

RAYSTATION 11A

RayTreat 5A Instructions for Use

11A



RayStation

Traceback information:
Workspace Main version a658
Checked in 2021-05-24
Skribenta version 5.4.004

Disclaimer

For information on functionality not available for regulatory reasons, see the Regulatory Information in the RayStation Instructions for Use.


Declaration of conformity



Complies with 93/42/EEC Medical Device Directive as amended by M1 to M5. A copy of the corresponding Declaration of Conformity is available on request.

Safety notices

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

	<p>WARNING!</p> <p>The general warning sign informs you of a risk for bodily harm. In most cases the risk is related to mistreatment of the patient.</p>
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Note: *The note gives additional information concerning a specific topic, for example, things to consider when performing a certain step in an instruction.*

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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-11A-RTDITS, RayStation 11A RayTreat 5A Treatment Device Integration Test Specification* - if RayTreat is installed as an application.
- *RSL-D-RS-11A-RTAASDITS, RayStation 11A RayTreat 5A as a Service Treatment Device Integration Test Specification* - if RayTreat is installed as a Service.

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

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

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

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

The RayStation 11A system is further described in the RayStation 11A 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 5A product documentation for information about the RayCare 5A system.

2 PRODUCT INFORMATION

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

2.1 RAYTREAT PRODUCT LABEL






The version number of an installed RayStation 11A 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 = **11.0**
- Marketing name = RayStation RayTreat 5A
- Software build number = **11.0.0.951**
- 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.

-  = The CE mark and the notified body number
-  = Production date
-  = Consult instructions for use
-  = The name and address of the manufacturer
-  = The support e-mail address

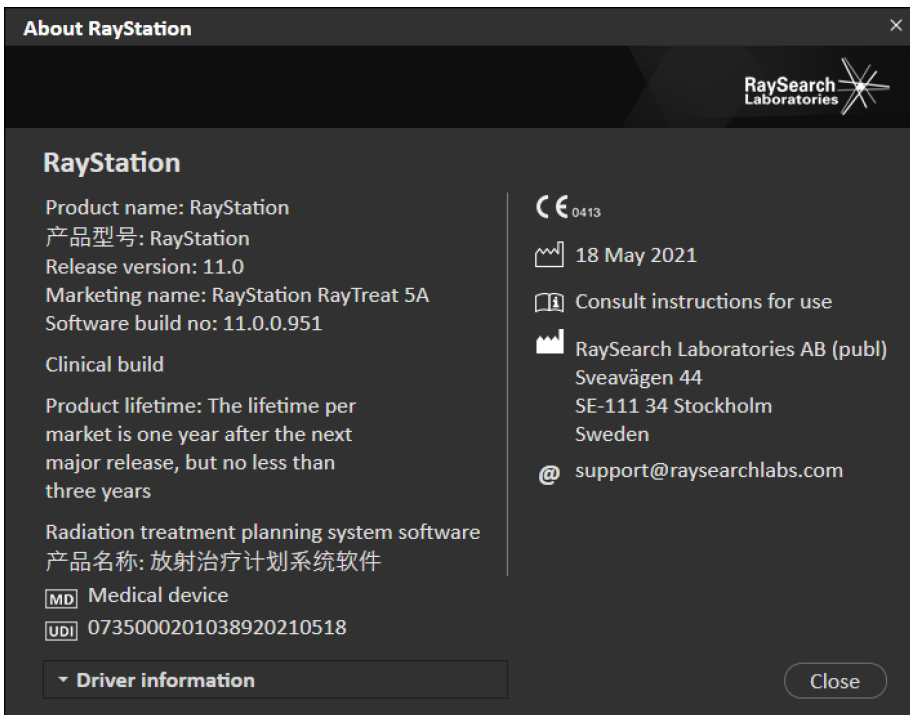


Figure 1. The **About RayStation** dialog for RayTreat.

3 INFORMATION NEEDED FOR SAFE OPERATION

Adhere to the following warnings as well as the warnings described in *RSL-D-RS-11A-IFU, RayStation 11A 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-11A-RTTDITS, RayStation 11A RayTreat 5A Treatment Device Integration Test Specification* - if RayTreat is installed as an application.
- *RSL-D-RS-11A-RTAASDITS, RayStation 11A RayTreat 5A as a Service Treatment Device Integration Test Specification* - if RayTreat is installed as a Service.

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

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

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 its 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. [371758]

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* and *RayTreat Treatment Device Integration Test Specification* to confirm correct functioning. [383414]

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. [531236]

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]

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. (371891)

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-11A-SEG, RayStation 11A 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-11A-SEG, RayStation 11A 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-11A-SEG, RayStation 11A System Environment Guidelines*. (531169)

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-11A-SEG, RayStation 11A System Environment Guidelines*.

(340921)

WARNING!



TrueBeam imaging. TrueBeam supports taking images before and during treatment. However, RayTreat as a Service does not support receiving the images or registrations.

(284906)

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!

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)

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-11A-RN, RayStation 11A 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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4.2	Known issues related to patient safety	p. 21
4.3	Other known issues	p. 23

4.1 NEWS AND IMPROVEMENTS IN RAYTREAT 5A

This chapter describes the news and improvements in the RayTreat 5A application as a part of RayStation 11A, compared to RayStation 10B.

- Task list from RayCare is shown.
- A more detailed patient information panel is shown in the Preparation and Delivery modules.
 - Contains alerts, case and care plan information.
 - Automatically updated when data is changed in RayCare.
- Tolerance table management is removed since this functionality is now part of RayPhysics and RayStation.
- Tracking of the nominal contribution is made towards the prescriptions defined in RayStation.
- A beam set used in RayTreat now requires a defined prescription.
- It is now possible to edit the treatment course through right-clicking in RayStation. The beam set of a single fraction can now be exchanged.
- It is now possible to have fractions without a beam set defined in the treatment course.
- It is now possible to use *Use plan in treatment course* on a plan with multiple beam sets where only a subset of the beam sets is approved.
- Approval of treatment course is added.
 - An unapproved treatment course can only deliver QA sessions.
 - A treatment course can only be edited when it is unapproved.
 - During approval, a list of all prescribed nominal contributions and tracked delivered nominal contributions is displayed. This can be used to compare against the prescription in RayCare.
- The concept of 'machine' and the concept of 'room' are now separated. A 'room' in the Clinic Settings application can now be configured to allow multiple 'machine models', created in RayPhysics, to be delivered. A machine model can also be shared between multiple rooms. This concept change will support rooms with multiple modalities and clinics with an identical machine model used for multiple rooms. This will also make it easier to reschedule an appointment between rooms.
- Support for delivery using Accuray CyberKnife is added.

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]

The patient panel is not used in the RayTreat Schedule workspace

The patient photo and patient flags shown in the Schedule workspace in RayTreat may not always be the latest if updates have been made in RayCare. Open and view the session in the Preparation or Delivery workspace to see the latest information.

[339607]

Assigning a plan so that the number of fractions is reduced

The 'Use plan in treatment course' functionality will crash if the number of fractions is reduced. Use the 'Clear beam set' functionality instead if delivering less fractions than originally planned for.

[345158]

Setup beams created at localization point

If setup beams are created to the localization point, the absolute table top positions are incorrectly calculated. Do not use localization point as the setup beam isocenter.

[345316]

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)

Online couch correction when performing imaging with rotation

RaySearch does not guarantee that the suggested online couch correction and the performed online couch correction are correct when imaging is performed for a beam with couch rotation other than zero degrees.

Correct values are displayed in adaPT insight.

[344436]

4.2.4 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]

Setup instruction modification for TrueBeam

Modifying the setup instructions or photos on the Varian TrueBeam console does not modify the setup instructions or photos in RayCare. Next time the patient is treated, the original instructions from RayCare will still be sent to the Varian Treatment System (VTS) and TrueBeam.

