayTreat application.

Study this manual and the *RSL-D-RS-11B-IFU, RayStation 11B Instructions for Use* carefully before using the RayTreat application. Proper functioning of the device can only be guaranteed if the instructions in these documents are adhered to.

Study the Release Notes in this manual as well as the *RSL-D-RS-11B-RN, RayStation 11B Release Notes* carefully. These notes provide final instructions on how to use the RayTreat application.

The RayStation 11B system is further described in the RayStation 11B product documentation. RayTreat Installation Instructions and Test Specification provide instructions for installing and configuring RayTreat as well as tests for verifying the installation.

Refer to the RayCare 5B product documentation for information about the RayCare 5B system.
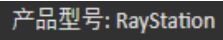
2   PRODUCT INFORMATION

This chapter describes the RayTreat product label. For product information regarding the RayStation 11B system, refer to the *RSL-D-RS-11B-IFU, RayStation 11B Instructions for Use.*
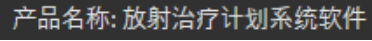
2.1   RAYTREAT PRODUCT LABEL

The version number of an installed RayStation 11B system can be found by choosing **Help: About RayStation** in the RayTreat menu.

The following information can be identified:

- Product name = RayStation

- 产品型号: RayStation (for the Chinese market only)

- Release version = **12.0**

- Marketing name = RayStation RayTreat 5B

- Software build number = **12.0.0.932**

- Clinical build = Indicates that the software is designed for clinical use.

  Note: A clinical installation requires both a clinical build and a clinical license. Otherwise, 'Not for clinical use' will be displayed in the title bar.

- Product lifetime = The lifetime per market is one year after the next major release, but no less than three years

- Radiation Treatment Planning System Software = The generic name of the product

- 产品名称: 放射治疗计划系统软件 (for the Chinese market only)

- MD = Indicates that the product is a medical device

- UDI = Unique Device Identification number

- Driver information = The qualified driver versions. Expand this field by clicking the arrow. Note that for the RayTreat drivers, only the first three numbers are significant. The fourth number is a build number that may differ from that of the software build number and is not used for validation.

- ![CE 2862]= The CE mark and the notified body number

- ![factory icon]= Production date

- ![book icon]= Consult instructions for use

- ![manufacturer icon]= The name and address of the manufacturer

- ![@ icon]= The support e-mail address
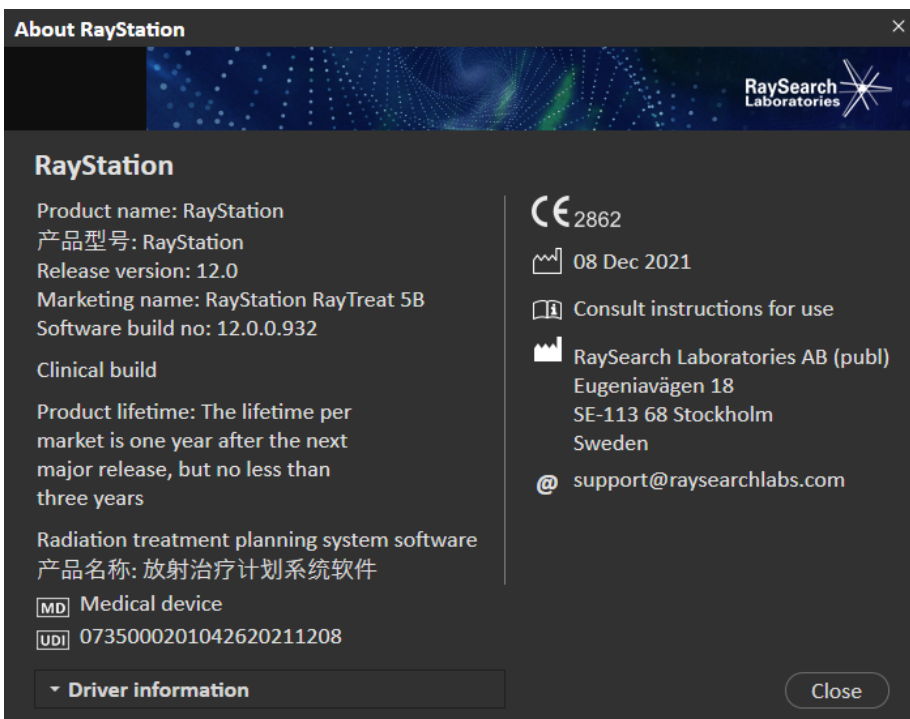
Figure 1. The **About RayStation** dialog for RayTreat.

3   INFORMATION NEEDED FOR SAFE OPERATION

Adhere to the following warnings as well as the warnings described in *RSL-D-RS-11B-IFU, RayStation 11B Instructions for Use* for safe operation of the RayTreat application.

3.1   MANDATORY SITE TESTS

Before using RayTreat clinically with a new machine or after an upgrade of any relevant software or hardware, the test cases in the Treatment Device Integration Test Specification shall be run on at least an evaluation environment to verify the correctness of the clinical integration:

- *RSL-D-RS-11B-RTTDITS, RayStation 11B RayTreat 5B Treatment Device Integration Test Specification* - if RayTreat is installed as an application.

In addition, the Installation Test Specification must be run on the clinical environment to verify the correctness of the clinical installation:

- *RSL-D-RS-11B-RTITS, RayStation 11B RayTreat 5B Installation Test Specification* - if RayTreat is installed as an application.

3.2   SAFETY PRECAUTIONS

3.2.1   General warnings

> **WARNING!**
>
> **Machine models.** The user who configures which machine models are supported in which rooms shall have a very clear understanding of the clinic and it's rooms and machine models. It is strongly discouraged to remove or rename any machine model in the configuration of a room. Instead it is recommended to deprecate the machine in RayPhysics if a machine model is not to be used anymore. It is still possible to add new machine models to a room.
>
> (341177)

WARNING!

Prescription in Approve treatment course dialog. The planned prescribed nominal dose shown in the *Approve treatment course* dialog is the sum of the nominal dose contributions for all fractions in the treatment course. The prescription is not automatically synchronized between RayStation and RayCare. The user is responsible for making sure that the prescription in the *Approve treatment course* dialog corresponds to the prescription in RayCare.

(341634)

WARNING!

Offline image review. If a registered image for the offline image review is displayed as "Unknown", this means that it was not recorded as part of a RayTreat treatment session. Instead it was imported and reviewed in RayCare afterwards. When an image is "Unknown" it is always recommended to verify the image and offline image review in RayCare.

(272198)

WARNING!

Ensure sufficient training. The user organization shall ensure that individuals authorized to perform treatment functions are appropriately trained for the functions they perform. Only individuals authorized to perform treatment functions and appropriately trained in treatment planning techniques should use this software. Carefully read all instructions prior to use. The user is responsible for proper clinical use and the prescribed radiation dose.

(1696)

WARNING!

Creating, removing and canceling treatment appointments in RayCare does not affect fractionation in RayTreat. The number of fractions in a treatment course for RayTreat can only be updated through treatment course management in RayStation. Additionally, creating a continuation session appointment in RayCare does not create the continuation session in RayTreat. That can only be done in the Complete session dialog in RayTreat or in the RayStation Dose tracking module.

(1650)

WARNING!

Configuration changes require testing. The correct functioning of RayTreat depends on the connection to the treatment delivery system, RayPacs and the RayStation database. Changes to the configuration of any of these components require testing according to the *RayTreat Installation Test Specification* to confirm correct functioning.

(8849)

WARNING!

Make sure that the intended plan is used. All plans can be included in the treatment course, regardless of the prescription or the planned number of fractions. Exercise caution when assigning different plans to different fractions.

(7190)

WARNING!

Verify table top positioning. If the table top positions have been entered or propagated, use the "Updated table top positions" dialog together with the treatment delivery system and the patient positioning system to verify that the table top displacement from localization point to setup and treatment isocenter table top positions are consistent.

(10711)

WARNING!

Only results from completed treatment sessions displayed in RayCare. The results of the treatment sessions will not be displayed in RayCare until the session is completed. If it is not possible to complete the session, the result will not be displayed in RayCare.

Note that in RayTreat, treatment delivery results are displayed both for completed and non-completed sessions.

(220412)

WARNING!

Offline import of treatment records. For a continuation session where the import of a treatment record is needed, the treatment record must be imported manually into both RayStation and PACS. It is not sufficient to import the treatment record into RayCare PACS only. There is no verification that all treatment records in RayCare PACS have been imported into RayTreat. If all treatment records are not correctly imported to RayTreat for a fraction that requires a continuation session, It is possible to deliver the previously delivered dose again.

(272901)

WARNING!

User is responsible to record delivery correctly. The user completing a session is responsible for ensuring that the delivery is correctly recorded. If the recording is not received automatically, a manual recording must always be performed. This is needed to make sure that a continuation session does not lead to a radiation overdose.

(285060)

WARNING!

Propagation of table top positions to continuation sessions. Propagation of table top positions to continuation sessions is not supported by all drivers. If propagation is performed, new table top positions will only be set on sessions in upcoming fractions, not to continuation sessions unless the driver supports this. Whether this driver feature is supported or not can be verified by checking if the feature "Can propagate table top positions to continuation sessions" for the rooms in Clinic Settings is selected.

(408169)

3.2.2   Accuray related warnings

WARNING!

Manually verify the status of a treatment session for consistency between the Accuray Treatment Delivery Console and RayTreat. The Accuray Treatment Delivery Console (TDC) does not automatically receive the fraction number or the continuation status from RayTreat. Additionally, the TDC shows fraction numbers for a specific plan, whereas RayTreat considers the fractions in the entire treatment course. For example, if a treatment course has plan A assigned to fractions and 1-4, 6-9, and plan B assigned to fractions 5 and 10, then fractions 1-4 will have matching fraction numbers on the TDC, fraction 5 will show as fraction 1 on the TDC, fraction 6-9 will show as fractions 5-8 on the TDC and fraction 10 will show as fraction 2 on the TDC.

The status of a treatment session, with regards to continuation status, fraction number and plan content, must therefore be manually verified to be consistent between the TDC and RayTreat.

(1689)

WARNING!

Compatible Accuray iDMS versions. Only versions of the Accuray system software that have been validated shall be used together with RayTreat. For a detailed list of supported versions, refer to *RSL-D-RS-11B-SEG, RayStation 11B System Environment Guidelines*.

(4613)

3.2.3   IBA related warnings

WARNING!

Compatible IBA system software versions. Only versions of the IBA system software that have been validated shall be used together with RayTreat. For a detailed list of supported versions, refer to *RSL-D-RS-11B-SEG, RayStation 11B System Environment Guidelines*.

(4614)

3.2.4   ProNova related warnings

WARNING!

Compatible ProNova system software versions. Only versions of the ProNova SC360 treatment machine that have been validated shall be used together with RayTreat. For a detailed list of supported versions, refer to *RSL-D-RS-11B-SEG, RayStation 11B System Environment Guidelines*.

(10752)

3.2.5   Varian related warnings

WARNING!

Compatible Varian system software versions. Only versions of the Varian VTI application (Varian Treatment Interface) and TrueBeam that have been validated shall be used together with RayTreat as a Service. For a detailed list of supported versions, refer to *RSL-D-RS-11B-SEG, RayStation 11B System Environment Guidelines*.

(340921)

WARNING!

Multiple plans on the same appointment. Instead of assigning multiple plans to the same fraction and appointment, the user must assign one plan per fraction and can only treat one fraction (session) per appointment. To be able to deliver for multiple isocenters, the user must schedule multiple appointments.

(407565)

WARNING!

TrueBeam display of setup instructions. The user is responsible for verifying that the setup instructions (text as well as images) defined in RayCare are possible to view in a satisfactory way on the TrueBeam console.

(284891)

WARNING!

Modification of setup images, setup notes and field order. Modifying setup notes, setup instructions or a field order on the Varian TrueBeam console does not modify the setup instructions in RayCare, or the beam order in the treatment plan. RayStation and RayCare will create a session note stating that these have been changed on the TrueBeam console but that the changes will not be saved. Next time the patient is treated, the original field order from RayStation and the original setup note and images from RayCare will still be sent to the Varian Treatment System. To change a field order requires replanning in RayStation. To change setup notes or images requires assignment of a new setup instruction in RayCare.

(408171)

WARNING!

Flags in VTS. Flags and RayTreat warnings are sent as patient-specific alerts to the Varian Treatment System (VTS). Since alerts in VTS are only for a specific patient, the shown appointment alerts will always be for the upcoming appointment, even when viewing alerts for an already completed appointment.

(285220)

WARNING!

Recorded meterset. It is recommended to verify in the Varian Treatment System that the meterset recorded for the session in RayCare is equal to the delivered meterset after performing treatment delivery with RayTreat as a Service, especially in case of a partial delivery.

(281494)

WARNING!

Multiple isocenter treatment. It is not possible to assign a plan to be delivered that has different isocenters per beam for Varian. Each isocenter will have to be treated in a separate beam set.

