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INTERNATIONAL ACCREDITATION SYSTEM FOR
INTERVENTIONAL ONCOLOGY SERVICES

IASIOS Interventional Oncology Benchmarking Report 2025-2026

The International Benchmarking Report on Organisational Structure, Clinical Practice and Service Delivery

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Copyright and use

The findings describe the participating IASIOS facilities and should not be interpreted as rankings, accreditation thresholds or universal standards of service performance.

Data availability

The survey instrument, analytical conventions, response-completeness summary and derived-variable dictionary are included in this report. Facility-level source data are not published because they contain confidential institutional responses. Requests for additional aggregate information may be directed to IASIOS and will be considered subject to confidentiality and data-governance requirements.

Editorial and analytical contributors

Prof. Miltos Korkidis

Chairperson of the Benchmarking Subcommmittee and Final Approval

Prof. Thomas Helmberger

Benchmarking Subcommittee Reviewer

Dr Fanco Orsi

Benchmarking Subcommittee Reviewer

Dr Farah Gillian Irani

Benchmarking Subcommittee Reviewer

Dr Christiaan van der Leij

Benchmarking Subcommittee Reviewer

Dr Anna Maria Ierardi

Benchmarking Subcommittee Reviewer

Mardis Karlsdottir

Report Author and Editorial Contributor

Colin O'Hare

Report Author and Statistical Analyst

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Abbreviations List

CT = Computed Tomography

EBIR = European Board of Interventional Radiology

FTE = Full-Time Equivalent

HIFU = High-Intensity Focused Ultrasound

IASIOS = International Accreditation System for Interventional Oncology Services

IO = Interventional Oncology

IR = Interventional Radiologist / Interventional Radiology (department)

IRE = Irreversible Electroporation

MDT = Multidisciplinary Team

MDTB = Multidisciplinary Tumour Board

MWA = Microwave Ablation

PICC = Peripherally Inserted Central Catheter

RFA = Radiofrequency Ablation

SIRT = Selective Internal Radiation Therapy

TACE = Transarterial Chemoembolisation

TAE = Transarterial Embolisation

Executive Summary

The **IASIOS International Benchmarking Report 2025** presents the findings of the first international benchmarking initiative specifically designed to evaluate the organisational characteristics of interventional oncology (IO) services.

While clinical evidence supporting image-guided cancer therapies continues to expand, comparatively little information has been available regarding how interventional oncology services are organised, staffed and integrated within multidisciplinary cancer care. Understanding these organisational characteristics is essential for supporting service development, identifying best practices and providing objective evidence for hospital planning and investment.

To address this gap, IASIOS conducted an international benchmarking survey among participating facilities to establish a baseline assessment of the infrastructure, workforce, procedural scope and educational activities of contemporary interventional oncology services.

A total of 61 facilities from 25 countries submitted the survey, representing a 77% response rate among the 79 IASIOS facilities invited to participate. Together, these organisations provide a substantial international dataset describing the structure and operation of participating IASIOS interventional oncology services.

The survey evaluated six key domains:

- Clinical scope and tumour types treated
- Workload and physician activity
- Multidisciplinary workforce
- Infrastructure and clinical autonomy
- Equipment and procedural capability
- Research and education

Collectively, the findings describe participating IASIOS facilities with broad procedural portfolios, substantial multidisciplinary activity and widespread involvement in research and education. These characteristics should be interpreted as features of the participating network rather than as direct measures of service quality.

Liver-directed interventions remain the cornerstone of interventional oncology practice worldwide, with almost all participating facilities providing treatment for both primary and secondary hepatic malignancies. At the same time, most centres now provide treatment across multiple tumour sites, reflecting the continued evolution of interventional oncology into a comprehensive oncological discipline rather than a single-organ procedural service.

Participating facilities reported considerable variation in organisational structure, staffing levels and access to clinical resources. While many centres have established clinical autonomy through prescribing rights, inpatient admission privileges and dedicated procedural infrastructure, access

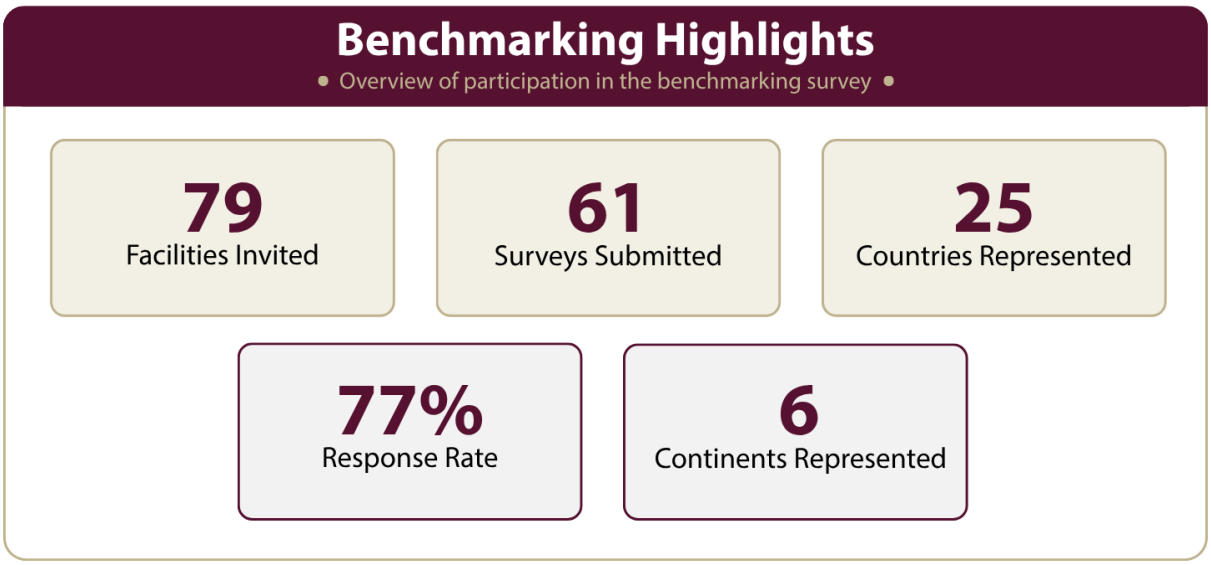
to anaesthesiology support, workforce capacity and scheduling resources remain common operational challenges.

The benchmarking data also describe substantial activity beyond tumour-directed procedural care. 95% of respondents to the research participation question reported participation, while 88% of respondents to the education question reported incorporating interventional oncology into formal teaching or training.

Importantly, this report is intended to support continuous quality improvement rather than to compare or rank individual institutions. Benchmarking enables participating centres to understand how their organisational structures compare with international peers, identify opportunities for service development, and support evidence-based discussions regarding investment, staffing and strategic planning.

Future benchmarking cycles can show how participating services change over time and provide a longitudinal resource for local planning, quality improvement and specialty development.

Benchmarking Highlights



Why This Report Matters

IASIOS has established an international organisational baseline describing how participating interventional oncology services are structured, staffed and integrated within cancer care.

Rather than measuring procedural outcomes, this report provides insight into the organisational foundations that support high-quality interventional oncology practice. By identifying common characteristics, operational challenges and emerging trends, the benchmarking programme provides comparative information to inform local quality-improvement discussions and multidisciplinary service planning.

Implications for Hospital Leadership

The findings can support structured discussions about service capacity and organisation. They do not establish required staffing levels, return on investment, comparative clinical performance or the superiority of a particular service model.

Workforce and capacity

Workforce planning should consider consultations, multidisciplinary meetings, governance, education and research alongside procedural activity. Nominal access to anaesthesia, rooms or beds should also be assessed in terms of predictability, delays, cancellations and actual utilisation.

Clinical pathways and organisational support

Outpatient capacity, appropriate clinical privileges, referral pathways, and multidisciplinary staffing may influence how efficiently patients move through the care process. Their local value should be assessed using waiting times, pathway delays, patient need and outcome data.

Questions for leadership

- Does workforce planning reflect the complete clinical and organisational workload?
- Are shared resources predictably available when patients need them?
- Do clinical privileges and referral pathways support coherent patient management?
- Which local measures—such as waiting times, cancellations, utilisation and outcomes—should accompany these benchmarks?

These questions are addressed in more depth, domain by domain, in the matrix from benchmark to organisational action in Chapter 12.

How to Read and Use This Report

This report is intended to support reflection, discussion and continuous quality improvement rather than comparison or ranking.

IASIOS encourages participating services to use the findings as a practical resource for organisational development.

The report may be used to:

- Review service organisation during departmental strategy meetings.
- Support discussions with hospital leadership regarding workforce, infrastructure and investment.
- Identify opportunities for multidisciplinary collaboration.
- Inform quality improvement initiatives.
- Guide future service planning.
- Monitor organisational development over successive benchmarking cycles.

The reflection questions included throughout the report are intended to facilitate these discussions and help translate benchmarking data into meaningful organisational action.

The survey findings describe the participating facilities, while the Organisational Development Framework in Chapter 12 represents IASIOS's interpretive synthesis of those findings and its quality principles.

Important Distinction
Use the report to structure discussions on workforce capacity, governance, predictable access to shared resources and strategic investment. Interpret international benchmarks alongside local demand, utilisation and financial information.

Using the Report with Different Audiences

The reflection questions throughout this report are intended for open, cross-functional discussion; the suggestions below indicate which audiences are likely to find each finding most relevant, but most questions benefit from joint discussion across roles.

Audience	Most Appropriate Use
Hospital and executive leadership	Use the report to structure discussions on workforce capacity, governance, predictable access to shared resources and strategic investment. Interpret international benchmarks alongside local demand, utilisation and financial information.
Interventional oncology service leads	Use peer distributions and reflection questions to identify service-development priorities, document unmet organisational needs and monitor change between benchmarking cycles.
Multidisciplinary partners	Use findings on referral pathways, clinical rights, team roles and training to review how interventional oncology is integrated across the cancer pathway.
IASIOS programme leadership	Use aggregate findings to refine future survey questions, develop implementation resources and identify areas where confidential peer learning may add value. Benchmark prevalence should not be converted automatically into an accreditation requirement.

Chapter 1: Introduction

Background

Interventional oncology has undergone remarkable growth over the past two decades. Advances in image-guided therapies, expanding clinical evidence, and increasing participation within multidisciplinary cancer care have transformed the specialty from a technically focused procedural service into an integral component of modern oncology.

While considerable attention has been devoted to demonstrating the clinical efficacy and safety of interventional oncology procedures, considerably less emphasis has been placed on understanding how interventional oncology services are organised. Questions relating to workforce composition, infrastructure, clinical autonomy, procedural scope, research activity and multidisciplinary integration remain largely unanswered at an international level.

This represents an important knowledge gap. High-quality patient care depends not only on technical expertise but also on the organisational environment in which care is delivered. Staffing levels, access to dedicated facilities, referral pathways, education programmes and institutional support all influence an interventional oncology service's ability to deliver safe, efficient and sustainable care. Overall, international organisational benchmarking data in interventional oncology remain limited, particularly across multicountry networks. This report seeks to address this gap.

Why Benchmarking Matters

Benchmarking is an established tool for supporting continuous quality improvement within healthcare. By comparing organisational structures and operational practices across similar institutions, healthcare providers can identify strengths, recognise opportunities for improvement and make evidence-informed decisions regarding service development.

Unlike accreditation, which evaluates whether predefined quality standards have been achieved, benchmarking provides context. It allows participating organisations to understand how their service compares with comparable institutions and to identify realistic opportunities for further development.

For interventional oncology, benchmarking is particularly valuable because the specialty continues to evolve rapidly. Significant variation exists among healthcare systems in clinical pathways, referral models, workforce structures and procedural capability. Understanding these differences helps describe how interventional oncology services are organised while recognising that appropriate models vary across healthcare settings.

Benchmarking, therefore, complements accreditation by supporting continuous improvement beyond compliance with standards.

The IASIOS Benchmarking Programme

The International Accreditation System for Interventional Oncology Services (IASIOS) was established to promote quality, consistency and excellence in interventional oncology through internationally recognised standards of practice.

The IASIOS Benchmarking Programme extends this commitment by providing participating facilities with objective data describing the organisational characteristics of contemporary interventional oncology services.

Rather than evaluating individual clinical outcomes, the programme examines the systems that enable high-quality care. Collectively, these data provide participating facilities with an opportunity to compare their organisational structures with those of an international peer group while contributing to a broader understanding of how interventional oncology services continue to evolve.

Over time, repeated benchmarking will allow IASIOS to monitor trends, identify recurring practices and provide increasingly detailed insights into service development across participating facilities.

Aim of this Report

The primary objective of this report is to establish the first international benchmarking baseline describing the organisational structure of IASIOS interventional oncology services.

Specifically, the report aims to:

- describe the clinical scope of participating interventional oncology services
- evaluate workforce composition, infrastructure and procedural capability
- identify common organisational characteristics across participating facilities
- highlight areas of variation that may represent opportunities for service development

- provide participating centres with objective benchmarking data to support local quality improvement initiatives
- establish a baseline against which future benchmarking cycles can measure organisational development over time

The report is intended as a quality improvement resource for participating facilities rather than a ranking of institutions or healthcare systems.

Scope of the Report

The findings presented in this report relate exclusively to data submitted by participating IASIOS facilities during the inaugural benchmarking survey.

The report focuses on organisational and operational characteristics of interventional oncology services rather than clinical outcomes or procedural effectiveness. It therefore provides insight into how services are structured and delivered, rather than evaluating treatment performance.

As participation in the benchmarking programme expands, future reports will enable increasingly detailed comparisons across facility types, accreditation status, and geographic regions, while providing longitudinal analyses of organisational development over time.

Benchmark in Context

High-quality interventional oncology is determined not only by the procedures performed, but by the organisational systems that support them. Workforce, infrastructure, multidisciplinary collaboration and clinical integration are fundamental components of delivering safe, effective and sustainable cancer care.

Chapter 2: Methodology

The IASIOS International Benchmarking Survey was developed to establish the first international baseline describing the organisational characteristics of interventional oncology (IO) services participating in the International Accreditation System for Interventional Oncology Services (IASIOS).

The survey was designed as a cross-sectional benchmarking exercise, collecting standardised information on service organisation, workforce, infrastructure, procedural capability, clinical integration, research activity and education.

Survey Development

The benchmarking survey was developed by the IASIOS Benchmarking Subcommittee, an international panel of experts representing a broad range of clinical, academic and organisational experience in interventional oncology.

Survey questions were designed to capture information across six principal domains considered fundamental to the organisation and delivery of interventional oncology services:

- Clinical scope and tumour types treated
- Workload and physician activity
- Multidisciplinary workforce
- Infrastructure and clinical autonomy
- Equipment and procedural capability
- Research and education

An additional open-response section allowed participating facilities to describe recent developments, operational challenges and observations regarding future service development.

To improve clarity and usability, the survey underwent pilot testing within Benchmarking Subcommittee member institutions before international distribution. Feedback from the pilot phase informed refinement of question wording, response options and data collection procedures before the survey was released to participating facilities.

Participating Facilities

The survey was distributed to 79 IASIOS facilities, including Centres of Excellence, Accredited Centres and Enrolled Centres.

Data were collected between **June and September 2025**, with deadline extensions provided where necessary to maximise participation.

A total of 61 facilities submitted surveys, representing a 77% response rate among the 79 invited facilities and providing data from 25 countries across Europe, North America, South/Central America, Asia, Oceania and the Middle East.

This is among the largest international datasets currently describing the organisational characteristics of interventional oncology services.

Data Validation

Submitted responses underwent a structured review for completeness, consistency and plausibility.

Where feasible, clarification was sought directly from participating facilities when responses were incomplete, ambiguous or appeared inconsistent. Remaining ambiguous or open-ended responses were handled using documented standardisation rules and should be interpreted as approximate.

Where appropriate, terminology and free-text responses were standardised to ensure consistency of reporting across institutions while preserving the intent of the original responses.

Data Analysis

Results are presented primarily as descriptive statistics describing the organisational characteristics of participating facilities.

Depending on the nature of the data, results are presented as:

- proportions of participating facilities
- averages and medians
- staffing ratios
- procedural distributions
- categorical frequency distributions

Where appropriate, regional and country-level summaries are included to illustrate the diversity of participating facilities. These comparisons are descriptive only and should not be interpreted as measures of comparative performance.

The objective of the analysis is to identify common organisational characteristics, patterns and areas of variation that may support benchmarking and service development.

Analysis Conventions and Denominators

The facility was the principal unit of analysis. Unless otherwise stated, percentages use all 61 participating facilities as the denominator. For questions with missing responses, results are reported among respondents to that item and the denominator is stated. Blank responses were not automatically interpreted as negative responses.

Question 6 asked facilities to report average activity per interventional radiologist (IR) using either a weekly or monthly reference period. Weekly responses were converted to monthly-normalised values. Facilities with unusually high procedure counts suggesting departmental rather than per-IR reporting were excluded. The analysis included 38 facilities with complete

eligible responses for procedures, outpatient consultations and tumour-board meetings. Activity was summarised using per-IR monthly counts and facility-level percentage composition, with each facility weighted equally.

Follow-up data convention: values entered as "0" or "No" in the master analysis workbook represent responses confirmed directly with the participating hospital and were treated as observed data. Blank fields indicate that the hospital did not confirm a response and were treated as missing.

Procedure-volume responses were collected in categorical annual bands (1–5, 6–20, 21–50, 51–100 and 100+). Accordingly, these figures describe the number of facilities within reported volume categories rather than exact aggregate procedure totals.

Staffing ratios were calculated using paired aggregate data: the sum of the numerator across facilities that reported both variables divided by the corresponding paired denominator. The number of paired facilities is shown with each ratio.

Referral-source percentages represent the mean of facility-level referral proportions among 55 responding facilities; they are not proportions of pooled referral counts.

Open-text descriptions of nursing, radiographer and procedural-team responsibilities were grouped into descriptive categories. A single response could contribute more than one coded mention. These summaries describe coded mentions rather than the proportion of facilities and were not subjected to formal qualitative reliability testing.

The supportive-procedure profile was a report-defined descriptive classification: at least two supportive categories with reported annual volume above 50 and no primary or secondary malignancy category above 50. It is neither a validated service category nor a measure of quality.

Regional and country results were reviewed descriptively. Because five of the six regional groups had four or fewer facilities, detailed geographic percentage charts were removed from the main report to avoid overinterpreting small denominators.

Interpretation of Findings

Benchmarking differs fundamentally from performance ranking.

The findings presented in this report are intended to provide participating facilities with objective reference data describing the organisational characteristics of comparable interventional oncology services.

Variation between facilities should not necessarily be interpreted as evidence of better or poorer performance. Differences may reflect national healthcare systems, referral pathways, institutional priorities, funding models or local models of care.

Instead, benchmarking provides context, enabling participating organisations to compare their own service structures with those of international peers and identify opportunities for continuous quality improvement.

Independence, Technology and Interpretation

References to technologies, techniques, or service configurations describe reported availability or practice within participating facilities. Their inclusion does not constitute IASIOS endorsement or an assessment of comparative clinical effectiveness, value or appropriate use.

The report should not be used to infer product demand, procurement need, commercial opportunity or superiority of a particular organisational model. Any local investment decision should also consider clinical evidence, patient needs, outcomes, utilisation, cost, and the healthcare system context.

Limitations

Several limitations should be considered when interpreting the findings presented in this report.

First, all information was self-reported by participating facilities. Although responses were reviewed and clarified where necessary, some variability in interpretation of survey questions is unavoidable.

Second, participation was limited to IASIOS facilities. Consequently, the findings may not be representative of all interventional oncology services worldwide. Participating institutions are likely to have a greater commitment to quality improvement and organisational development than non-participating centres.

Third, while the survey achieved broad international participation, some regional and country-level analyses are based on relatively small numbers of facilities. These analyses should therefore be interpreted with caution and viewed as descriptive observations rather than comparisons between healthcare systems.

Finally, the benchmarking programme focuses on organisational characteristics rather than clinical outcomes. It should therefore be interpreted as a description of how interventional oncology services are organised and delivered, rather than as an assessment of treatment quality or effectiveness.

Benchmarking Subcommittee Members

The benchmarking programme was developed under the guidance of the IASIOS Benchmarking Subcommittee. The Subcommittee provided scientific oversight throughout the development of the survey, the review of the collected data, and the interpretation of the benchmarking findings.

- Prof. Miltos Krokidis (Chairman) - Areteion Hospital, Greece
- Prof. Thomas Helmberger - München Klinik Bogenhausen, Germany

- Dr. Anna Maria Ierardi - Ospedale Maggiore Policlinico Milano, Italy
- Dr. Farah Gillan Irani - Singapore General Hospital, Singapore
- Dr. Christiaan van der Leij - Maastricht UMC+, the Netherlands
- Dr. Ornella Moschovaki-Zeiger - Attikon University Hospital, Greece
- Dr. Franco Orsi - European Institute of Oncology, Italy

Benchmark in Context

Establishing international benchmarks can support the structured development of a clinical specialty. By describing how high-quality interventional oncology services are organised today, IASIOS is creating the foundation for measuring organisational development, identifying emerging best practices and supporting continuous quality improvement in future benchmarking cycles.

Chapter 3: The Benchmarking Network

The inaugural IASIOS International Benchmarking Survey brought together **61 interventional oncology facilities from 25 countries**, representing one of the largest international collaborations focused on organisational benchmarking within the specialty.

Participating facilities included **Centres of Excellence, Accredited Centres and Enrolled Centres**, reflecting a broad spectrum of organisational development, healthcare systems and clinical practice models.

