ICaRe

2024
Annual Report



Key Findings

ICaRe is a national, anonymised, web-based registry for capsule endoscopy performance data across Irish hospitals.

6/10

Data collated from 6 out of 10 capsule centres nationally.

1,876

Procedures
(1,172 SBCE + 704 CCE)

Facilitates benchmarking, supports quality improvement, and enables inter-institutional collaboration.



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GI Laboratory Staff at Tallaght University Hospital



Professor Deirdre Mc Namara
Consultant Gastroenterologist /
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Tallaght University Hospital | Ospidéal Ollscoile Thamhlachta
An Academic Partner of Trinity College Dublin

Foreword by Professor Deirdre McNamara

In 2022-2023 the HSE Endoscopy Programme, rolled-out Capsule Endoscopy, particularly colon capsule (CCE), across ten centres in Ireland. As a minimally invasive, office-based test for the investigation of gastrointestinal disorders, it offered an opportunity to improve patient access at a time of unprecedented demand for traditional colonoscopy services. With an ever-growing requirement, currently over 28,000 patients, despite a myriad of traditional approaches to waiting list management, endoscopy-waiting times remain a key challenge across the country. Colon capsule endoscopy is one of a suite of technological solutions to be recently introduced by the programme. These new initiatives, CCE, Faecal Immunological Testing (FIT) and enhanced models for patient vetting, have the potential to dramatically reduce the need for standard colonoscopy. They offer a rapid access diagnostic pathway while also identifying patients who should be prioritised for urgent onward referral.

As with all innovative technologies and services, despite the best preparation and planning, they can only be truly assessed once operational. As such, there was a need to assess Ireland's capsule services against international and national quality standards. As well as to determine its true value within our complex health care system.

ICaRe, a voluntary anonymised web-based capsule registry, was established by the Capsule Clinical Leads at each centre and went live in October 2023. This first registry report gives us the opportunity to review and compare our current practice, refine our capsule techniques, and explore ways to maximise the impact of capsule services across the country."

We hope this inaugural report helps to raise awareness of capsule services among our hospital and community colleagues and patients themselves. Tailoring diagnostics to an individual's preference not only improves the experience it also improves the overall patient outcome. Where appropriate, CCE should be offered as a viable alternative to traditional optical colonoscopy, alongside CT-Colonography where available. Empowering patients to choose their preferred diagnostic approach helps reduce pressure on individual services while supporting a more patient-centered model of care.

As the ICaRe Chairperson I would like to sincerely thank all the participating capsule teams across Ireland. Your dedication and collaboration have been vital to the national rollout of capsule endoscopy and to the success of this registry. Realising the full potential of CCE for our patients depends on your continued commitment.

I would also like to take the opportunity to thank Drs. Conor Costigan and Fintan O'Hara, who were instrumental in the design and development of the registry.

My thanks also to our Local Capsule Team and my colleagues at Tallaght University Hospital whose unwavering support over the past decade has made it possible to advance and expand capsule endoscopy services across Ireland - and beyond.

Capsule Centres



Connolly Hospital Blanchardstown
Clinical Lead: Dr. Barry Hall
Left to Right: Lisa Keating (CNM2), Catherine Garry (CNM2), Dr. Karl Hazel (Consultant Gastroenterologist), Dr. Barry Hall (Consultant Gastroenterologist), Dr. Roisin Connaughton (Gastroenterology Registrar).