(401952)

3

4   RELEASE NOTES

This chapter contains important notes about the use of the RayTreat application. It contains information related to patient safety and lists new features, known issues and possible workarounds.

Every user of the RayTreat application must be familiar with these known issues as well as the known issues described in *RSL-D-RS-11B-RN, RayStation 11B Release Notes***.** Contact the manufacturer for any questions about the content.

Note: *Beware that additional safety-related release notes may be distributed separately within a month of software installation.*

In this chapter

This chapter contains the following sections:

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4.1   NEWS AND IMPROVEMENTS IN RAYTREAT 5B

This chapter describes the news and improvements in the RayTreat 5B application as a part of RayStation 11B, compared to RayStation 11A.

- Fixation devices from RayCare are now displayed in the Preparation module.

- Nominal progress is now displayed in the RayTreat Delivery module.

- Nominal contribution for the current fraction is now displayed in RayTreat top toolbar.

- Bolus information from RayStation is now displayed in the Preparation module.

- Appointment comments are now displayed in the Schedule module.

- It is now possible to require additional beam set delivery approval before treatment.

- Treatment course approval in RayStation has been updated to include more details in the nominal progress table.

- The correct patient card information is now ensured to be displayed in the Scheduling module.

- An issue has been fixed where scheduling to a room with multiple machine models was not possible.

- An issue has been fixed where adding and removing fractions from the treatment course was overly complicated.

- An issue has been fixed where synching treatment course in RayStation was not possible before all appointments in RayCare were scheduled to match the correct room.

- More information added to the tooltip of the Treatment course tab in RayStation.

- Support to open a session earlier in RayTreat, to view the setup instructions before starting treatment with CyberKnife and Tomo, has been added.

- An issue has been fixed where approving a plan on the iDMS after check-in required manual recording of the first delivery for Tomo customers.

4.2   KNOWN ISSUES RELATED TO PATIENT SAFETY

4.2.1   RayTreat installed as a desktop application

Setup instructions are applicable to all plans with the same planning image set instead of only a single plan

If a setup instruction is available for one beam set in RayTreat, that setup instruction will automatically be used for any other beam set defined on the same planning image set. If setup details specific to the first beam set are mentioned in the setup instruction, those will also incorrectly be displayed in the preparation workspace for other beam sets. Therefore, if there are multiple beam sets or plans

that have the same planning image set, describe the setup for all beam sets and plans in the same setup instruction.

(69240)

Offline recording through RayStation

Modifying the treatment record for a session that is not the last for a fraction and changing the total delivered meterset for a beam will not affect the list of omitted beams for any of the upcoming already existing sessions in the fraction.

In the case where a beam was previously considered completely delivered, but has since then been updated to be undelivered or partially delivered, the continuation session will incorrectly omit the updated beam. This will cause RayTreat to crash when trying to create another continuation session. To deliver the remaining beams, the incorrect record must be restored and a new beam set must be created and appended to the plan.

In the case where a beam was previously considered undelivered or partially delivered, but has since then been updated to be completely delivered, the beam will not be included in the list of omitted beams. Thus, none or near-none remaining meterset will remain to be delivered in a continuation for that beam.

(146246)

Importing treatment record for a continuation session

When modifying the delivery and importing a treatment record for a continuation session where previous delivery took place, the beam record will display the wrong *Planned Meterset*. This will be shown as an error and as a faulted beam even when everything has been delivered correctly. By hovering the status icon, the correct *Planned Meterset* is displayed.

(143582)

Canceling session through RayStation may update the delivered date

A canceled session without any delivered meterset will show the delivery date as the last time the session's delivery was approved. If the delivery of a session is modified in RayStation, the displayed date will be incorrectly updated.

(145286)

4.2.2   RayTreat installed as a desktop application (Accuray)

Treatment console allows treatment of another session than the session open in RayTreat

It is possible to start delivering a session from the Accuray console before completing the previous session in RayTreat. Always make sure to complete the session in RayTreat before opening a new session in the treatment console. Refer to Accuray for more information about this issue.

(342723)

Delivering fractions out of order

Delivering beams in a different order than planned is supported by RayTreat but is not supported by Accuray. Do not schedule fractions for Accuray in such a way that fractions are delivered out of order within the same beam set.

(344094)

4.2.3   RayTreat installed as a desktop application (IBA)

Suggested online couch correction when imaging against treatment beam

The suggested online couch correction displayed in RayTreat may be wrong when imaging is performed on any other beam than the setup beam. The setup beam position and rotation will always be used when calculating the suggested online couch corrections. Make sure to only use the suggested online couch correction for verification when imaging against the setup beam.

(344436)

4.2.4   RayTreat installed as a desktop application (ProNova)

Session note for QA

Notes added for a QA session will not be displayed in any RaySearch software. Therefore, only use notes for treatment sessions, not for QA sessions.

(408668)

4.2.5   RayTreat installed as a Service (Varian)

Recording of partial treatment for TrueBeam

When performing a partial treatment it is the user's responsibility to verify that the delivery is correctly recorded in RayCare after having signed the treatment in the TrueBeam console.

If a recording is missing and has to be imported offline, it is currently not possible for RayTreat with TrueBeam to compel the user to do so.

If the user does not verify that the delivery is correctly recorded in RayCare, nothing will prevent the user from performing overdose treatment during the resumption.

(283768)

4.3   OTHER KNOWN ISSUES

4.3.1   RayTreat installed as a desktop application

Continuation session cannot be completed if patient name has been changed between sessions of the same fraction

If the patient details are updated in RayCare between the check-in of the first session in a fraction and the check-in of a continuation session in the same fraction, it will not be possible to start the

delivery of the continuation session. The dot will never turn green. The workaround is to undo the check-in for the continuation session and revert the patient detail changes in RayCare.

(69242)

Displayed status of a QA beam may differ after signing the QA session

The displayed status of a QA beam may differ between when performing the QA and after signing the QA session. The indicator that a beam was invalid during the delivery may not be displayed after signing. The specified and delivered meterset will however always be correct.

(69236)

Canceling a non-scheduled session through RayStation

When canceling a non-scheduled treatment session through RayStation, that session's scheduling information will be set in RayTreat. As a consequence, the canceled session will appear as a session in the calendar on the room it was canceled on. However, this information will not be visible in RayCare.

(145299)

It is not possible to cancel a treatment course

It is not possible to cancel a treatment course in RayTreat. Instead, each fraction must be canceled manually, either through RayTreat or RayStation.

(342758)

QA requires scheduling of treatment appointments

It is not possible to perform QA for a beam set before at least one fraction with the beam set assigned has been scheduled to the room in which QA is to be performed. For patients with alternative plans, at least one appointment must be scheduled for each room in order to perform QA for all plans.

(408609)

Changing room name prevents usage of already approved plans

After updating the name of a room or creating a new room, previously approved plans for treatment machines supported by the room cannot be used in this room. The user must either unapprove the plan, approve and assign the plan again or copy the plan and use the copy instead.

(409606)

Changing room name affects appearance of previous deliveries

After updating the name of a room, previous treatments in that room will be displayed as out of tolerance in RayStation and RayTreat. The delivered dose is displayed in red and the tooltip of the status icon will inform that no tolerances can be fetched for the room.

(409607)

4

Do not rename a plan after the beam set has been approved

RayTreat will use the plan name that was used when it was assigned to the treatment course. If the plan name is changed after the beam set has been approved, this could result in beam sets of the same plan being displayed with different plan names depending on when they were assigned.

(344738)

Plan specific tolerance table updates will not affect delivery

If a tolerance table for a beam set is updated using scripting, it will not be used for treatment. Only the template tolerance table will be used.

(406811)

Nominal progress in RayTreat

Nominal progress in the Delivery module in RayTreat can show unexpected values for Remaining dose and Expected dose. This only occurs when the delivered dose was higher or lower than planned dose in the current session and the session is not yet signed in RayTreat. The values will be recalculated and be correct after signing. Do not create a continuation session or manual recordings based on the nominal progress shown in RayTreat.

(410548)

4.3.2   RayTreat installed as a desktop application (Accuray)

Suggested couch correction coordinates displayed as undefined for Accuray systems

For Accuray TomoTherapy, Radixact and CyberKnife systems, the suggested couch correction is not computed from the registration and all coordinates will be displayed as undefined.

(69237)

Not possible to decide if an image is MVCT or CBCT

When performing imaging on a Tomo machine, kilovoltage CT (kVCT) might incorrectly be reported as megavoltage CT (MVCT) to RayTreat. Refer to Accuray for more information about this issue.

(343504)

Some plan annotation details in RayTreat might differ from plan annotation details in iDMS

RayStation treatment plans are not communicated to iDMS using DICOM, instead the RayStation DICOM file is stored in iDMS using the RayGateway functionality.

When storing DICOM files in iDMS, some non-dose affecting plan properties are not stored.

The plan data presented in RayTreat is read from the RayStation domain. Names of plans, beam sets and beams in the RayStation domain might differ from the names presented in iDMS and what is presented in an RTPlan created from iDMS.

The beam set name stored in iDMS is affected by the *PlanNameFormat* configuration in *RayGatewayConfig.xml* found in the RayGateway installation folder. This configuration needs to be

taken into account when validating if a beam set name in RayTreat matches a beam set name in iDMS.

(344716)

Treatment records denied when there is patient information inconsistency between RayCare and iDMS

Inconsistency in patient demographics (for example, name, gender and date of birth) between RayCare and iDMS (Accuray Data Management System) causes RayTreat to reject treatment records. The session will have no recorded delivered monitor units (MU). Manual recording of delivered monitor units is possible before completing the session. Treatment records can be exported from iDMS and manually be imported offline into RayStation, to account for the delivered monitor units.

Ensure that changes of patient demographics are always done at the same time in both RayCare and iDMS.

(403944)

More sessions than allowed can be marked as ready for treatment when restarting driver

Restarting the driver while simultaneously checking in multiple sessions can cause more than one session to become ready for treatment. Incorrect setup instructions may be displayed if the session that is opened in RayTreat is different to the session selected for treatment in the Accuray software.

Make sure that no more than one session is checked in after restarting the driver.

(410675)

4.3.3 RayTreat installed as a Service (Varian)

Patient Id length for TrueBeam

DICOM supports PatientId to be 64 characters and this is supported by RayStation. However, the Varian Treatment System (VTS) and TrueBeam only support a maximum of 25 characters in the PatientId. If RayTreat as a Service is used with Varian, make sure to not create patients with Ids longer than 25 characters.

(285227)

Plan notes and field notes for TrueBeam

Plan notes and field notes entered on the TrueBeam console will not be shown by RaySearch applications or sent back for future treatments.

(407568)

Remove Patient For Today for TrueBeam

It is not possible to perform *Remove Patient For Today* on the Varian console for an appointment that has not yet been checked in in RayCare (or that was just checked in). The user should instead use RayCare to reschedule the appointment.

(284670)

4

Patient name length for TrueBeam

RayStation supports PatientName to be 64 characters on each part (FirstName, LastName, etc.). However, VTS and TrueBeam only support a maximum of 64 characters in total for the entire patient name. RayStation does not check or block if the PatientName is too long for VTS.

(285311)

QA appointments for TrueBeam

It is not possible to schedule QA appointments in RayCare. It will therefore not be possible to perform QA delivery when using RayTreat with TrueBeam.

(285145)

Manual recording for TrueBeam

Do not use manual recording with Varian TrueBeam.

It is not possible to check in a session in RayCare when a previous session in the same fraction has a manual recording.

If there is a manual recording for a previous fraction, it will still be possible to deliver an upcoming fraction, although the manual recording will not be included in the treatment summary in the TrueBeam console.

(285233)

Patient name modification for TrueBeam

Avoid changing the patient Id or name after the treatment has begun and when using RayTreat as a Service. If any of these properties are changed, problems may occur that will prevent further treatment.

(278428)

Close patient for TrueBeam

When using the Varian TrueBeam functionality *Close Patient* after having performed *Load* on an appointment in VTS without performing any treatment, the appointment will have to be canceled in VTS and a new appointment scheduled through RayCare.

(284363)

Continuation session for TrueBeam

When performing a partial delivery, the user is always required to cancel the current appointment and schedule the continuation session manually through RayCare.

(285053)

Appointment without sessions for TrueBeam

Any appointments scheduled in RayCare which do not yet have a plan assigned for treatment in RayStation, will be incorrectly displayed as 'Cancelled' in VTS.

(285229)

Machine model deprecation for TrueBeam

If the machine model used when creating the plan to be delivered has been deprecated, this will not be indicated. RayTreat does not provide this information to Varian.

