



Catalan Clinical Audit  
Network for Quality Improvement  
in Radiotherapy

# Collection and benchmarking of QI (and checklists!) in CAT-ClinART

Description and demonstration of the tools for QI (and checklists!) reporting

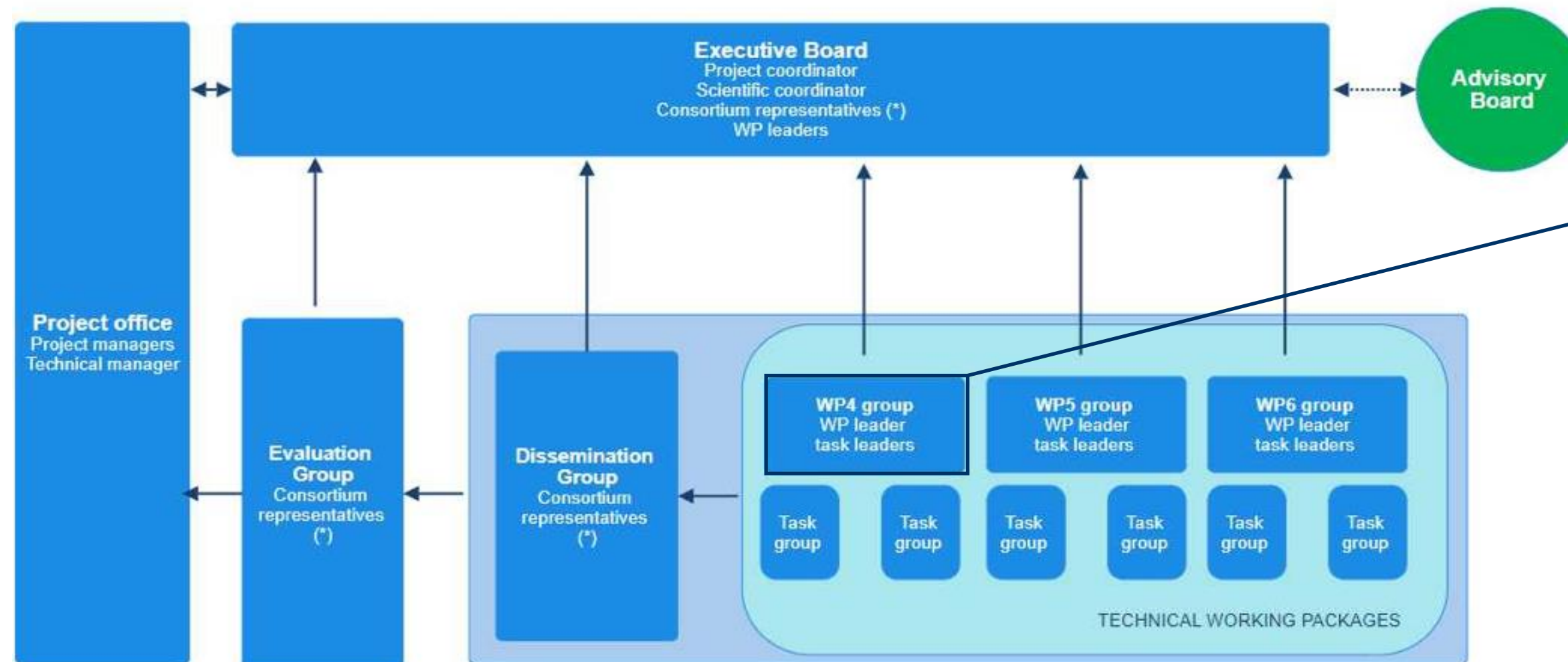
Carles Muñoz Montplet  
Institut Català d'Oncologia



Co-funded by  
the European Union

**CAT·ClinART**

## Coordination between different WPs and leadership



Development of Clinical Audit  
Methodology and Infrastructure

M1-M36 (October 2024-September 2027)

Objectives:

- Develop a standardized methodology and a solid infrastructure for conducting clinical audits in radiotherapy (RT) in Catalonia
- Proposal for a permanent mechanism for long-term clinical audits in RT

(\*) 1 member per consortium partner and all disciplines represented (RO, MPE, RTT, National Health authorities representative)

## WP4 Development of Clinical Audit Methodology and Infrastructure (What?)

T4.1 - Call and selection of auditors - N. Jornet (HSP)

T4.2 - **Development of clinical audit manuals** - C. Muñoz (ICO) ➡ Checklists & Standardized forms

T4.3 - **Definition of quality indicators (QI) and standards** - X. Maldonado ➡ Indicator data  
(HVVH) and F. Guedea (ICO)

T4.4 - Design of dosimetric audits - C. Candela (HCB)

T4.5 - **Development of IT infrastructure for the collection and evaluation of clinical audit data** - C. Muñoz (ICO)

T4.6 - Needs assessment and development of a strategic plan for a permanent mechanism of clinical audits in RT - D. Segura (DSC) and C. Muñoz (ICO)