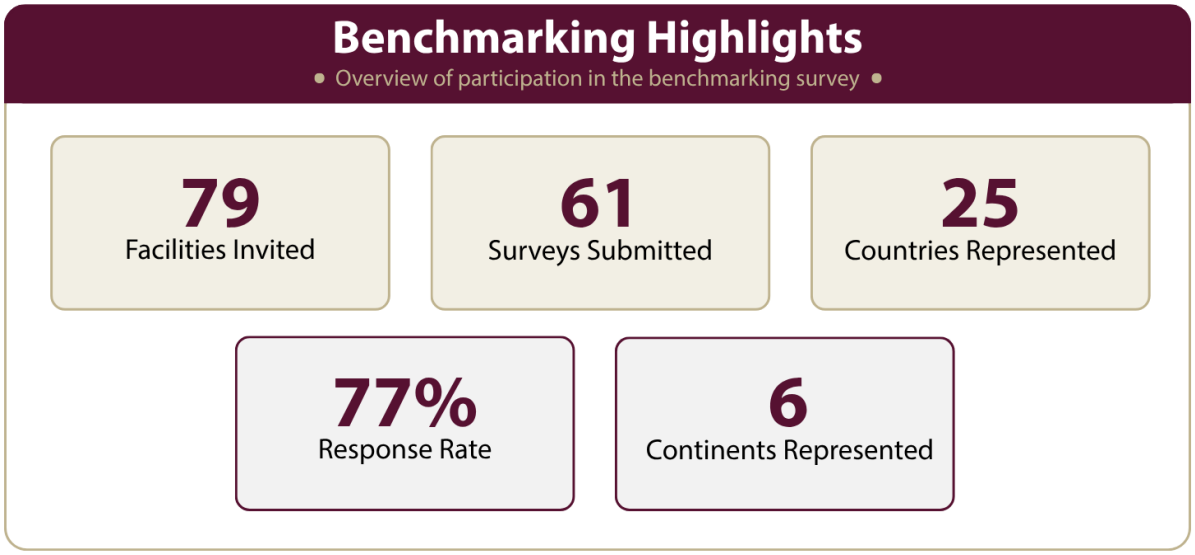
Together, these institutions provide care across university hospitals, comprehensive cancer centres, tertiary referral hospitals and regional healthcare organisations, demonstrating the diversity of interventional oncology services represented within the IASIOS network.

The breadth of participation provides a substantial descriptive baseline for the IASIOS network and illustrates engagement with structured quality improvement across participating facilities.

A full list of participating institutions, including their IASIOS status and location, can be found in Appendix 2.

Survey Participation

Of the 79 IASIOS facilities invited to participate, 61 submitted the survey, representing a response rate of 77%.



IASIOS Status of Participating Facilities

IASIOS status is reported according to the survey cohort recorded in the original response file at the time of survey participation.

The survey included facilities representing all stages of the IASIOS quality pathway, with a cohort comprising 3 Centres of Excellence, 30 Accredited Centres and 28 Enrolled Centres.

This distribution describes services at different stages of the IASIOS pathway and may support future analyses of how reported organisational characteristics vary over time.

Geographic Representation

Participating facilities represented **25 countries** spanning Europe, North America, South America, Asia, Oceania and the Middle East.

Chapter 4: Clinical Scope of Interventional Oncology Services

Measuring the Breadth of Contemporary IO Practice

Why Clinical Scope Matters

The range of diseases managed by an interventional oncology service provides valuable insight into its clinical scope and level of integration within multidisciplinary cancer care.

Historically, many interventional oncology services developed around liver-directed therapies. While these remain a cornerstone of practice, modern interventional oncology increasingly encompasses a broad spectrum of primary and metastatic malignancies, as well as supportive and palliative interventions throughout the cancer pathway.

The number of tumour types reported provides a descriptive measure of clinical breadth. The survey did not test whether broader scope was associated with multidisciplinary integration, expertise or service quality. Understanding the clinical scope of participating facilities therefore provides an important benchmark of organisational capability rather than simply describing procedural activity.

Primary Cancers

Results

Primary liver and kidney malignancies remain the most consistently treated cancers across participating IASIOS facilities, with more than 95% of centres reporting treatment of both disease sites.

Musculoskeletal, lung, and soft tissue tumours are also commonly managed, with approximately two-thirds to three-quarters of facilities providing treatment. In contrast, breast, thyroid and pancreatic malignancies are treated by a smaller proportion of centres, reflecting differences in referral pathways, clinical indications and institutional expertise.

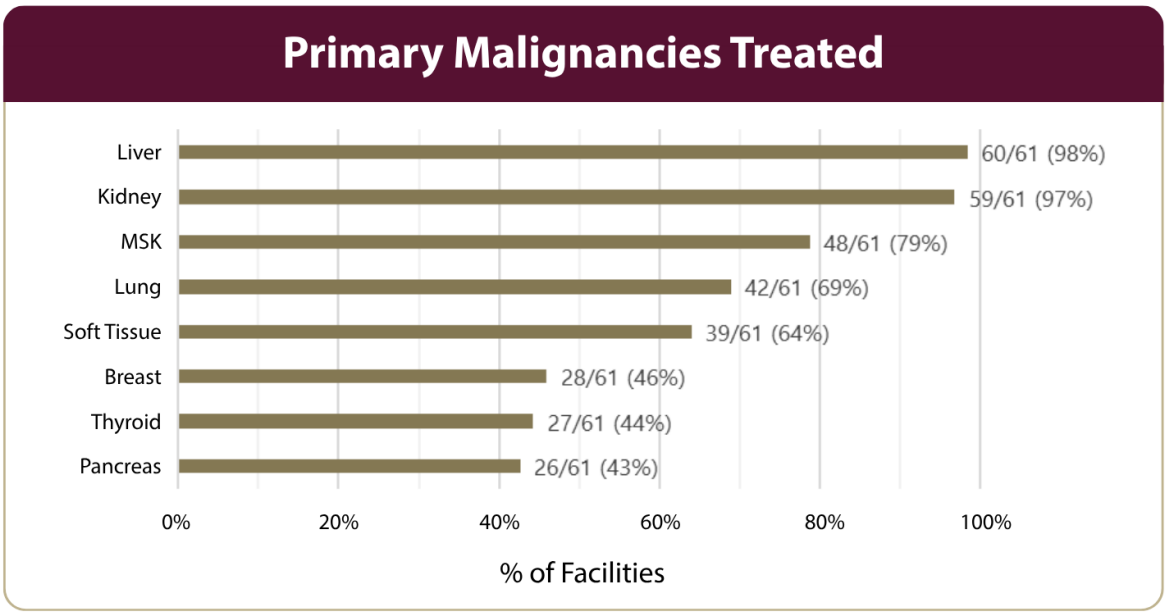


Figure 1. Primary malignancies treated among 61 participating facilities.

Clinical Breadth

Most of the participating facilities reported treating multiple primary tumour sites.

Approximately two-thirds of facilities manage five or more primary malignancies, indicating that many participating centres provide interventional oncology services across a diverse range of cancers rather than focusing on a single organ.

Every participating facility reported treating at least two primary tumour locations.

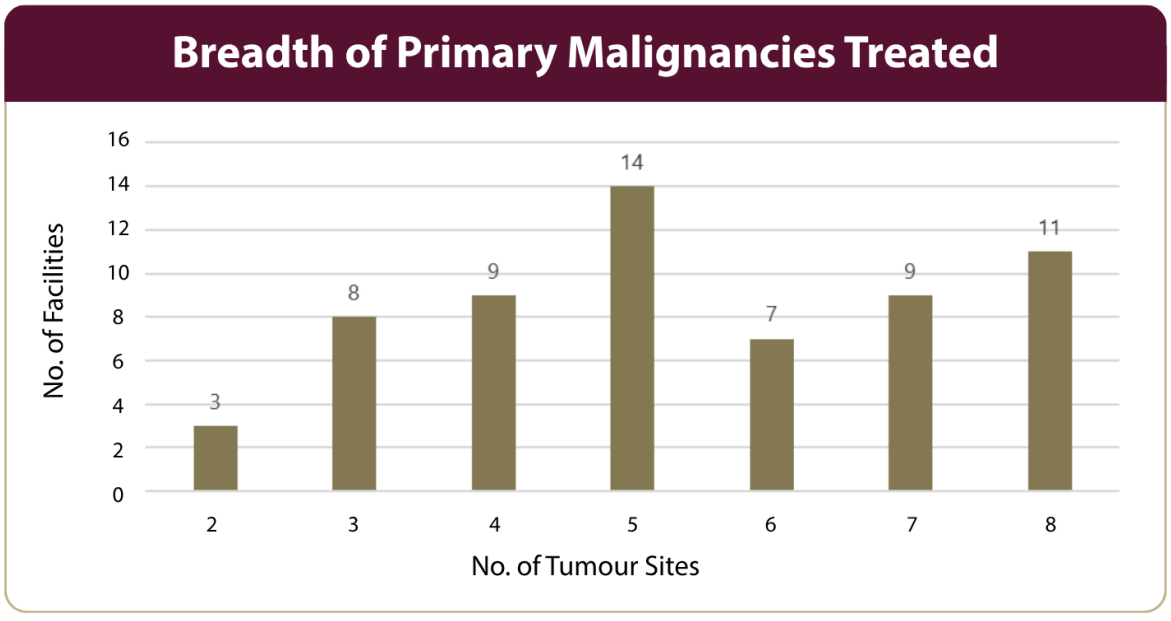


Figure 2. Number of primary malignancy sites treated by participating facilities (n=61).

Procedure Volume

Liver malignancies account for the greatest procedural volume across participating facilities.

Twenty centres reported 100 or more annual liver interventions, the highest number among the top-reported volume category.

Kidney interventions represent the second highest-volume indication, while pancreatic interventions remain comparatively uncommon.

The survey did not assess the clinical evidence, epidemiology or referral factors underlying this distribution.

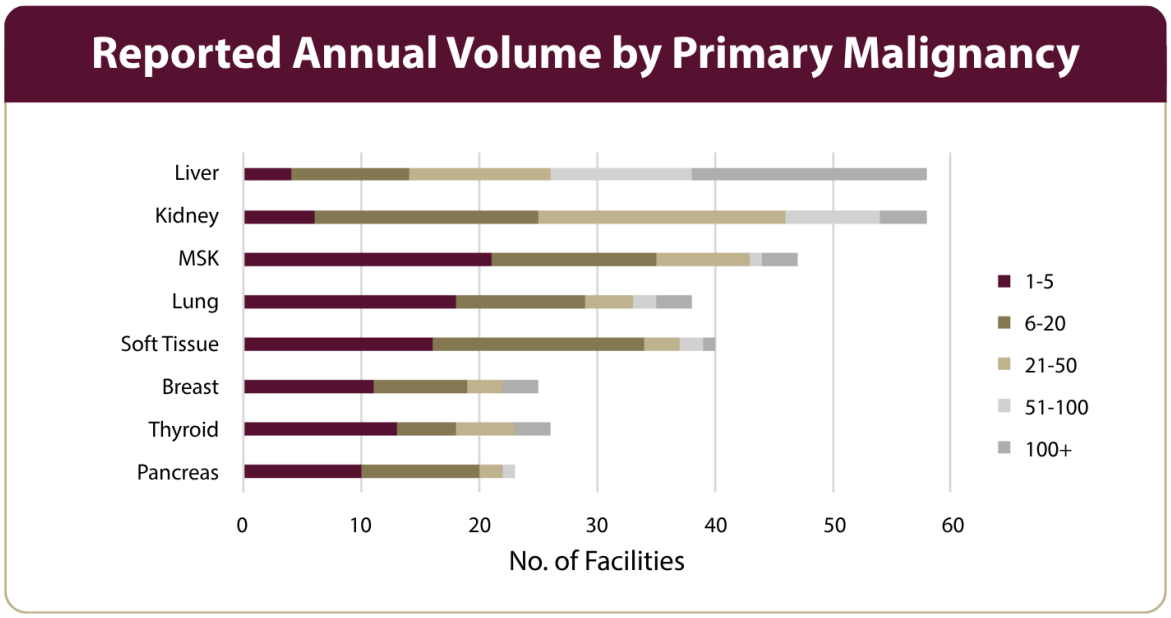


Figure 3. Number of facilities within each reported annual primary malignancy volume category.

Interpretation

The findings indicate that practice among participating facilities extends beyond liver-directed therapy.

Although hepatic malignancies continue to form the foundation of practice, most participating facilities now provide treatment across numerous anatomical sites.

This reported clinical breadth is consistent with the expansion of interventional oncology across multiple disease pathways, although breadth alone should not be interpreted as a measure of comprehensiveness or quality.

Less commonly treated tumour types should not necessarily be interpreted as indicators of limited capability. Rather, they frequently reflect disease prevalence, local referral pathways, institutional case mix and evolving clinical evidence.

Secondary Malignancies

Results

Treatment of liver metastases is almost universal across participating facilities, with more than 90% of centres reporting routine management. Bone and pulmonary metastases are also frequently treated, whereas lymph node, soft-tissue, and adrenal metastases show greater variability across institutions.

More than half of participating facilities reported treating five or more metastatic disease sites, further illustrating the broad clinical scope of contemporary interventional oncology.

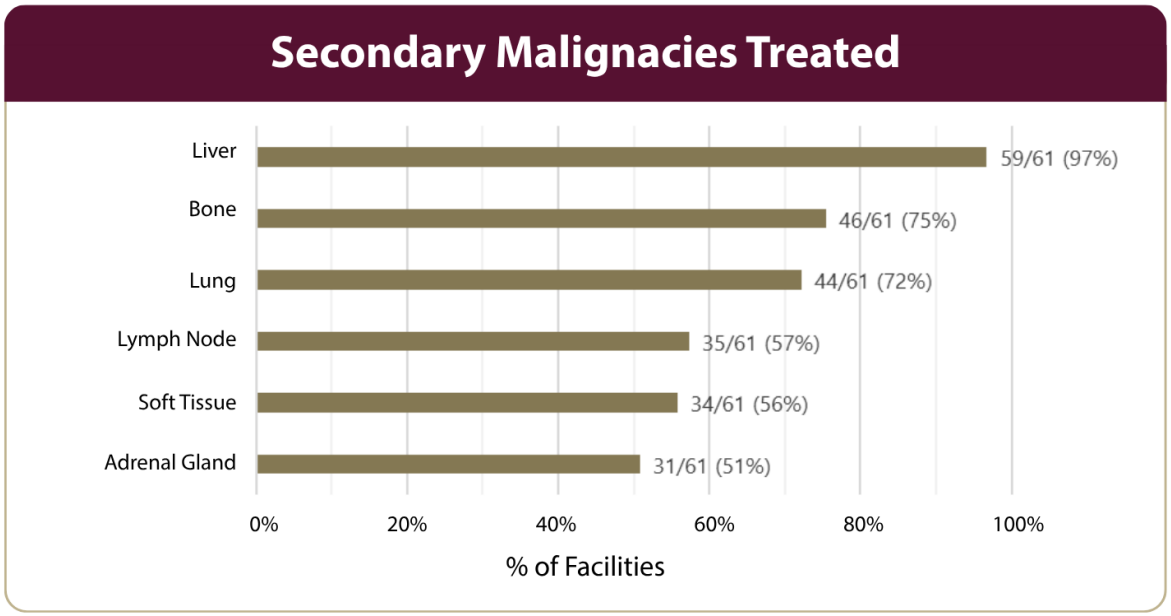


Figure 4. Secondary malignancies treated among 61 participating facilities.

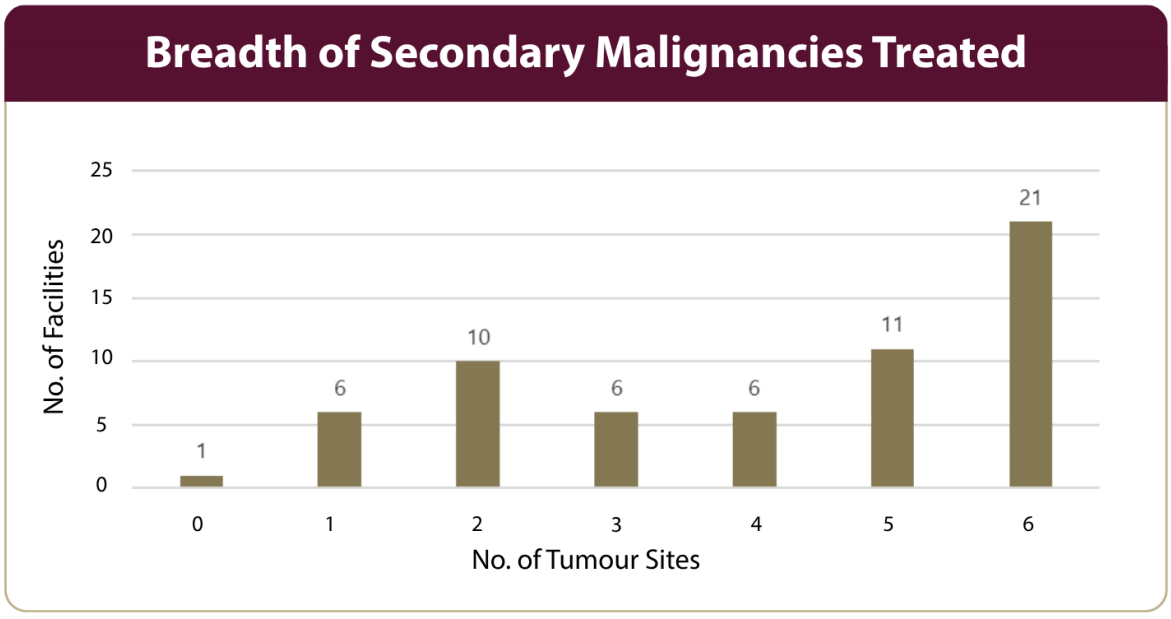


Figure 5. Number of secondary malignancy sites treated by participating facilities (n=61).

Procedure Volume

As with primary malignancies, liver metastases account for the greatest procedural volume across participating centres.

Bone metastases represent the second most common indication, while adrenal metastases remain relatively uncommon.

The survey did not assess the clinical or referral factors underlying this distribution.

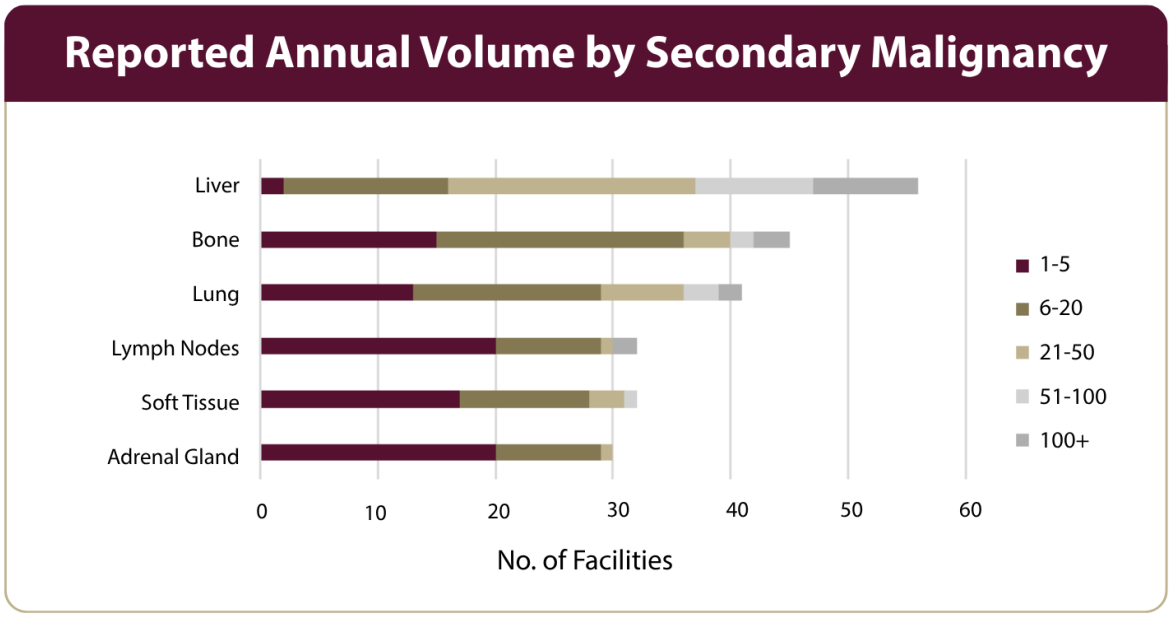


Figure 6. Number of facilities in each reported annual secondary malignancy volume category.

Interpretation

The widespread reporting of treatment of metastatic disease illustrates an important component of practice across participating facilities.

Participating facilities reported activity across multiple metastatic disease sites. Treatment intent was not collected consistently and should not be inferred from these data.

This breadth of practice reinforces the increasingly important role of interventional oncology within multidisciplinary cancer care.

Key Findings

- Liver-directed interventions remain the foundation of practice, while participating facilities also report substantial breadth across primary and metastatic tumour sites.
- The treatment of multiple tumour types indicates broad clinical scope, although service profiles should be interpreted in the context of case mix, referral pathways and institutional expertise.

From Benchmarking to Action

Consider the following questions when reviewing your service:

Clinical Scope

- Does our service provide treatment across the range of tumour types expected for a service of our size and case mix?
- Are there tumour pathways where interventional oncology could contribute more effectively?
- Which referrals are we not currently receiving, and why?
- Are there opportunities to strengthen collaboration with tumour-specific MDTs?
- Do our procedural volumes reflect the needs of our patient population?

Service Development

- Which clinical capabilities should we develop over the next three years?
- What barriers currently limit expansion into new disease pathways?
- Do referring clinicians fully understand the services we provide?

Chapter 5: Comprehensive Cancer Care Beyond Tumour Treatment

The Role of Supportive Interventional Oncology

Why Supportive Procedures Matter

In this report, supportive procedures refer to image-guided interventions provided for patients with cancer. Depending on the institution, these activities may sit within an interventional oncology programme or within the wider interventional radiology service.

Interventional oncology extends far beyond tumour-directed therapies.

Modern interventional oncology services play a critical role throughout the patient journey by providing image-guided procedures that facilitate diagnosis, enable systemic therapy, relieve symptoms, maintain vascular access and improve quality of life.