(284985)

4

5   RAYTREAT

In this chapter

This chapter contains the following sections:

5

5.1 CLINIC SETTINGS CONFIGURATION FOR RAYTREAT

In order to use RayTreat, configuration of the treatment settings in the Clinic settings application is needed. Most of the settings are configured at installation and are therefore described in the RayTreat installation documents. This section describes some important things to keep in mind for the user.
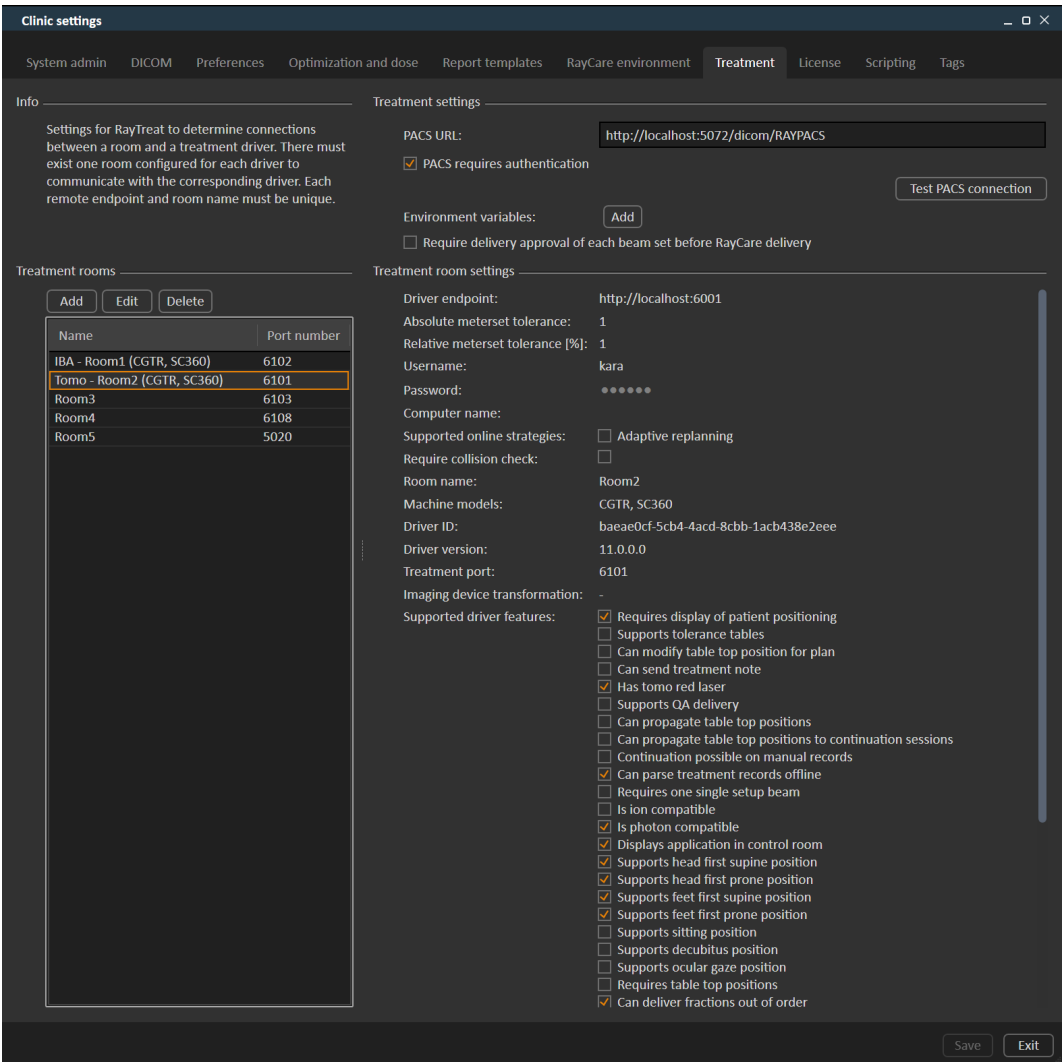
Figure 2. The **Treatment** tab in **Clinic settings**.

The configuration has a list of rooms. These reflect the rooms that the user can schedule an appointment for in RayCare. Each room also has a list of machine models. These reflect the models of the machine setup in RayPhysics and are used when creating a beam set in RayStation. The same

machine model can be referenced in multiple rooms. It is also possible to let a single room support multiple machine models.

> **WARNING!**
>
> **Machine models.** The user who configures which machine models are supported in which rooms shall have a very clear understanding of the clinic and it's rooms and machine models. It is strongly discouraged to remove or rename any machine model in the configuration of a room. Instead it is recommended to deprecate the machine in RayPhysics if a machine model is not to be used anymore. It is still possible to add new machine models to a room.
>
> (341177)

To edit treatment room settings, click the **Edit** button. This opens the **Edit treatment room settings** dialog.

Figure 3. The **Edit treatment room settings** dialog.

Absolute meterset tolerance and **Relative meterset tolerance** can be configured to indicate how much of the delivered meterset can be missing while the system still considers the delivery completed. When the system considers the delivery completed, a checkmark is shown on the session/fraction/beam, and no more continuation can be delivered. For more information, see *section 5.4.4 Delivery on page 60*.

Absolute meterset tolerance takes the unit into account. For example, a machine of a vendor using MU, NP (number of particles) and Minutes as the meterset unit shall all have very different absolute meterset tolerances defined.

It is possible to specify only one of the tolerances. When having both absolute and relative tolerances set, the delivery is considered complete if any of the tolerances is a pass.

In **Imaging device system** it is possible to enter an imaging device transformation in case the patient coordinate system and the imaging device do not match. If IDT is set to 0,0,0 the coordinate system for the patient and the imaging system is coinciding.

5.1.1   Configure beam set delivery approval in Clinic settings

It is possible to configure Clinic settings to require an additional approval step before a specific beam set can be delivered.

Figure 4.   The **Treatment settings** in **Clinic settings**.
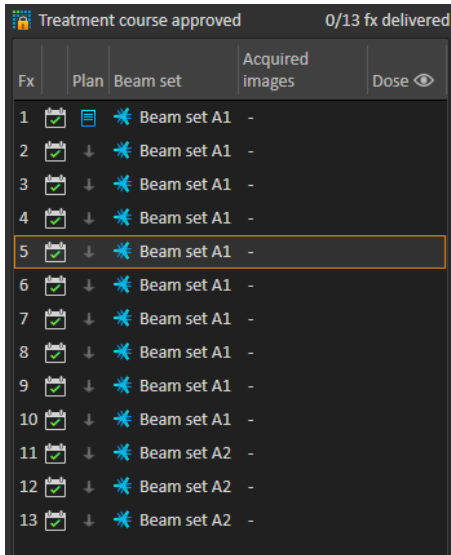
When **Require delivery approval of each beam set before RayCare delivery** is selected, all beam sets added to a treatment course will require delivery approval and it will not be possible to check in a patient for a session or to validate the session for delivery in RayCommand. It will not apply for beam sets already part of a treatment course when the setting is enabled. For further information see *section 5.2.9 Beam set delivery approval in treatment course on page 46*.

Note: *This feature is only applicable for RayCare treatments.*

5.2 TREATMENT MANAGEMENT IN RAYSTATION

5.2.1 Overview

Before an approved treatment plan from RayStation can be used for delivery in RayTreat, it is necessary to specify which plans and beam sets to use for a specific fraction in the treatment course. An overview of the treatment course can be found in the **Treatment course** tool panel to the left.

Figure 5. **Treatment course** tool panel.

Management of the treatment course prior to delivery can either be done by right-clicking on selected fractions in the panel, or in the **Approval** tab in the **Plan evaluation** module.

Additional information regarding fractions included in the treatment course is available in the tooltip.
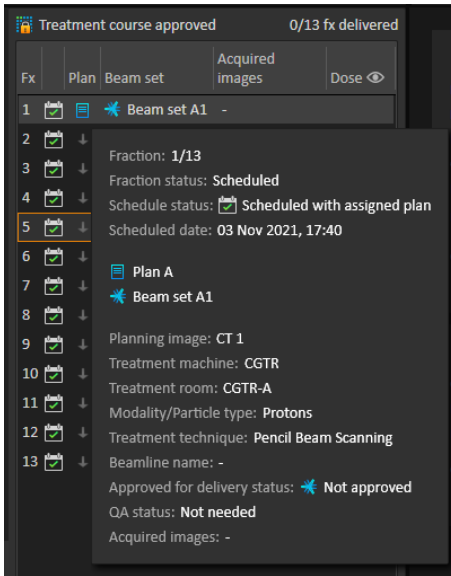
Figure 6. Tooltip with information about a fraction.
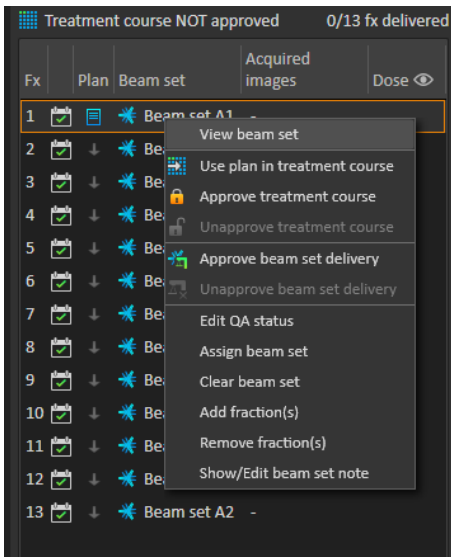
Figure 7. **Treatment course** tool panel menu.
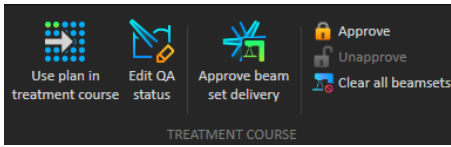
Figure 8.   Treatment course management in the **Approval** tab.

In the **Patient data** management module in RayStation, the treatment delivery overview displays the available plans to deliver, as well as the number of delivered fractions.

The treatment delivery overview shows all beam sets that can be used for upcoming delivery. The name, machine and assigned fractions are displayed.
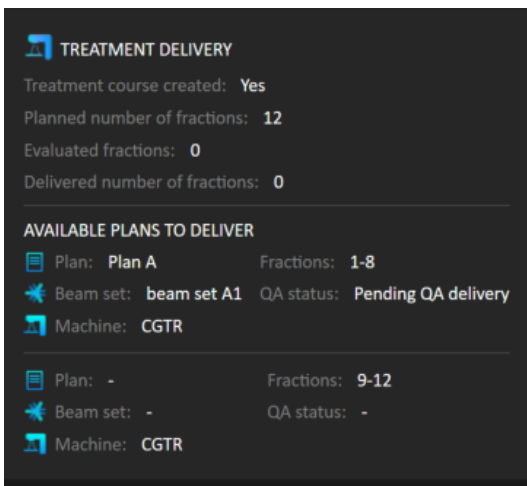
Figure 9.   Treatment delivery overview in **Patient data** management.

If any fractions are scheduled in RayCare, for a room with no plan assigned for a machine model corresponding to one that the room supports for delivery, the plan and beam set will be displayed as - .

When having alternative plans, the same fraction may occur for multiple beam sets. This indicates that these fractions can be delivered by either of the machines specified.

Different actions to manage the treatment course are described below.

5.2.2   Use plan in treatment course

Assigning plans for treatment is done in the **Use plan in treatment course** dialog in RayStation. The dialog is accessed by clicking the **Use plan in treatment course** button.
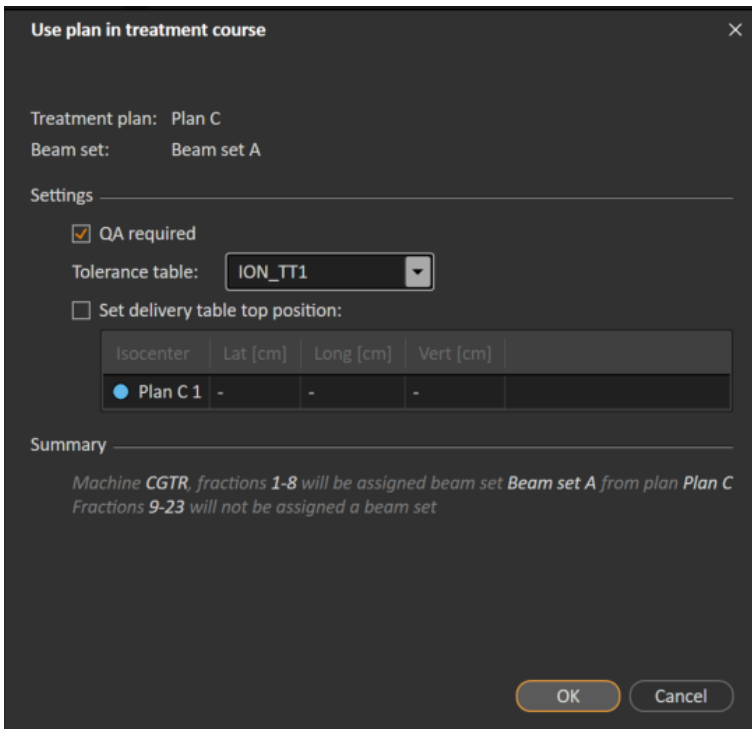
Figure 10. The **Use plan in treatment course** dialog in RayStation. The dialog may look different depending on the machine model.

The **Use plan in treatment course** dialog shows the currently open plan, all approved beam sets and to which fractions each beam set will be assigned. The assignment depends on the current plan's fractionation schedule and the fractions that have already been delivered.