Galway University Hospital –
Clinical Leads: Dr. Carol Goulding & Dr. Mary Hussey
Left to Right: Dr Mary Hussey (Consultant Gastroenterologist), Dr Carol Goulding (Consultant Gastroenterologist), Frances Dawn Aquilar Serap (CNM2)



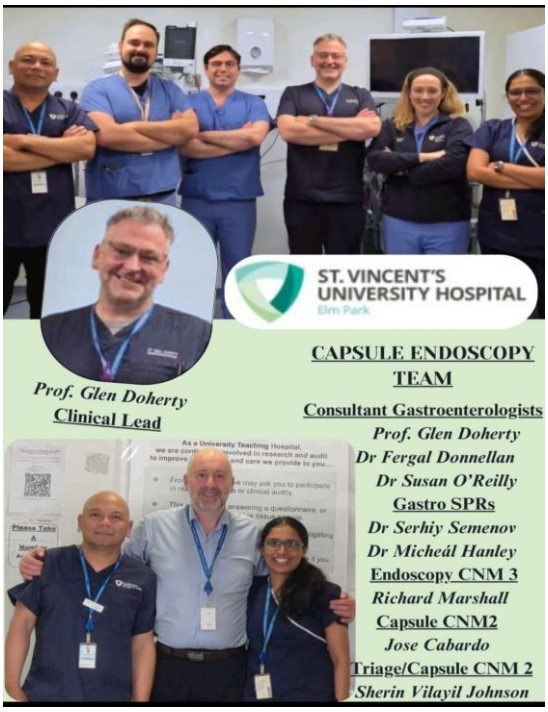
St. James Hospital
Clinical Leads:
Dr. Grainne Holleran & Dr. David Prichard



Letterkenny University Hospital –
Clinical Lead Dr. Vikrant Parihar
Left to Right: Dr Kevin Van Der Merwe (Gastroenterology Registrar), Maire Ferry (CNM2), Dr Vikrant Parihar (Consultant Gastroenterologist & Physician), Sarah Ferry (ANP), Aundrea Mulreany (Senior Nurse).



Beaumont Hospital - Clinical Lead Dr Syafiq Ismail
Left to Right:
Dr. Mohamed Mohamed (Gastroenterology Registrar), Dr Syafiq Ismail (Consultant Gastroenterologist) and Philip Maligaya (CNM2)





Tallaght University Hospital
- Clinical Leads: Prof. Deirdre McNamara & Dr. Fintan O'Hara
Left to Right: Emmanuel Omallao (GI Laboratory Technical Manager), Niamh Eagle (CNM2), Ogechukwuka Izegbune (GI Laboratory Assistant), Mary Theresa Gregg (Capsule Administrative Lead), Divya Kripakaran (TAGG Research Assistant), Dr Fintan O'Hara (Consultant Gastroenterologist), Dr Sandeep Sihag (Specialist Registrar in Gastroenterology), Yvonne Bailey (CNM2), Prof. Deirdre McNamara (Consultant Gastroenterologist & Professor in Clinical Medicine)

Glossary of Terms

Adverse Event (AE)	Any unintended medical occurrence during or after the procedure, not necessarily caused by the capsule endoscopy.
Appropriateness of Referral	A measure of whether the clinical indications for the procedure align with established guidelines.
Bowel Preparation Quality	Assessment of the cleanliness of the gastrointestinal tract, critical for optimal mucosal visualisation.
Capsule Endoscopy (CE)	A non-invasive diagnostic test using a small, ingestible video capsule to visualise the gastrointestinal tract, especially the small bowel.
Capsule Retention	Retention occurs when the capsule fails to pass through the gastrointestinal tract within 14 days of ingestion or the patient presents with obstructive symptoms, which may necessitate medical or surgical intervention.
Completion Rate	The percentage of procedures where the capsule reaches the caecum (SBCE) or rectum (CCE) or other intended anatomical landmark before battery expiration.
Diagnostic Yield (DY)	The proportion of capsule studies that detect significant pathology relevant to the indication for the test.
Device-Assisted Enteroscopy (DAE)	An endoscopic technique that allows for examination of the small intestine, utilising a flexible tube with a camera (an endoscope) and specialised over-tube apparatus to access and visualise the small bowel.
Small Bowel Capsule Endoscopy (SBCE)	A swallowed capsule, usually with a single camera designed to examine the small bowel.
Colon Capsule Endoscopy (CCE)	A swallowed capsule, usually with two cameras designed to examine the large bowel.
Pan Intestinal Endoscopy (PIC)	The use of a colon capsule to examine both the small and large intestine.
Indication	The clinical reason for performing the capsule endoscopy.
Lesion Detection Rate	Percentage of capsules with clinically significant findings.
Mucosal Visualisation Score	A scoring system used to quantify how well the mucosal surface was visualised.
Patency Capsule	A dissolvable capsule used before a capsule endoscopy to assess the risk of capsule retention.
Key Performance Indicator (KPI)	A metric for which there is sufficient evidence base to recommend a standard.