[284693]

4.3 OTHER KNOWN ISSUES

4.3.1 RayTreat installed as a desktop application

Incorrect approval warning displayed

The first time a plan is assigned for treatment via *Use plan in treatment course*, an incorrect approval warning will be displayed if the treatment plan is not approved. This warning can be disregarded.

[344478]

Fixation devices from RayCare not displayed

RayTreat does not display any fixation devices created in RayCare. To see the fixation devices for the corresponding setup instructions, open the patient in RayCare.

[341890]

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]

Possible to interact with the Dose tracking module in RayStation even if the treatment course is not synchronized

Do not interact with the Dose tracking module in RayStation if a treatment course is not synchronized. If a treatment course needs synchronization, this is clearly displayed with red marked fractions and a button for synchronization in the treatment course panel.

[341560]

Nominal progress is not displayed in RayTreat

RayTreat only displays the planned primary prescription from the RayStation beam set. This information only reflects how the beam set was initially defined in RayStation and does not reflect the number of fractions that the beam set is actually used for in the treatment course. The nominal progress is displayed in the treatment course in RayCare.

[341807]

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]

Comments written on an appointment in RayCare will not be displayed in RayTreat

Appointment comments created in RayCare are not displayed in RayTreat. Before treatment, verify that no important information about the appointment is overlooked by opening the appointment in RayCare.

[343221]

Not possible to treat if machine model is not the same as room name

A treatment machine in the Clinic Settings application must only be configured with a single room name that exactly matches the name of the machine model in RayPhysics.

[344360]

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]

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]

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]

Table top positions will not be propagated for TrueBeam

RayTreat as a Service does not support propagating table top positions to the upcoming fractions.
(285232)

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)

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)

Partial treatment for TrueBeam

RayTreat in combination with Varian TrueBeam might not be able to start the delivery of a resumption on a resumption. Such delivery shall be performed without the involvement of RayCare and later imported into RayStation and RayPacs.
(284357)

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)

Multiple isocenters for TrueBeam

It is not possible to use a plan for treatment for the TrueBeam machine if the beams have different isocenters.
(285230)

Multiple beam sets for TrueBeam

For a Varian TrueBeam machine, it will not be possible to use a plan with multiple beam sets for treatment delivery. It will also not be possible to use an adapted plan for treatment delivery.

[285231]

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]

5 RAYTREAT

In this chapter

This chapter contains the following sections:

5.1	User interface top bar	p. 30
5.2	Clinic Settings configuration for RayTreat	p. 31
5.3	Treatment management in RayStation	p. 35
5.4	Tolerance table management	p. 47
5.5	RayTreat activities	p. 48
5.6	Treatment results in RayStation	p. 67

5.1 USER INTERFACE TOP BAR

The top bar of the user interface contains, from left to right, the RayTreat drop-down menu, the treatment activity tabs Schedule, Preparation, Delivery and QA.

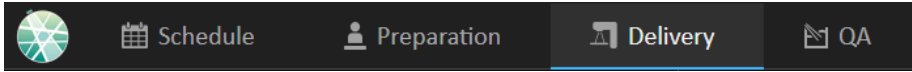


Figure 2. The treatment activity tabs, where Delivery is currently active.

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.

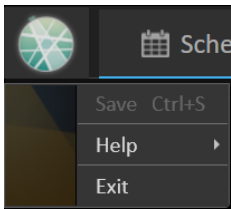


Figure 3. The RayTreat menu.

5.2 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.

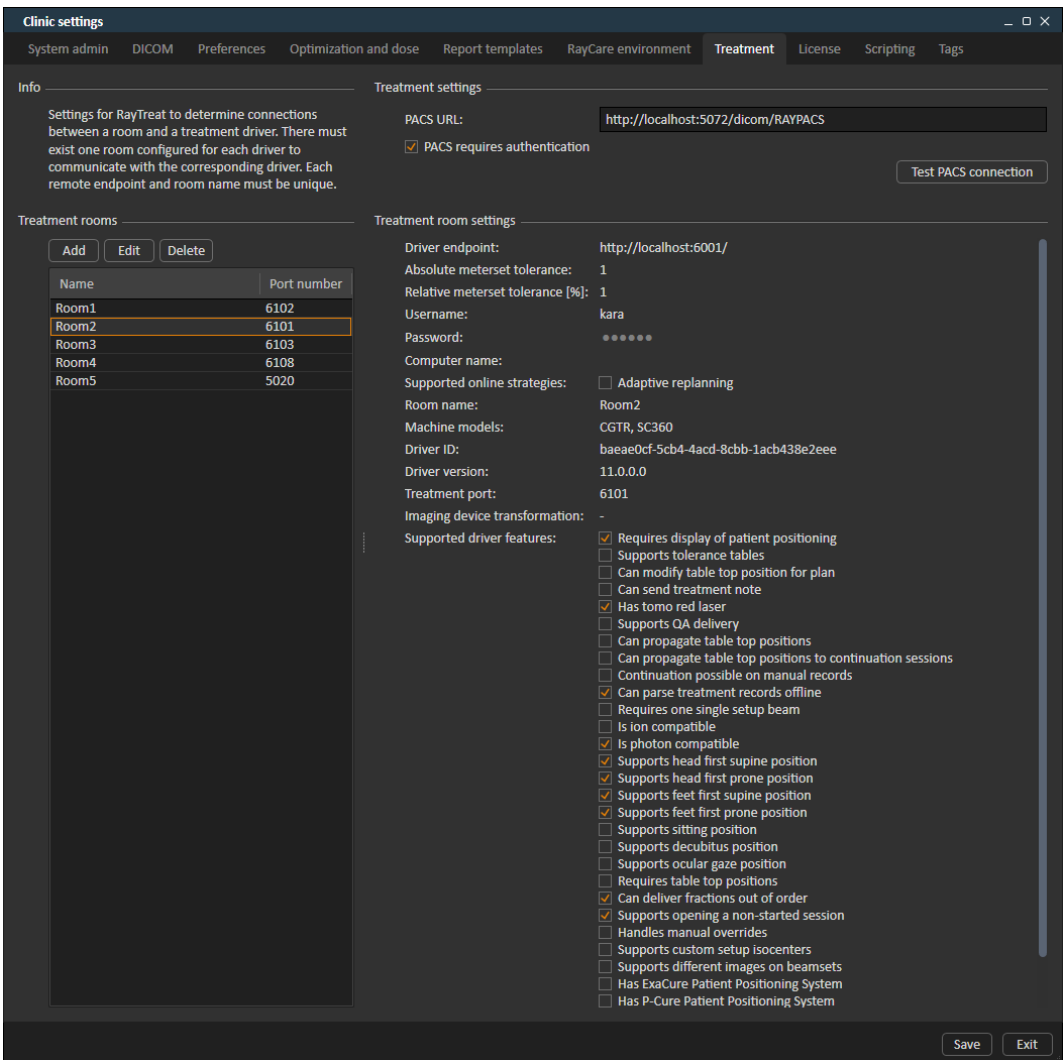


Figure 4. The **Treatment** tab in **Clinic settings**.

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 its 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.

[34117?]

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

Edit treatment room settings

General

Driver endpoint:

Absolute meterset tolerance:

Relative meterset tolerance [%]:

Username:

Password:

Computer name:

Supported online strategies: Adaptive replanning

Driver essentials

Room name:

Machine models:

Driver ID:

Driver version:

Treatment port:

Driver features

Supported driver features:

- Supports tolerance tables
- Can modify table top position for plan
- Can send treatment note
- Has tomo red laser
- Supports QA delivery
- Can propagate table top positions
- Can propagate table top positions to continuation session
- Continuation possible on manual records
- Can parse treatment records offline

Figure 5. 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 5.5.3 Delivery on page 56](#).