## WP4 Team (Who?)

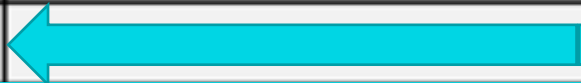
Nom	T4.1	T4.2	T4.3	T4.4	T4.5	T4.6	Centre	Correu
Núria Jornet	Responsable						HSP	<a href="mailto:NJornet@santpau.cat">NJornet@santpau.cat</a>
Ferran Guedea	Participa		Responsable			Participa	ICO	<a href="mailto:fguedea@iconcologia.net">fguedea@iconcologia.net</a>
Xavier Maldonado	Participa		Responsable		Participa	Participa	HUVH	<a href="mailto:xavier.maldonado@vallhebron.cat">xavier.maldonado@vallhebron.cat</a>
Cristina Vilella	Participa					Participa	DSC	<a href="mailto:cristinavilellam@gencat.cat">cristinavilellam@gencat.cat</a>
Jordi Saez	Participa			Participa			HCB	<a href="mailto:josaez@clinic.cat">josaez@clinic.cat</a>
Sonia Bermejo	Participa	Participa					HSP	<a href="mailto:sbermejom@santpau.cat">sbermejom@santpau.cat</a>
David Gomez Gomez	Participa						HUSJR	<a href="mailto:david.gomez@salutsantjoan.cat">david.gomez@salutsantjoan.cat</a>
Maria Lizondo Gisbert	Participa				Participa		CST	<a href="mailto:mlizondo@cst.cat">mlizondo@cst.cat</a>
Carles Muñoz		Responsable			Responsable	Responsable	ICO	<a href="mailto:cmunoz@iconcologia.net">cmunoz@iconcologia.net</a>
Roger Grèbol		Participa					ICO	<a href="mailto:rgrebol@iconcologia.net">rgrebol@iconcologia.net</a>
Antonio Herreros		Participa					HCB	<a href="mailto:herreros@clinic.cat">herreros@clinic.cat</a>
Meritxell Arenas		Participa					HUSJR	<a href="mailto:meritxell.arenas@urv.cat">meritxell.arenas@urv.cat</a>
Josep Puxeu		Participa					HUSJR	<a href="mailto:jpuxeu@gmail.com">jpuxeu@gmail.com</a>
Pablo Carrasco		Participa					HSP	<a href="mailto:pcarrasco@santpau.cat">pcarrasco@santpau.cat</a>
Jaume Molero		Participa					ICO	<a href="mailto:jmolero@iconcologia.net">jmolero@iconcologia.net</a>
Montse Ventura		Participa			Participa		ICO	<a href="mailto:montseventura@iconcologia.net">montseventura@iconcologia.net</a>
Sivia Comas Anton		Participa	Participa				ICO	<a href="mailto:scomas@iconcologia.net">scomas@iconcologia.net</a>
Joel Mases			Participa				HCB	<a href="mailto:mases@clinic.cat">mases@clinic.cat</a>
Joan Lozano			Participa				CST	<a href="mailto:jlozano@cst.cat">jlozano@cst.cat</a>
Jady Rojas			Participa				HSP	<a href="mailto:jrojasc@santpau.cat">jrojasc@santpau.cat</a>
Noe Ventosa			Participa				HSP	<a href="mailto:nventosa@santpau.cat">nventosa@santpau.cat</a>
Víctor Hernández			Participa	Participa			HUSJR	<a href="mailto:vhernandezmasgrau@gmail.com">vhernandezmasgrau@gmail.com</a>
David Garcia			Participa				HUVH	<a href="mailto:david.garciarelancio@vallhebron.cat">david.garciarelancio@vallhebron.cat</a>
Marisol Lopez			Participa				ICO	<a href="mailto:mlgamez@iconcologia.net">mlgamez@iconcologia.net</a>
Diego Abad						Participa	CND	<a href="mailto:dabad@ingesa.sanidad.gob.es">dabad@ingesa.sanidad.gob.es</a>
Cristian Candela				Responsable			HCB	<a href="mailto:candela@clinic.cat">candela@clinic.cat</a>
Diego Jurado				Participa			ICO	<a href="mailto:djurado@iconcologia.net">djurado@iconcologia.net</a>
Mª Jesús Sánchez				Participa			CND	<a href="mailto:mjsanchezg@ingesa.sanidad.gob.es">mjsanchezg@ingesa.sanidad.gob.es</a>
Anna Fernández Lumbreras					Participa	Participa	DSC	<a href="mailto:annafernandezl@gencat.cat">annafernandezl@gencat.cat</a>
Dolors Segura Bisbal		Participa			Participa	Responsable	DSC	<a href="mailto:dolorssegura@gencat.cat">dolorssegura@gencat.cat</a>
Merce Beltran						Participa	HUVH	<a href="mailto:merce.beltran@vallhebron.cat">merce.beltran@vallhebron.cat</a>
Gemma Sancho						Participa	HSP	<a href="mailto:gsancho@santpau.cat">gsancho@santpau.cat</a>
Meritxell Molla						Participa	HCB	<a href="mailto:molla@clinic.cat">molla@clinic.cat</a>
Xavier Hernández Rodríguez					Participa		HSP	<a href="mailto:xhernandez@santpau.cat">xhernandez@santpau.cat</a>
Macià Comella Barbé					Participa		HSP	<a href="mailto:mcomella@santpau.cat">mcomella@santpau.cat</a>