These interventions often represent the first or last point of contact between patients and the interventional oncology team, highlighting the specialty's contribution across the entire continuum of cancer care.

Benchmarking supportive procedures, therefore, provides insight into how comprehensively an interventional oncology service supports multidisciplinary oncology rather than simply measuring procedural volume.

Supportive Procedures Performed

Results

Image-guided biopsy was almost universally available across participating IASIOS facilities, with 98% of centres reporting routine provision.

Other commonly performed supportive procedures included:

- PICC line insertion
- Pain management interventions
- Salvage procedures
- Port implantation
- Palliative interventions

Although the availability of procedures varied between centres, most participating facilities reported delivering a broad range of supportive interventions alongside tumour-directed therapies.

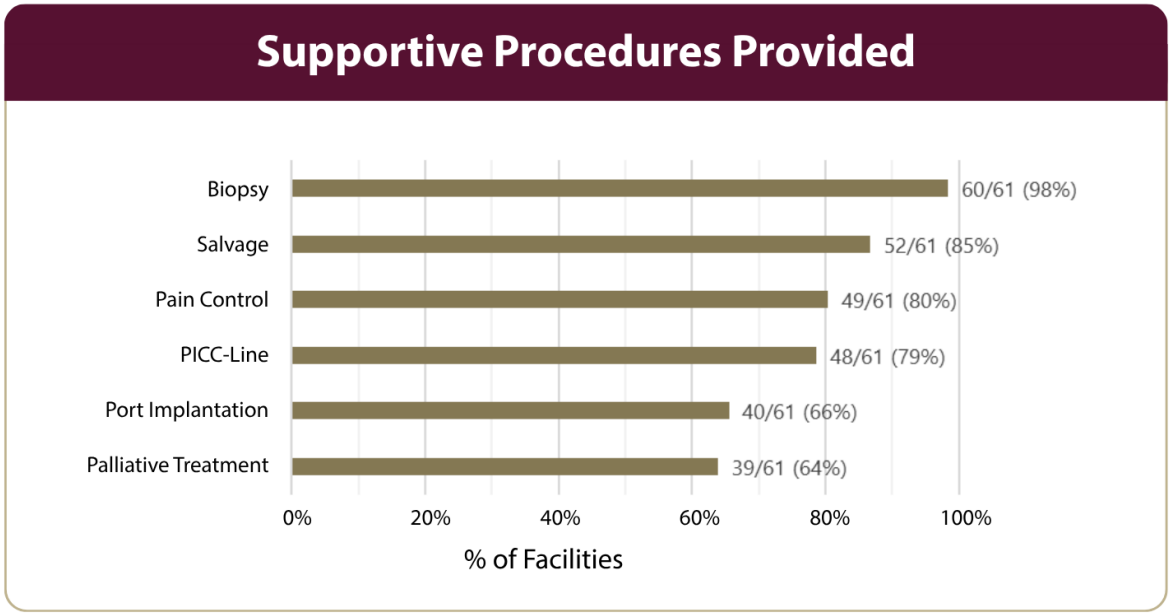


Figure 7. Supportive procedures reported among 61 participating facilities.

Interpretation

The near-universal reported availability of biopsy services demonstrates that this activity is widely provided among participating facilities.

Meanwhile, the widespread provision of vascular access, pain interventions, and palliative procedures demonstrates that participating facilities contribute far beyond procedural interventional oncology.

These findings describe activity across diagnosis, treatment support and symptom management; patient experience and patient-centredness were not directly measured.

Breadth of Supportive Care

Results

Most participating facilities reported delivering multiple supportive procedures.

Approximately 60% of centres provide five or more of the surveyed supportive interventions.

Every participating facility reported providing at least two types of supportive procedures.

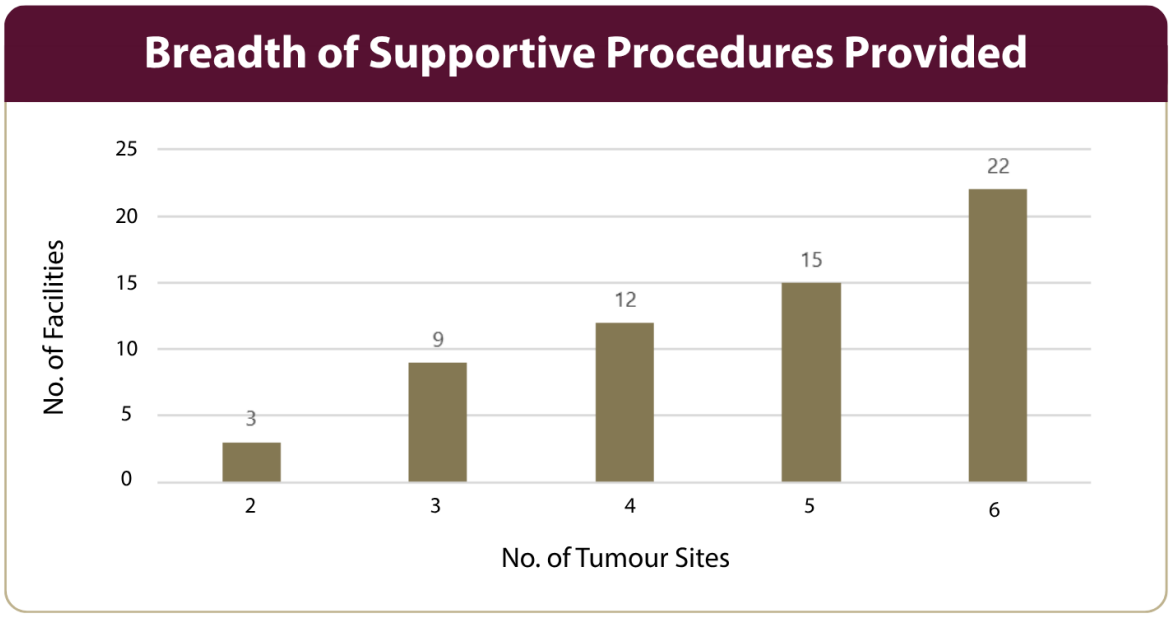


Figure 8. Number of supportive procedure types provided by participating facilities (n=61).

Interpretation

These findings indicate that supportive oncological procedures are widely provided within the participating interventional radiology and interventional oncology services.

The broad availability of multiple procedure types suggests that participating services contribute at different stages of cancer management; the organisational ownership of these procedures may vary locally.

Procedure Volumes

Results

Biopsy accounted for the highest procedure volumes across participating facilities.

Fifty-six of 61 facilities (92%) reported 100 or more biopsies annually.

PICC line insertion also demonstrated substantial procedural activity, followed by pain management and port implantation.

Salvage procedures were performed less frequently but remained available across most participating centres.

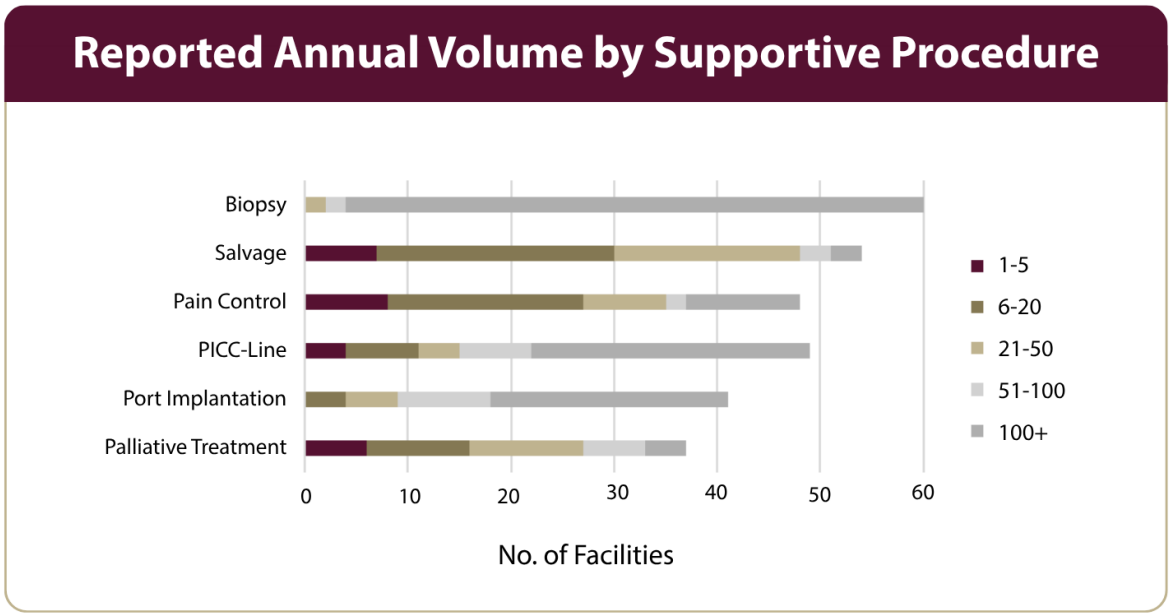


Figure 9. Number of facilities within each reported annual supportive procedure volume category.

Interpretation

The predominance of biopsy procedures underscores the essential contribution of image-guided diagnosis within oncology.

Similarly, high volumes of vascular access procedures illustrate the close integration of interventional oncology with systemic cancer therapy.

These findings demonstrate that much of the workload undertaken by participating facilities supports the wider oncology service rather than individual procedural programmes.

Supportive Procedure Focused Facilities

Results

34% of facilities are focused on providing supportive procedures, in which they conduct >50 procedures on at least 2 of the surveyed supportive treatment locations and do not conduct >50 procedures on any of the surveyed primary cancer or secondary malignancy locations.

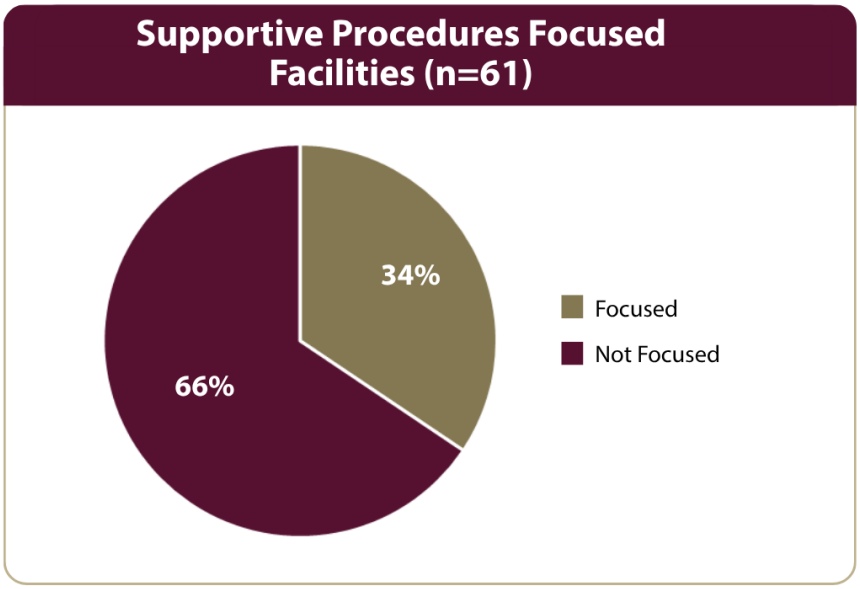


Figure 10. Proportion of facilities that are supportive procedure-focused

Interpretation

The results indicate that approximately one-third of facilities reported particularly high activity across supportive procedures without similarly high volumes in primary or secondary malignancy categories. This highlights the diversity of organisational roles within the network: some services make a substantial contribution through diagnostic, vascular-access, pain-management and palliative interventions, while others combine supportive care with broader tumour-directed activity. This classification describes only reported procedural profiles and should not be interpreted as a measure of service quality, maturity or comprehensiveness.

Key Findings

- Image-guided biopsy is almost universally available, and most participating facilities provide supportive procedures alongside tumour-directed therapies.
- Biopsy, vascular access, pain management and palliative interventions demonstrate the contribution of interventional radiology services across multiple stages of the cancer pathway.
- Differences in supportive-procedure profiles reflect diverse institutional responsibilities, referral pathways and healthcare environments.

Interpreting Different Service Models

The diversity observed across participating facilities illustrates the varied roles that interventional oncology services perform internationally. Interventional oncology programmes do not necessarily have identical procedural profiles. Some centres function primarily as tertiary referral centres for complex oncological interventions, while others provide a broader portfolio of diagnostic, supportive and palliative procedures within regional cancer networks.

These different models contribute to multidisciplinary cancer care in ways that reflect the needs of their patient populations and their roles within the wider healthcare system. Organisational development should therefore not be assessed solely by procedural mix, and the prevalence of a particular service model should not be interpreted as a measure of quality or maturity.

From Benchmarking to Action

Patient Journey

- Does our service support patients throughout the entire cancer pathway, or only during procedures?
- Are we involved early enough in treatment planning?
- Do we provide sufficient outpatient assessment and follow-up?

Supportive Care

- Which supportive procedures could improve patient experience if expanded?
- Are vascular access, biopsy and palliative interventions appropriately integrated into our oncology pathways?
- Are there opportunities to reduce delays in diagnosis or treatment through greater interventional oncology involvement?

Chapter 6: The Interventional Oncology Workforce

Understanding the Role of the Modern Interventional Oncologist

Why Workforce Matters

People are the most important resource within any healthcare service.

While equipment, facilities and technology enable image-guided procedures, it is the expertise, clinical judgement and multidisciplinary collaboration of healthcare professionals that ultimately determine the quality and sustainability of patient care.

As interventional oncology continues to evolve into an increasingly clinical specialty, understanding how physicians spend their time - and the workforce required to support comprehensive care - has become an important benchmark for workforce planning and service development.

This chapter explores the medical workforce of participating IASIOS services, including physician numbers, professional qualifications and the balance of clinical activities undertaken within contemporary interventional oncology practice.

Medical Workforce

Results

Participating services reported a mean of 5.6 full-time interventional radiologists across 61 facilities and 2.8 part-time interventional radiologists among the 53 facilities providing a part-time figure.

The median number of full-time physicians was 5, indicating that the typical IASIOS service operates with a relatively compact specialist workforce.

Most participating services relied predominantly on full-time physicians, while only 2 facilities reported exclusively part-time staffing models.

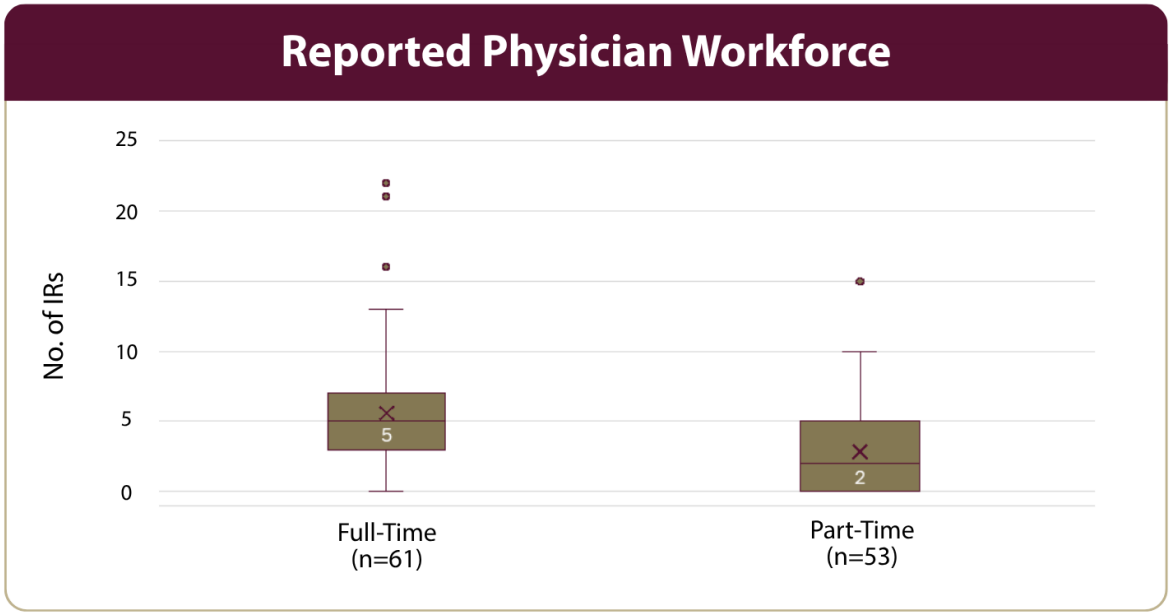


Figure 11. Distribution of reported full-time and part-time interventional radiologist headcounts.

Interpretation

The relatively modest size of the medical workforce highlights an important characteristic of interventional oncology.

Many services deliver complex multidisciplinary cancer care with comparatively small specialist teams.

This places particular importance on workforce planning, protected clinical time and organisational support to ensure that physicians can fulfil their expanding clinical responsibilities alongside procedural activity.

As demand for interventional oncology continues to grow, workforce capacity is likely to become one of the principal determinants of future service development.

Professional Qualifications

Results

Participating physicians demonstrated a high level of professional qualification.

Across reporting services:

Among the 54 facilities reporting an EBIR count, 122 of 445 reported physicians (27%) held the European Board of Interventional Radiology (EBIR) qualification.

Among the 43 facilities reporting this item, 203 of 390 physicians (52%) were reported to hold an additional interventional radiology qualification.

Among the 36 facilities reporting this item, 88 of 304 physicians (29%) were reported to hold an additional interventional oncology qualification.

Reported qualifications included national board certifications, university postgraduate programmes and recognised subspecialty diplomas. Qualification categories were not mutually exclusive and should not be summed.

Confirmed zero values obtained through hospital follow-up were included as observed responses; blank fields were treated as missing. Percentages therefore use item-specific physician-headcount denominators. Qualification categories may overlap.

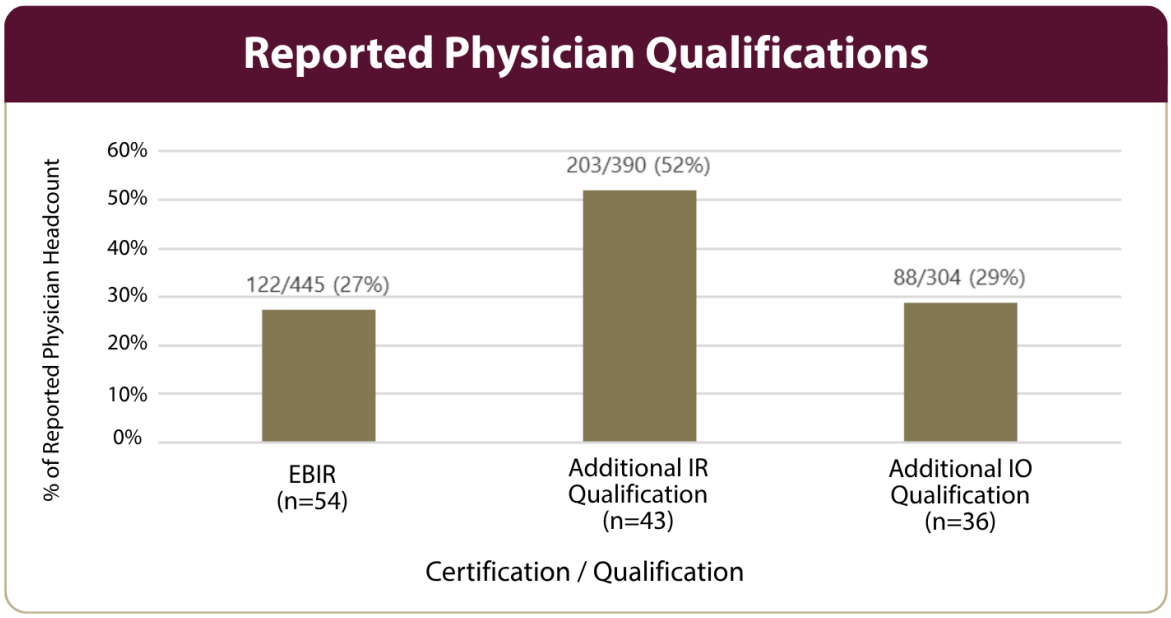


Figure 12. Reported physician qualifications using item-specific physician headcount denominators[1]

Interpretation

The breadth of postgraduate qualifications reflects the increasingly specialised nature of interventional oncology.

Professional certification provides evidence of additional formal training and may support harmonisation of training standards and continuous professional development across the specialty.

Although qualification pathways differ internationally, the findings illustrate a strong commitment among participating physicians to advanced subspecialty education.

Reported Monthly Clinical Activity

Results

The analysis was restricted to facilities with complete monthly-normalised responses for IO procedures, outpatient consultations, and tumour-board meetings, with extreme outlier

[1]Categories may overlap.

responses excluded, as they represented total departmental activity rather than per IR. The normalised values represent reported activity per IR, rather than total departmental activity.