Introduction to the ICaRe Registry

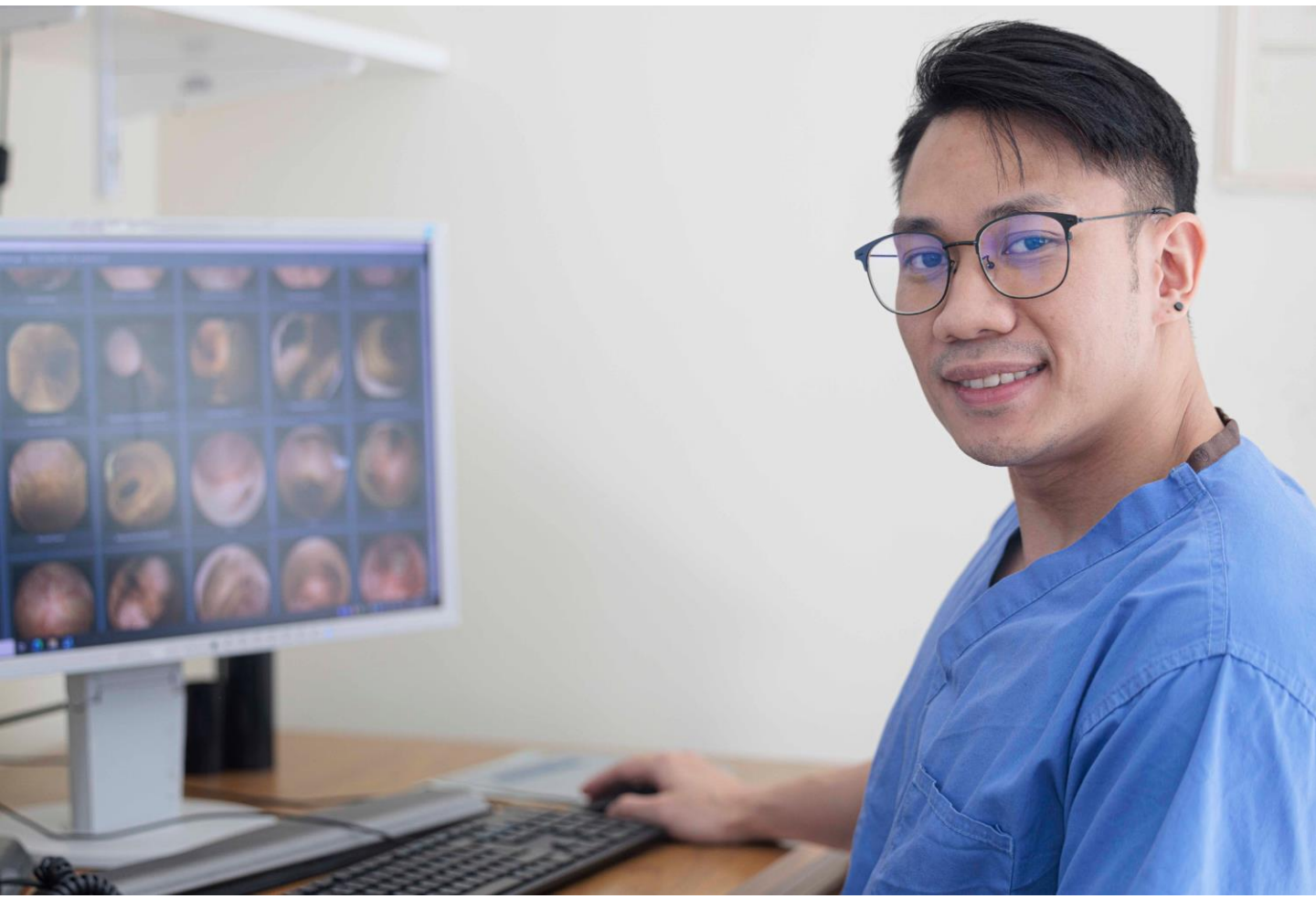
The rapid expansion of capsule endoscopy services in Ireland over the last number of years revealed both a risk and an opportunity. Maintaining and improving quality in capsule endoscopy nationally was seen as a necessary development in conjunction with this increase in capsule availability. Standard endoscopy has been down this road previously with the well-established National GI endoscopy quality improvement programme, which has driven quality in endoscopy in Ireland since its inception in 2011.