## WP4 Milestones and Deliverables (When?)

	year 1												year 2												year 3																			
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12								
	2024			2025									2026									2027																						
	OCT	NOV	DIC	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP	OCT	NOV	DIC	ENE	FEB	MAR	ABR	MAY	JUN	JUL	AGO	SEP								
WP4																																												
4.1 Development of clinical audit manuals													MS4.2																															
4.2 Definition of QI and standards																																												
4.3 Development of IT infrastructure for collection and evaluation of clinical audit data							MVP												D4.2																									
4.4 Design of dosimetry audits													D4.1																															
													D4.4																															
4.5 Assessment of needs and development of an strategic plan for a permanent Catalan mechanism for clinical audits in RT																																									D4.3			
4.6 Call and selection of the auditors				MS4.1																																								

We aimed to deliver a Minimum Viable Product for the first audit round

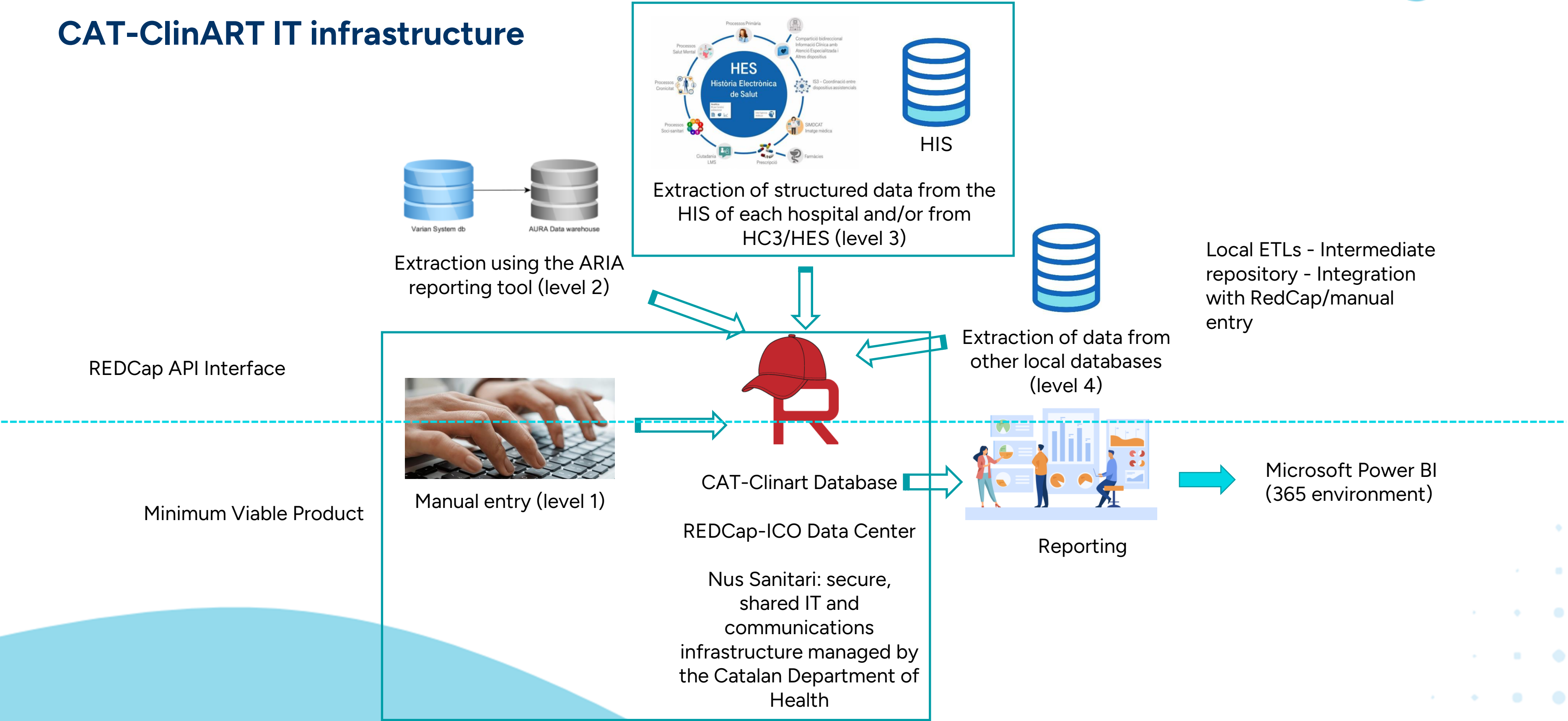


## IT infrastructure requirements (How?)

- **Use interoperable systems** – Ensure compatibility with ARIA, HIS, and other local databases
- **Secure and compliant** – Follow GDPR; encrypt data and control access by role
- **Centralized data platform** – Use a secure, shared database for storing audit data
- **Enable mixed data input** – Support both automatic data extraction and manual entry when needed
- **Provide dashboards** – Offer visual summaries of quality indicators and audit results
- **Plan for maintenance** – Allocate IT staff and plan long-term hosting, updates, and user support