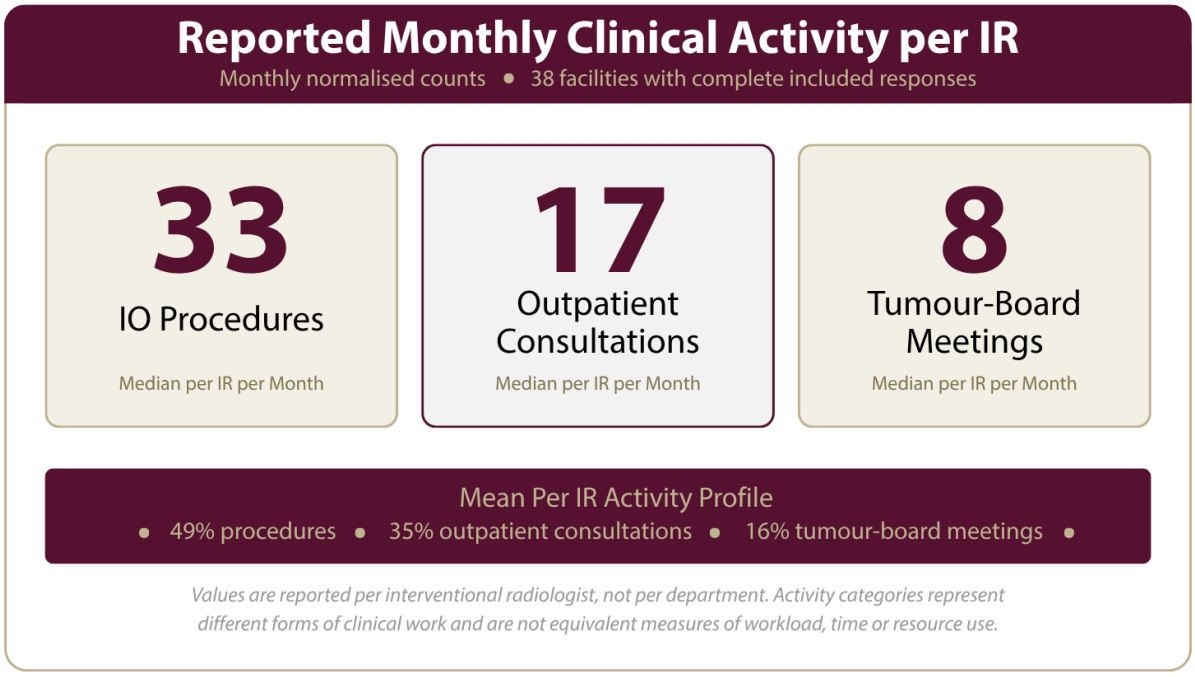


Figure 13. Median monthly number of IO procedures, outpatient consultations and tumour-board meetings[2].

Among 38 facilities with complete included responses, the median reported monthly activity per IR was 33 IO procedures, 17 outpatient consultations and 8 tumour-board meetings.

The mean reported monthly activity was 37.3 procedures, 27.3 outpatient consultations and 9.3 tumour-board meetings per IR. Median values are presented as the primary summary because activity levels varied considerably between participating services.

When activity was weighted proportionally within each facility, and each facility was weighted equally, the mean per-IR activity profile comprised 49% IO procedures, 35% outpatient consultations, and 16% tumour-board meetings.

[2] Reported per interventional radiologist, together with the mean facility-level percentage composition of these three activity types among 38 facilities with complete responses

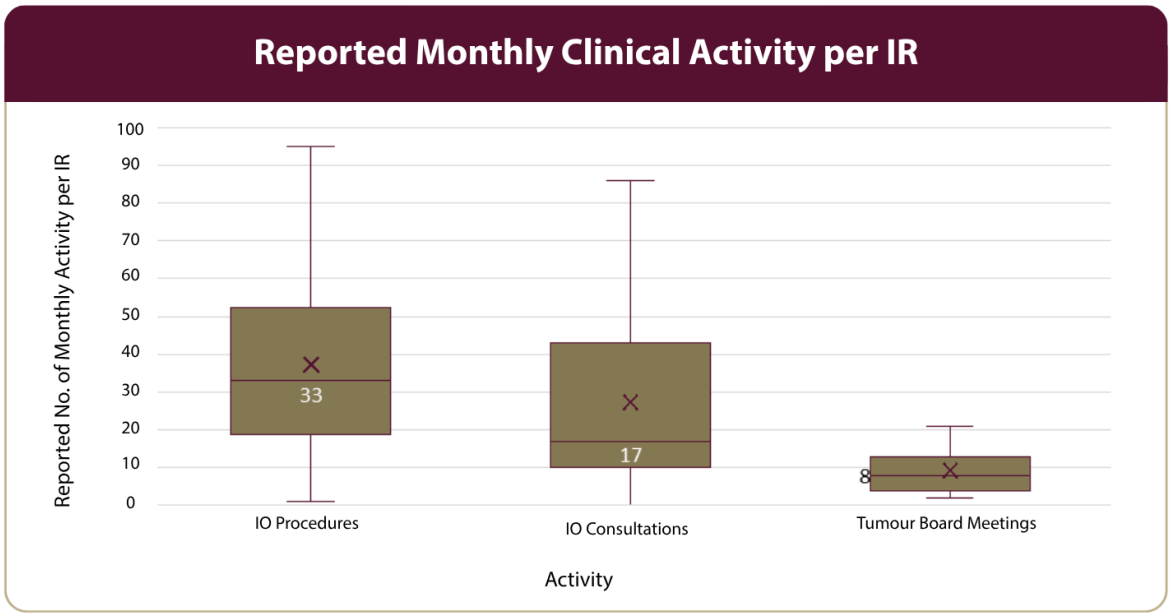


Figure 14. Reported monthly per-interventional-radiologist activity[3]

Interpretation

These findings describe the relative frequency of three reported activity types; they do not describe physician time. The figures describe the frequency of reported activities undertaken by an individual IR rather than total departmental service volume.

Consultations and tumour board participation together accounted for 51% of the mean activity profile per IR, indicating substantial reported activity beyond procedures. The survey design does not establish change over time.

The substantial volume of outpatient consultations highlights the growing responsibility of interventional oncologists for patient assessment, treatment planning, informed consent and longitudinal follow-up.

Reported tumour board activity indicates participation in multidisciplinary case discussions.

The monthly activity summary incorporates the source-response corrections and standardisation conventions described in Chapter 2.

Benchmark in Context

The modern interventional oncologist is no longer defined solely by technical expertise. Increasingly, the specialty combines procedural excellence with outpatient clinical practice, multidisciplinary decision-making and long-term patient management.

[3]Counts for IO procedures, outpatient consultations and tumour-board meetings across 38 facilities, with complete responses included, showing the variation in activity levels between participating services.

Weekly Professional Activity

Results

Clinical interaction with patients accounted for approximately 54% of mean reported weekly professional time.

The remaining reported time comprised:

- training and teaching (19%)
- administration (19%)
- other activities (8%)

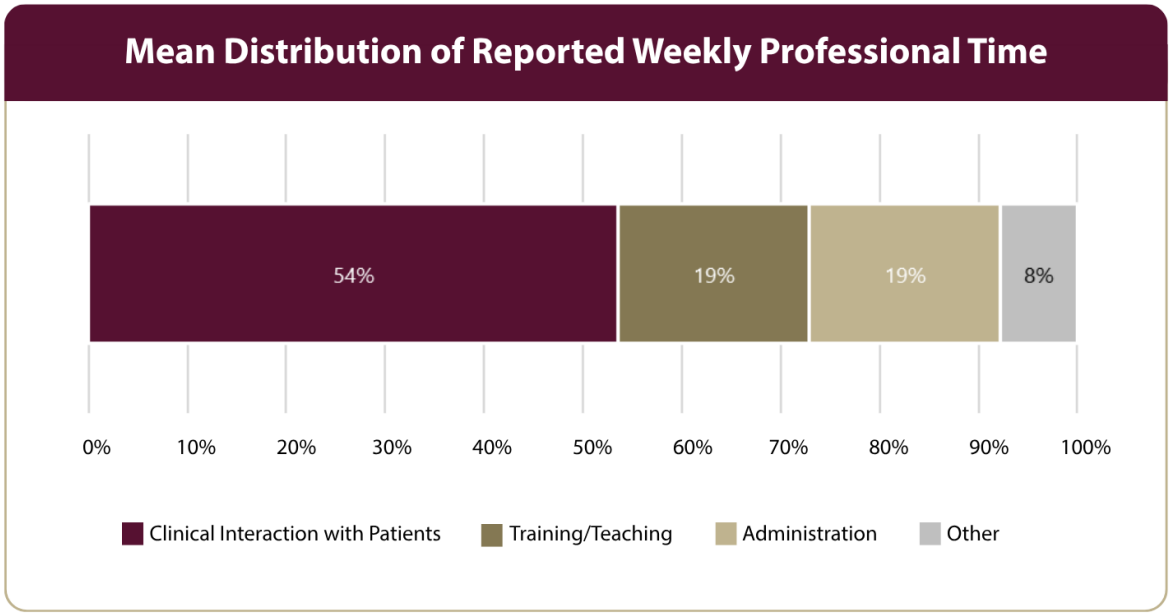


Figure 15. Mean distribution of reported weekly professional time across the four survey categories (n=58).

Interpretation

These findings demonstrate that procedural activity represents only one component of an interventional oncologist's professional responsibilities.

Training and teaching, administration and other activities collectively accounted for approximately 46% of mean reported professional time.

This has important implications for workforce planning.

Services that estimate staffing requirements based solely on procedural volumes are likely to underestimate the true clinical workload associated with delivering comprehensive interventional oncology care.

Local workforce planning should account for non-procedural responsibilities. The current survey quantified training/teaching, administration, and an 'other' category; it did not separately quantify research, governance and multidisciplinary meetings

Key Findings

- Participating IASIOS services typically operate with relatively small, specialised physician teams.
- A substantial proportion of physician activity occurs outside the procedure room through consultations, multidisciplinary participation, education and other professional responsibilities.
- Workforce planning should recognise the full clinical and organisational workload associated with delivering an interventional oncology service.
- These findings inform the Clinical Medical Workforce domain of the IASIOS Organisational Development Framework presented in Chapter 12.

From Benchmarking to Action

Workforce Planning

- Does our physician workforce reflect our true workload rather than procedural numbers alone?
- Is adequate time protected for outpatient clinics?
- Do physicians have sufficient time for MDT participation?
- Are research, education and governance recognised within workforce planning?

Professional Development

- Are physicians encouraged to pursue advanced qualifications?
- Are succession plans in place for future workforce needs?

Chapter 7: Building the Multidisciplinary Interventional Oncology Team

The People Behind High-Quality Patient Care

Why the Multidisciplinary Workforce Matters

Interventional oncology is fundamentally a team-based specialty.

Although physicians perform image-guided procedures, the delivery of safe, effective and patient-centred care depends upon a coordinated multidisciplinary workforce. Specialist nurses, radiographers, anaesthesiologists, administrative staff and numerous other healthcare professionals each contribute essential expertise throughout the patient pathway.

As interventional oncology services expand, understanding how multidisciplinary teams are structured has become increasingly important for workforce planning, quality improvement and service development.

This chapter examines the composition of the multidisciplinary workforce and explores how responsibilities are distributed across modern interventional oncology services.

Workforce Composition

Results

Participating facilities reported physician, nursing and radiographer workforces of differing sizes. Because response completeness varied by profession, aggregate headcount shares should be interpreted cautiously.

Four facilities explicitly reported that no nurses were working in the interventional radiology department. Their accompanying responses identified procedural support from radiographers, junior physicians, interns, or anaesthesia teams; these values should therefore be interpreted as departmental workforce configuration, not absence of clinical support. Among facilities that report all three groups, median staffing levels are presented in Figure 16. A reported staffing outlier of 80 radiographers was excluded for clarity.

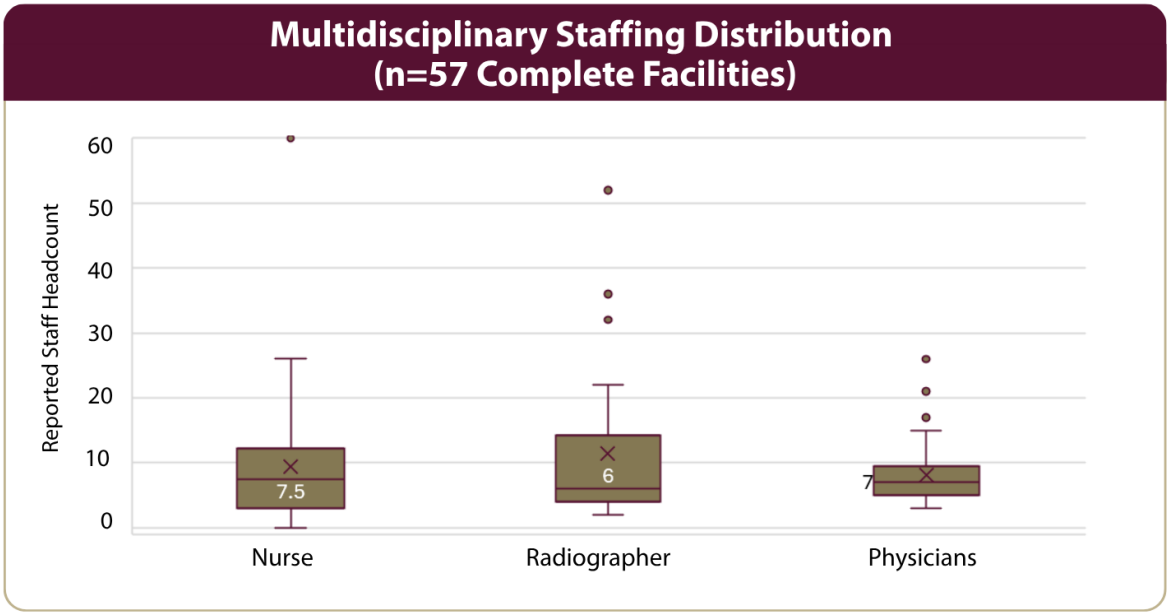


Figure 16. Distribution of reported staffing headcounts among facilities reporting physicians, nurses and radiographers.

Interpretation

The survey findings emphasise that participating interventional oncology services rely on multidisciplinary teams rather than individual practitioners alone.

The reported distribution of physicians, nurses and radiographers reflects the collaborative nature of image-guided oncology. The survey did not assess associations between staffing configuration and safety, efficiency or patient experience.

Staffing Ratios

Results

Using paired aggregate data, participating services reported:

1.19 nurses per interventional radiologist (paired n=59)

1.38 radiographers per interventional radiologist (paired n=58)

1.21 radiographers per nurse (paired, n=57)

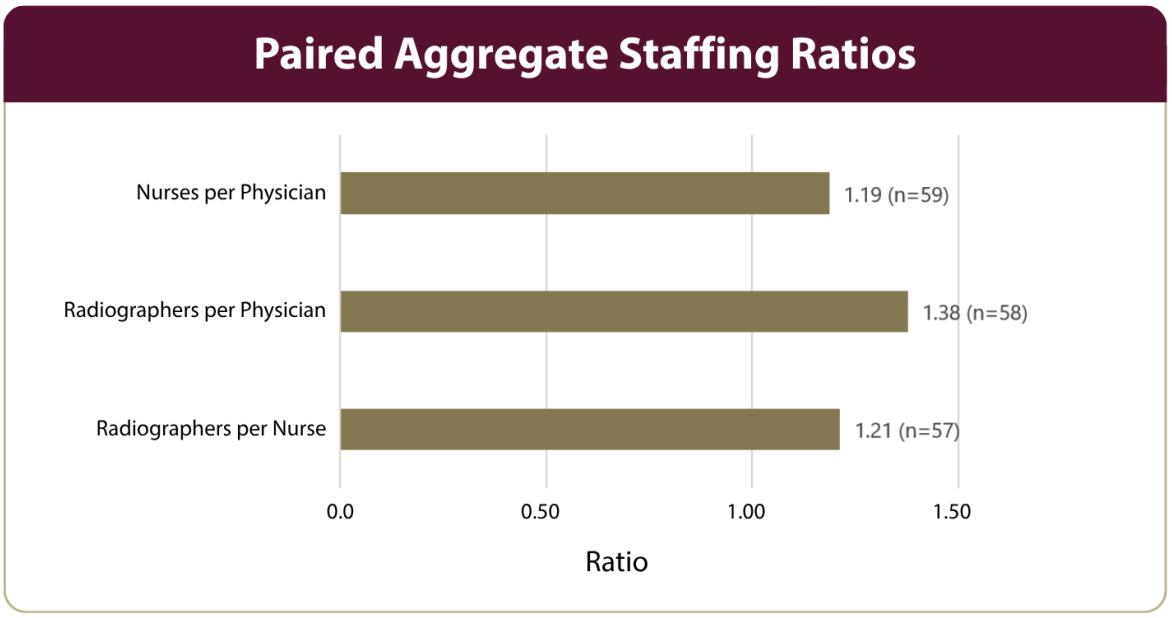


Figure 17. Paired aggregate multidisciplinary staffing ratios with the paired facility denominator shown.

Interpretation

Staffing ratios provide descriptive organisational benchmarks when their calculation method and paired denominators are stated.

Rather than representing ideal staffing standards, these data describe workforce configurations reported by participating interventional oncology services.

Appropriate staffing is essential not only for procedural efficiency but also for patient safety, workflow coordination and continuity of care.

As services expand, benchmarking workforce ratios may help departments plan for sustainable growth while maintaining quality standards.

Reported Specialist Training

Results

Reported access to profession-specific training varied. Interventional radiology training was reported for nursing teams at 30 of 57 responding facilities (53%), while interventional oncology-specific nursing training was reported at 17 of 53 facilities (32%).

For radiographers, interventional radiology training was reported at 37 of 58 responding facilities (64%), while interventional oncology-specific training was reported at 17 of 54 facilities (31%).

Interpretation

IO-specific training was less frequently reported than broader IR training for both professional groups. This may indicate that specialised team roles are developing faster than consistently defined IO-specific training pathways.

These findings should not be interpreted as evidence of insufficient competence. Open-text responses described on-the-job, departmental and course-based training that may not have been classified consistently as formal IO training.

The survey asked broadly about "specific training" and did not distinguish formal qualifications from external courses, departmental instruction or on-the-job training. Results should therefore be read as respondent-reported access to specific training rather than formal certification.

The Expanding Role of Specialist Nurses

Results

Open-text descriptions of nursing responsibilities were grouped into procedural stages and descriptive categories. A single response could contribute more than one coded mention. These summaries describe coded mentions rather than the proportion of facilities and were not subjected to formal qualitative reliability testing. 214 of these coded mentions were identified for nursing responsibilities.

Survey responses demonstrate that nursing responsibilities extend across every stage of the patient journey. Reported responsibilities include:

- patient assessment
- patient education
- procedural preparation
- intra-procedural assistance
- monitoring
- sedation support
- post-procedural recovery
- care coordination
- quality assurance
- equipment management

Patient care generated the largest number of coded nursing-responsibility entries, with responsibilities spanning pre-procedural, intra-procedural, post-procedural and service-support activities.

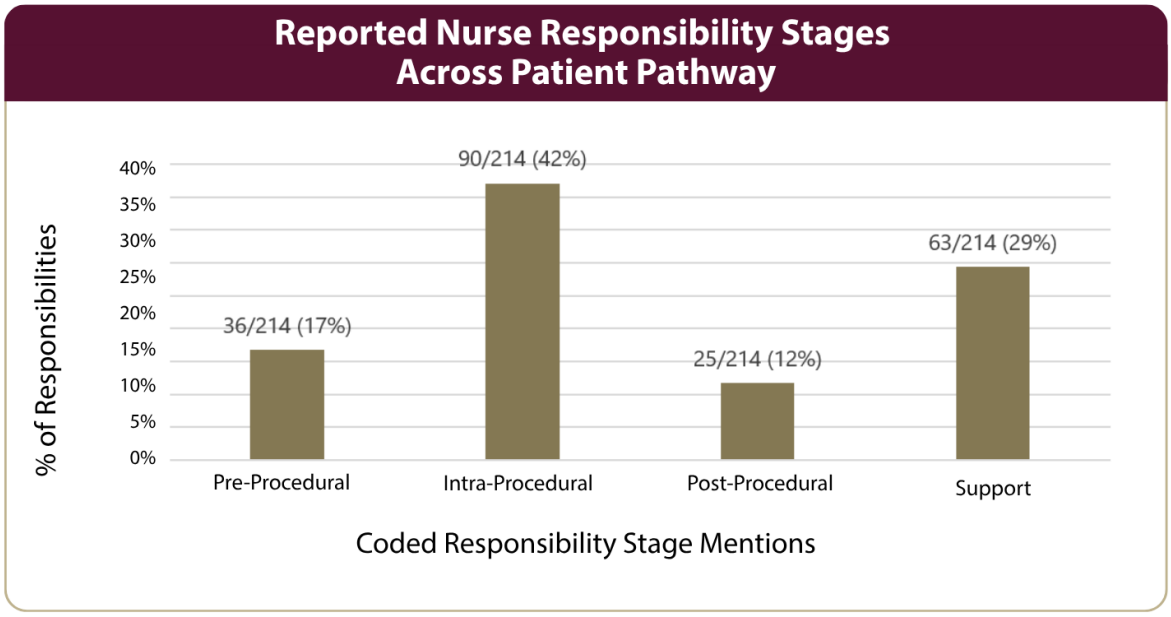


Figure 18. Distribution of reported nurse responsibility stages across the patient pathway in the IR department

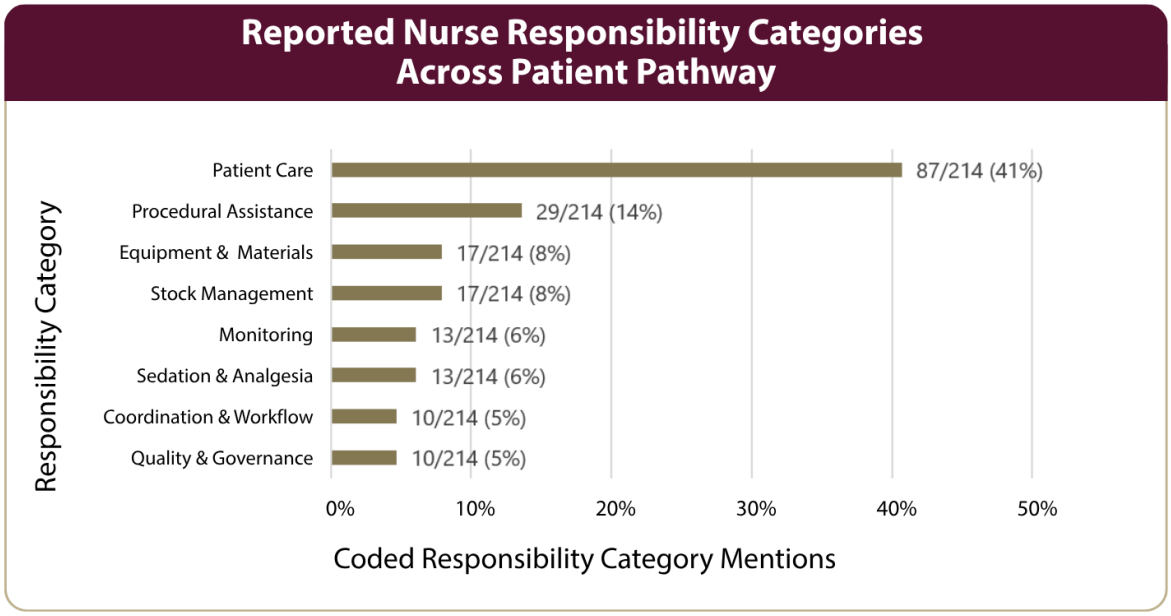


Figure 19. Distribution of reported nurse responsibility categories across the patient pathway in the IR department

Interpretation

These findings reflect the continuing evolution of specialist nursing within interventional oncology.