To be able to assign a beam set for treatment, the following is required:

- The machine used in the plan must have a corresponding machine model configured in a treatment room in the **Treatment** section of the Clinic Settings application (for more information, see *section 5.1 Clinic Settings configuration for RayTreat on page 30*).

- The approved plan must have a dose computed with the current dose engine version and the latest, not deprecated, treatment machine model version.

- Each beam set in the plan needs to have a primary prescription.

Note: *For IBA, there must be exactly one single setup beam in the list.*

Note: *In RayTreat, the beam sets will be displayed with both their plan and beam set name. Make sure to use unique beam set names.*

5

> **WARNING!**
>
> **Make sure that the intended plan is used.** All plans can be included in the treatment course, regardless of the prescription or the planned number of fractions. Exercise caution when assigning different plans to different fractions.
>
> (7190)

Typically, when treatment planning has been completed for a patient, the approved plan is assigned to be delivered for all fractions in the treatment course. This can be accomplished by opening the **Use plan in treatment course** dialog, and verifying that the selected beam set will be used for all expected fractions. If the treatment machine for the plan requires a tolerance table to be selected for a plan, that must also be selected in the **Tolerance table** drop-down menu.

If fractions do not have an approved beam set, they will be left unassigned. They can later be assigned by opening the same dialog again, or by manually editing the treatment course. For more information, see *section 5.2.7 Modify treatment course on page 44*.

If the plan needs to be replaced during the treatment course (e.g., if a replanned treatment plan, adapted treatment plan or fallback plan needs to be used instead of the original plan), the new plan will be used according to its fractionation schedule. The user is responsible for verifying that the new plan is assigned to the correct fractions in the **Use plan in treatment course** dialog.

Note: *When the patient has been checked in to a treatment session, the plan for the corresponding fraction cannot be changed.*

Set delivery table top position

If the machine is set to support modifying table top positions, it is possible to set the default absolute table top position for the plan in the **Use plan in treatment course** dialog.

Once the table top positions are set and the plan has been assigned for treatment, it is possible to open the **Use plan in Treatment Course** dialog again to edit the table top position values but it is not possible to clear the values.

Alternative plans

When using a plan for treatment it is possible to include alternative plans for different rooms, if needed. Having alternative plans does not increase the number of fractions. However, it will be useful when having several treatment rooms, and to easily be able to reschedule a fraction for another room which does not share a common machine model. It adds a backup if any of the machines needs maintenance, for example.

There are a number of requirements that need to be fulfilled in order for a plan to be considered as an alternative plan:

• It must have been planned on the same image set as the original plan.

• It must use the same approved structure set as the original plan.

- It must have exactly the same prescriptions as the original plan.

- There must be a localization point and it must be the same localization point as the original plan.

- It must have the same fractionation schedule as the original plan.

- It must be for a different machine model than the original plan.

- The plan must not be deliverable in the same room as the original plan.

Figure 11.   The **Use plan in treatment course** dialog, with alternative plans.

Any alternative plans are displayed in the **Available plans** list in the **Use plan in treatment course** dialog. When using alternative plans, each beam set needs to be prepared by configuring its **Settings** in the **Use plan in treatment course** dialog.

Note: *When selecting an alternative plan, other plans for the same machine may be disabled. This happens if selecting them would cause any fraction to get alternative beam sets for the same machine.*

Note: *It is not possible to reschedule a continuation session for a machine other than the one for which the fraction was originally scheduled.*

Plans with multiple isocenters

For plans with multiple isocenters, table top positions for all treatment isocenters are shown. Note that there are some specific requirements for plans with multiple isocenters:

- There must be a POI of type "Localization point".

- Isocenters must only be used for a consecutive set of beams and not be used in multiple beams with non-consecutive beam numbers. This means that a previously used isocenter cannot be repeated after another isocenter has been used.

This is OK	This is NOT OK
Beam 1 - Iso 1	Beam 1 - Iso 1
Beam 2 - Iso 1	Beam 2 - Iso 2
Beam 3 - Iso 2	Beam 3 - Iso 1

- Delivery table top positions must be specified in the **Use plan in treatment course** dialog.

- Validated plans with treatment patient position **HFS** (Head First Supine), **HFP** (Head First Prone), **FFS** (Feet First Supine) and **FFP** (Feet First Prone) are supported.

Only the table top position for the first isocenter can be edited — the other table top positions are automatically calculated based on the relative positions of the isocenters.
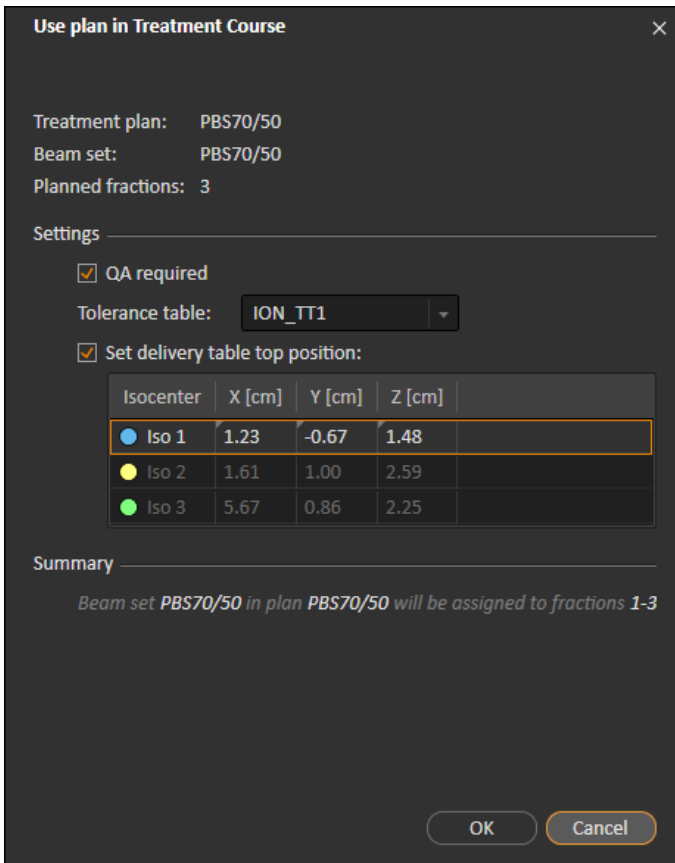
Figure 12. The **Use plan in treatment course** dialog for multiple beams at separate isocenters. The dialog may look different depending on the machine model.

5.2.3 Clear all beam sets

This button will clear all existing fractions which have not been delivered of their existing assigned beam sets. Similar functionality for individual fractions is found in the **Treatment course** tool panel. The treatment course must be unapproved to allow any removal of beam sets from fractions. A warning is displayed where the user can choose to verify the action to remove all plans from undelivered fractions.

5
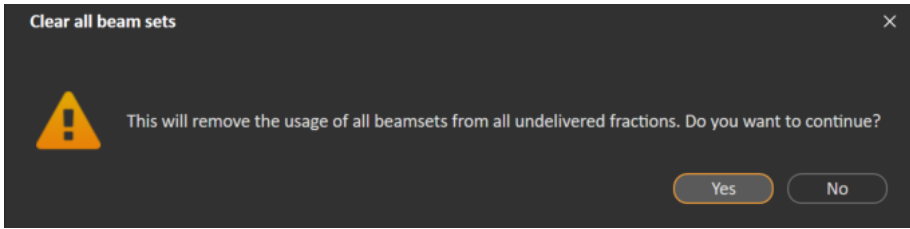
Figure 13.   Warning dialog displayed when clearing all beam sets.

5.2.4   Edit QA status

In the **Use plan in Treatment Course** dialog, it is possible to define whether or not the beam set will require QA delivery. Note that only treatment plans, as opposed to QA plans, will be used for delivery in this RayTreat version, both for treatment and QA delivery. When QA delivery is performed, or if the requirement of QA delivery changes, it is possible to edit the QA status by clicking the **Edit QA status** button.
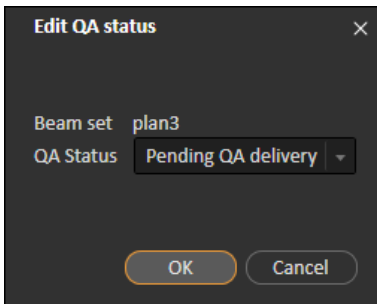
Figure 14.   The **Edit QA status** dialog.

The available QA statuses are listed in the following table.

Table 5.1: List of the available QA statuses.

QA status	Meaning
Pending QA delivery	The plan is expected to be delivered and measured for plan-specific QA and analyzed prior to use for patient treatment delivery.
Pending QA analysis	The plan has been delivered for plan-specific QA, but the results have not been analyzed yet.
Not needed	The plan is of a type that either does not require plan-specific QA before patient treatment delivery, or the QA status of treatment plans is managed in another system.

QA status	Meaning
Pass	The plan has been delivered and measured for plan-specific QA, and the results have been analyzed and are acceptable for patient treatment delivery.
Failed measurements	The plan has been delivered and measured for plan-specific QA, and the results have been analyzed but are unacceptable for patient treatment delivery. The reason is likely that the plan is correct but the measurement procedure has failed. Repeated QA delivery and measurement is recommended.
Failed plan	The plan has been delivered and measured for plan-specific QA, and the results have been analyzed but are unacceptable for patient treatment delivery. The reason is likely to be a problem with the plan. Therefore, it shall not be used and replanning is required.
-	QA status is unknown.

5.2.5   Approve treatment course

Before a treatment course can be used for delivery, approval is needed. This is done by clicking the **Approve** button, available both in the right-click menu in the **Treatment course** tool panel and in the **Approval** tab (see *section 5.2.1 Overview on page 34*). A table shows all the prescriptions of the treatment course and the total prescribed contribution of all fractions to each prescription. For more information, see *Nominal progress on page 62*.

Figure 15. The **Approve treatment course** dialog.

By clicking the **Approve** button the user confirms that the prescribed dose of the total treatment course is as expected. Only patients with a treatment course approved for delivery will be possible to treat in RayTreat. QA delivery is still possible without approval.

WARNING!

⚠️ **Prescription in Approve treatment course dialog.** The planned prescribed nominal dose shown in the *Approve treatment course* dialog is the sum of the nominal dose contributions for all fractions in the treatment course. The prescription is not automatically synchronized between RayStation and RayCare. The user is responsible for making sure that the prescription in the *Approve treatment course* dialog corresponds to the prescription in RayCare.

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5.2.6 Unapprove treatment course

By clicking the **Unapprove treatment course** button, the treatment course becomes unapproved for delivery. When a treatment course is unapproved the user can make modifications, such as assigning or clearing the beam set on fractions. A patient with an unapproved treatment course can be scheduled for treatment. However, RayTreat will not allow any delivery to be made, and the patient cannot be checked in from RayCare. For details about how a patient with an unapproved treatment course is handled in RayTreat. For more information, see *section 5.4.2 Schedule on page 51*.

Unapproving the treatment course can only be done when no session is checked in. Only a fraction with no recorded delivery can be modified.

5.2.7 Modify treatment course

The following actions can be found in the **Treatment course** tool panel menu. Some actions are only available for an unapproved treatment course.
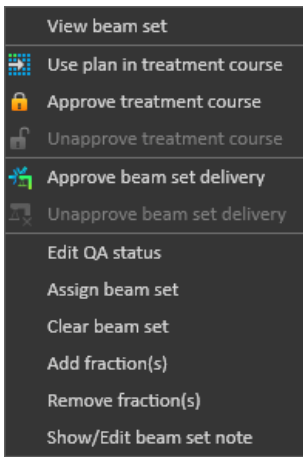
Figure 16.   Menu displayed when right-clicking in the **Treatment course** tool panel.

- **View beam set**: Changes the current viewed beam set in RayStation.

- **Use plan in treatment course**: Assigns the current selected plan in RayStation for the entire treatment course. For more information, see *section 5.2.2 Use plan in treatment course on page 36*.

- **Approve treatment course**: Approves treatment course for delivery. For more information, see *section 5.2.5 Approve treatment course on page 43*.

- **Unapprove treatment course**: Unapproves treatment course for delivery. For more information, see *section 5.2.6 Unapprove treatment course on page 44*.

- **Edit QA status**: Edits the beam set QA status. For more information, see *section 5.2.4 Edit QA status on page 42*.

- **Assign beam set**: Updates the beam set to be delivered on a fraction. Any approved beam set from any plan can be assigned to any undelivered fraction. Assigning a beam set to fractions opens a dialog similar to the **Use plan in treatment course** dialog, where tolerance table, QA status and table top positions can be reassigned.

  Note: *The tolerance table, QA status and table top positions will be modified for all upcoming fractions using the same beam set.*

- **Clear beam set**: Clears the selected fractions of their assigned beam sets. If the beam set for a fraction needs to be reassigned but the intended new beam set is not approved or decided yet, the fraction can be cleared of its current beam set.

- **Add fraction(s)**: Extends the treatment course with a number of desired fractions. The fractions are always added at the end of the treatment course.