# CAT-ClinART IT infrastructure



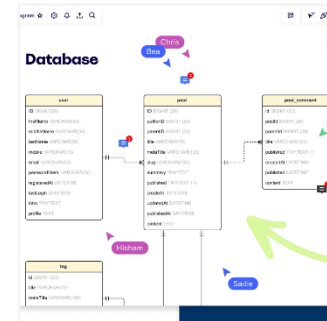
## CAT-ClinART IT infrastructure (Why?)

Feature	CAT-ClinART Infrastructure	Excel Files
Data Standardization	Automatic validation & structure	Inconsistent, error-prone
Data Integration	Links to ARIA, HIS, local databases	Manual data entry
Real-Time Access	Centralized, multi-user platform	Version conflicts, file-based sharing
Security & GDPR	Encrypted, role-based access	Weak protection, hard to control copies
Efficiency	ETL processes, reduced manual work	Time-consuming, high risk of mistakes
Analytics & Dashboards	Built-in indicators, live reporting	Manual charts, limited analysis
Scalability	Grows with project needs	Not suited for large or evolving datasets
Sustainability	Long-term, reusable infrastructure	Temporary, not scalable

Please note that we also manage prostate-related quality indicators



# CAT-ClinART IT infrastructure (Where are we?)



Phase 1: design  
(until September 2025)

- Create REDCap database and intermediate repository at ICO
- Study REDCap integration capabilities
- Check possible access to Exadata
- Create checklists and standardized B-QUATRO II forms
- Create indicator data forms
- Make them available to auditors
- Start identifying and using local ARIA Reports
- Hire IT technician


Minimum Viable Product  
[redcap.iconcologia.net](https://redcap.iconcologia.net)

Review after  
the course!!



Phase 2: automation  
(from September 2025 until May 2026 and more)

- Standardize and share ARIA reports
- Automate integrations with HC3/HES or at least with the HIS
- Other integrations with local databases
- Create audit reports using Power BI
- Gather ideas for possible future improvements



Conectado como **cmunoz** | [¿Salir?](#)

Proyectos

Contacte su Administrador REDCap

Inicio y diseño del proyecto

Inicio · Configuración

Diseñador de formularios · Diccionario · Libro de códigos

Estado del proyecto: **Desarrollo**

Recolección de datos

Consola de estado de registros

- Ver el estado de recolección de datos de todos los registros

Agregar o editar registros

- Crear nuevos registros o editar/ver los existentes

Mostrar los instrumentos de recopilación de datos

Aplicaciones

Paneles de control del proyecto

Alertas y Notificaciones

Gestor multilingüe

Calendario

Exportar datos, informes y estadísticas

Herramienta para importar datos

Herramienta para comparar datos

Bitácora/Registros & Historial de correo electrónico

Campo comentario, conectar

Repositorio de archivos

Permisos del usuario & GAD

Calidad de los datos

Módulos externos

Ver los registros

Administrar

Set DAG for all records

Search Dashboard

Ayuda e información

Ayuda

Videotutoriales

Learn Advanced Design Features

Sugiera una nueva característica

Contacte su Administrador REDCap

Cat-clinArt PID 281

Inicio

Configuración

Otras funciones

Historial de cambios

Las tablas de abajo dan información general de tablero, como la lista de todos los usuarios con acceso a este proyecto, estadísticas generales del proyecto y eventos de calendario por venir (de existir).

Usuarios regulares (10)


Usuario	Vence
aiguaran (Ainhoa Iguaran)	nunca
annafernandezl (Anna Fernández Lumbreras)	nunca
cmunoz (Carles Muñoz)	nunca
dolorssegura (Dolors Segura Bisbal)	nunca
mcomella (Macià Comella Barbé)	nunca
mlizando (Maria Lizondo Gisbert)	nunca
mventura (Montserrat Ventura)	nunca
njornet (Núria Jornet i Sala)	nunca
xavier.maldonado (Xavier Maldonado)	nunca
xhernandez (Xavier Hernández Rodríguez)	nunca

Estadísticas de la base de datos

Registros base de datos	0
Actividad más reciente	11/06/2025 11:13am
Espacio ocupado docs	0,00 MB

Eventos próximos en el calendario (próximos 7 días)

Tiempo	Fecha	Descripción
		No hay eventos próximos



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PID 281

Inicio

Configuración

Diseñador de formularios

Diccionario de datos

Libro de códigos

VÍDEO: cómo usar esta página

Crear instantánea de los instrumentos

Última instantánea: Nunca

El Diseñador de formularios le permitirá realizar modificaciones a los campos del formulario y a los formularios de recolección de datos muy fácilmente usando solo el navegador web. NOTA: mientras esté en el entorno de desarrollo, todos los cambios tendrán efecto inmediato, en tiempo real.