Reported nursing responsibilities extended beyond procedural assistance to include patient-pathway coordination and quality-related activities.

The coded responses describe a broad nursing contribution across the patient pathway; they do not measure the effect of individual roles on safety, efficiency or patient experience.

The Role of Specialist Radiographers

Results

Open-text descriptions of radiographers' responsibilities were grouped into procedural stages and descriptive categories. A single response could contribute more than one coded mention. These summaries describe coded mentions rather than the proportion of facilities and were not subjected to formal qualitative reliability testing. 229 of these coded mentions were identified for radiographer responsibilities.

Radiographers similarly contribute throughout the patient pathway.

Reported responsibilities included:

- procedural imaging
- image optimisation
- equipment operation
- radiation safety
- workflow coordination
- patient care
- quality assurance
- equipment maintenance
- procedural assistance

Imaging and procedural technique generated the largest number of coded radiographer-responsibility entries, concentrated primarily in the intra-procedural phase.

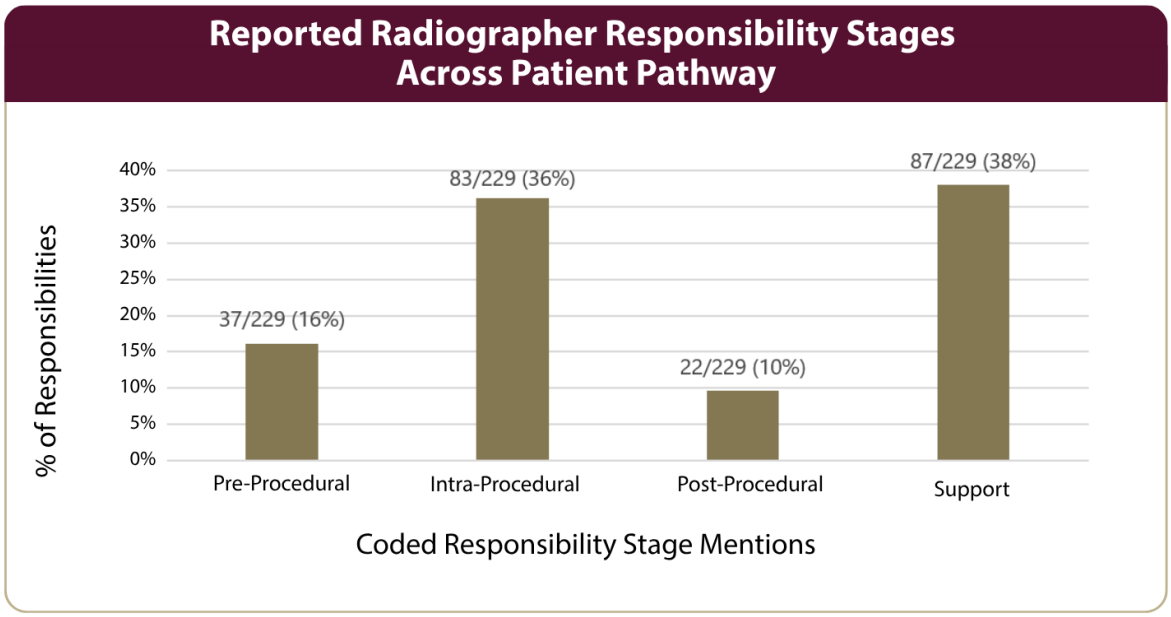


Figure 20. Distribution of reported radiographer responsibility stages in the IR department

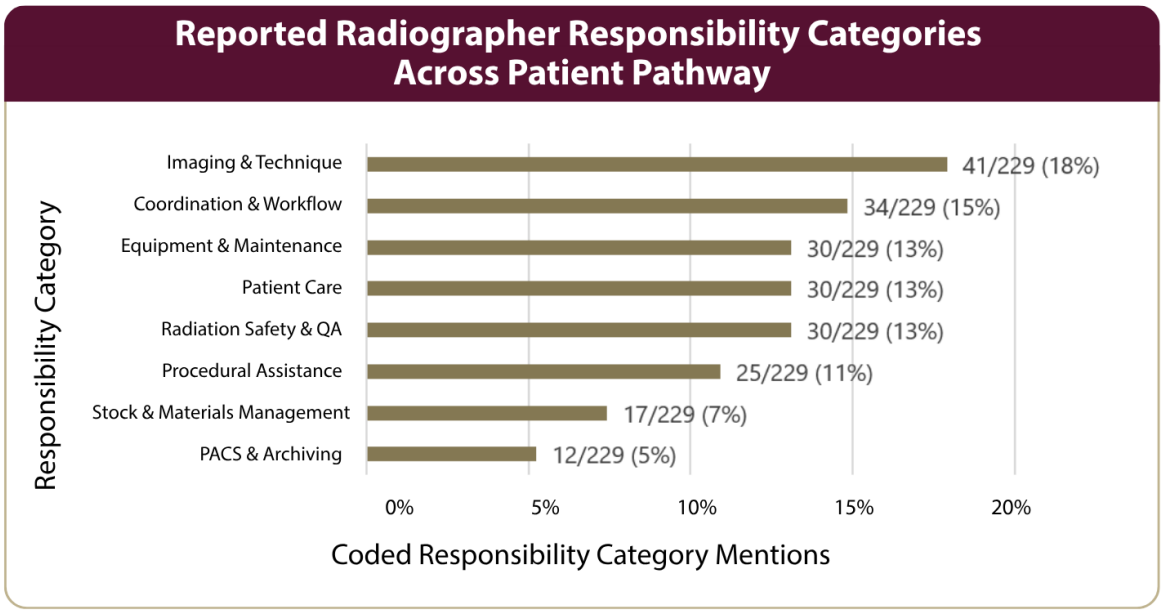


Figure 21. Distribution of reported radiographer responsibility categories in IR department

Interpretation

Reported radiographer responsibilities extended beyond image acquisition. The survey identified responsibilities in imaging technology, procedural workflow and radiation safety but did not assess their effects on procedural outcomes.

The findings highlight the increasingly specialised nature of radiographer practice within interventional oncology and the importance of advanced training as procedural complexity continues to increase.

Teamwork During Procedures

Results

After excluding three responses that appeared to describe broader departmental staffing pools rather than a typical procedure, the median reported number of assisting staff was three; 34 of 56 included facilities reported two or three assisting staff.

Values of 12, 15 and 20 were excluded from this distribution because the accompanying role and task descriptions indicated broader departmental staffing pools. This exclusion is reported transparently and does not imply that the source responses were erroneous.

Open-text descriptions of tasks reported during IO procedures were grouped into descriptive categories. A single response could contribute more than one coded mention. These summaries describe coded mentions rather than the proportion of facilities and were not subjected to formal qualitative reliability testing. 145 of these coded task mentions were identified.

Across the coded procedural-task entries, the most frequently reported categories included:

- procedural assistance

- imaging operation
- patient monitoring
- sedation
- patient preparation
- logistics
- documentation
- post-procedural care

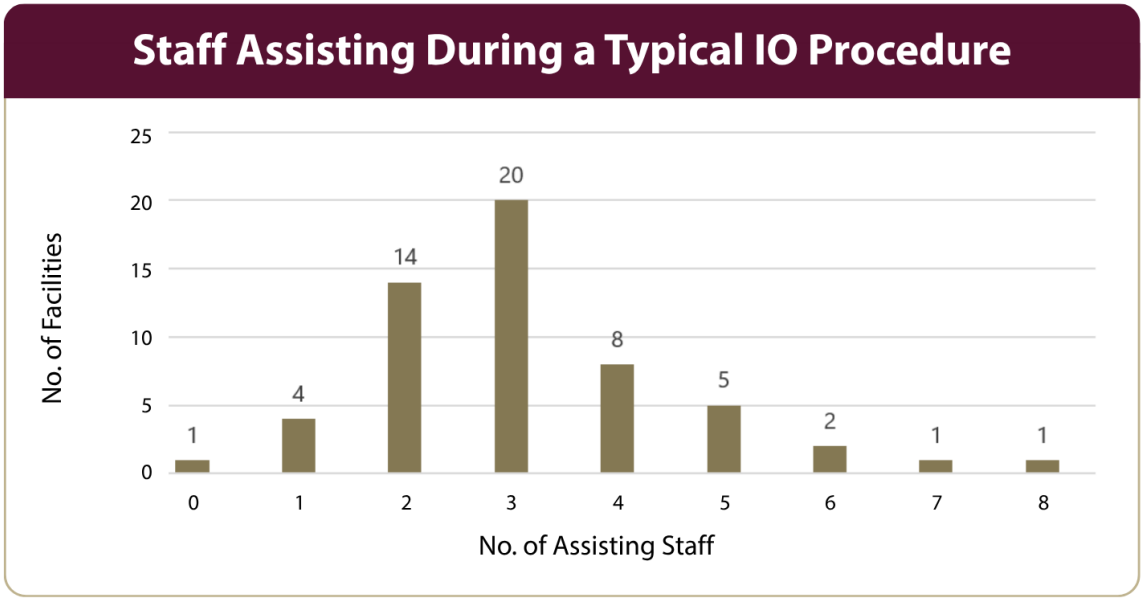


Figure 22. Distribution of reported staff assisting during a typical interventional oncology procedure[4]

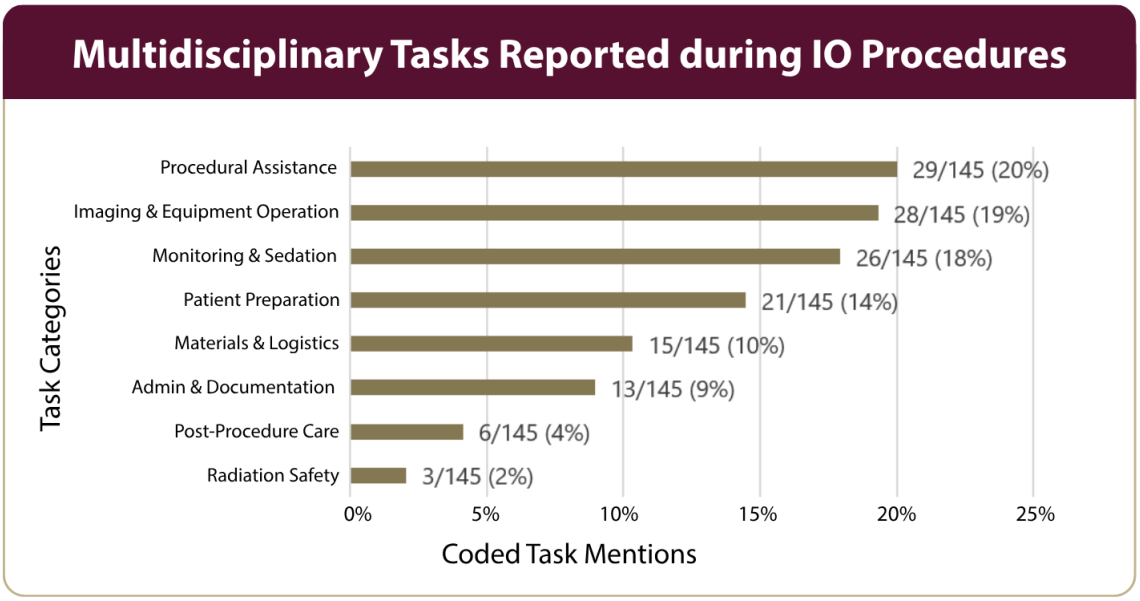


Figure 23. Ranked distribution of 145 coded multidisciplinary procedural-task mentions.

[4] (n=56 after three documented departmental-pool exclusions).

Interpretation

The number of professionals involved in a typical procedure illustrates the highly collaborative nature of interventional oncology. Each procedure represents the coordinated efforts of multiple healthcare professionals with complementary expertise.

This multidisciplinary model contributes not only to procedural efficiency but also to patient safety, communication and overall quality of care.

Workforce capacity should therefore be considered across the clinical team rather than through physician numbers alone.

Beyond Numbers: Building Integrated Teams

One of the most striking findings from this benchmarking survey is that workforce excellence cannot be measured simply by staffing numbers. Effective team-based care depends on clearly defined professional roles, communication and shared responsibility for patient care.

The survey findings indicate that staffing numbers should be considered alongside role definition and the integration of multidisciplinary expertise across the patient pathway.

This represents an important shift from viewing interventional oncology as a physician-led procedural service towards recognising it as a coordinated multidisciplinary clinical programme.

Key Findings

- Modern interventional oncology is delivered by multidisciplinary teams rather than by individual practitioners.
- Specialist nurses and radiographers contribute across the patient pathway, extending beyond procedural assistance.
- Staffing ratios are useful planning benchmarks, but team integration, role definition and local service models remain important context.

These findings inform the Multidisciplinary Team domain of the IASIOS Organisational Development Framework presented in Chapter 12.

From Benchmarking to Action

Team Structure

- Do we have dedicated specialist nurses and radiographers?
- Are advanced roles clearly defined?
- Is every member of the multidisciplinary team working at the top of their professional scope?

Education

- Does every professional group have access to continuing education?
- How could multidisciplinary collaboration be strengthened?

Chapter 8: Organisational Infrastructure

Building the Environment for Clinical Excellence

Why Infrastructure Matters

Clinical excellence depends upon more than technical expertise.

Interventional oncology services require an organisational environment that enables timely access to patients, supports multidisciplinary care, and allows physicians to assume responsibility for the complete clinical pathway.

Infrastructure—including procedural facilities, inpatient and outpatient resources, anaesthesia support, and clinical autonomy—determines whether an interventional oncology service functions as a procedural unit or as an integrated clinical specialty.

This chapter explores the organisational resources that support contemporary interventional oncology practice and examines the variation that exists across participating IASIOS services.

Access to Anaesthesia Support

Results

Access to anaesthesia services was widely available across participating institutions, although the model of provision varied considerably.

More than half of participating services reported routine access to anaesthesiology support within the interventional radiology department. In contrast, many others relied on shared services provided by anaesthesia departments, operating theatres or intensive care units.

Several participating services reported access through multiple pathways, combining scheduled anaesthesia support with emergency or on-demand availability.

Nine participating services (15%) reported anaesthesia-related operational constraints, including scheduling delays or limited procedural capacity.

For this analysis, an anaesthesia-related operational constraint was coded when a facility explicitly identified anaesthesia access as a challenge or described a direct scheduling or case-capacity restriction in its anaesthesia free-text response.

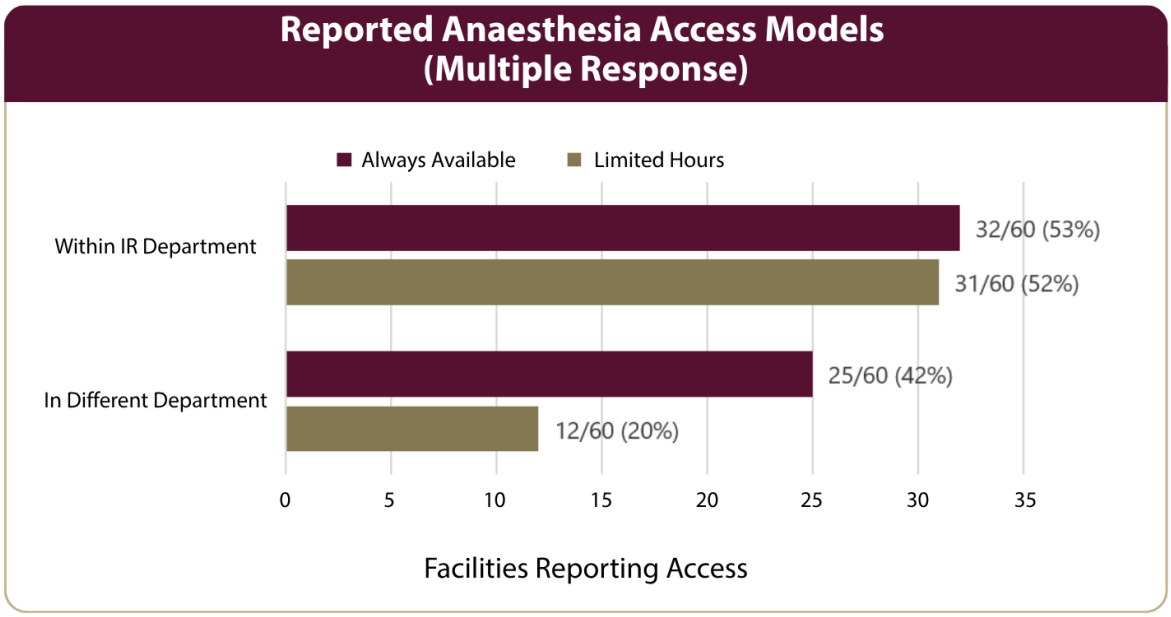


Figure 24. Reported anaesthesia access models; facilities could select more than one model.

Interpretation

Access to anaesthesia was a frequently reported operational consideration.

The findings suggest that the principal challenge is not whether anaesthesia is available, but whether it is available consistently and predictably enough to support efficient procedural scheduling. This distinction is important. Many services technically have access to anaesthesia, yet still experience delays because availability depends upon competing hospital priorities. Reliable access to anaesthesia is therefore an important operational consideration rather than simply a nominally available resource.

Benchmark in Context

Procedural capability alone is insufficient. Without predictable access to anaesthesia support, the capacity of an interventional oncology service to deliver timely patient care may be significantly constrained.

Access to Inpatient and Outpatient Beds

Results

Most participating services relied on inpatient and outpatient beds located outside the interventional radiology department. Only a minority reported dedicated inpatient facilities within their own service.

Outpatient care demonstrated greater integration, with many services reporting dedicated day-case facilities either within the department or shared with other specialties.

Median bed availability was substantially lower than the mean, reflecting considerable variation among participating institutions and the presence of several very large tertiary centres. Facilities reporting outlier levels of available beds were excluded from Figure 25 for clarity, and are as follows:

- Inpatient Beds - Other Department: 820, 450, 400, 200, 150, 125
- Outpatient Beds - Other Department: 150, 60

The mean value of 80 for Inpatient-Other Department was excluded from Figure 25 for clarity.

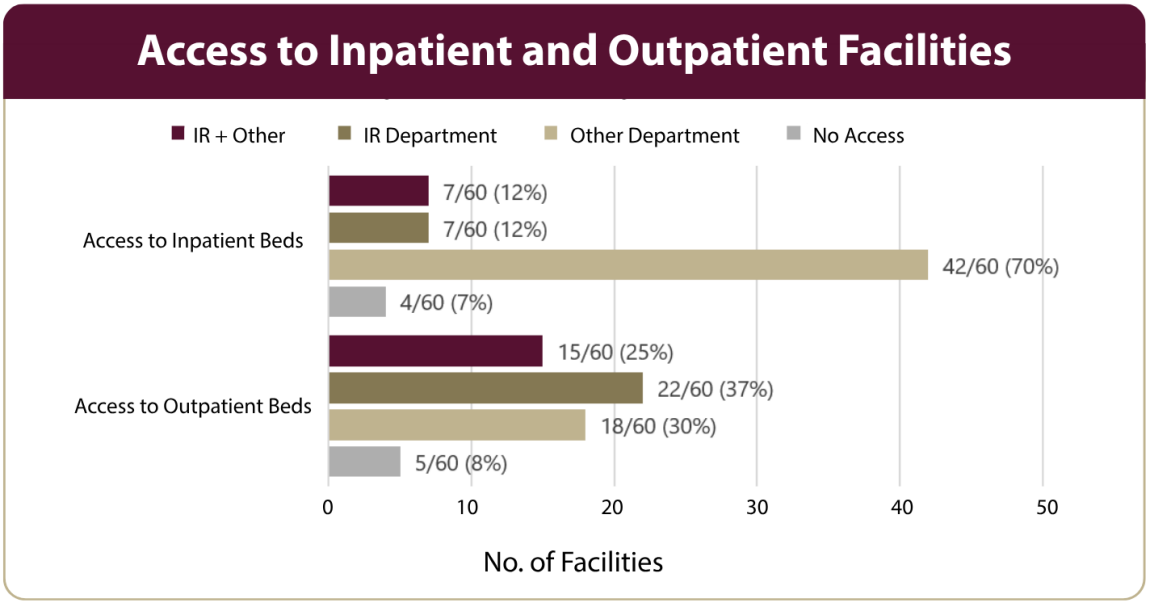


Figure 25. Reported access to inpatient and outpatient facilities among 60 respondents.