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.

5.3 TREATMENT MANAGEMENT IN RAYSTATION

5.3.1 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.

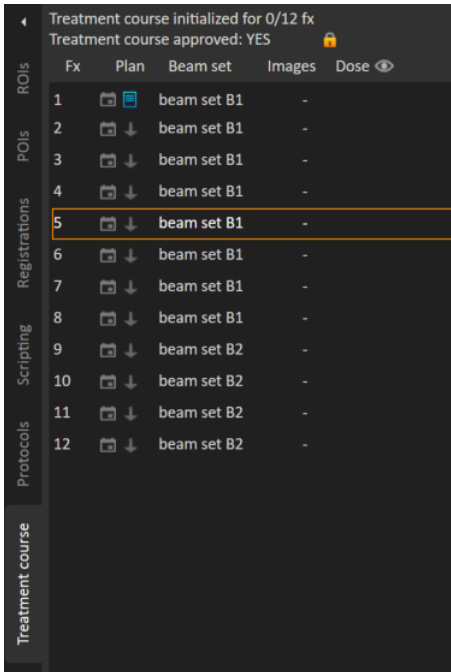


Figure 6. Treatment course tool panel.

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.

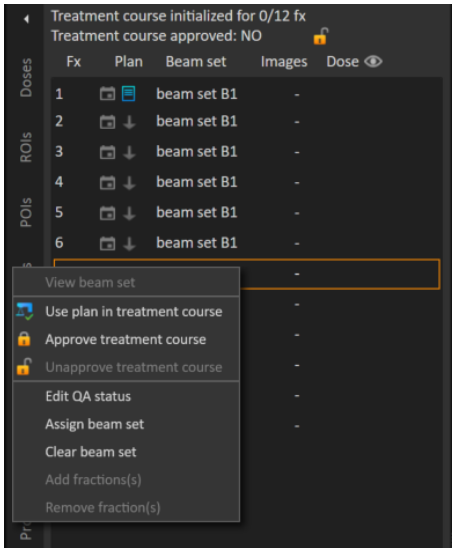


Figure 7. Treatment course tool panel menu.

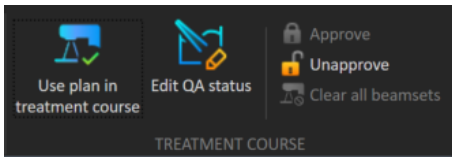


Figure 8. Treatment course management in the **Approval** tab.

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.

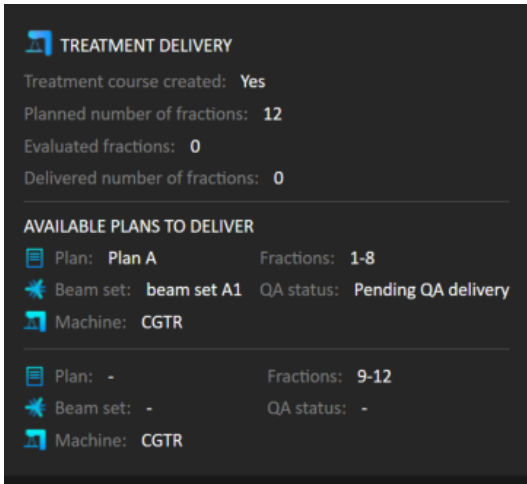


Figure 9. Treatment delivery overview in **Patient data** management.

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.

5.3.2 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.

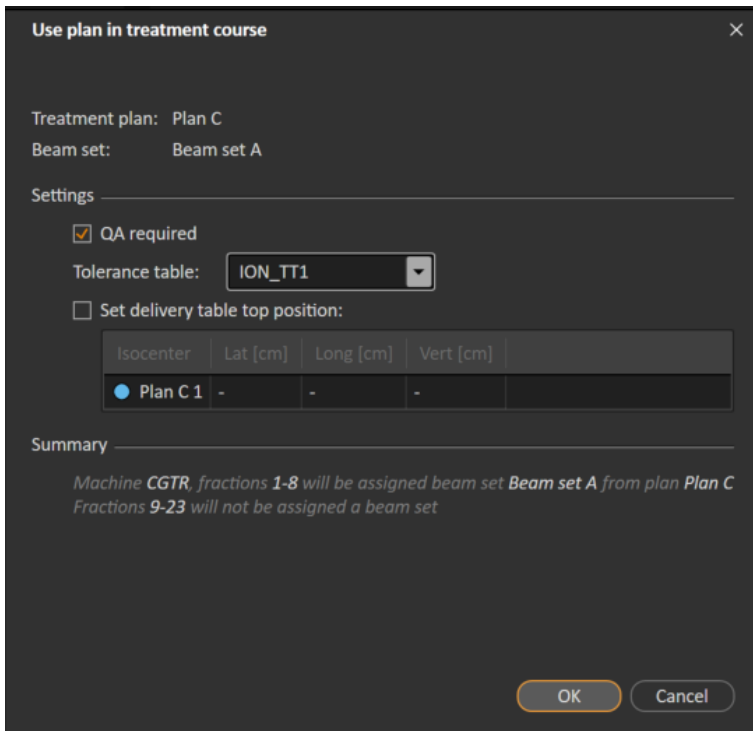


Figure 10. The **Use plan in treatment course** dialog in RayStation. The dialog may look different depending on the machine model.

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 5.2 Clinic Settings configuration for RayTreat on page 31*).
- 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.

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 5.3.7 Modify treatment course on page 45*.

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 be for a machine model that is not possible to deliver in the original plan's treatment room.

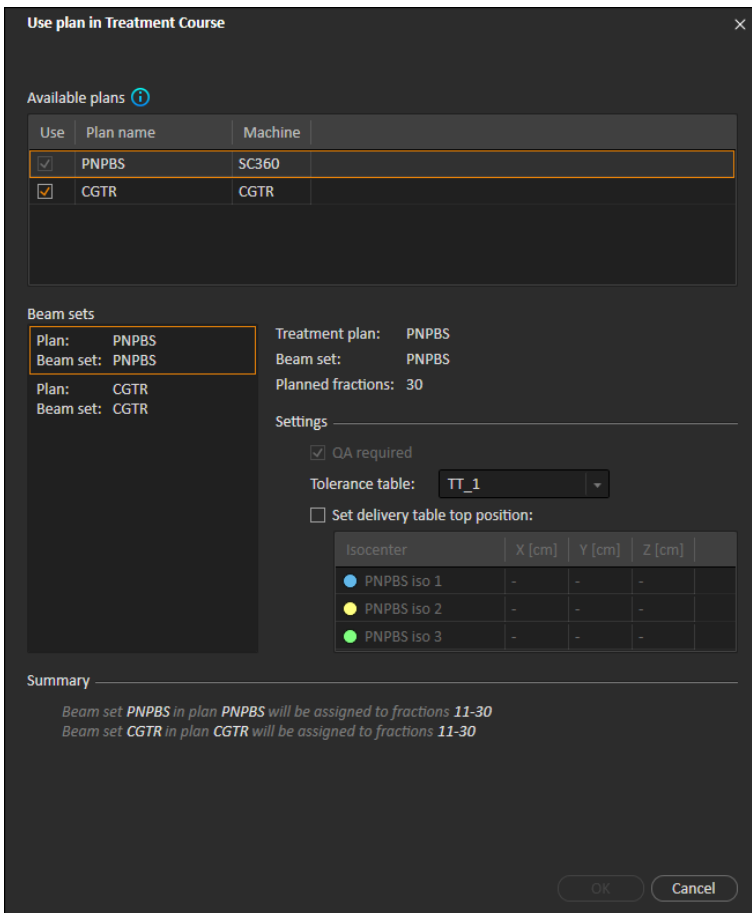


Figure 11. The **Use plan in treatment course** dialog, with alternative plans.