- **Remove fraction(s)**: Removes selected fractions to shorten the treatment course. Fractions are removed from the end of the treatment course, and only fractions without any delivery can be removed.

Note: *Some of the above actions will alter the treatment course nominal contributions to the defined prescriptions. These will, thus, require the user to first unapprove and then re-approve the treatment course.*

5.2.8 Show/edit beam set note

It is possible to edit the beam set note for a plan. The edited note will be saved for the plan in the treatment course.

If the beam set has a beam set note there is a speech bubble in all rows for this beam set in the treatment course list.

To show/edit a note, right-click on the fraction in the treatment course and select **Show/Edit beam set note**.

5.2.9 Beam set delivery approval in treatment course

When Clinic settings is configured to require beam set delivery approval, an additional approval step is required before the scheduled beam set can be delivered. For further information, see *section 5.1.1 Configure beam set delivery approval in Clinic settings on page 33*.

The **Approve beam set delivery** option is accessible by right-clicking on a fraction in the treatment course list. The delivery approval will apply to the beam set that is shown for the fraction.
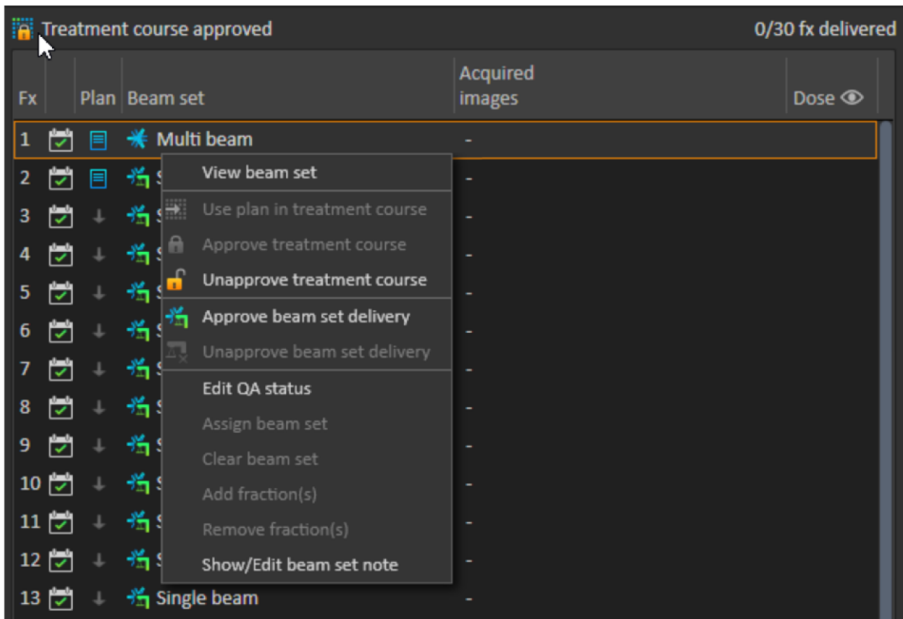
Figure 17.   The **Approve beam set delivery** option in Treatment course.

Delivery approval can also be set for the currently selected beam set by clicking the **Approve beam set delivery** button in the top tool bar. This also allows approving beam sets not currently shown in the treatment course list (alternative beam sets).
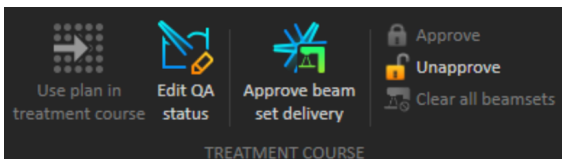
Beam set delivery approval requires authentication by a user with treatment administration rights.
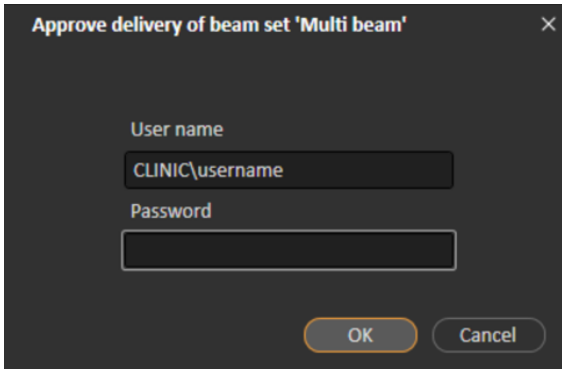
Figure 18.   The Beam set delivery approval authentication dialog.

If the scheduled beam set is missing delivery approval, it will not be possible to check in the patient for the session. It is also not possible to send session data to the treatment driver.
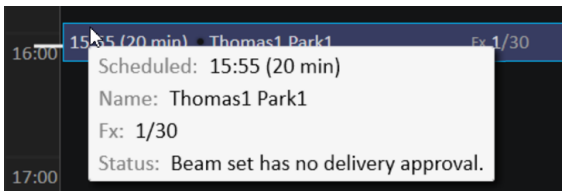
Figure 19.   Example of schedule in RayTreat.
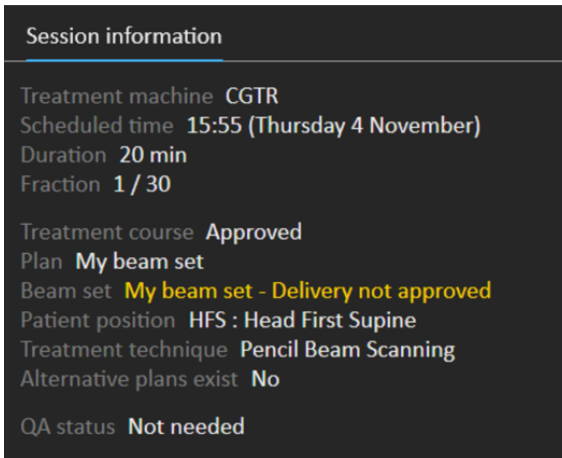
Figure 20.   Example of session information in RayTreat.

Once a beam set delivery is approved it is possible to undo the approval by unapproving it. This also requires treatment administration rights. Removing a beam set completely from the treatment

course will unapprove the delivery and if a previously approved beam set is re-added to the treatment course, its delivery will have to be approved again.

It is possible to see the delivery approval status in the treatment course list as well as in the session tooltip. An approved beam set delivery is indicated by a beam set icon with a green treatment unit. The delivery approval status is also shared with RayCare and its state shows up as a treatment alert for a specific session.
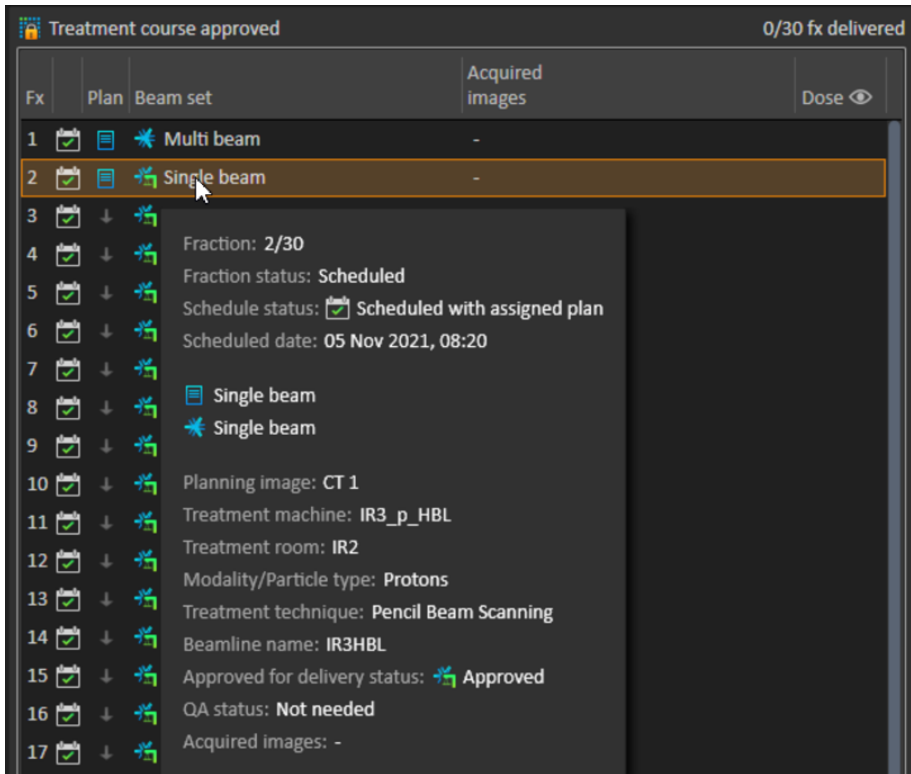
Figure 21.   The delivery approval status in Treatment course.

When Clinic settings is set to require beam set delivery approval, but the scheduled beam set does not require delivery approval (i.e., if the beam set was added to the treatment course before selecting the delivery approval option in Clinic settings), the delivery approval buttons will be visible but disabled. To require delivery approval for such beam sets they need to be removed and re-added to the treatment course.

Note: *This feature is only applicable for RayCare treatments.*

5.3   TOLERANCE TABLE MANAGEMENT

For treatment machines that support the transmission of a tolerance table in the RT Plan, it is necessary to define at least one tolerance table in the **Tolerance table management** dialog in the application menu in RayPhysics.

When selecting a tolerance table for a plan in the **Use for treatment** dialog in RayStation, only the approved tolerance tables for the corresponding treatment machine are displayed.

For further information, refer to the *Tolerance table management* section in *RSL-D-RS-11B-RPHY, RayStation 11B RayPhysics Manual.*

5.4   RAYTREAT ACTIVITIES

If RayTreat is installed to run as a Service, this chapter is not applicable.

The RayTreat application is divided into different parts, called treatment activities:

• **Schedule**

• **Preparation**

• **Delivery**

• **QA**

The user can toggle between the different activities by clicking the tabs in the user interface top bar.

5.4.1   User interface top bar

The top bar of the user interface contains the RayTreat menu, and the treatment activity tabs Schedule, Preparation, Delivery and QA.

Each treatment activity tab holds functionality related to that treatment activity. The workspaces for the activities contain toolbars showing information about the selected patient and the selected treatment plan, as well as other information relevant when performing the activity.
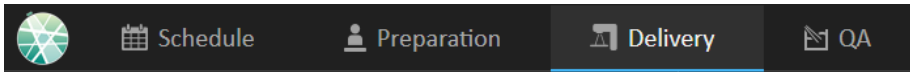
Figure 22.   The treatment activity tabs, where Delivery is currently active.

The RayTreat menu provides access to global functions such as saving domain state changes made via scripting, managing tolerance tables, help and exiting the application. The RayTreat menu is opened by clicking the RayTreat icon in the upper left corner.
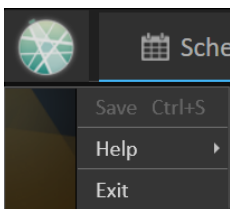
Figure 23.   The RayTreat menu.

5.4.2   Schedule

RayTreat displays a list of scheduled treatment appointments for the room it is configured against.

Workspace

The name of the treatment room is located in the upper left of the workspace. Today's treatment appointments are listed to the left in the Schedule workspace (by default). It is possible to display the schedule for other days by clicking the arrow to the right of today's date.

Patient information is located to the left of the workspace. It contains the patient photo, details, and flags and alerts that could be relevant during the treatment.

A list of tasks to be performed during the selected treatment session is displayed. To the right is the detailed session information and details regarding the plan to deliver (e.g., number of fractions, modality and treatment technique).

Figure 24.   The Schedule workspace.

Treatment appointments

The treatment appointments are listed to the left in the Schedule workspace. Each appointment is summarized in a treatment appointment bar.
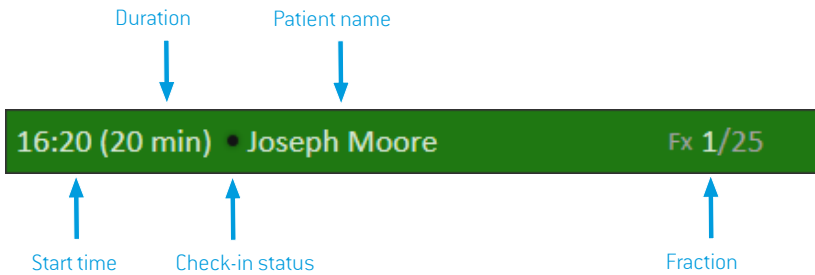
The treatment appointment bar contains the following information:

- Scheduled start time for the treatment appointment

- Estimated duration of the appointment

- Check-in status

- Patient name

- Fraction number out of the total number of fractions. Fraction one is explicitly indicated by the background color green.

Click an appointment in the schedule to get an overview of the treatment appointment. The overview consists of **Patient information**, **Appointment comments** from RayCare and **Session information**.

The patient information is managed and synchronized with the information entered into RayCare and the plan information is managed via the **Use plan in Treatment Course** dialog in RayStation.