The Irish Capsule Endoscopy Registry (ICaRe) was established as a national initiative to monitor and enhance the quality of capsule endoscopy services across Ireland. ICaRe is designed as a centralised, anonymised, web-based database that collects key performance and procedural data from capsule endoscopy services.

The registry is built around the quality standards defined by the European Society of Gastrointestinal Endoscopy (ESGE), which provides a structured set of quality indicators for capsule endoscopy practice. These include metrics such as completeness of studies, adequate bowel preparation, appropriate indications, and lesion detection rates. Furthermore, in areas where there is an absence of specific standards for colon capsule procedures, the quality indicators for standard colonoscopy and HSE Clinical Guidance for Colon Capsule Endoscopy Services were employed.

The development of ICaRe reflects a collaborative effort among Irish gastroenterologists, endoscopy units, and data specialists. Its primary goals are to promote quality improvement, facilitate benchmarking between centres, support clinical audit, and contribute to better outcomes for patients undergoing capsule endoscopy.

By enabling systematic and standardised data collection, ICaRe offers a valuable framework for ongoing quality assurance and research in this evolving field of gastrointestinal diagnostics.



Emmanuel Omallao, GI Laboratory Technical Manager, Tallaght University Hospital

ICaRe Design



ICaRe Design
by Dr. Conor Costigan

Maintaining exacting standards is a fundamental aspect of clinical practice. As clinicians, we are committed to delivering safe, effective, and evidence- based care to our patients. In line with this commitment and drawing inspiration from established national programmes such as the National Quality Assurance Improvement System (NQAIS) for traditional endoscopy, we recognised the need to develop a structured method for collecting and analysing performance data specific to capsule endoscopy.

Capsule endoscopy systems currently operate in isolation, there is no national platform to capture and report data - unlike conventional endoscopy, which benefits from automatic, centralised reporting. This posed a significant challenge and highlighted the necessity of creating a system that would enable centres to capture and submit performance data efficiently and uniformly. The ICaRe registry was established to address this need. It enables individual centres to benchmark their services against national and international quality standards, supports local protocol refinement, and fosters collaboration through shared learning and problem-solving.

The design of the registry placed a strong emphasis on data security and compliance with Irish and EU data protection legislation. To ensure a robust and ethically sound framework, we consulted with domain experts, academic colleagues from Trinity College Dublin, and the joint Research Ethics Committee at St James' and TUH. These collaborations were critical in developing a secure, anonymised system for data entry, transfer, and storage on central servers managed by the TUH team.

A streamlined online questionnaire was developed to collect key procedural and quality metrics. This tool was rigorously evaluated and refined by the Capsule Endoscopy Team at TUH before a national roll-out. Each participating centre received support in obtaining local Research Ethics Committee approval before commencing data collection. Feedback from initial pilot sites played an integral role in enhancing the usability and efficiency of the data entry process.

To date, six centres have joined the registry and are submitting data regularly. ICaRe generates quarterly reports detailing both national and centre-level outcomes. These insights support performance monitoring and drive quality improvement discussions within the network. Registry data has also contributed to several national and international scientific presentations and is the subject of a forthcoming peer-reviewed publication.