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.

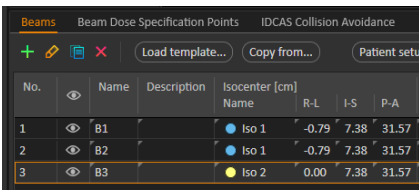
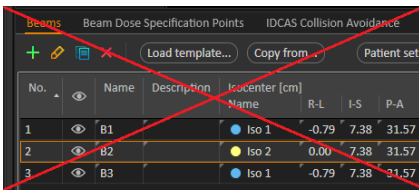
Note: When selecting an alternative plan, other plans for the same machine may be disabled. This happens if selecting them would cause any fraction to get alternative beam sets for the same machine.

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																																																																					
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- 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.
- A maximum of one setup beam can exist in a plan with multiple isocenters.

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.

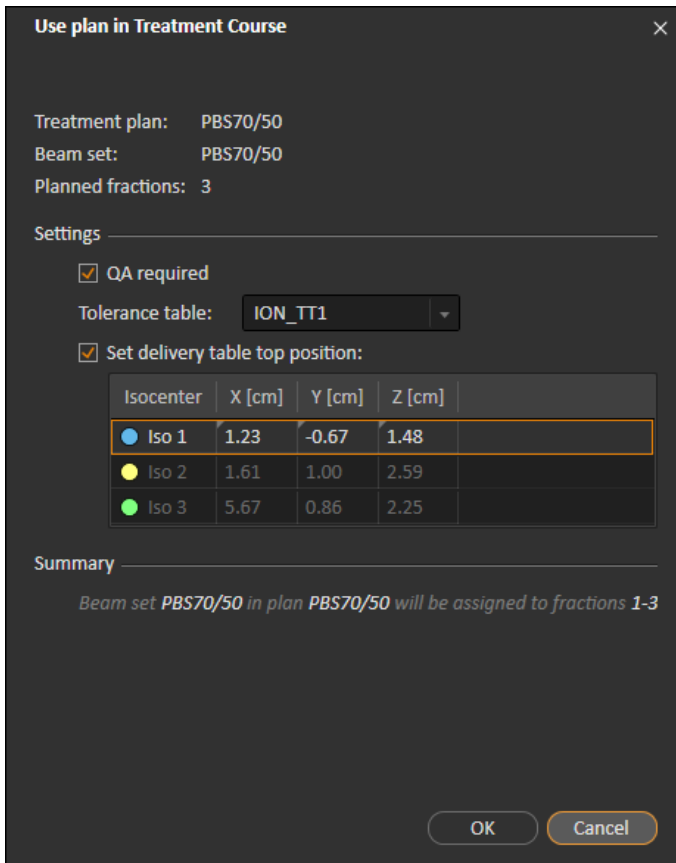


Figure 12. The **Use plan in treatment course** dialog for multiple beams at separate isocenters. The dialog may look different depending on the machine model.

5.3.3 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.

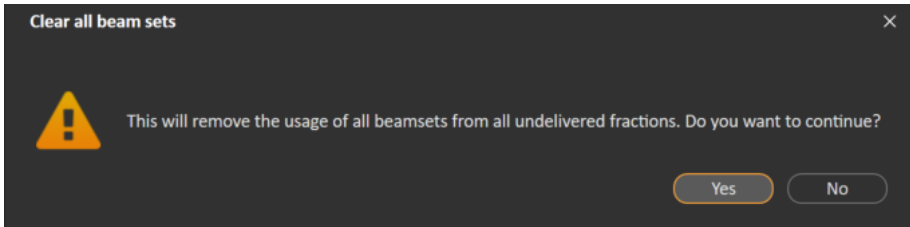


Figure 13. Warning dialog displayed when clearing all beam sets.

5.3.4 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.

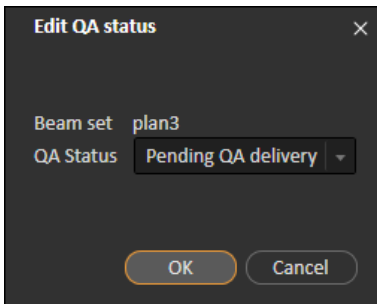


Figure 14. The **Edit QA status** dialog.

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.

5.3.5 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 5.3.1 Overview on page 35). A dialog shows all the prescriptions of the treatment course and the total prescribed contribution of all fractions to each prescription.

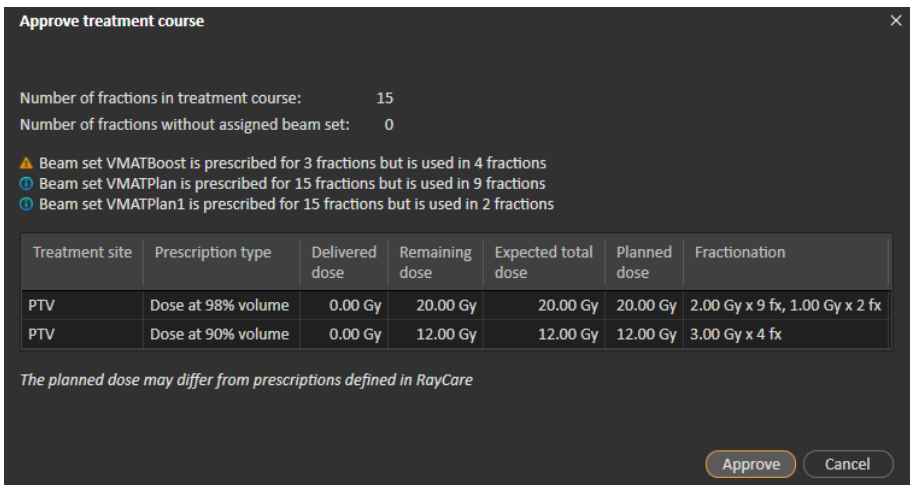


Figure 15. The **Approve treatment course** dialog.

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.

(341634)

5.3.6 Unapprove treatment course

By clicking the **Unapprove treatment course** button, the treatment course becomes unapproved for delivery. When a treatment plan 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 to RayCare. For details about how a patient with an unapproved treatment course is handled in RayTreat, see *section 5.5.1 Schedule on page 48*.

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

5.3.7 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.

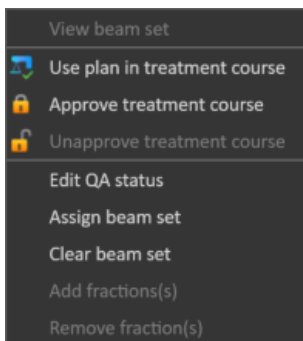


Figure 16. Menu displayed when right-clicking in the **Treatment course** tool panel.

- **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 5.3.2 Use plan in treatment course on page 37*.

- **Approve treatment course:** Approves treatment course for delivery. For more information, see *section 5.3.5 Approve treatment course on page 44*.
- **Unapprove treatment course:** Unapproves treatment course for delivery. For more information, see *section 5.3.6 Unapprove treatment course on page 45*.
- **Edit QA status:** Edits the beam set QA status. For more information, see *section 5.3.4 Edit QA status on page 43*.
- **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. The fractions can only be removed from the end of the treatment course.

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.*

5.4 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-11A-RPHY, RayStation 11A RayPhysics Manual*.

5.5 RAYTREAT ACTIVITIES

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

- **Schedule**
- **Preparation**
- **Delivery**
- **QA**

The user can toggle between different activities by clicking the tabs. Each treatment activity tab holds functionality related to that treatment activity and a workspace containing a toolbar showing information about the selected patient and the selected treatment plan, as well as other information relevant to performing the activity.