An appointment that does not have a plan assigned for the current room, or is for an unapproved treatment course, is indicated with purple background color. When clicking on the appointment, information on what action is needed is shown in the panel to the right.
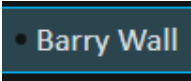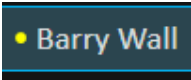
Figure 25.   An appointment with no plan and an unapproved treatment course.
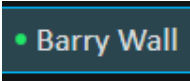
Checking in a patient

Before delivering a treatment session, the patient needs to be checked in. The patient is checked in in RayCare by selecting the corresponding appointment in the **Treatment** schedule in RayCare and then clicking the **Check-in** button. Once the patient has been checked in, the session is available for sending to the treatment machine. If there are warnings that need to be acknowledged by the user, the session has to be sent manually to the treatment machine.

The dot to the left of the patient name in the treatment appointment bar indicates the status for patient check-in. It is possible to open the treatment session by clicking **Open session**. The user is then navigated to the Preparation workspace to prepare the patient for treatment delivery.

The following patient check-in statuses exist:

Status indicator color	Description
Black	The status indicator is black if the patient has not been checked in.
Yellow	The status indicator turns yellow when the patient has been checked in, but the treatment session delivery instructions are not yet available in the treatment machine console. If the status indicator remains yellow for a long time, it is possible to right-click on the appointment and choose **Show driver status**. This will indicate any problems the driver has detected about why the treatment session delivery instructions are still not available in the treatment machine console.

Status indicator color	Description
Yellow with warning	 If the patient is checked in but the session delivery instructions cannot be sent automatically, a warning icon will appear next to the yellow status indicator. Hover over the warning to display the tooltip that describes the issues that need to be resolved. Click the button with three dots in the appointment bar (only visible in this particular state) to perform an action that resolves the current state: • Select **Send to driver** to manually send the treatment session delivery instructions to the treatment console. • Select **Remove from driver** to manually remove the treatment session delivery instructions from the treatment console. ***Note:*** *This action should only be used if the yellow status indicator does not turn black as intended. For example, if undo check-in has been performed.*
Green	As soon as all information for the treatment session has been retrieved from RayPacs, the status indicator turns green. The session is now ready to be started from the treatment delivery console.
Green with warning	The status indicator is green but there is a warning, with two possible reasons: • The status of an offline image review is **Rejected**, which will have to be viewed and handled during the session. • The session has been left checked-in until the next day without being treated. The warning indicates that it must be removed from the driver manually by right-clicking the session in the calendar. Hover over the warning icon to display a tooltip about the warning.

5.4.3   Preparation

Workspace

The Preparation workspace contains setup notes and patient setup information needed to position the patient prior to position verification imaging and treatment delivery.
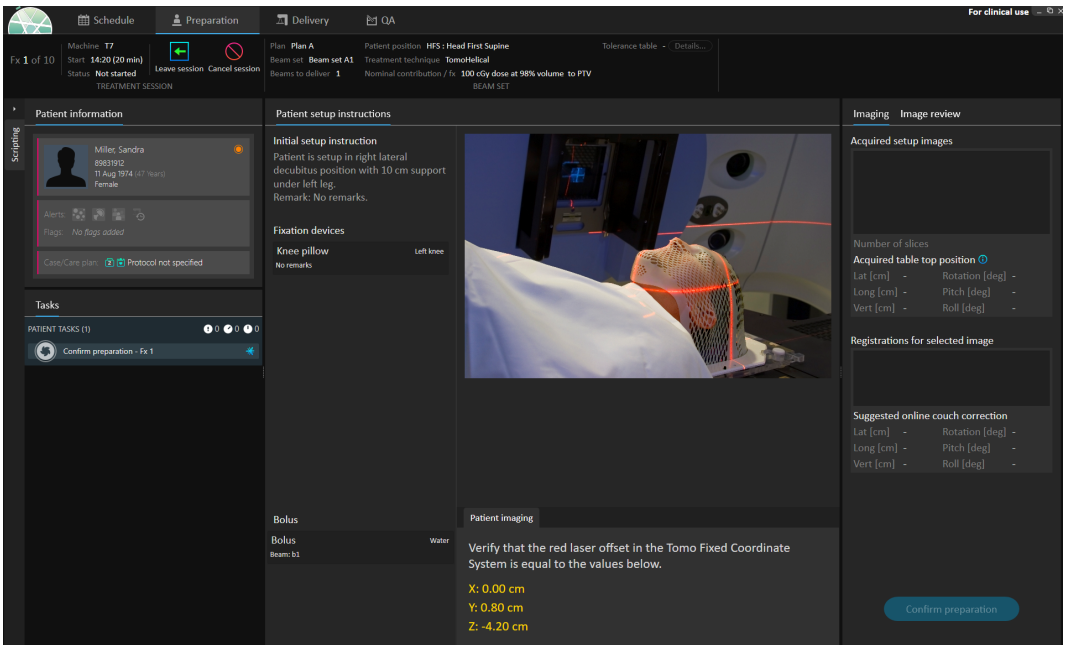
5

Figure 26. The Preparation workspace.

Preparing a patient for treatment delivery

In the **Patient setup instructions** section of the workspace, the setup instructions defined in RayCare are shown. This includes patient setup photo(s) and if any fixations devices must be used. In the lower left corner of the section, bolus information is displayed for the beams that have a bolus assigned.

In the **Patient imaging** section of the workspace, the shift from the localization point to the imaging isocenter is shown. For Accuray TomoTherapy or Radixact treatment delivery systems, the shift is shown as the **Red laser offset** in the fixed coordinate systems. For CyberKnife nothing is displayed since everything regarding the shift is handled in the CyberKnife software. For other treatment delivery systems, the shift is shown either in patient coordinates or in table top coordinates, depending on the corresponding option in RayStation Clinic settings.

When setup images (position verification images) have been received from the treatment delivery system, they are listed in the **Imaging** tab to the right, together with the table top position where the images were acquired. If registrations between the reference planning images and the acquired setup images have been received, they are listed in the **Registrations for selected image** list. The online couch correction implied by the registration is shown in the **Suggested online couch correction** section for the selected registration.

Note: *For the Accuray TomoTherapy and Radixact systems, the suggested couch correction is not computed from the registration and all coordinates will be displayed as undefined.*

Once patient setup and imaging has been completed, the preparation phase can be completed by clicking the **Confirm preparation** button in the bottom right corner. If there are multiple acquired setup images, select the one to use for calculation of setup corrections before clicking the **Confirm preparation** button.

Image review

In the **Image review** tab, all the related offline image reviews made in RayCare are visible. This view will show reviews for all fractions related to the patient and the current treatment course. Only reviews that have been handled in RayCare are visible. By selecting a fraction in the top list, it is possible to view the details for the related image review. Should the status have been set to **Rejected**, the review will be marked with a warning triangle. This status also triggers a dialog when opening the session, which informs that the review has been rejected. The user should look at the details for the rejected review and read the notes. If the details do not provide enough information, it is possible to open the review in RayCare for additional information. When appropriate actions have been made, it is possible to **Dismiss the warning** by clicking the **Dismiss warning** button at the bottom of the tab. This will remove the yellow warning triangle ⚠ for the selected review and replace it with a greyed-out triangle ⚠. This indicates that the review status is **Rejected** and will not trigger the warning dialog anymore, the warning is dismissed. It will still be possible to view all the details even though the warning has been dismissed. Should the review be updated in RayCare the dismissal will be removed. This causes any yellow warning triangle to reactivate, as there is probably new information available that needs attention.

⚠ **WARNING!**

If a registered image for the offline image review is displayed as "Unknown", this means that it was not recorded as part of a RayTreat treatment session. Instead it was imported and reviewed in RayCare afterwards. When an image is "Unknown" it is always recommended to verify the image and offline image review in RayCare
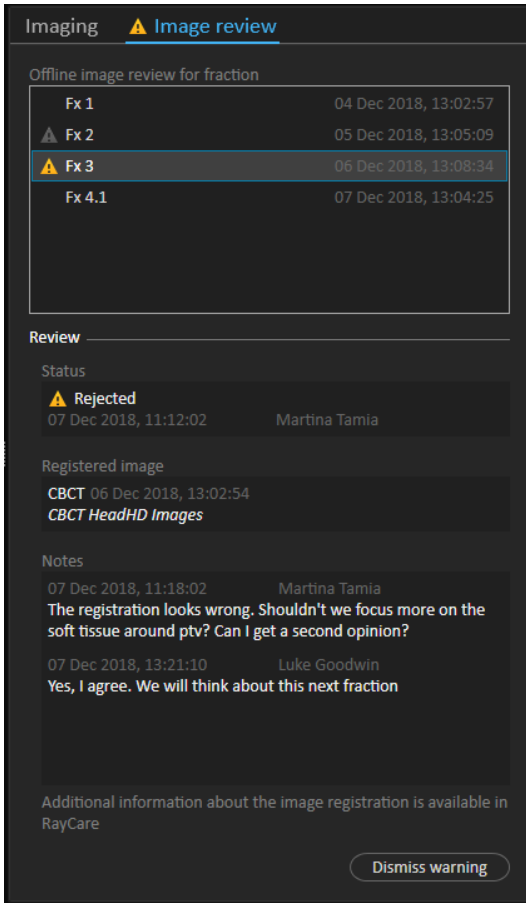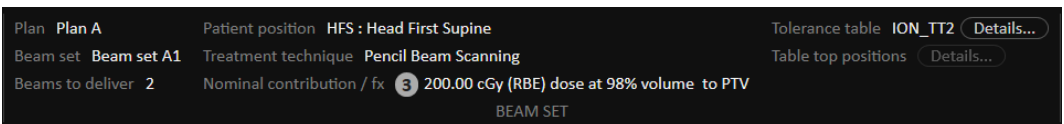
(272198)

5

Figure 27.   The **Image review** tab.

Nominal contribution/fx

The toolbar shows the planned nominal contribution for the current fraction. Note that the full fraction value is shown also for a session where only a partial fraction is treated.

Presence of multiple nominal contributions is indicated by a grey circle with the number of nominal contributions in it. All nominal contributions will be displayed in a tooltip when hovering this icon.

Tolerance table

In the top bar, it is possible to verify that the correct tolerance table has been selected for the plan by viewing the tolerance table details. Click the **Details...** button to open the tolerance table details.
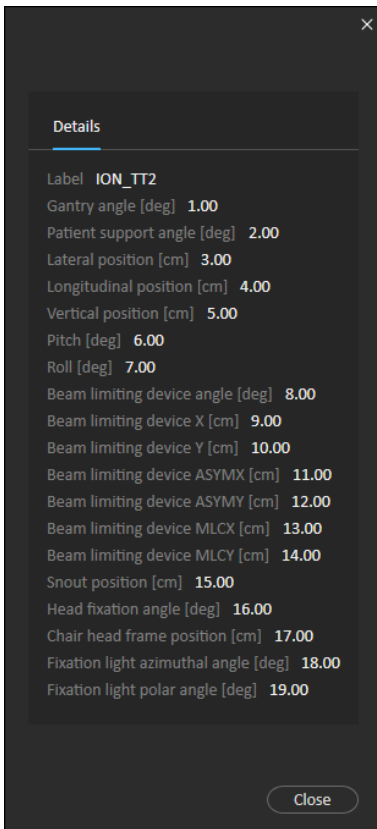
Figure 28. The tolerance table details.

Table top positions

If the machine is set to support modifying table top positions, and the table top positions have been manually edited in Treatment delivery settings or propagated through Treatment session completion, it is possible to view the updated table top position details. Click the **Details...** button next to the **Table top positions** in the top bar to open the **Updated table top positions** dialog. If the updated positions are altered when pressing **Use in treatment course**, it is updated when opening a session in RayTreat. However, if the **Set delivery table top position** is unchecked it will not be updated unless the plan is discontinued first.

> **WARNING!**
>
> **Verify table top positioning.** If the table top positions have been entered or propagated, use the "Updated table top positions" dialog together with the treatment delivery system and the patient positioning system to verify that the table top displacement from localization point to setup and treatment isocenter table top positions are consistent.
>
> (10711)
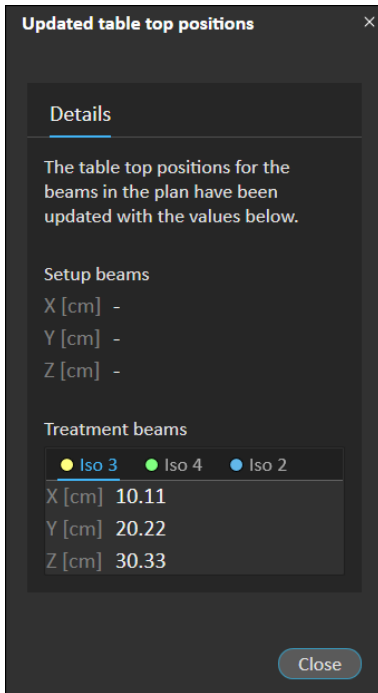
Figure 29. The **Updated table top positions** dialog.