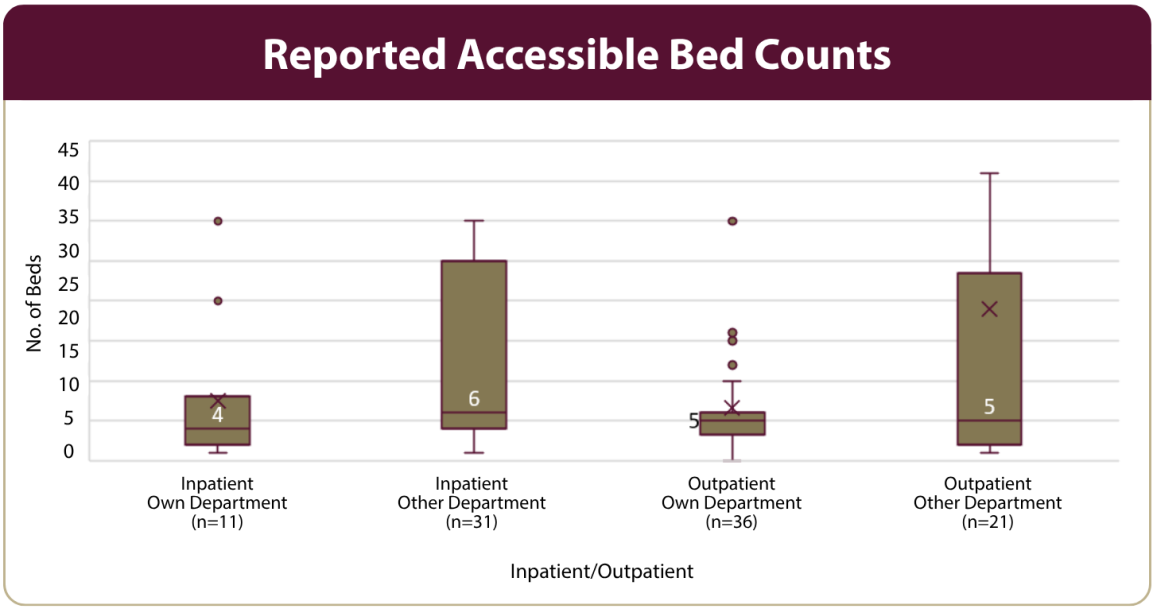


Figure 26. Distribution of reported accessible bed counts in IR department and other departments

Interpretation

These findings illustrate one of the defining organisational characteristics of interventional oncology. Most services operate successfully without owning dedicated inpatient wards. Instead, they depend upon strong collaboration with oncology, surgery and other clinical departments.

While this model can function effectively, dedicated outpatient capacity appears increasingly important as interventional oncology assumes greater responsibility for longitudinal patient management.

Ambulatory access is an organisational resource whose local value should be assessed alongside waiting times, cancellations, utilisation and patient outcomes.

Clinical Autonomy

Results

Participating services reported high levels of clinical autonomy.

Most physicians had authority to:

- prescribe medication (excluding chemotherapy) (n=60)
- admit patients for day-case procedures (n=60)
- discharge patients following treatment (n=60)
- admit selected patients for overnight observation (n=59)
- discharging patients after overnight observation (n=59)

The proportion of services reporting these clinical rights ranged from approximately 70% to over 90%, depending on the specific activity.

Among the 59 facilities with complete responses to all five clinical-rights items, 37 (63%) reported all five rights, and a further four reported four of five. This bundled view indicates that clinical autonomy was commonly reported across several components of patient management rather than as an isolated privilege.

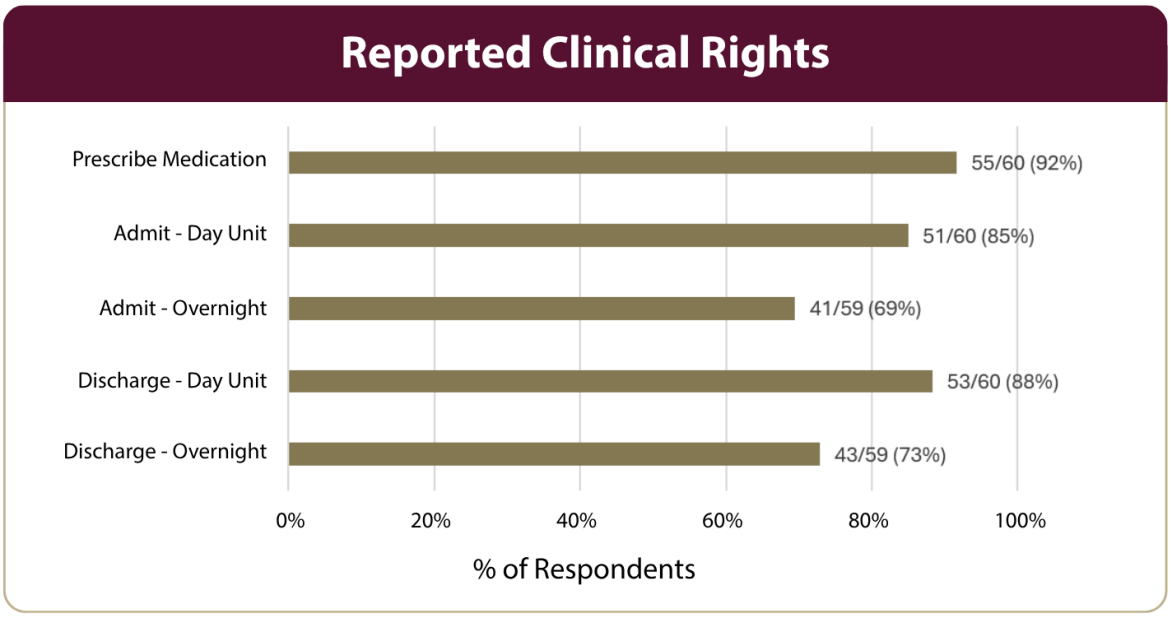


Figure 27. Reported clinical rights among facilities

Interpretation

This is an important organisational finding from the benchmarking survey. Clinical autonomy can support interventional oncology services in assuming responsibility beyond the technical aspects of the procedure.

The ability to prescribe medication, admit patients and manage peri-procedural care reflects increasing recognition of interventional oncology physicians as independent clinical specialists rather than procedural consultants.

Variation between institutions likely reflects national regulatory frameworks and local organisational structures rather than differences in clinical capability.

These findings demonstrate that clinical autonomy was widely reported across the participating IASIOS network.

Referral Pathways

Results

Surveyed referrals originated from:

- other clinical specialties
- multidisciplinary tumour boards
- self-referrals to interventional oncology facilities

Across 55 responding facilities, the mean facility-level distribution was 48% from other specialties, 38% from multidisciplinary tumour boards and 14% from self-referral. Self-referral had the smallest mean facility-level proportion.

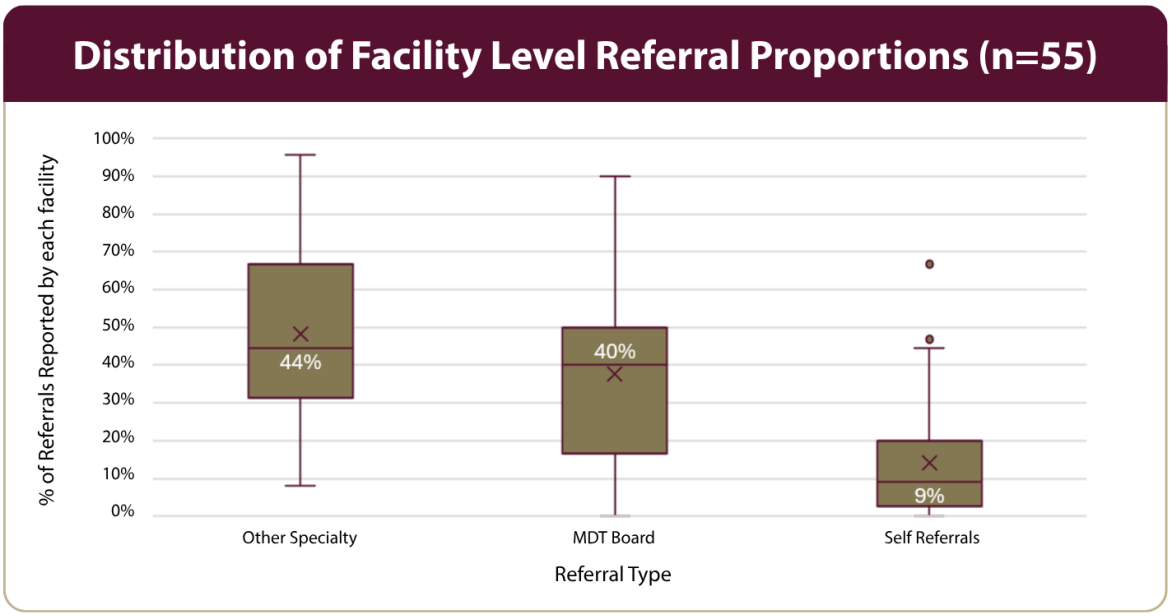


Figure 28. Distribution of total reported referrals for IO procedures among 55 responding facilities.

Interpretation

Referral pathways provide insight into the level of integration of interventional oncology within hospital cancer services.

The predominance of referrals from multidisciplinary teams and specialist colleagues reflects strong collaboration with oncology, surgery and other cancer disciplines.

The presence of direct referrals additionally suggests that many interventional oncology services are developing independent clinical identities, supported by outpatient consultation services and established referral pathways.

Financial Models

Results

Participating services reported considerable variation in reimbursement pathways.

Funding models included reimbursement to:

- the interventional radiology department
- the radiology department
- the admitting clinical specialty
- shared institutional funding arrangements

Several services described hybrid reimbursement models depending on patient setting, procedural complexity or institutional structure. Facilities could have multiple departments receive reimbursement.

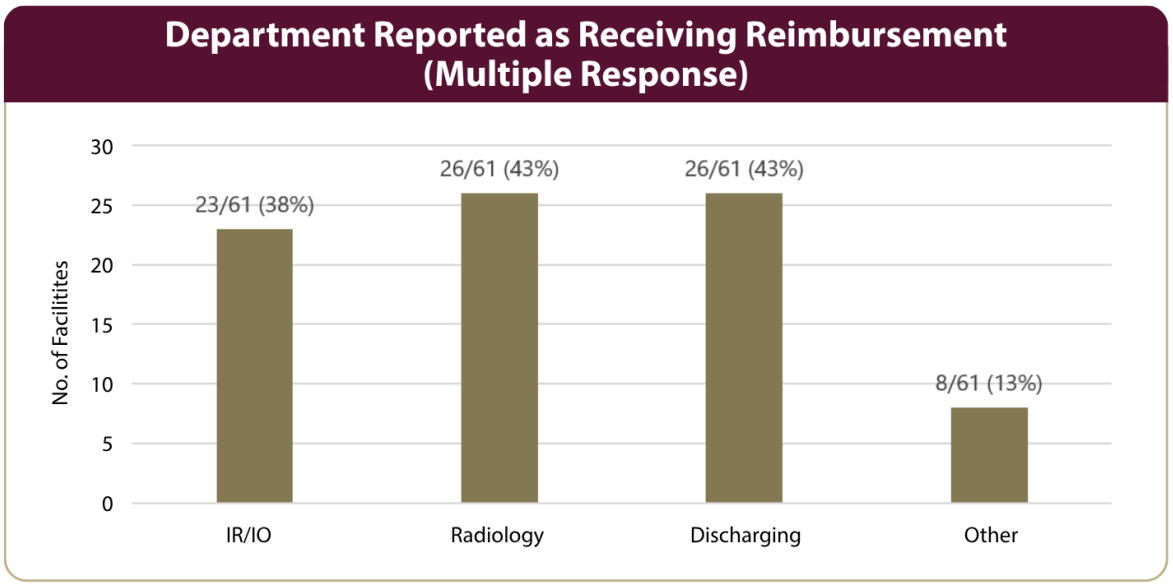


Figure 29. Departments reported as receiving reimbursement; multiple responses were permitted.

Interpretation

Financial models for interventional oncology remain highly heterogeneous internationally.

Rather than representing best practice, these findings illustrate the diversity of organisational structures through which high-quality services are delivered.

Future benchmarking could examine reimbursement alongside longitudinal service measures, but the present cross-sectional data do not establish associations with development or growth.

Bringing It All Together

Key Findings

- Reliable access to anaesthesia and procedural capacity are important operational determinants of service delivery.
- Many participating services rely on shared hospital infrastructure while maintaining substantial clinical autonomy and multidisciplinary integration.
- Infrastructure and reimbursement arrangements vary considerably and should be interpreted within the context of national and institutional healthcare systems.

These findings demonstrate that organisational infrastructure extends far beyond physical facilities. They identify predictable access to clinical resources, integration within hospital systems and appropriate organisational autonomy as relevant considerations for managing patients throughout the treatment pathway.

Taken together, these findings suggest that procedural expertise should be considered alongside the clinical and organisational systems that support service delivery.

These findings inform the Organisational Infrastructure domain of the IASIOS Organisational Development Framework presented in Chapter 12.

From Benchmarking to Action

Clinical Integration

- Do we have sufficient access to anaesthesia?
- Is outpatient capacity adequate for current demand?
- Does our service have appropriate clinical autonomy?

Organisational Development

- What organisational barriers most limit patient access?
- Where could stronger collaboration with hospital leadership improve service delivery?
- Do current funding and referral pathways support future growth?

Chapter 9: Clinical Capability

Expanding Therapeutic Options Through Image-Guided Oncology

Why Clinical Capability Matters

Technology has played a defining role in the development of interventional oncology.

Advances in image guidance, ablation technologies, catheter-based therapies and minimally invasive treatment techniques have expanded the range of cancers that can be treated with image-guided interventions.

However, the availability of technology alone does not define an excellent interventional oncology service.

Clinical capability reflects the ability to deliver the right treatment to the right patient at the right time within an integrated multidisciplinary care pathway.

Understanding the therapeutic capabilities of participating services provides descriptive insight into the flexibility and range of contemporary interventional oncology practice.

Availability of Therapeutic Techniques

Results

Participating IASIOS services demonstrated broad access to established interventional oncology therapies.

At least 90% of participating services reported availability of:

- Transarterial Chemoembolisation (TACE)
- Microwave Ablation (MWA)
- Radiofrequency Ablation (RFA)
- Cryoablation

Transarterial Embolisation (TAE) was also widely available, while Selective Internal Radiation Therapy (SIRT) and Irreversible Electroporation (IRE) were available in smaller—but still substantial—proportions of participating services.

Several institutions also reported access to emerging therapies, including electrochemotherapy, hepatic chemoperfusion, high-intensity focused ultrasound (HIFU) and reversible electroporation.

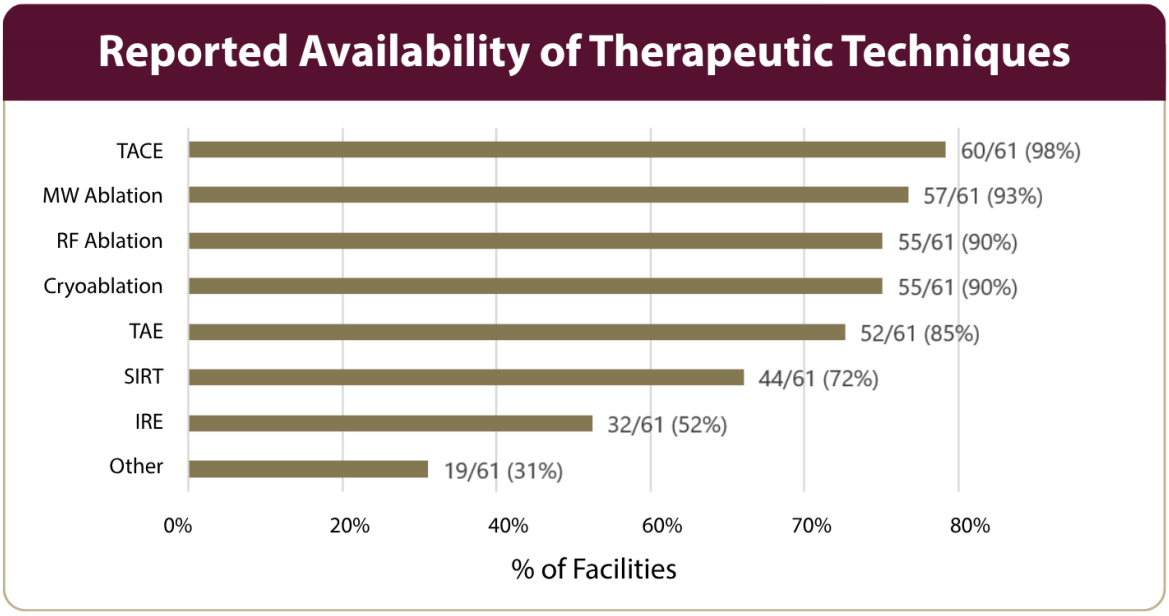


Figure 30. Reported availability of therapeutic techniques among 61 participating facilities.

Interpretation

Participating services reported availability of multiple therapeutic modalities.

Most participating services reported more than one therapeutic technique. The survey assessed reported availability, not utilisation, expertise, patient access or comparative clinical effectiveness.

This therapeutic flexibility is one of the defining strengths of modern interventional oncology and reflects the growing complexity of multidisciplinary cancer management.

Benchmark in Context

Clinical excellence is not defined by the number of technologies available, but by the ability to select and deliver the most appropriate therapy for each individual patient.

Technology as an Enabler of Patient Care

One of the most important observations emerging from the benchmarking programme is that technology should be viewed as an enabler rather than an endpoint.

The introduction of new equipment expands treatment possibilities, but meaningful clinical benefit depends upon:

- multidisciplinary patient selection
- physician expertise
- trained multidisciplinary teams
- appropriate infrastructure
- robust governance

- long-term clinical follow-up

Consequently, technology should always be interpreted within the broader organisational context described throughout this report.

Procedural Infrastructure

Results

Participating services reported good access to dedicated procedural facilities.

Within the interventional radiology department, participating services reported a median of 2 angiography suites and 2 CT rooms.

Many services also had access to additional imaging resources located elsewhere within their institution.

Procedural-room counts varied substantially between institutions. The survey did not ask respondents whether this infrastructure was sufficient for local demand.

A facility reporting access to 15 angio suites within its own department was excluded from Figure 31 for clarity.

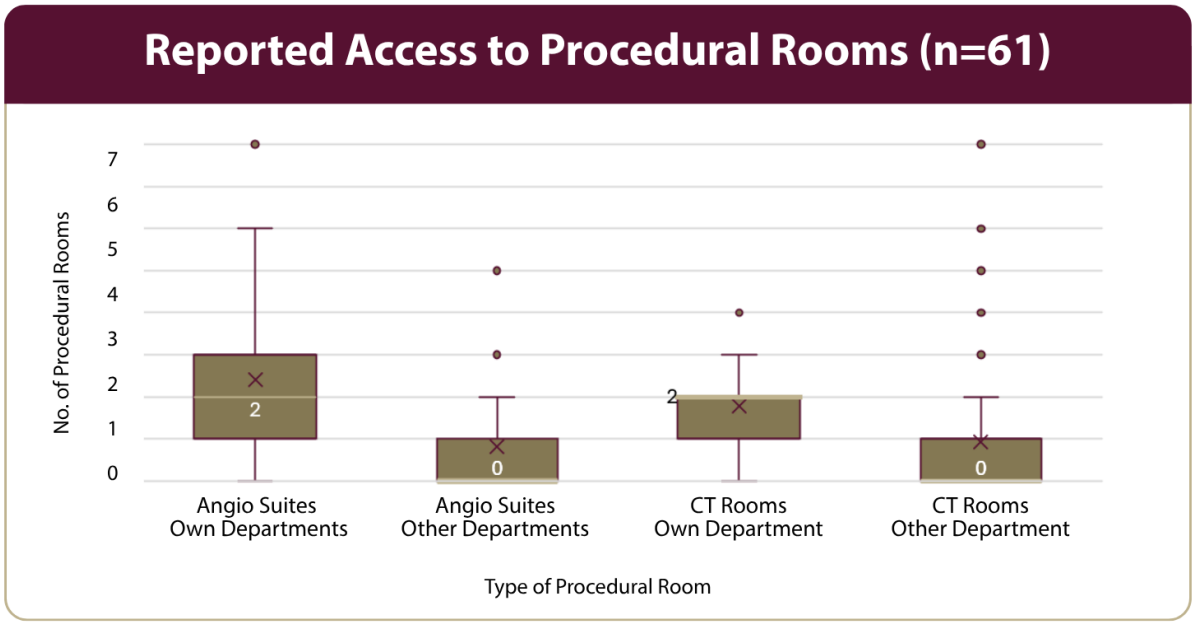


Figure 31. Distribution of number of accessible procedure rooms within IR department and in other departments

Interpretation

Dedicated procedural infrastructure is one organisational resource that may support the delivery of interventional oncology services.

Access to multiple imaging modalities enables physicians to select the most appropriate procedural guidance for individual patients while improving scheduling flexibility and supporting service growth.

However, procedural capacity depends not only on the number of available rooms but also on staffing, scheduling processes, and institutional prioritisation.

Infrastructure should therefore be considered as part of a broader organisational ecosystem rather than an isolated resource.

Key Findings

- Participating services report broad access to established image-guided cancer therapies and multiple complementary treatment modalities.
- Angiography and CT-guided intervention facilities provide core procedural infrastructure, although capacity also depends on staffing, scheduling and institutional prioritisation.
- Clinical capability should be considered in the context of patient need, multidisciplinary expertise, governance and organisational resources rather than equipment availability alone.

Perhaps the most important message of this chapter is that comprehensive interventional oncology services are characterised by choice.

Services should not be characterised solely by individual procedures. Instead, they offer an integrated therapeutic portfolio that enables treatment decisions to be individualised according to patient needs rather than technological limitations.

The availability of multiple treatment modalities therefore represents organisational flexibility rather than technological sophistication alone.

These findings inform the Appropriate Clinical Capability domain of the IASIOS Organisational Development Framework presented in Chapter 12.

From Benchmarking to Action

Technology

- Does our therapeutic portfolio meet the needs of our patients?
- Are there important evidence-based techniques we should introduce?
- Is our technology strategy driven by patient need rather than equipment availability?