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

5.5.1 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).

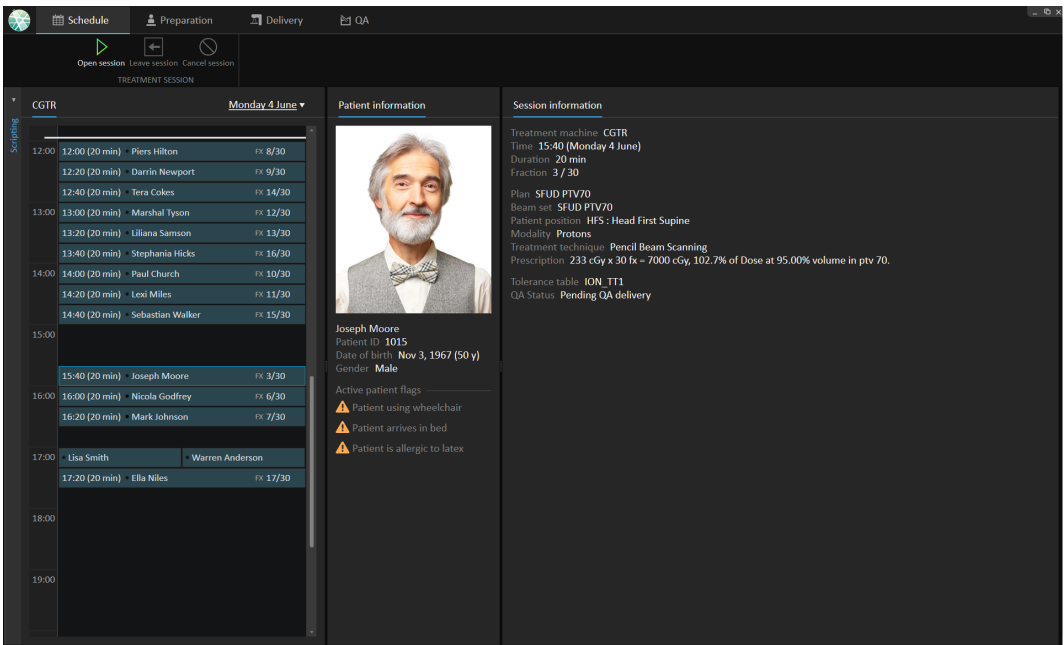
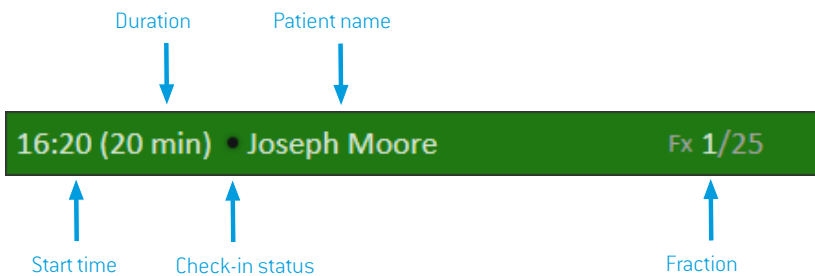


Figure 17. The Schedule workspace.

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** 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.

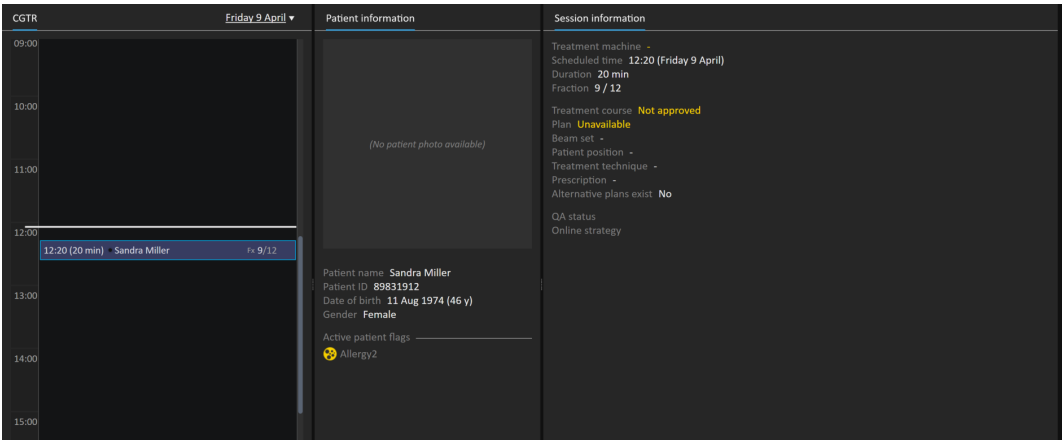


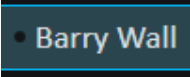
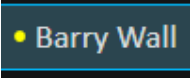

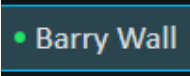
Figure 18. An appointment with no plan and an unapproved treatment course.

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	<p>The status indicator is black if the patient has not been checked in.</p> 
Yellow	<p>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.</p>  <p>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.</p>
Yellow with warning	 <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> • 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. <p>Note: <i>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.</i></p>
Green	<p>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.</p> 

Status indicator color	Description
Green with warning	<p>The status indicator is green but there is a warning, with two possible reasons:</p> <ul style="list-style-type: none"> 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. <p>Hover over the warning icon to display a tooltip about the warning.</p>

5.5.2 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.

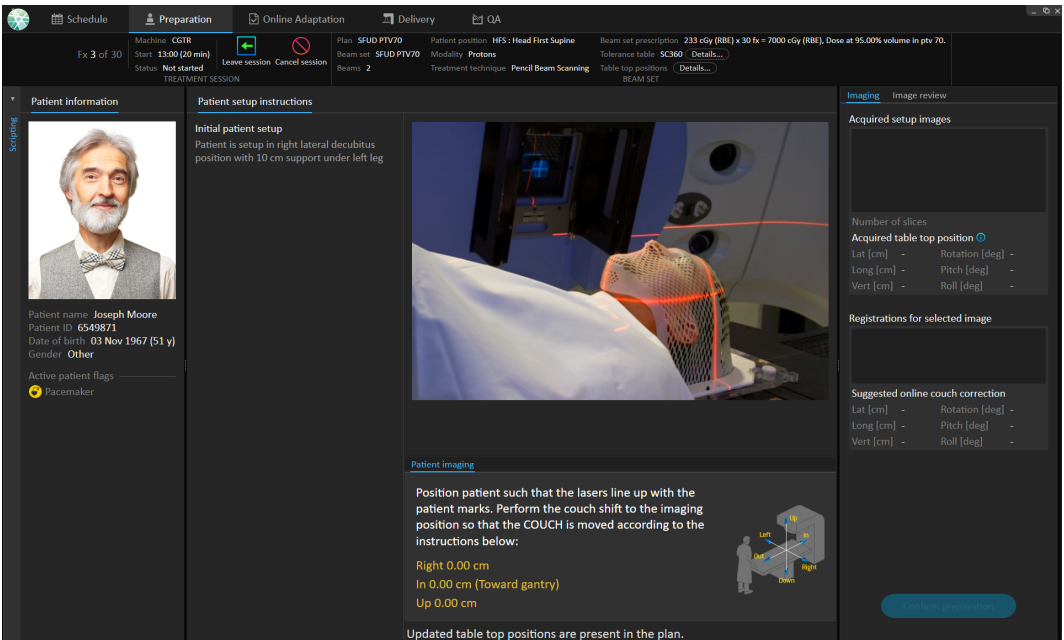


Figure 19. The Preparation workspace.