Formularios de entrada de datos

Crear

un formulario nuevo desde cero

Importar

un instrumento nuevo oficial de la Librería compartida de REDCap

Cargar

instrumento ZIP de otro proyecto/usuario o Librerías externas








Opciones de formulario:

PDF Snapshots

Lógica de visualiz. formul.

PDF (all instruments)

Descriptive Popups

Nombre del formulario	Campo	PDF	Acciones al formul.
INFRASTRUCTURE	141		Elija una acción
PATIENT RELATED PROCEDURES	481		Elija una acción
EQUIPMENT RELATED PROCEDURES	157		Elija una acción
QUALITY MANAGEMENT SYSTEM	277		Elija una acción
COMMUNICATION MANAGEMENT	23		Elija una acción
RADIATION PROTECTION OF STAFF AND POPULATION	14		Elija una acción
RTT ROLES AND RESPONSIBILITIES	23		Elija una acción

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Recolección de datos

Consola de estado de registros

Agregar o editar registros

Record ID 1 [Seleccionar otro registro](#)

Instrumentos de recopilación de datos:

INFRASTRUCTURE

**PATIENT RELATED PROCEDURES**

EQUIPMENT RELATED PROCEDURES

QUALITY MANAGEMENT SYSTEM

COMMUNICATION MANAGEMENT

RADIATION PROTECTION OF STAFF AND POPULATION

RTT ROLES AND RESPONSIBILITIES

Aplicaciones

Paneles de control del proyecto

Alertas y Notificaciones

Gestor multilingüe

Calendario

Exportar datos, informes y estadísticas

Herramienta para importar datos

Herramienta para comparar datos

Bitácora/Registros & Historial de correo electrónico

Campo comentario, conectar

Repositorio de archivos

Permisos del usuario & GAD

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[Administrar](#)

Set DAG for all records

Search Dashboard

Cat-clinArt

PID 281

Acciones:

Modificar el instrumento

Descargar el instrumento en PDF

[Video: ingreso de datos básicos](#)

PATIENT RELATED PROCEDURES

Añadiendo un nuevo Record ID 1.

Record ID

1

Auditor

\* Campo requerido

Internal Self-Assessment (ISA)

External Peer Audit (EPA)

Diagnosis and staging

CHECKLIST 1. Patient Assessment

	YES	In progress	No	N/A
Is patient specific and relevant radiotherapy information easily accessible by the rest of the institution?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does the radiotherapy department have access to all relevant patient clinical data/records?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Please comment	<div></div>			
Is there an ease of access to patient diagnostic imaging data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is the pathology report included in all patients' files?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are patients staged?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is an international staging system used (TNM, AJCC, FIGO...)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is the pTNM available when				



Confidencial

Cat-clinArt  
Página 1

PATIENT RELATED PROCEDURES

Record ID

Auditor

- ☐ Internal Self-Assessment (ISA)  
☐ External Peer Audit (EPA)

Diagnosis and staging

CHECKLIST 1. Patient Assessment

	YES	In progress	No	N/A
Is patient specific and relevant radiotherapy information easily accessible by the rest of the institution?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does the radiotherapy department have access to all relevant patient clinical data/records?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please comment

	YES	In progress	No	N/A
Is there an ease of access to patient diagnostic imaging data?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is the pathology report included in all patients' files?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Are patients staged?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is an international staging system used (TNM, AJCC, FIGO...)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is the pTNM available when indicated?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is the patient's performance status assessed (WHO, Karnofsky or ECOG)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is systematic geriatric assessment carried out in patients >75 years old?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Next step: indicator data forms