Innovation

- Are new technologies introduced within appropriate governance frameworks?
- Do we regularly review emerging evidence to guide service development?

Chapter 10: Research, Education and the Future of the Specialty

Advancing Interventional Oncology Beyond Clinical Practice

Why Research and Education Matter

The long-term success of any clinical specialty depends upon more than delivering excellent patient care. Sustainable growth requires a continuous commitment to research, innovation, education and professional development.

Research generates the evidence that advances clinical practice. Education ensures that future generations of healthcare professionals possess the knowledge and skills required to deliver high-quality care. Together, these activities drive the evolution of the specialty while supporting continuous improvement within individual services.

This chapter examines the contribution of participating IASIOS services to research and education and highlights their role in advancing interventional oncology internationally.

Research Activity

Results

Research participation was reported by 57 of the 60 facilities answering the research question (95%).

Among the 60 respondents:

- 39 facilities (65%) reported undertaking their own research and contributing to externally led studies.
- 16 (27%) reported undertaking their own research without currently contributing to external studies.
- Two (3%) contributed to externally led studies without reporting their own research.
- Three (5%) reported no current research activity.

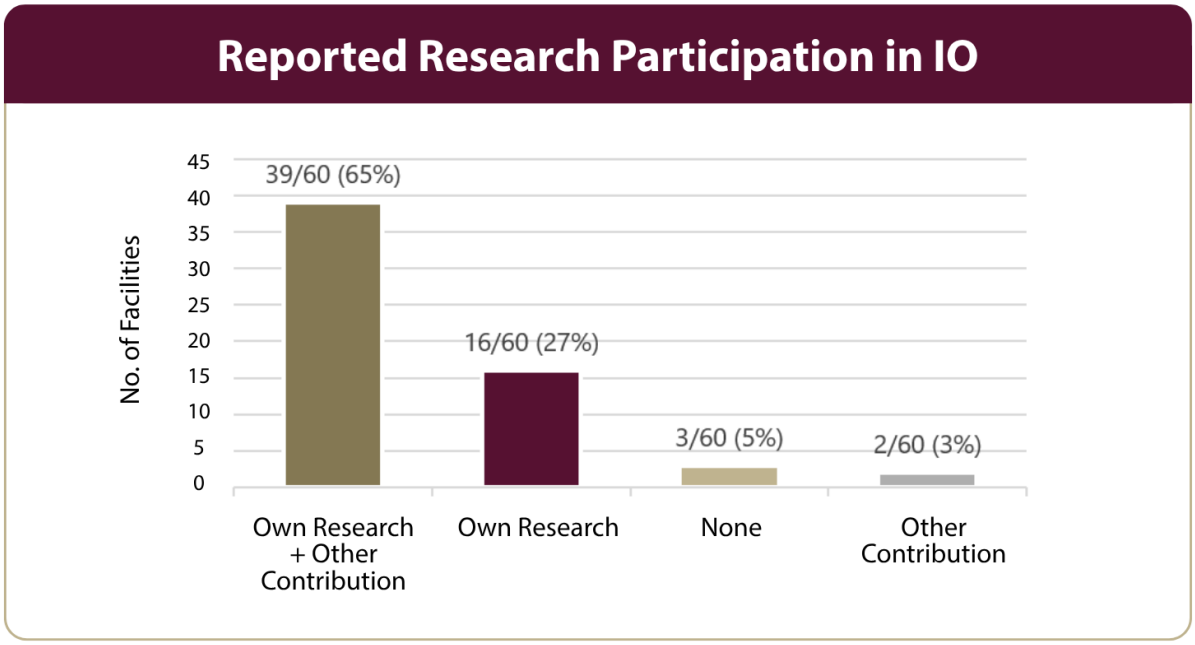


Figure 32. Research participation in studies led by the reporting facility or others among 60 responding facilities[5]

Interpretation

The high level of reported research participation reflects the academic activity of the participating IASIOS network.

These findings indicate that many participating services contribute to research alongside patient care. The ability to participate in research may reflect multidisciplinary collaboration, institutional support and the availability of academic resources.

Research activity may contribute to innovation and continuous improvement, but it should not be interpreted as a standalone measure of service quality or organisational development.

Education and Training

Results

Formal education is widely embedded within participating services.

A total of 88% of participating services reported incorporating interventional oncology into structured teaching or training programmes.

Educational activities included:

- resident training
- fellowship programmes

[5] Categories describe reported activity and should not be interpreted as measures of service quality or organisational maturity

- multidisciplinary education
- postgraduate teaching
- continuing professional development
- practical procedural training

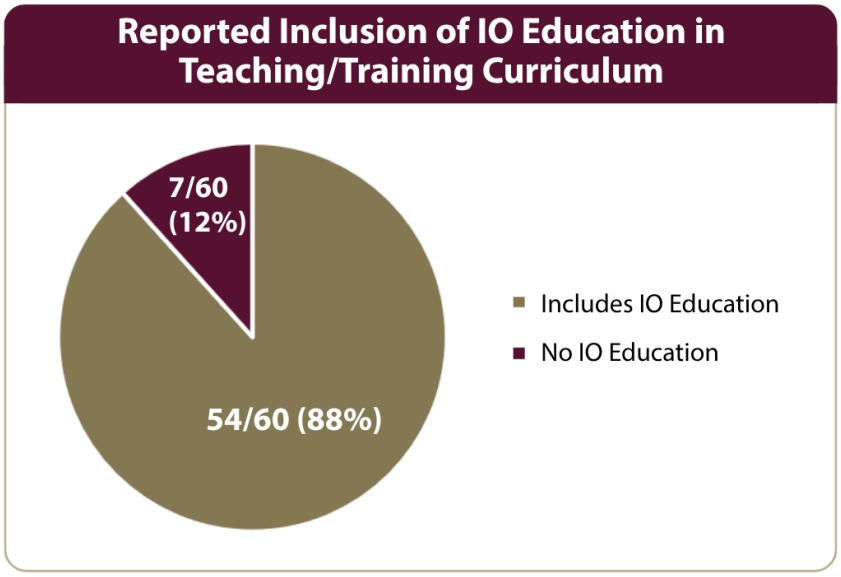


Figure 33. Proportion of facilities that include IO education in their teaching/training curriculum

Interpretation

Education is one of the strongest investments a service can make in the specialty's future.

The widespread inclusion of interventional oncology within formal training programmes indicates that education is an established activity in many participating services. Training programmes not only develop future specialists but also increase awareness of interventional oncology among referring clinicians, multidisciplinary teams and the wider healthcare community.

These activities may increase awareness of interventional oncology, although their effect on clinical integration was not measured.

Research and Education as Components of Organisational Development

Research and education frequently coexisted among participating facilities. This joint prevalence is descriptive; the survey did not test whether one activity supports or causes the other. Research and education may support knowledge generation and professional development, but their effects on clinical quality were not assessed.

Together, these activities may support continuous learning and the long-term development of the specialty.

Rather than representing separate organisational functions, research and education should be viewed as complementary pillars of organisational development.

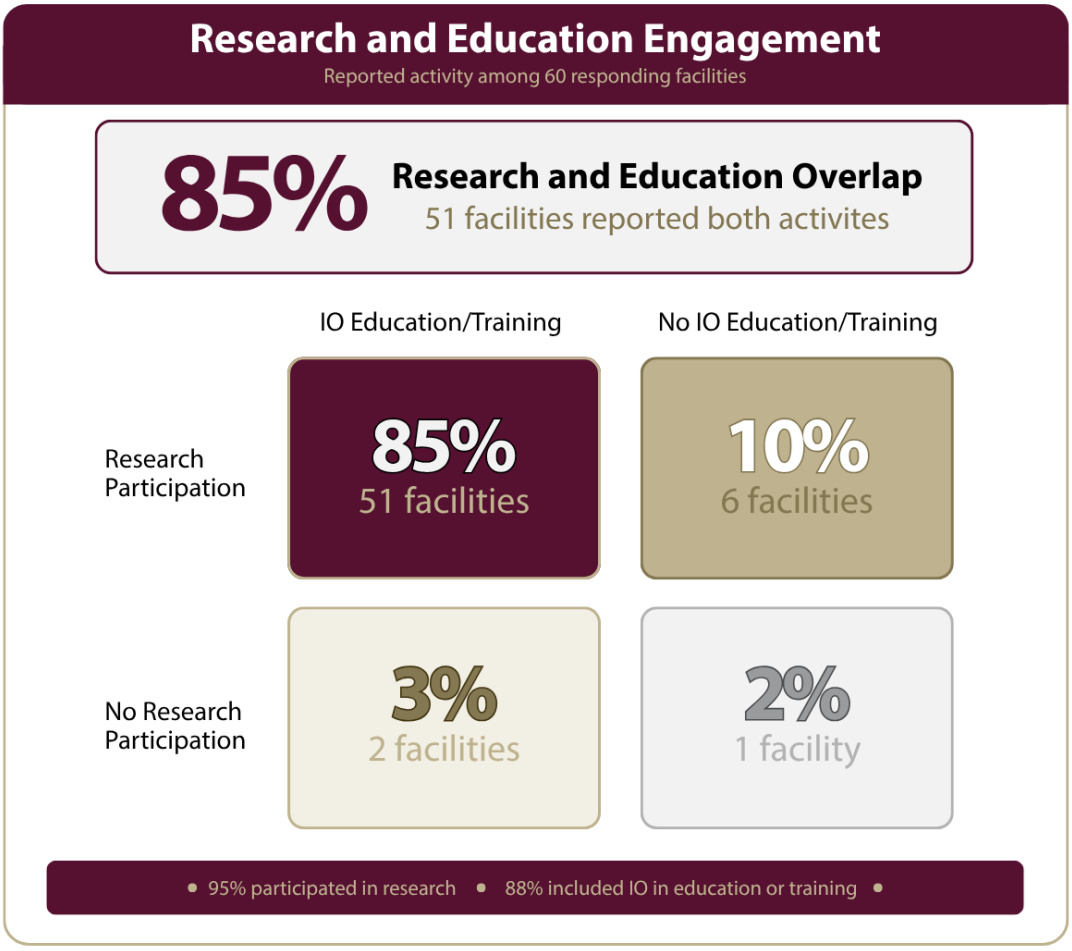


Figure 34. Overlap between research participation and inclusion of IO in education or training among participating facilities.

Developing the Next Generation

The future of interventional oncology depends upon attracting, developing and supporting the next generation of clinicians, nurses, radiographers and researchers.

Participating IASIOS services demonstrate a strong commitment to this responsibility through structured education, postgraduate training and active involvement in scientific research.

As the specialty continues to expand, these activities will become increasingly important for ensuring workforce sustainability, supporting innovation and maintaining high standards of patient care.

Key Findings

- Research participation is widespread across the IASIOS network, and formal education is established in most participating services.
- Research and education contribute to professional development, knowledge generation and the future workforce.

- Academic engagement should be interpreted as one component of organisational development rather than as a standalone measure of service quality.

These findings inform the Research and Innovation and Education and Workforce Development domains of the IASIOS Organisational Development Framework presented in Chapter 12.

From Benchmarking to Action

Academic Development

- Is research embedded within our service?
- Are we participating in multicentre studies?
- Do we have protected time for research?

Education

- Are we actively training the next generation of interventional oncology professionals?
- Does our department contribute to multidisciplinary education?
- How can we strengthen our educational programme?

Chapter 11: Voices from the IASIOS Network

Participating services were invited to reflect on recent achievements, operational challenges and the perceived influence of IASIOS within their organisations. Their comments provide a direct view of how interventional oncology services are developing in practice.

The excerpts below are organised into five illustrative themes. They were selected for their relevance to the report's principal findings. They should not be interpreted as representative of all participating facilities or as the results of a formal qualitative analysis. Quotations have been anonymised and lightly edited for spelling, punctuation and brevity without changing their intended meaning.

1. Advancing Clinical Capability

Several participants linked clinical progress to the development of skilled, cohesive teams capable of adopting new techniques and managing increasingly complex care.

> *Training interventional radiographers to independently perform selected procedures, such as PICC-line insertions and exchange of drainage catheters (e.g., nephrostomy drains and single-J stents). This development increases procedural capacity, supports professional growth of staff, and helps free up interventional radiologists' time during the week for other clinical, procedural, and multidisciplinary responsibilities.*

2. Building Multidisciplinary Partnerships

Comments also illustrated how clinical evidence and collaborative practice can strengthen the position of interventional oncology within multidisciplinary cancer care.

> *We constantly educate physicians from other specialties in our daily work, demonstrating that it is possible to treat cancer patients safely and effectively using a minimally invasive approach.*

3. Workforce and Capacity Pressures

Participants described expanding responsibilities that extend well beyond procedures and place increasing demands on available clinical capacity.

> *Very frequently the workload for completing every-day clinical activity (i.e. procedures), visits and multidisciplinary meeting is high, and this situation is very demanding for the present IR/IO staff within the hospitals. In order to protect our field, we need to regulate and properly register all these activities, and we need scheduled time for them; ultimately, this leads to the need to increase the staff numbers to properly perform each one of the activities.*

4. Quality Improvement as an Organisational Catalyst

Two comments were particularly illustrative of how structured quality improvement can support institutional advocacy and stimulate wider organisational change.

> *Our IASIOS accreditation drive and the talks with the Scientific Board in order to get internal funding from the hospital, gave ignition for other specialties (clinics and individuals) to seek similar accreditations (Oncological Surgery, Medical Oncology, Urology, Ophthalmology, Endocrinology) and I personally believe that overall gave a constructive "competition" to our hospital to become better in many aspects.*

> *A thorough risk assessment was performed together with the patient safety and quality office of the hospital. This exercise identified multiple risks and gaps in our services which provided the ammunition for us to request for resources to mitigate the risks and close the gaps. We managed to get approval for more administrative manpower to support IR operational needs and expertise from the hospital's Ops team (COO's office) to review our processes and improve efficiency.*

5. The Collective Opportunity

Participants also identified an opportunity for the IASIOS network to support greater consistency through shared learning and collaborative development.

> *As IASIOS, we should develop a standardized SOP outlining the roles and responsibilities of nurses and technicians in IO services. There is still much work to be done to achieve consistency in this area.*

Together, these observations illustrate the interaction between clinical capability, multidisciplinary engagement, workforce capacity and organisational support. They provide a natural bridge from descriptive benchmarking to the developmental framework presented in Chapter 12.

Illustrative Organisational Practice Caselets

The following caselets are derived from individual open-text survey responses. They illustrate potentially transferable organisational approaches but were not independently verified and should not be interpreted as comparative evidence of effectiveness.

Accreditation as a Wider Quality Catalyst

Challenge

Quality development activity was initially concentrated within the IO service.

Approach

The IASIOS accreditation process was discussed with scientific and hospital leadership bodies.

Reported Effect

Other specialties were encouraged to pursue comparable accreditation and quality initiatives.

Transferable Lesson

A visible specialty programme can provide an organisational model for broader quality development.

Using Risk Assessment to Support Resource Advocacy

Challenge

Operational risks and service gaps were not sufficiently visible in routine resource discussions.

Approach

A structured risk assessment was completed with the hospital's quality and patient-safety office.

Reported Effect

Additional administrative support and COO-led process review were approved.

Transferable Lesson

Translate service needs into documented risk and governance evidence that hospital leadership can act upon.

Dedicated IO Nurses Supporting Complex Pathways

Challenge

Complex IO pathways were not always well understood or accommodated by other specialties.

Approach

The service developed a dedicated team of three interventional oncology nurses.

Reported Effect

The nurses supported coordination and management of increasingly complex treatment pathways.

Transferable Lesson

Dedicated roles can strengthen continuity when responsibilities, competencies abd interfaces are clearly defined.

Chapter 12: From Benchmarking to Organisational Development

A Framework for Building Better Services

Looking Beyond the Data

The inaugural IASIOS International Benchmarking Survey was established to better understand how contemporary interventional oncology services are organised.

However, the findings presented throughout this report describe more than the current state of participating services. Considered alongside the organisational principles underlying IASIOS accreditation, they identify recurring domains that may support the development of interventional oncology services appropriate to their institutional and healthcare-system contexts.

Across diverse healthcare systems, cultures and organisational models, participating services reported common organisational features relevant to the organisation of patient care. These observations provide an opportunity to move beyond individual metrics and establish a structured framework for discussing organisational development in interventional oncology.

Organisational Development is Multidimensional

A central proposition of the framework is that organisational development cannot be understood through a single indicator.

High procedural volumes alone do not define an appropriately developed service. Neither does advanced technology, research activity or workforce size. Rather, organisational development can be considered across multiple complementary domains that together support the delivery of patient care.

Taken together, the findings indicate that participating services commonly combine clinical expertise, organisational capability, multidisciplinary collaboration and a commitment to continuous improvement.

Eight Domains for Organisational Reflection

The benchmarking findings can be considered across eight interconnected domains of interventional oncology service organisation. These domains provide a structured way to interpret the results, support local reflection and identify topics that facilities may wish to explore further.

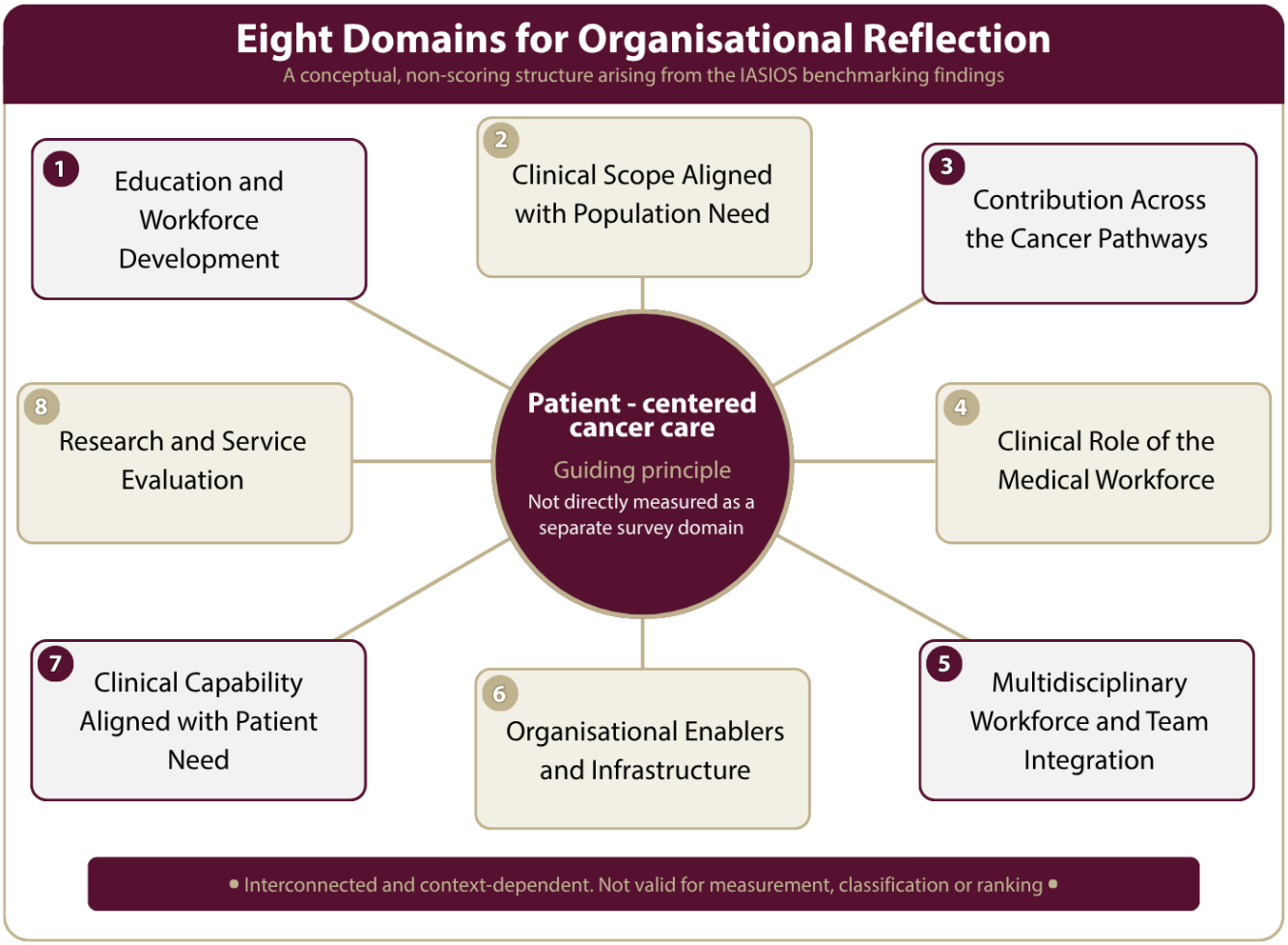
The domains draw on the organisational themes observed in the benchmarking data and the quality principles underlying IASIOS accreditation. They do not constitute a validated

measurement instrument, maturity model or scoring system, nor do they introduce new IASIOS accreditation requirements. They should not be used to rank or formally classify participating facilities.

Organisational development is contextual. Services are not expected to maximise every domain, and greater procedural breadth, technological capability, research activity or institutional scale should not automatically be interpreted as higher quality. The relevance of each domain depends on the facility's patient population, institutional responsibilities, referral network, resources and wider healthcare environment.

Patient-centred cancer care is evident at the centre as the guiding principle that connects the eight domains. Patient-centredness was not directly measured as a separate survey domain in this benchmarking cycle.

The eight domains are intended to support interpretation and discussion rather than prescribe a single model of service organisation[6].



[6] This is a conceptual, non-scoring structure and has not been validated for measurement, classification or ranking.

1. Clinical Scope Aligned with Population Need

Considers whether the service's scope reflects its patient population, institutional role, referral network and available expertise. Greater procedural breadth is not inherently preferable.

2. Contribution Across the Cancer Pathway

Considers the service's contribution to diagnosis, tumour-directed treatment, vascular access, symptom management, supportive care and palliation.