Preparing a patient for treatment delivery

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]

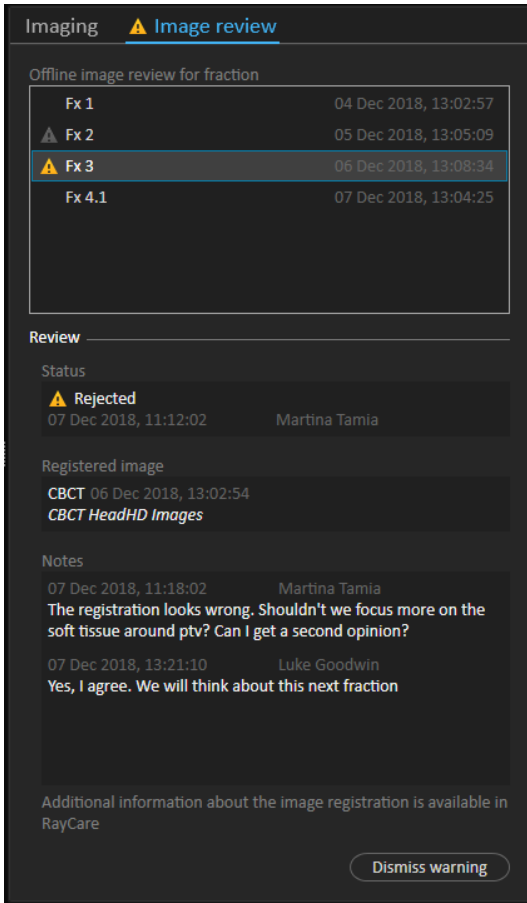


Figure 20. The **Image review** tab.

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.

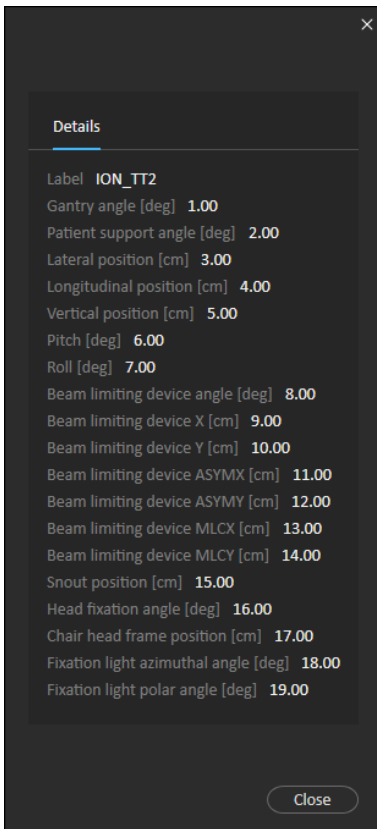


Figure 21. The tolerance table details.

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. [531236]

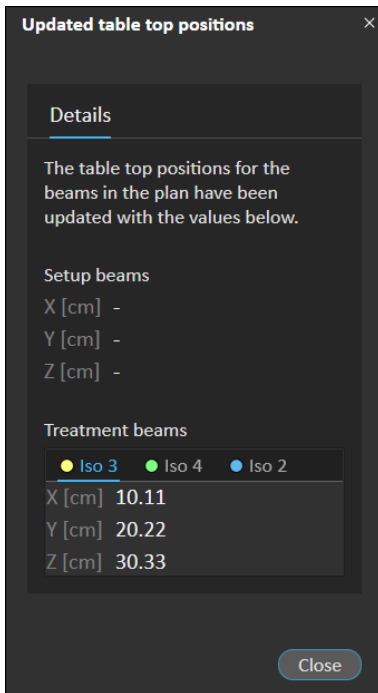


Figure 22. The **Updated table top positions** dialog.

5.5.3 Delivery

Workspace

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

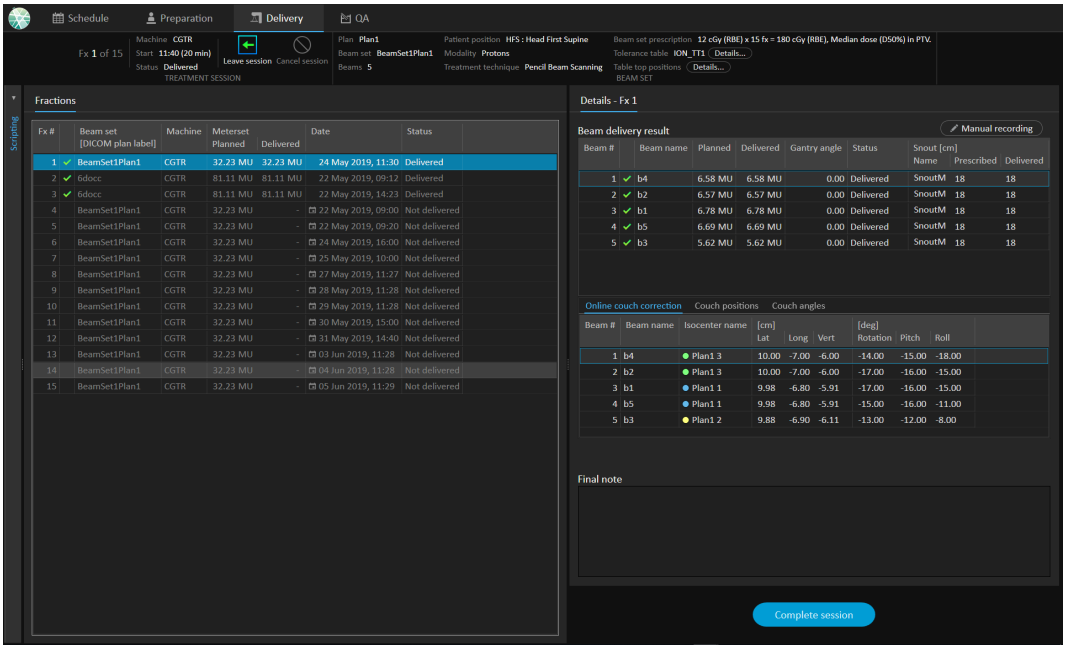


Figure 23. The Delivery workspace.

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.

Fx #	Beam set [DICOM plan label]	Machine	Meterset Planned	Meterset Delivered	Date	Status
1	BeamSet1Plan1	CGTR	32.23 MU	32.23 MU	24 May 2019, 11:30	Delivered
2	6docc	CGTR	81.11 MU	81.11 MU	22 May 2019, 09:12	Delivered
3	6docc	CGTR	81.11 MU	81.11 MU	22 May 2019, 14:23	Delivered
4	BeamSet1Plan1	CGTR	32.23 MU	16.11 MU	24 May 2019, 12:32	Partially delivered

Figure 24. 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.

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.

Details - Fx 5

Beam delivery result Manual recording

Beam #	Beam name	Planned	Delivered	Gantry angle	Status	Snout [cm]		
						Name	Prescribed	Delivered
1	✓ b4	6.58 MU	6.58 MU	0.00	Delivered	SnoutM	18	18
2	✓ b2	6.57 MU	6.57 MU	0.00	Delivered	SnoutM	18	18
3	✓ b1	6.78 MU	6.78 MU	0.00	Delivered	SnoutM	18	18
4	✓ b5	6.69 MU	6.69 MU	0.00	Delivered	SnoutM	18	18
5	✓ b3	5.62 MU	5.62 MU	0.00	Delivered	SnoutM	18	18

Online couch correction Couch positions Couch angles

Beam #	Beam name	Isocenter name	Prescribed [cm]			Recorded [cm]		
			Lat	Long	Vert	Lat	Long	Vert
1	b4	● Plan1 3	1.00	2.00	3.00	20.00	5.00	11.00
2	b2	● Plan1 3	1.00	2.00	3.00	20.00	5.00	11.00
3	b1	● Plan1 1	1.02	1.80	2.91	15.00	9.00	10.00
4	b5	● Plan1 1	1.02	1.80	2.91	15.00	9.00	10.00
5	b3	● Plan1 2	1.12	1.90	3.11	2.00	1.00	8.00

Figure 25. The **Beam delivery result** and **Couch positions** tables.