Definition	Formula	Green	Yellow	Red	Action Level	Frequency
Average time between biopsy diagnosis and start of radiotherapy	Median in days +/- SD of all patients who started radiotherapy treatment for prostate cancer with curative intent	≤30 days	30-60 days	>60 days		annual (cross-sectional)
Percentage of patients with PSMA-PET prior to radiotherapy indication for oligometastatic disease	n patients with PSMA-PET and oligometastatic disease treated with radiotherapy / n patients with oligometastatic disease by CT/GGO treated with radiotherapy	≥90%	70-89%	<70%		annual
% of patients with documented and specific informed consent for radiotherapy	n patients with signed informed consent for pelvic radiotherapy / n without specific signed consent	≥90%	80-89%	<79%		semestral (cross-sectional)
% of re-planning requirements due to non-compliance with setup or critical organs	n patients requiring re-simulation due to non-compliance with setup limits or critical organ discrepancies in IGRT / procedures without re-simulation	≤5%	6-10%	>10%		semestral (cross-sectional)
Existence of peer review procedures for volume delineation	Active peer review procedures for prostate cancer radiotherapy treatments	yes	partial	no		annual
% of patients with dosimetric planning reviewed by independent double-check	n patients with dosimetric planning reviewed by independent double-check for prostate cancer / n patients planned for prostate cancer	≥90%	70-89%	<70%		annual (cross-sectional)
% of patients receiving hypofractionated radiotherapy based on risk criteria	n patients with localized prostate cancer (non-postoperative) receiving hypofractionated RT / n patients receiving treatments with 2 Gy/fraction	≥90%	70-89%	<70%		annual (cross-sectional)
% of treatments integrating simultaneous modulated boost (SIB)	n patients with integrated boost technique treatment / n patients with sequential treatments (includes radical and postoperative)	≥90%	70-89%	<70%		annual (cross-sectional)
% of medical records with structured toxicity registration (CTCAE v4.0 or v5.0)	n medical records of prostate cancer patients treated with radiotherapy registering toxicity in a structured way / medical records without structured toxicity registration	≥90%	70-89%	<70%		semestral (cross-sectional)
% of treatment reports including detailed and structured mandatory information	n treatment reports including detailed and structured mandatory information on fractionation, dose, and technique used / n reports not meeting criteria	≥95%	90-94%	<89%		annual (cross-sectional)
% of patients with documented baseline functional assessment (urinary, intestinal, sexual)	n patients with correct assessment at follow-up / total patients treated with radiotherapy for prostate cancer	≥90%	70-89%	<70%		annual (cross-sectional)
% of patients with documented treatment summary in medical record	n prostate cancer patients treated with radiotherapy with correct summary / n prostate cancer patients treated with radiotherapy	≥95%	90-94%	<89%		annual (cross-sectional)
Prevalence of urinary toxicity grade 2 or higher at 6 months	n prostate cancer patients treated with radiotherapy presenting grade 2 or higher toxicity at six months / n patients treated with radiotherapy for prostate cancer	≤15%	15-20%	>20%		annual (cross-sectional)

- Most of the data/indicators are at the patient level ⇒ individual registries
- Required for conducting statistical tests
- Patient selection? Randomize N patients within a date range?
- Are the data entered from each center? By whom?

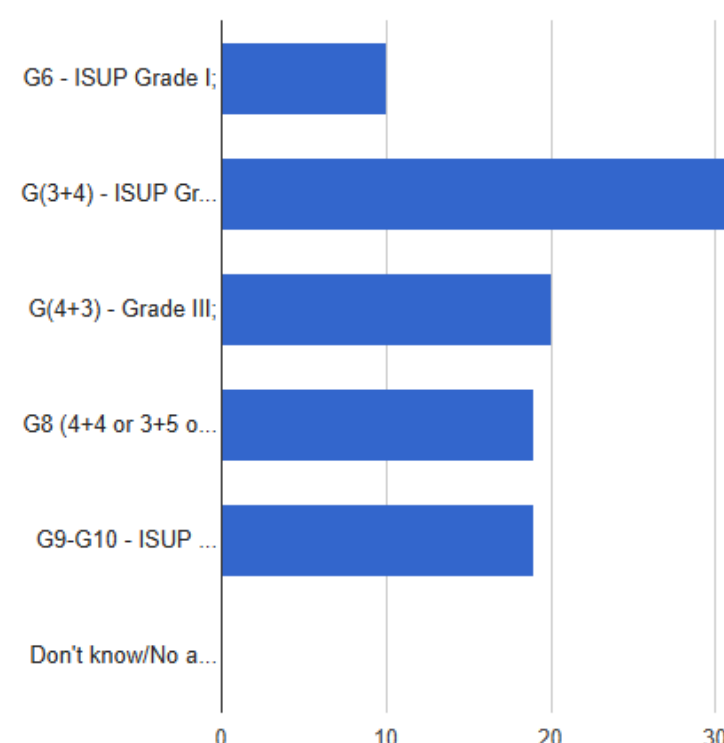
To be discussed...

# Examples of a first level of reporting and benchmarking within REDCap

**COMBINED HISTOLOGIC GRADE (GLEASON):** *(combined\_histologic\_grade)* [Refresh Plot](#) | [View as Bar Chart](#) ▼

Total Count (N)	Missing*	Unique
99	0 (0,0%)	5

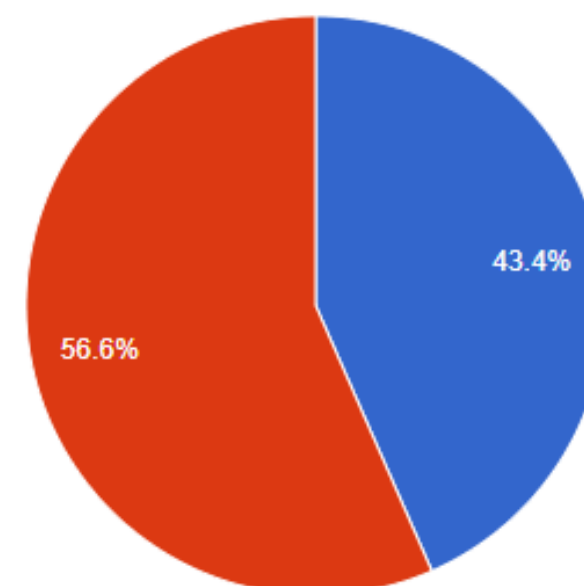
**Counts/frequency:** G6 - ISUP Grade I; (10, 10,1%), G(3+4) - ISUP Grade II; (31, 31,3%), G(4+3) - Grade III; (20, 20,2%), G8 (4+4 or 3+5 or 5+3) - ISUP Grade IV; (19, 19,2%), G9-G10 - ISUP Grade V; (19, 19,2%), Don't know/No answer (0, 0,0%)