5.4.4 Delivery

Workspace

The Delivery workspace lists all treatment fractions in the current treatment course. The fraction highlighted in blue is the current treatment fraction.
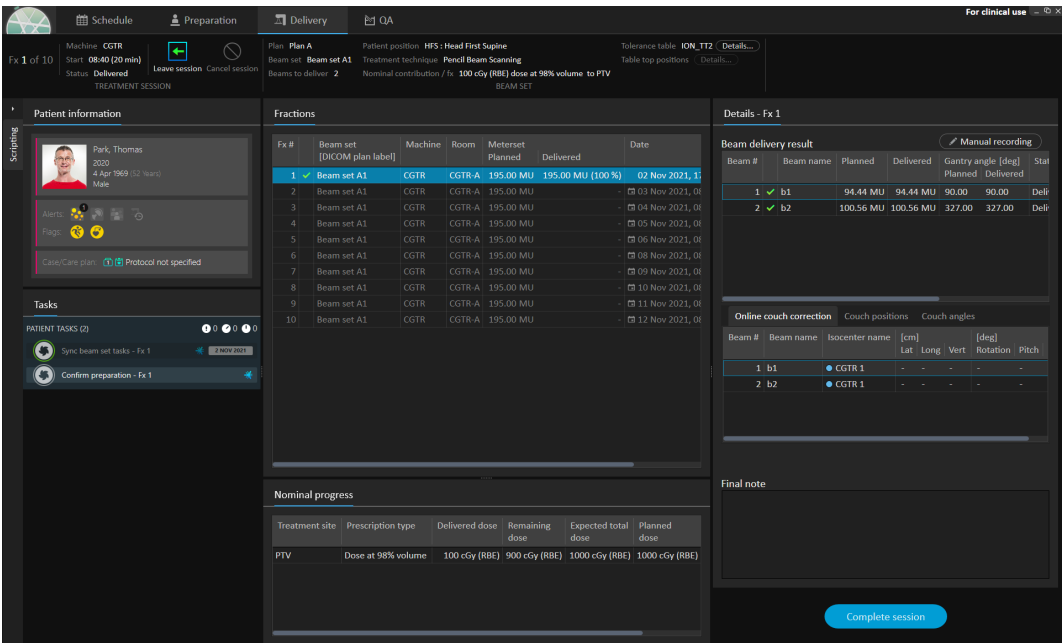
Figure 30.   The Delivery workspace.

Treatment fractions

If a treatment fraction is delivered in several sessions, the sessions will be listed as sub-rows, below their corresponding fraction. The fraction row summarizes values from the treatment session rows, where applicable.

Values and statuses for fractions that are not completely delivered are indicated in yellow and a warning icon is displayed.

Figure 31.   The **Fractions** list with one partially delivered fraction.

Note: *It is only possible to edit the final note if the current treatment session is selected. It is possible to view details for other treatment sessions, by selecting the corresponding row (the row will be highlighted with a blue outline). The current fraction will however remain highlighted in blue.*

Nominal progress

Nominal progress is displayed for all prescriptions included in the current treatment course. If multiple beam sets have the same prescription, the combined prescription dose level will be displayed here. The table can be used to monitor the prescription fulfillment during treatment.

Nominal progress

Treatment site	Prescription type	Delivered dose	Remaining dose	Expected total dose	Planned dose	Progress
Prostate	Dose at 98% volume	760 cGy (RBE)	2041 cGy (RBE)	2801 cGy (RBE)	2801 cGy (RBE)	
PTV	Average dose	760 cGy (RBE)	1240 cGy (RBE)	2000 cGy (RBE)	2000 cGy (RBE)	
Bladder	Dose at 2% volume	266 cGy (RBE)	434 cGy (RBE)	700 cGy (RBE)	700 cGy (RBE)	
DSP	Dose at site	760 cGy (RBE)	1240 cGy (RBE)	2000 cGy (RBE)	2000 cGy (RBE)	

Treatment site: Displays the name of the ROI/POI/Site depending on the **Prescription type**. Note that the **Prescription type** does not take the prescription percentage into account.

Delivered dose: Displays the accumulated nominal contribution at present and this value is incremented as treatment proceeds.

Expected total dose: The expected total dose is initially based on the planned dose level but can change during treatment due to deviations from planned delivery for fractions.

Planned dose: The sum of all nominal contributions from all fractions to this prescription.

Fractionation: Specifies how many fractions from different beam sets that contribute to the prescription and specifies their respective prescribed dose level. **Fractionation** will only be shown in treatment course approval and not in the **Delivery** module of RayTreat.

Progress: The progress bar displays the current prescription fulfillment based on delivered and expected total dose.

Note: *Nominal contribution is unrelated to the calculated beam set dose in RayStation, and is based solely on the prescribed dose. It is not affected by whether the prescription is fulfilled or not.*

Beam delivery result

The delivery details for the selected treatment session are shown to the right in two separate tables – one for the beam delivery data and one that is switchable between the online couch corrections, the absolute prescribed and recorded couch positions and couch angles and the absolute prescribed and recorded table top positions. There is also a text area for writing notes about the delivered session.

Figure 32. The **Beam delivery result** and **Couch positions** tables.

Figure 33. The **Beam delivery result** and **Couch angles** tables.

Figure 34. The **Beam delivery result** table with three incorrectly delivered beams.

Figure 35. The **Beam delivery result** table with a delivered dose above accepted tolerance.

If there are problems with the integration between RayTreat and the delivery system, an error icon will be displayed next to the beam in the Beam delivery results indicating that the beam is invalid.

If an unexpected error has occurred at any time during a session delivery, RayTreat might crash or show an error dialog. In some cases, these sessions cannot receive any more information from the delivery system. The session is then in a faulty state. This is shown in the calendar and in the toolbar next to the **Status** column. The error icon will be present. Hover over to see a tool tip explaining how to proceed. The delivery system can still proceed with the treatment even though the session is in a faulty state in RayTreat. However, RayTreat cannot display any progress. Acquired setup images and treatment records will still be sent to the OIS. When the treatment is finished, cancel the session and manually record what has been delivered and finally, complete the session. If this occurs, report it to the RaySearch support email: support@raysearchlabs.com or to your local support organization. If it is possible to save the treatment record that was produced by the vendor-specific treatment delivery console, this record can then later be imported and modified as a delivery in RayStation (see *section 5.5.2 Modify delivery on page 73*).

Figure 36. The error icon

Online couch correction

The online couch correction will be calculated as the difference between the recorded table top position and the image acquisition point shifted by the displacement from the setup beam to the treatment beam if all of the following conditions are fulfilled:

• There is an acquired setup image with a recorded table top position

- There is one setup beam

- The delivery table top position is recorded

- The preparation has been confirmed

If any of those conditions are not fulfilled, an alternative algorithm is tried. The alternative algorithm calculates the online couch correction as the difference between the planned table top position and the recorded table top position. If those positions are not available, no online couch correction will be calculated.

If the first algorithm is used, the tool tip "Shift from the laser-corrected planned table top position to treated table top position" is shown over the beam list. If the second algorithm is used, the tool tip is instead "Shift from initial planned table top position to treated table top position".

Note: *The online couch correction shown for treatments performed with Accuray TomoTherapy or Radixact systems is the accepted registration of the couch correction, and thus not necessarily the exact performed couch correction.*

Figure 37.   The **Beam delivery result** and **Online couch correction** tables.

Cancel session

If a treatment session cannot be completed nor canceled through the treatment console (machine vendor software). Or, if the changes to the session status is not forwarded correctly to RayTreat, it is possible to cancel the session through the **Cancel session** button in the RayTreat top bar.

5
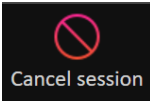
Once a session is canceled, no more deliveries can be performed. Manual recording can still be done, and completion of the session is needed to be able to continue with the next delivery.

Treatment session completion

Once the treatment has been completed by the treatment delivery system, the treatment session must also be completed in RayTreat:

1. Click the **Complete session** button in the bottom right part of the Delivery workspace.

This opens a dialog that displays all the recorded beams during this treatment session.

2. Verify that the recorded data is correct.

3. Complete the treatment session by clicking **Yes**. This opens the authentication dialog. Alternatively, if there is an error in the treatment recording, click **No** and correct the recording before completing the session.

4. Enter user name and password in the authentication dialog.

Note: *The user completing a session is responsible for ensuring that all of the delivery is correctly recorded. If the recording is not received automatically, a manual recording must always be performed. This is needed to guarantee that a continuation session cannot receive overdose.*

Note: *The user must complete an active session before continuing treatment with another session. If a session has not been completed, this is indicated in the Scheduling work space with the following:*
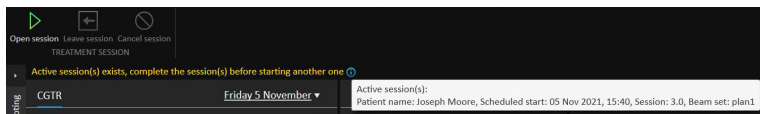
Manual recording

If the beam delivery results displayed in the Delivery workspace (see *Beam delivery result on page 62*) do not match what was actually delivered (e.g., due to communication failure), it is possible to correct this manually by creating an additional record of what was delivered. To create an additional record, select the beam with a missing meterset and click the **Manual recording** button.
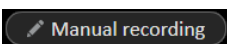
In the beam delivery results list, items with manually added metersets are indicated with a pen icon.

Continuation session

If the fraction was not completely delivered in the first treatment session, the status "Partially delivered" will be displayed for one or more beams as well as for the entire treatment session. When completing a treatment session that is only partially delivered, it is possible to select the option to **Create a continuation session** in the **Do you want to approve this delivery** dialog. The planned meterset in the continuation session will be the difference between the planned values for the original treatment fraction and what was delivered.

After completing a treatment session and creating a continuation session, that session will need to be scheduled in RayCare.
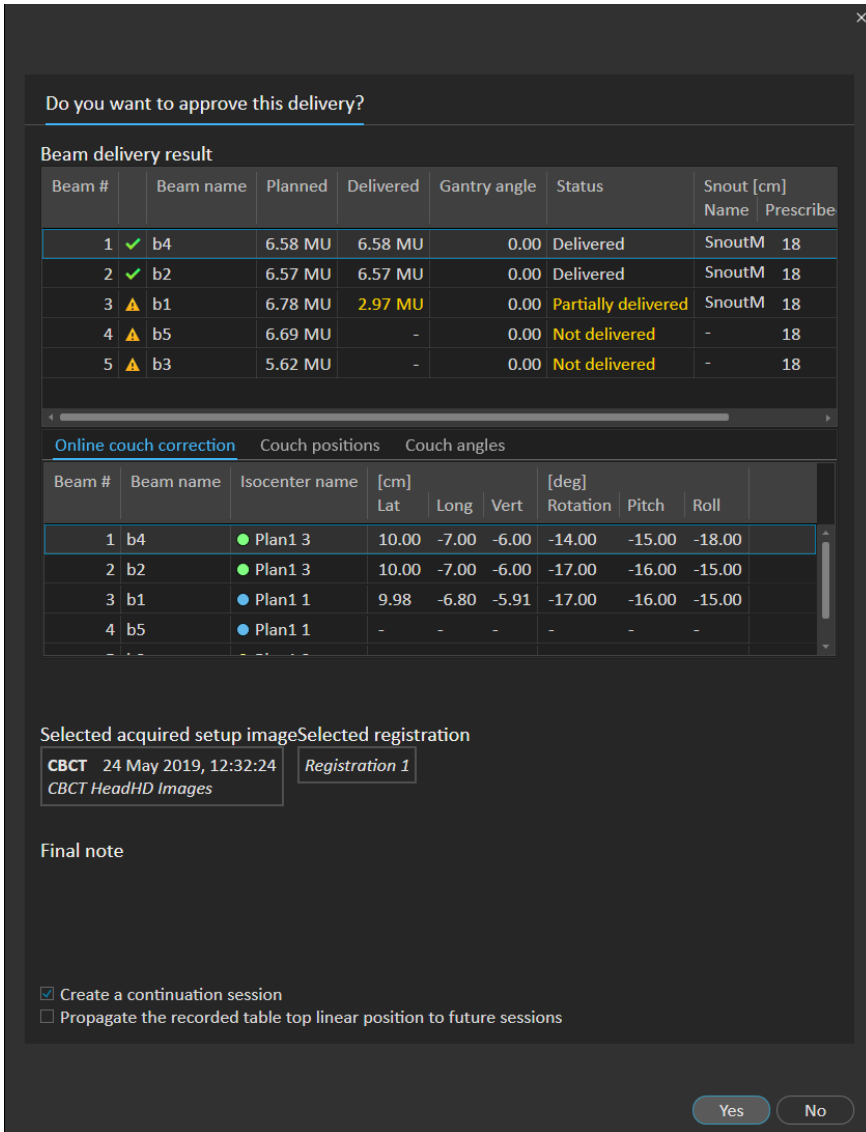
Figure 38.   The Delivery approval dialog.

Propagate table top position

If the machine is set to support modifying table top positions, it is possible to propagate the recorded delivery table top linear position gained from the treatment record for all future fractions. This is done by checking the option **Propagate the recorded table top linear position to future sessions** and verifying the displayed absolute positions. The user will then be notified next time these new positions are used for delivery. If several beams are delivered, all beams must have been delivered

within the corresponding tolerances defined in the Tolerance table used for the fraction. Lateral, longitudinal and vertical differences must all be within the tolerance.