Details - Fx 5

Beam delivery result Manual recording

Beam #	Beam name	Planned	Delivered	Gantry angle	Status	Snout [cm]		
						Name	Prescribed	Delivered
1	✓ b4	6.58 MU	6.58 MU	0.00	Delivered	SnoutM	18	18
2	✓ b2	6.57 MU	6.57 MU	0.00	Delivered	SnoutM	18	18
3	✓ b1	6.78 MU	6.78 MU	0.00	Delivered	SnoutM	18	18
4	✓ b5	6.69 MU	6.69 MU	0.00	Delivered	SnoutM	18	18
5	✓ b3	5.62 MU	5.62 MU	0.00	Delivered	SnoutM	18	18

Online couch correction Couch positions Couch angles

Beam #	Beam name	Isocenter name	Prescribed [deg]			Recorded [deg]		
			Rotation	Pitch	Roll	Rotation	Pitch	Roll
1	b4	● Plan1 3	2.00	6.00	14.00	4.00	2.00	9.00
2	b2	● Plan1 3	5.00	7.00	11.00	7.00	3.00	6.00
3	b1	● Plan1 1	5.00	7.00	11.00	2.00	3.00	15.00
4	b5	● Plan1 1	3.00	7.00	7.00	0.00	3.00	11.00
5	b3	● Plan1 2	1.00	3.00	4.00	8.00	11.00	6.00

Figure 26. The **Beam delivery result** and **Couch angles** tables.

Beam delivery result

Beam #	Beam name	Planned [MU]	Delivered [MU]	Gantry angle	Status
1	✓ b1	66.53	66.53	7.0	Completed
▶ 2	▲ b2	57.31	14.94	37.5	Partially delivered
3	▲ b3	62.59	-	48.9	Not delivered
4	▲ b4	85.15	-	57.2	Not delivered

Figure 27. The **Beam delivery result** table with three incorrectly delivered beams.

Beam delivery result Manual recording

Beam #	Beam name	Planned	Delivered	Gantry angle	Status
1	▲ b1	36.81 MU	44.17 MU	0.00	Delivered

Figure 28. 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 5.6.2 *Modify delivery on page 68*).



Figure 29. 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.*

Details - Fx 5

Beam delivery result Manual recording

Beam #	Beam name	Planned	Delivered	Gantry angle	Status	Snout [cm]		
						Name	Prescribed	Delivered
1	✓ b4	6.58 MU	6.58 MU	0.00	Delivered	SnoutM	18	18
2	✓ b2	6.57 MU	6.57 MU	0.00	Delivered	SnoutM	18	18
3	✓ b1	6.78 MU	6.78 MU	0.00	Delivered	SnoutM	18	18
4	✓ b5	6.69 MU	6.69 MU	0.00	Delivered	SnoutM	18	18
5	✓ b3	5.62 MU	5.62 MU	0.00	Delivered	SnoutM	18	18

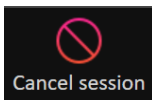
Online couch correction Couch positions Couch angles

Beam #	Beam name	Isocenter name	[cm]			[deg]		
			Lat	Long	Vert	Rotation	Pitch	Roll
1	b4	● Plan1 3	19.00	3.00	8.00	2.00	-4.00	-5.00
2	b2	● Plan1 3	19.00	3.00	8.00	2.00	-4.00	-5.00
3	b1	● Plan1 1	13.98	7.20	7.09	-3.00	-4.00	4.00
4	b5	● Plan1 1	13.98	7.20	7.09	-3.00	-4.00	4.00
5	b3	● Plan1 2	0.88	-0.90	4.89	7.00	8.00	2.00

Figure 30. 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.

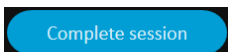


Once a session is canceled, no more deliveries can be performed. Manual recording can still be done, and completion of the session is needed to be able to continue with the next delivery.

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.

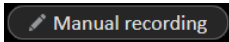
2. Verify that the recorded data is correct.

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.*

Manual recording

If the beam delivery results displayed in the Delivery workspace (see *Beam delivery result on page 58*) 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.

Do you want to approve this delivery?

Beam delivery result

Beam #	Beam name	Planned	Delivered	Gantry angle	Status	Snout [cm]	
						Name	Prescribe
1	✓ b4	6.58 MU	6.58 MU	0.00	Delivered	SnoutM	18
2	✓ b2	6.57 MU	6.57 MU	0.00	Delivered	SnoutM	18
3	▲ b1	6.78 MU	2.97 MU	0.00	Partially delivered	SnoutM	18
4	▲ b5	6.69 MU	-	0.00	Not delivered	-	18
5	▲ b3	5.62 MU	-	0.00	Not delivered	-	18

Online couch correction Couch positions Couch angles

Beam #	Beam name	Isocenter name	[cm]			[deg]		
			Lat	Long	Vert	Rotation	Pitch	Roll
1	b4	● Plan1 3	10.00	-7.00	-6.00	-14.00	-15.00	-18.00
2	b2	● Plan1 3	10.00	-7.00	-6.00	-17.00	-16.00	-15.00
3	b1	● Plan1 1	9.98	-6.80	-5.91	-17.00	-16.00	-15.00
4	b5	● Plan1 1	-	-	-	-	-	-

Selected acquired setup image Selected registration

CBCT 24 May 2019, 12:32:24 Registration 1
 CBCT HeadHD Images

Final note

Create a continuation session
 Propagate the recorded table top linear position to future sessions

Yes No

Figure 31. 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.

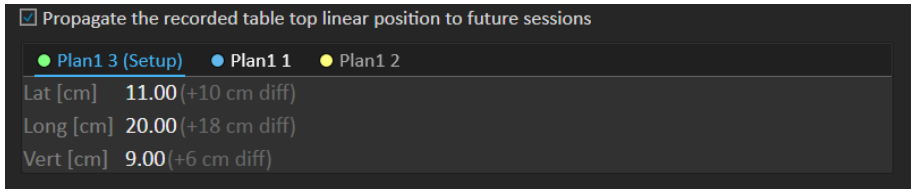
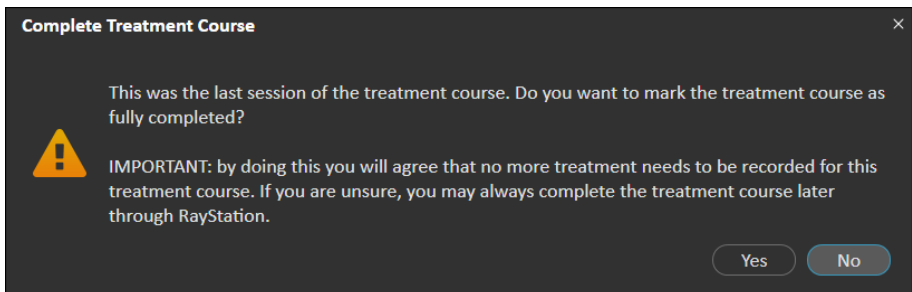


Figure 32. The Delivery approval dialog with table top position propagation.

Final session

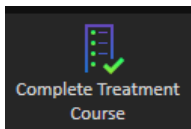
After delivering the final treatment session, the user gets the option to also complete the entire treatment course:

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.



5.5.4 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.