**TREATMENT INTERRUPTION OF EBRT** *(treatment\_interruption\_ebrr)*

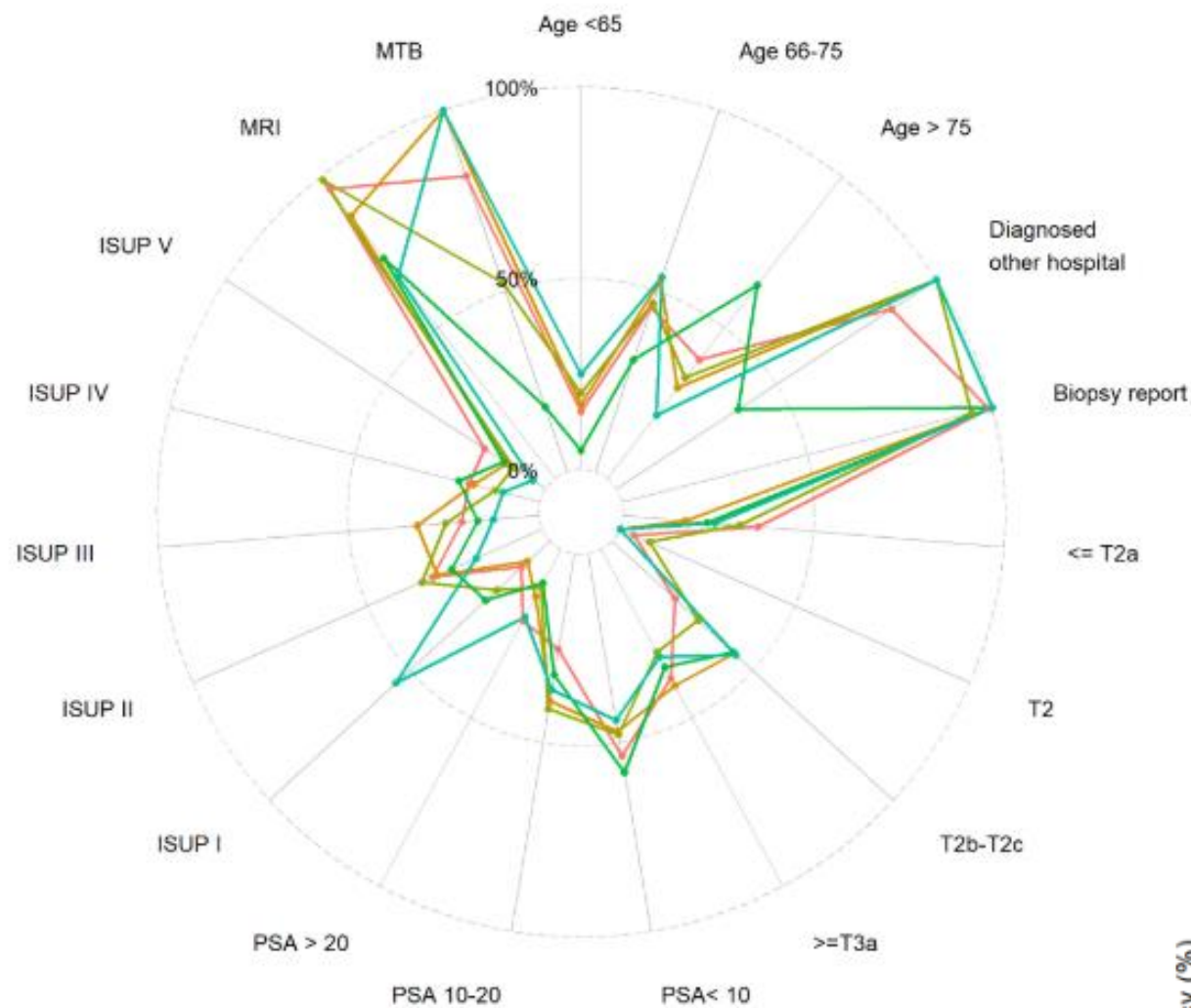
Total Count (N)	Missing*	Unique
99	15 (13,2%)	2