For plans with multiple isocenters, all delivered beams are considered in the validation of the tolerances. However, only the first delivered beam for the first isocenter is used to calculate the position for the propagated position. If no beam was delivered to the first isocenter, propagation is not possible.
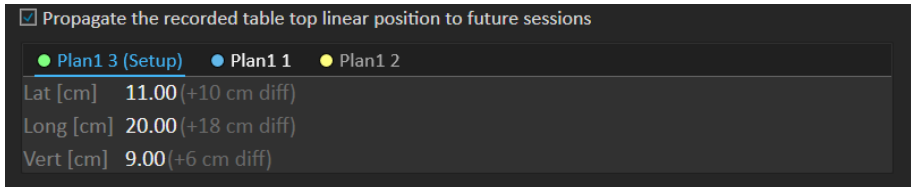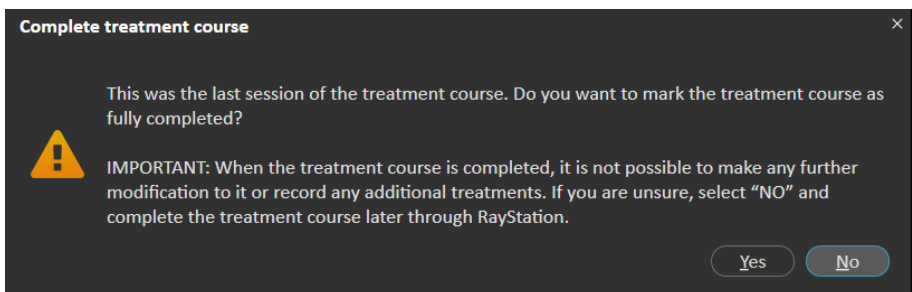

Figure 39.   The Delivery approval dialog with table top position propagation.

Final session

After delivering the final treatment session, the user gets the option to also complete the entire treatment course:

1. After delivering the final treatment session, the **Complete Treatment Course** warning is displayed.

2. Click **Yes** to confirm that all treatment sessions for this treatment case have been completed and thus lock the treatment course from further delivery.

    Click **No** to keep the treatment course open. It is however possible to complete the treatment course later in RayStation by clicking the **Complete Treatment Course** button in the Dose Tracking module.
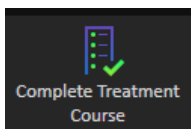
5.4.5 QA

Workspace

The QA workspace contains tools for sending QA plans to the treatment machine. All plans that are scheduled to start and have the QA status set to **Pending QA delivery** are shown in the **Plans to QA** list.
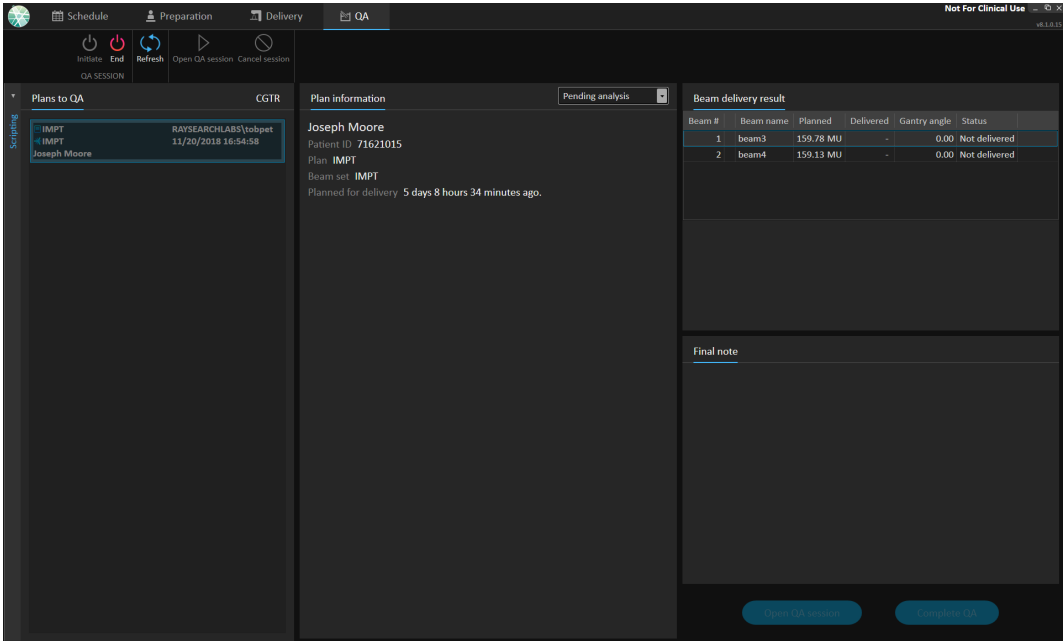

Figure 40. The QA workspace.

Deliver plans in QA mode

To deliver plans in QA mode, RayTreat needs to be set in QA mode. To enter QA mode, click the **Initiate** button in the toolbar.

In QA mode, the QA session must be started before it is available to the treatment delivery system. Once the QA delivery is done, the session shall be completed in the same way as for treatment sessions (*Treatment session completion on page 66*). The QA status of the plan can then be changed to one of the following options:

- **Pending QA delivery**

- **Pending analysis**

- **Not needed**

- **Pass**

- **Failed measurements**

- **Failed plan**

5.5 TREATMENT RESULTS IN RAYSTATION

After the treatment delivery has been performed, it is possible to examine the results of the delivery in RayStation. The delivery results are presented in the **Result** workspace layout in the Dose Tracking module in RayStation. Delivery results such as beam delivery result status, couch positions, couch angles and online couch correction can be examined for each delivered treatment session.

Figure 41. The **Result** workspace layout in the Dose Tracking module in RayStation.

It is possible to edit results or compensate for any mistakes done in RayTreat. It is also possible to cancel and record any treatment sessions delivered outside of RayTreat, so that the results may still be used for dose tracking or when displaying the results of the treatment course in RayCare and RayStation. Editing results and recording of treatment sessions are not available when using RayCommand.

Note: *Modifications done in this workspace cannot be undone. Any changes here require that no previous unsaved modifications exist. All changes also require user authentication to be performed before completion.*

Note: *The treatment course needs to be approved in order to modify delivery or cancel a session.*

5.5.1 Cancel session

To cancel a treatment session that has not yet been started, click the **Cancel session** button in the Dose Tracking module in RayStation.
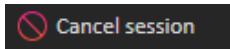

It is not possible to cancel a session that has already started, or has been checked-in through RayCare. Such a session will still have to be canceled through RayTreat. For more information, see *Cancel session on page 65*.

Note: *It is always preferred to cancel a session through RayTreat before canceling it through RayStation, if the session is scheduled for delivery on the same day.*

When canceling a session in RayStation, the user has to confirm the cancellation and complete the empty session. Once a session has been canceled it is still possible to modify the delivery through the **Modify delivery** button.

5.5.2 Modify delivery

To modify the treatment delivery, click the **Modify delivery** button.
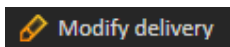
A dialog appears that allows the user to add, edit or remove any current manual treatment records. The manual records that can be modified are indicated with a pen icon.

Figure 42.   The **Modify delivery** dialog.

Add treatment record

To manually add a treatment record, click the green **Add** button. This is done in the same way as when recording a manual treatment record in RayTreat. For more information, see *Manual recording on page 66*.

Edit treatment record

Once added, a manual record can be edited by entering a value in the Delivered column. The delivery Status must also be set to either *Delivered* or *Partially delivered*. In the same way it is also possible to edit any of the manual records that were created in RayTreat.

Delete treatment record

To delete a manual record, represented by the pen icon, click the red **Delete** button.

Import treatment record

To import a treatment record, to be used to modify the delivery, click the **Import treatment record** button. This allows the user to import a treatment record by selecting a DICOM treatment record from file.

If there are any discrepancies in the expected delivery of the current session, these will have to be accepted as overrides in the dialog. Discrepancies that will be checked are if the machine, patient details, fraction number or plan ID in the treatment record mismatches with the selected session.

> **WARNING!**
>
> For a continuation session where the import of a treatment record is needed, the treatment record must be imported manually into both RayStation and PACS. It is not sufficient to import the treatment record into RayCare PACS only. There is no verification that all treatment records in RayCare PACS have been imported into RayTreat. If all treatment records are not correctly imported to RayTreat for a fraction that requires a continuation session, It is possible to deliver the previously delivered dose again.
>
> (272901)

Note: *Any discrepancies shown will have to be analyzed for relevance, especially with regards to any machine vendor specific warnings, before being accepted as overrides.*

If the current fraction has been delivered during multiple treatment sessions, an additional override dialog is displayed where the user has to confirm that the currently selected session in the treatment course list is indeed the session into which the treatment record should be imported.

Note: *Extra care must be taken when editing a session for a fraction which is not the last one. If changing the recorded meterset in a way that would modify whether the following session(s) should or should not deliver a particular beam, this could make the state for the following sessions to be represented in an unexpected way. Therefore, it is encouraged to take extra care when delivering any following session for the fraction that was edited.*

Approve the modified delivery

When the modified treatment session is completed, click **OK**. An approval dialog is shown, similar to the dialog shown when completing a session in RayTreat. For more information, see *Treatment session completion on page 66*.
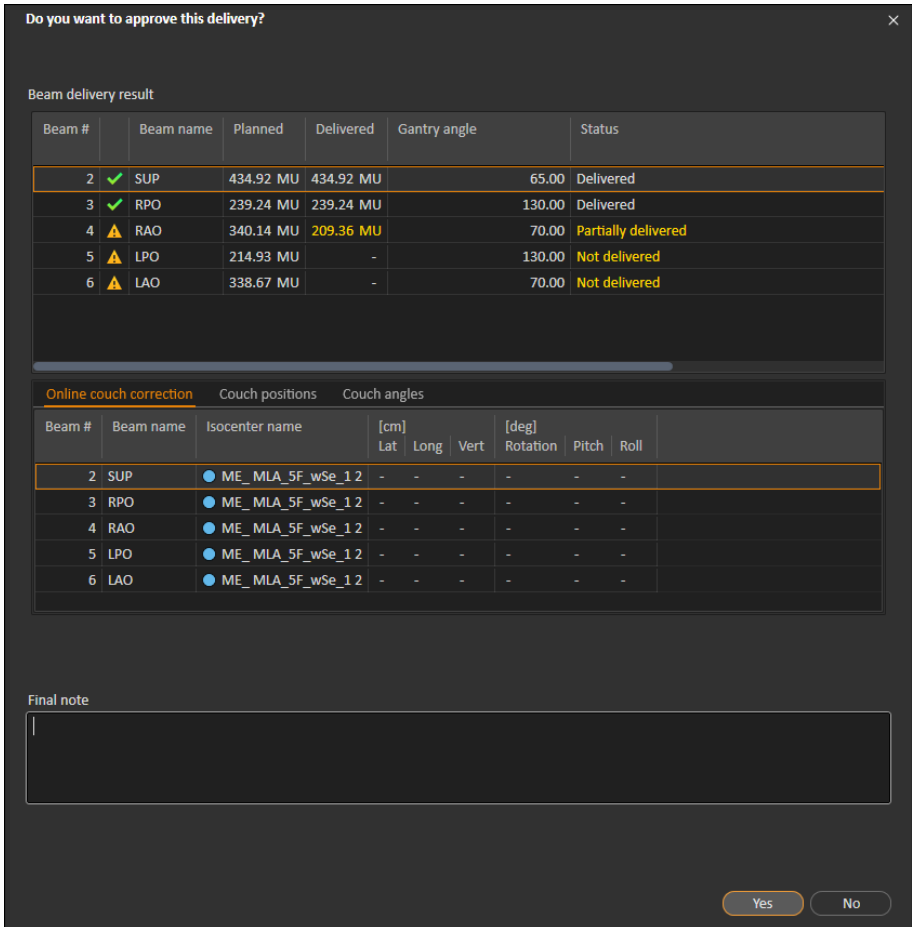
5

Figure 43.   The Delivery approval dialog.

This dialog provides a complete list of the treatment records to be delivered. Verify that the delivery is as expected. Add a final note or edit the existing treatment notes if the information is still relevant.

Once accepted, the result in RayStation will be updated accordingly and the result in RayCare should also reflect the change.

5.5.3   Add session to fraction

Add an additional treatment session to the selected fraction by clicking the **Add session to fraction** button. That is, if the last session is completed, and there is still more to be delivered on that fraction.

Note: *Treatment course needs to be unapproved before session can be added to fraction.*
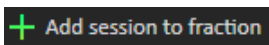
The new session that is added will then have to be scheduled manually through RayCare.

5.5.4   Complete treatment course

When all fractions have been delivered and completed, it is possible to complete the entire treatment course by clicking the **Complete Treatment Course** button. A completed treatment course will be locked from further delivery.
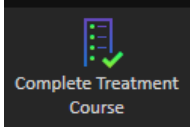
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