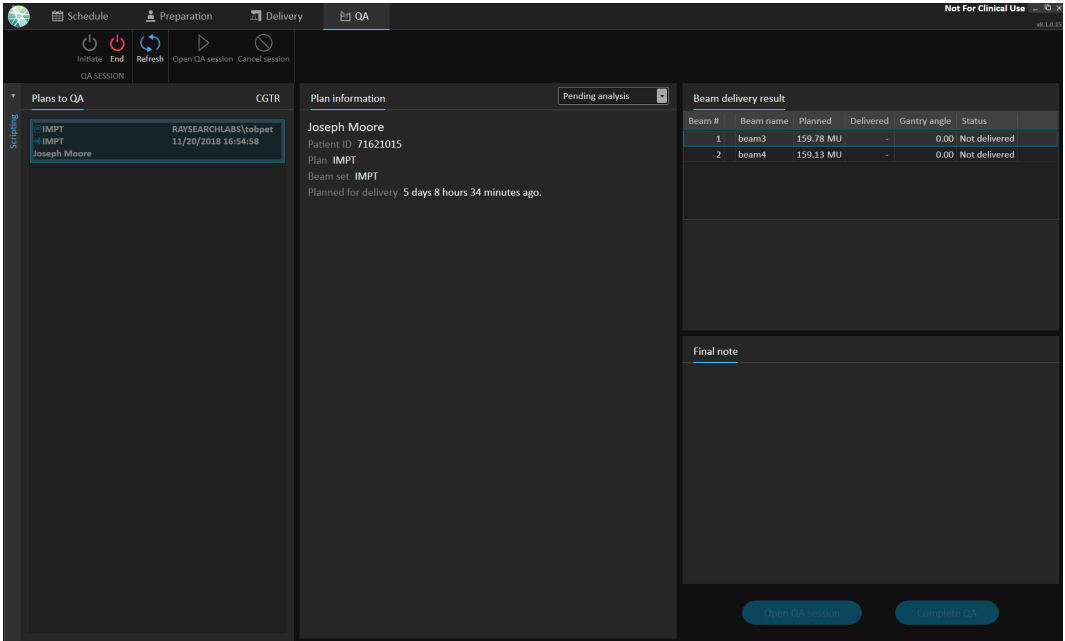


Figure 33. The QA workspace.

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 61*). 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**

5.6 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.

The screenshot shows the RayStation software interface. At the top, there is a toolbar with buttons for 'Compare', 'Result', 'Cancel session', 'Modify delivery', and 'Add session to fraction'. Below the toolbar, there is a sidebar with a tree view of treatment components: ROIs, POIs, Registrations, Scripting, Protocols, Treatment Course, and Visualization. The main area displays 'Beam delivery result' and 'Online couch correction' data.

Beam #	Beam name	Planned	Delivered	Gantry angle	Status	Snout [cm]			
						Name	Prescribed	Delivered	
1	b1	36.81 MU	36.81 MU	0.00	Delivered	-	0.00	0.00	

Online couch correction		Couch positions			Couch angles			
Beam #	Beam name	Isocenter name	[cm]	[deg]				
			Lat	Long	Vert	Rotation	Pitch	Roll
1	b1	-	0.10	0.10	0.10	0.99	1.00	1.00

Final note
ProNova notes

Figure 34. The **Result** workspace layout in the Dose Tracking module in RayStation.

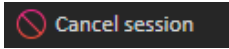
It is possible to edit results or compensate for any mistakes done in RayTreat. It is also possible to cancel and record any treatment sessions delivered outside of RayTreat, so that the results may still be used for dose tracking or when displaying the results of the treatment course in RayCare and RayStation.

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.*

5.6.1 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.



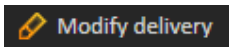
It is not possible to cancel a session that has already started, or has been checked-in through RayCare. Such a session will still have to be canceled through RayTreat (see *Cancel session on page 61*).

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.

5.6.2 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.

Plan: PBS70/50
Beam set: PBS70/50
Fraction: 9.0

+ x Import treatment record

Beam #	Beam name	Delivered [MU]	Status
2	SUP	434.92	Delivered
3	RPO	239.24	Delivered
▼ 4	RAO	259.36	Delivered
	RAO	209.36	Partially delivered
	RAO	50.00	Delivered
5	LPO	-	
6	LAO	-	

OK Cancel

Figure 35. 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. See *Manual recording on page 62*.

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 (see *Treatment session completion on page 61*).

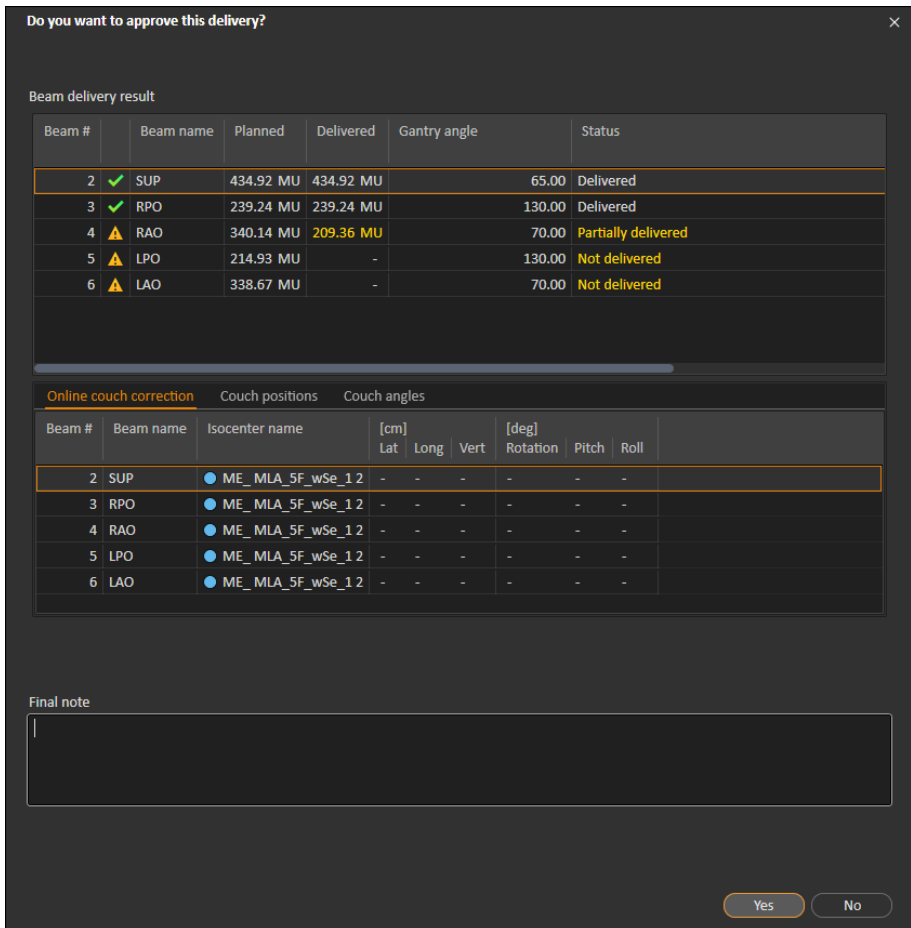


Figure 36. The Delivery approval dialog.

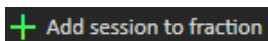
This dialog provides a complete list of the treatment records to be delivered. Verify that the delivery is as expected. Add a final note or edit the existing treatment notes if the information is still relevant.

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

5.6.3 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.

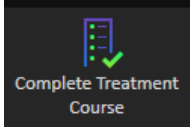
Note: Treatment course needs to be unapproved before session can be added to fraction.



The new session that is added will then have to be scheduled manually through RayCare.

5.6.4 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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