**Counts/frequency:** Yes (43, 43,4%), No (56, 56,6%), Don't know/No answer (0, 0,0%)

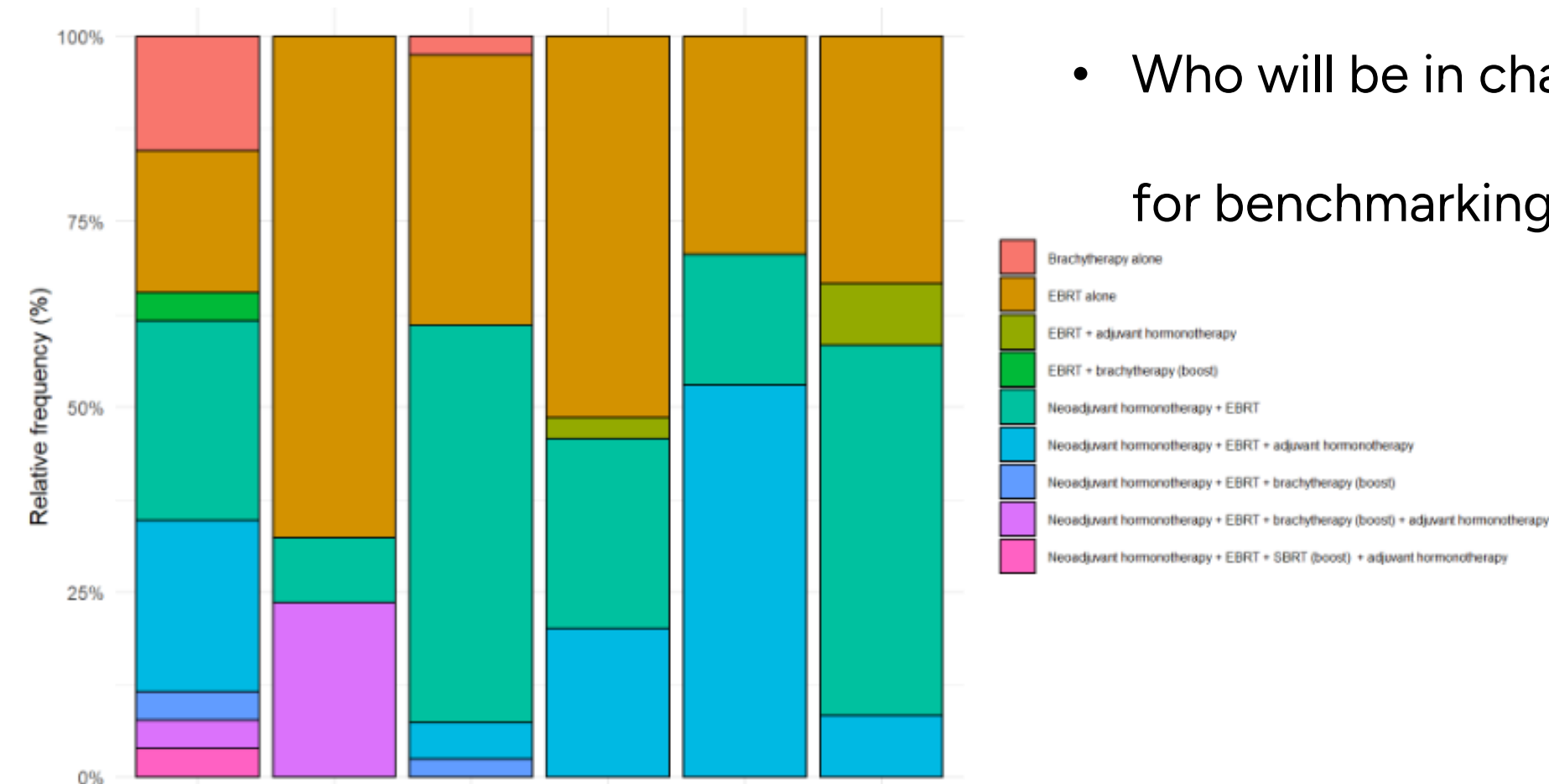


- Automated reports for each audit/center (Data Access Group)
- Fast self-evaluations for the Checklists (similar to spiderwebs)
- The administrator can visualize comparisons of the different DAGs for benchmarking
- The data can be exported to Excel if needed

## Examples of a second level of reporting and benchmarking outside REDCap



	N=83	N=57	N=96	N=100	N=90	N=426	
Difference between theoretical and actual sessions*, Median [Q1;Q3]	3.00 [2.00;6.00]	-1.00 [-1.00;0.00]	0.00 [-0.25;0.00]	2.00 [1.00;3.00]	3.00 [1.25;4.00]	1.00 [0.00;3.00]	426
Completed the treatment in prescribed time **, N (%)	7 (8.43%)	5 (8.77%)	61 (63.5%)	7 (7.00%)	11 (12.2%)	91 (21.4%)	426
Completed the treatment in prescribed time +/- 4 days **, N (%)	50 (60.2%)	56 (98.2%)	96 (100%)	87 (87.0%)	78 (86.7%)	367 (86.2%)	426



- Power BI? Alternative tools?
- Who will be in charge of the statistics for benchmarking? Standards? Mean?





Catalan Clinical Audit  
Network for Quality Improvement  
in Radiotherapy

# Questions

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# Answers

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