3. Clinical Role of the Medical Workforce

Recognises physicians' roles in consultation, multidisciplinary decision-making, procedural care, inpatient management and follow-up.

4. Multidisciplinary Workforce and Team Integration

Considers how nurses, radiographers and other healthcare professionals contribute specialist expertise and continuity across the patient pathway.

5. Organisational Enablers and Infrastructure

Considers access to anaesthesia, outpatient facilities, procedural capacity, inpatient support and the organisational authority required to provide coordinated care.

6. Clinical Capability Aligned with Patient Need

Considers access—directly or through referral networks—to evidence-based image-guided therapies appropriate to patient needs. The number of technologies available is not itself a measure of quality.

7. Research and Service Evaluation

Considers participation in research, evidence generation and structured evaluation, with expectations reflecting institutional remit and available resources.

8. Education and Workforce Development

Considers education, training and professional development supporting current and future capability, with appropriate forms varying across teaching, specialist and regional institutions.

From Benchmark to Organisational Action

This matrix is a discussion aid rather than an accreditation checklist. Suggested owners and local measures should be adapted to each institution's governance model, resources and service remit.

Domain	Leadership question	Potential owner	Evidence to review	Illustrative action
Clinical Scope	Does the service scope reflect local patient need and referral arrangements?	IO service lead; cancer-service leadership	• Referral patterns • Unmet referrals • Treatments referred elsewhere	Define the intended local scope and formalise referral pathways for services not provided in-house.
Cancer Pathway Contribution	Are consultations, MDT participation, supportive procedures and follow-up formally recognised?	IO lead; oncology pathway owners	• Clinic capacity • MDT commitments • Pathway responsibilities	Document the IO contribution across the pathway and incorporate it into
Clinical Medical Workforce	Does workforce planning recognise clinical governance, research and educational work in addition to procedures?	Department chair; HR; hospital leadership	• FTE allocation • Scheduled sessions • Workload and vacancy data	Develop a workforce plan based on the complete service role rather than procedure counts alone.
Multidisciplinary Team	Are nursing, radiographer and other team roles defined and supported by appropriate development?	Nursing and radiography leadership; IO lead	• Role descriptions • Competency frameworks • Access to training	Agree role expectations and a profession-specific development plan.
Organisational Infrastructure	Are anaesthesia, rooms, beds and outpatient resources predictably available when required?	COO; departmental and shared-service directors	• Delays • Cancellations • Access schedules and utilisation	Establish service-level arrangements, escalation routes or protected capacity where local evidence demonstrates need.
Clinical Capability	Is available technology aligned with the service remit, workforce and referral network?	IO lead; procurement; hospital leadership	• Demand, utilisation and maintenance • External referral patterns	Develop a capability plan based on clinical need and sustainable use—not the number of technologies alone.
Research and Innovation	Is the research activity supported by governance, time, and infrastructure appropriate to institutional remit?	Research lead; department chair	• Active studies • Protected time • Research support and collaboration	Define a proportionate research plan and identify network opportunities where local capacity is limited.
Education and Workforce Development	Are educational activities systematic and available to all relevant professional groups?	Education lead; professional group leads	• Curricula • Attendance • Competency review • Access equity	Create a documented, multidisciplinary education plan aligned with service needs.

Benchmarking as a Tool for Continuous Improvement

The purpose of benchmarking is not to compare organisations for the sake of comparison; its value lies in helping services better understand themselves.

By providing comparative self-reported organisational data, benchmarking can help participating services identify strengths, recognise opportunities for development and monitor reported change over time.

Equally importantly, benchmarking creates a common language through which organisations can discuss workforce, infrastructure, governance, and service development using evidence rather than anecdote.

- For hospital leaders, benchmarking provides comparative descriptive information that can inform strategic planning and investment discussions alongside local demand, utilisation, cost, and outcome data.
- For clinicians, it offers insight into how comparable services have organised their practice.
- For IASIOS, it establishes an evidence base capable of supporting the continued advancement of interventional oncology internationally.

Benchmark in Context

Quality improvement begins with understanding where we are today. Benchmarking provides that understanding. Accreditation helps define the standard. Together, they create a framework for continuous organisational improvement.

Looking Ahead

This report represents the beginning rather than the conclusion of the IASIOS Benchmarking Programme.

As participation expands and additional benchmarking cycles are completed, future reports will enable:

- longitudinal analysis of organisational development
- benchmarking according to accreditation status and service-development context
- more detailed workforce and infrastructure analyses
- evaluation of emerging technologies and clinical practices
- development of individual confidential benchmarking reports for participating services; and
- increasingly sophisticated insights into the organisational evolution of interventional oncology.

Over time, these data will create one of the world's most comprehensive resources describing how high-quality interventional oncology services are organised and how they continue to evolve.

Final Reflections

Interventional oncology has reached an important stage in its development.

The specialty is no longer defined solely by technical innovation or procedural excellence.

Increasingly, its success depends upon the strength of the organisations that deliver care, the multidisciplinary teams that support patients, and the systems that enable continuous improvement.

Participating IASIOS services reported activity across workforce development, research, education, organisational capability, and patient care. Future benchmarking cycles can examine how these characteristics change over time and how they relate to locally measured performance and outcomes.

Together, these organisations provide an important baseline for continued discussion and development within interventional oncology.

Closing Statement

Excellence in interventional oncology is not achieved through individual procedures or technologies alone. It is built through people, systems, collaboration and an unwavering commitment to continuous improvement.

The IASIOS Benchmarking Programme provides descriptive evidence to inform that journey. IASIOS Accreditation provides standards to support it. Together, they offer complementary tools for structured organisational improvement.

Looking Forward

- Rather than looking at individual metrics, consider the broader picture.

Reflection

- Which areas represent our greatest strengths?
- Which framework domains require the greatest investment?
- What three organisational priorities should we focus on over the next two years?
- How will we measure our progress before the next benchmarking cycle?

Appendix 1: Benchmarking Survey

IASIOS INTERNATIONAL ACCREDITATION SYSTEM FOR INTERVENTIONAL ONCOLOGY SERVICES

IASIOS BENCHMARKING SURVEY

Please fill out each section of the survey completely. Every section of the survey will begin on a new page.

Person completing questionnaire:

Name: _____
Position: _____

Facility information

1. Facility Name: _____
2. City, Country: _____
3. Your Centre's IASIOS Status:
   - Registered: ☐
   - Enrolled: ☐
   - Accredited: ☐
   - Centre of Excellence: ☐
4. Year of IASIOS Registration: _____
5. Year of IASIOS Enrolment: _____
6. Year of IASIOS Accreditation (if applicable): _____
7. Year of IASIOS Re-Accreditation (if applicable): _____
8. What kind of facility do you operate in? (check all that apply):
   - Private: ☐
   - Public: ☐
   - Teaching: ☐
   - Academic research: ☐
   - Government: ☐
   - Other (please specify): _____

1

IASIOS INTERNATIONAL ACCREDITATION SYSTEM FOR INTERVENTIONAL ONCOLOGY SERVICES

Types of Cancer/Tumours Treated

Indicate the types treated in your IO service in the past year (check all that apply) and select the approximate number treated per year (1-5, 6-20, 21-50, 51-100, 100+).

1. Primary cancers
   - Liver (HCC, CC): ☐
     - Number treated: _____
   - Kidney: ☐
     - Number treated: _____
   - Breast: ☐
     - Number treated: _____
   - Lung (NSCLC, Mesothelioma): ☐
     - Number treated: _____
   - Pancreas: ☐
     - Number treated: _____
   - MSK: ☐
     - Number treated: _____
   - Soft tissue: ☐
     - Number treated: _____
   - Thyroid: ☐
     - Number treated: _____

2. Secondary malignancies – metastases to
   - Liver: ☐
     - Number treated: _____
   - Lung: ☐
     - Number treated: _____
   - LN: ☐
     - Number treated: _____
   - Bone: ☐
     - Number treated: _____
   - Adrenal Gland: ☐
     - Number treated: _____
   - Soft tissue: ☐
     - Number treated: _____
   - Other: _____
     - Number treated: _____

2

IASIOS INTERNATIONAL ACCREDITATION SYSTEM FOR INTERVENTIONAL ONCOLOGY SERVICES

3. Supportive procedures
   - Pain control: ☐
     - Number treated: _____
   - Salvage (e.g. tumour related bleeding): ☐
     - Number treated: _____
   - Palliative treatment (e.g. for chemo-holidays): ☐
     - Number treated: _____
   - PICC-line: ☐
     - Number treated: _____
   - Port implantation: ☐
     - Number treated: _____
   - Biopsy: ☐
     - Number treated: _____

3

IASIOS INTERNATIONAL ACCREDITATION SYSTEM FOR INTERVENTIONAL ONCOLOGY SERVICES

Workload

4. Number of doctors in your department:
   - Full-time IRs: _____
   - Part-time IRs: _____

5. Number of doctors with:
   - EBIR certification: _____
   - Other IR-specific qualification(s): _____
     - Specify qualification(s): _____
   - IO-specific qualification(s): _____
     - Specify qualification(s): _____

6. Average workload for each IR per week or monthly, please specify:
   - Number of IO procedures: _____
   - Number of consultations for IO services (outpatient): _____
   - Number of tumour board meetings: _____

7. Approximate hours in a typical week per IR spent on:
   - Clinical interaction with patients: _____
   - Training/teaching: _____
   - Administration: _____
   - Other activities: _____
     - Specify: _____

4

IASIOS INTERNATIONAL ACCREDITATION SYSTEM FOR INTERVENTIONAL ONCOLOGY SERVICES

Dedicated staff:

8. Number of nurses in the IR department: _____
   - Additional training in IR: Yes ☐ No ☐
     If yes, specify: _____
   - Additional training in IO: Yes ☐ No ☐
     If yes, specify: _____
   - Could you detail the specific responsibilities that nurses hold:
     - within the IR department:

     - across the broader radiology department:

9. Number of radiographers in the IR department: _____
   - Additional training in IR: Yes ☐ No ☐
     If yes, specify: _____
   - Additional training in IO: Yes ☐ No ☐
     If yes, specify: _____
   - Could you detail the specific responsibilities that radiographers hold:
     - within the IR department:

     - across the broader radiology department:

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10. Who from the staff is present/assisting the physicians during IO procedures?
    - Number of staff: _____
    - Tasks:

    - Staff Position(s):

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Infrastructure:

11. Access to inpatient beds:
    - Inpatient beds within my department: Yes ☐ No ☐
      If yes, number of beds: _____
    - Inpatient beds within a different department: Yes ☐ No ☐
      If yes, department: _____
      Number of beds: _____

12. Access to outpatient beds:
    - Outpatient beds within my department: Yes ☐ No ☐
      If yes, number of beds: _____
    - Outpatient beds within a different department: Yes ☐ No ☐
      If yes, department: _____
      Number of beds: _____

13. Access to anaesthesiologists:
    - Always available in my department: Yes ☐ No ☐
    - Always available in a different department: Yes ☐ No ☐
      - If yes, department: _____
    - Limited hours in my department: Yes ☐ No ☐
      - If yes, specify: _____
    - Limited hours from a different department: Yes ☐ No ☐
      - If yes, department: _____
      - If yes, specify: _____
    - Other: Yes ☐ No ☐
      - If yes, specify:

14. Do you have clinical rights to:
    - Prescribe medication to patients? (excluding chemotherapy): Yes ☐ No ☐
    - Admit patients?
      - Day unit: Yes ☐ No ☐
      - Overnight: Yes ☐ No ☐
    - Discharge patients?
      - Day unit: Yes ☐ No ☐
      - Overnight: Yes ☐ No ☐

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14a. Which of the above clinical rights are dictated by your country's regulations, as opposed to hospital policy?

15. Approximately how many patients per month are referred to you through:
- MDT board referral: ____
- Referral from other specialities: ____
- Self-referring patients: ____

16. Which department receives reimbursement for IO procedures in your facility?
- IO/IR department: ☐
- Radiology department: ☐
- Discharging department: ☐
- Other (please describe the reimbursement structure for IO procedures): ☐

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Equipment and Techniques:

17. Which techniques are available at your facility?
    - Cryoablation: ☐
    - MW ablation: ☐
    - RF ablation: ☐
    - TACE: ☐
    - TAE: ☐
    - SIRT: ☐
    - IRE: ☐
    - Other (please specify): ☐

18. How many angio suites do you have access to?
    - In my own department: ____
    - In another department: ____

19. How many CT rooms do you have access to?
    - In my own department: ____
    - In another department: ____

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Research and Education:

20. Do you participate in research in IO?
    - Own research: Yes ☐ No ☐
    - Other contributions: Yes ☐ No ☐
        - If yes, specify:

21. Do you include education in IO in your teaching or training curriculum?
    - Yes: ☐
    - No: ☐

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IASIOS INTERNATIONAL ACCREDITATION SYSTEM FOR INTERVENTIONAL ONCOLOGY SERVICES

Additional comments:

Please share the most interesting or beneficial development in your department within the last year:

Please share the most challenging development in your department within the last year:

Please share any additional comments or feedback on your IO services or this survey, e.g., challenges faced in IO services, resources needed, suggestions for IASIOS:

Appendix 2. Participating Institutions

Participating institutions are grouped using the survey cohort recorded at the time of participation: **28 Enrolled, 30 Accredited, and 3 Centres of Excellence**. Statuses reflect the survey cohort recorded at the time of participation.

Enrolled Facility	Country	Year of Enrolment
251 Hellenic Airforce Hospital	Greece	2025
Auckland City Hospital	New Zealand	2024
Centre Hospitalier de l'Université de Montréal	Canada	2025
Chris O Brien Lifehouse	Australia	2025
CHU de Nice	France	2024
Fondazione Policlinico Universitario Campus Biomedico	Italy	2024
Gavearad Radiologia Vascular e Intervencionista	Brazil	2025
Grange University Hospital	UK	2025
Hospital Ramon y Cajal	Spain	2025
Hunter New England Medical Imaging	Australia	2025
Instituto Oncológico Nacional de Panamá	Panama	2025
Istituto Nazionale Tumori	Italy	2024
Lausanne University Hospital (CHUV)	Switzerland	2025
Medias Klinikum	Germany	2023
Muenchen Klinik Bogenhausen	Germany	2023
Netherlands Cancer Institute AVL	Netherlands	2022
Ordensklinikum Linz	Austria	2025
Parkway - Gleneagles Hospital	Singapore	2025
Saint Savvas Oncological Anticancer Hospital of Athens	Greece	2024
Santa Croce e Carle Hospital	Italy	2024
Semmelweis University	Hungary	2024
St Augustinus Gruppe	Germany	2023
St. Jude Children's Research Hospital	USA	2024
Tawam Hospital	UAE	2024
University Hospital Frankfurt	Germany	2021
University Hospital Galway	Ireland	2025
University Hospitals of Geneva	Switzerland	2024
Vilnius University Hospital Santaros Klinikos	Lithuania	2024

Accredited Facility	Country	Year of Accreditation
Anadolu Medical Center	Turkey	2020
Areteion Hospital	Greece	2025
Attikon University Hospital	Greece	2023
Azienda Ospedaliero Universitaria Pisana	Italy	2021
Charité Universitätsmedizin Berlin	Germany	2025
Cleveland Clinic Abu Dhabi	UAE	2024
Erasmus UMC	Netherlands	2024
European Institute of Oncology	Italy	2023
Ghent University Hospital	Belgium	2023
Helios Universitätsklinikum Wuppertal	Germany	2024
Hôpital Européen Georges Pompidou	France	2023
Hospital Curry Cabral	Portugal	2025
Hospital Israelita Albert Einstein	Brazil	2023
Institut Bergonié	France	2021
Institut Paoli-Calmettes	France	2024
IRCCS Ospedale San Raffaele	Italy	2024
Kantonsspital Graubünden	Switzerland	2024
Kantonsspital Winterthur	Switzerland	2021
King Abdulaziz Medical City	Saudi Arabia	2025
Klinikum Karlsruhe	Germany	2025
Maastricht UMC+	Netherlands	2023
Mallinckrodt Institute of Radiology	USA	2023
MIOT HOSPITALS Private Limited	India	2025
National Institutes Of Health	USA	2025
NHS Southampton	UK	2022
Ospedale Maggiore Policlinico Milano	Italy	2024
Policlinico Universitario Agostino Gemelli	Italy	2022
Regional General Hospital "F. Miulli"	Italy	2023
St. Vincent's Healthcare Group	Ireland	2024
University of Turin	Italy	2023

Centre of Excellence Facility	Country	Year of CoE
Hôpitaux Universitaires de Strasbourg	France	2024
Singapore General Hospital	Singapore	2025
SLK Kliniken Heilbronn	Germany	2025

Appendix 3: Analytical Dictionary and Data-Quality Summary

This appendix documents the principal denominators and derived-variable conventions used in the report. It is intended to improve transparency and reproducibility. The complete survey instrument is reproduced in Appendix 1.

Response Completeness by Report Domain

Denominators vary because some facilities did not answer every item. Confirmed values of zero and "No" were treated as observed responses; blanks were treated as missing. Optional open-text questions have lower response counts and are used illustratively.

Domain	Analytical denominator or range	Interpretive Note
Survey participation and status	61	Complete for the 61 submitting facilities; invitation denominator 79.
Clinical scope and tumour sites	61	Complete facility-level responses for the principal scope analyses.
Supportive procedures	61	Complete for the headline breadth and report-defined profile analyses.
Medical workforce and qualifications	36–61	Headcount data were more complete than item-specific qualification counts; each
Monthly activity per IR	38	Restricted to facilities with complete procedure, consultation and tumour-board responses.
Multidisciplinary workforce and training	37–59	Item-specific denominators and paired denominators are reported.
Typical-procedure staffing	56	Three departmental-pool responses were excluded transparently from the typical-procedure distribution.
Organisational infrastructure and referral pathways	11–60	Denominators vary across anaesthesia access, beds, clinical rights and referral-source items.
Research and education	60	One facility had insufficient information for the paired analysis.
Optional open-text responses	47 beneficial; 43 challenging; 24 additional comments	Illustrative responses only; not a representative qualitative sample.

Principal Derived-Variable Dictionary

Variable	Operational Definition	Denominator	Treatment and Interpretation
Participation rate	Submitting facilities divided by invited facilities.	61/79	A submission was counted when a facility returned the survey.
IASIOS cohort	Survey-time status: Centre of Excellence, Accredited or Enrolled.	61	Original response file and survey tracker used.
Primary-malignancy breadth	Count of listed primary tumour sites treated by each facility.	61	Facility-level count: greater breadth is not automatically interpreted as better performance.
Secondary-malignancy breadth	Count of listed metastatic tumour sites treated by each facility.	61	Facility-level count using the submitted categories.
Supportive-procedure breadth	Count of listed diagnostic, supportive or palliative procedure categories provided.	61	Describes scope, not quality or appropriateness.
Report-defined supportive profile	More than 50 annual procedures in at least two supportive categories and no primary or secondary malignancy category above 50.	61	Analytical construct created for this report; not an IASIOS requirement.
Full-time IR headcount	Reported full-time interventional radiologists in the department.	61	Headcount, not FTE; confirmed zero retained.
Part-time IR headcount	Reported part-time interventional radiologists in the department.	53	Blank responses treated as missing.
EBIR qualification share	Reported EBIR-qualified physicians divided by physician headcount among facilities answering the item.	54 facilities; 122/445	Item-specific denominator; categories may overlap.
Additional IR qualification share	Physicians with another reported IR qualification divided by physician headcount among responding facilities.	43 facilities; 203/390	Confirmed zero values included; categories may overlap.

Variable	Operational Definition	Denominator	Treatment and Interpretation
Additional IO qualification share	Physicians with another reported IO qualification divided by physician headcount among responding facilities.	36 facilities; 88/304	Confirmed zero values included; categories may overlap.
Standardised monthly activity	Reported procedures, consultations and MDT meetings per IR converted to a monthly basis.	38 Complete Responses	Weekly values multiplied by 52/12; annual values divided by 12; ranges represented by midpoint; open-ended values retained as lower bounds—facilities with unusually high procedure counts indicating likely departmental rather than per-IR reporting were excluded.
Facility-weighted activity composition	Each facility's activity proportions are calculated first, then averaged equally.		Prevents high-volume facilities from dominating the average service profile.
Staffing ratios	Sum of one workforce group divided by the paired sum of another among facilities reporting both.	Paired n=57–59	Aggregate paired ratios; not minimum staffing standards.
Reported specialist training	Facility reported access to profession-specific IR or IO training.	Nursing n=53–57; radiography n=37–54	The survey did not distinguish formal certification from departmental, course-based or on-the-job training.
Typical-procedure assisting staff	Number reported as assisting during a typical IO procedure.	56 included	Values 12, 15 and 20 excluded because descriptions indicated broader departmental staffing pools.
Anaesthesia-related constraint	Explicit challenge or direct scheduling/case-capacity restriction attributed to anaesthesia access.	9/61	Coded from explicit challenge and anaesthesia free-text responses.

Variable	Operational Definition	Denominator	Treatment and Interpretation
Clinical-rights bundle	Count of five reported clinical rights available to the IO service.	59-60	Descriptive bundle; rights may be governed differently across jurisdictions.
Referral-source distribution	Mean of each facility's reported proportions from other specialties, MDTs and self/direct referral.	55	Facility-weighted mean; not pooled patient-level referrals.
Research participation	Facility reported leading studies, contributing to externally led studies, or both.	60	Measures organisational participation, not research output or impact.
Education participation	Facility reported inclusion of IO in formal education or training.	60	Measures reported organisational participation, not educational effectiveness.

Context and Comparability

The current survey primarily collected institutional headcounts and reported activity rather than full-time-equivalent staffing, service operating hours or complete capacity denominators. Cross-facility comparisons should therefore be interpreted as descriptive organisational context. Future cycles should introduce stable contextual denominators before developing confidential peer groups or longitudinal comparisons.