As with any voluntary system, certain limitations exist. Not all ten designated capsule endoscopy centres are currently participating, and the voluntary nature of data submission means that full procedural capture cannot be guaranteed. Despite this, ICaRe has collected data on 1,876 procedures in its first year, offering valuable insights into the early performance of this emerging national service. Already, the analysis of ICaRe data has directly informed service improvements.

The establishment of the registry has been a substantial undertaking, made possible by the dedicated efforts of the team at TUH, the support of the HSE National Endoscopy Programme, and the commitment of Capsule Endoscopy Teams across the country.

We are confident that the Irish National Capsule Endoscopy Registry will continue to play a vital role in advancing the quality, safety, and accessibility of capsule endoscopy services across Ireland in the years ahead.

Data Analysis



Data Analysis
by Dr. Fintan O'Hara

The ICaRe 2024 Report provides an in-depth analysis of SBCE, and CCE services benchmarked against ESGE quality and performance guidelines as well as the national endoscopy quality improvement programme indicators for standard endoscopy.

Data relating to the following key quality indicators (KQI) were analysed in the preparation of this report:

Small Bowel Capsule Endoscopy

- Appropriate indication for SBCE
- Rate of adequate bowel preparation
- Appropriate patient selection for patency
- Caecal or stomal visualisation
- Lesion detection rate
- Capsule retention rate

Colon Capsule Endoscopy

- Adequate bowel prep
- Complete transit rate
- Polyp detection rate
- Onward Referral

Given that this is the first set of annual data, there is insufficient data on some parameters, trends over time are not available and some KPIs are not captured on the current registry.

There are difficulties in capturing certain parameters which may not be available at the time of capsule reporting. For example, capsule retention rates, are available for one centre only and were collated as part of a separate local audit.

Participating Hospitals

In 2024, six of the 10 public hospitals providing capsule endoscopy services contributed data to the capsule registry and were included for analysis.

Completeness

Unlike the National Endoscopy Quality Initiative, the completeness of the dataset from each hospital is unknown and has not been audited, but the participating hospitals have reported 100% compliance.

All participants use a common web-based platform to capture common data sets and remove variation between sites.

Registry Dataset

The 2024 ICaRe dataset comprises 1,172 SBCE cases and 704 CCE/Pan intestinal cases from the six participating centres across Ireland.

Centre	SBCEs	CCE/PIC
Connolly Hospital	126	5
Galway University Hospital	166	48
Letterkenny University Hospital	130	133
St. James's Hospital	16	165
St. Vincent's University Hospital	0	73
Tallaght University Hospital	734	280
Total	**1,172**	704

Figure 1. ICaRe annual activity by Centre

Key Performance Indicators

Key Performance Indicators

Small Bowel Capsule Endoscopy (SBCE)	**Appropriate Indication for capsule** 95% – Achieved target **Adequate Bowel Preparation** 94% - All centres met the target. **Patency Assessment** 95% - Achieved target **Completion Rate** 95% – Exceeded standard **Lesion Detection Rate** 36% – Meets the standard **Capsule Retention Rate** 1% – Within reported parameters
Colon Capsule Endoscopy (CCE)	**Adequate Bowel Preparation** 83% – Identified as a key area for improvement **Complete Transit Rate** 82% - Wide variability between centres (60–94%) **Polyp Detection Rate** 44% - Above the standard CCE is accurate in detecting colon pathology **CCE Onward Referral** 30% - colonoscopy & 9% - sigmoidoscopy Suggests patient selection needs refinement

Small Bowel Capsule Endoscopy

Irish SBCE KPIs n=1,172

Key Performance Indicator (Target)	iCaRe Performance	KPI Met
Key Performance Indicator Appropriate Indication (≥95%)	1,108 (95%)	Yes
Rate of Adequate Bowel Prep (≥80)	1,102 (94%)	Yes
Patient Selection for Patency (≥95%)	228/240 (95%)	Yes
Caecal Visualisation (≥80%)	1,113 (95%)	Yes
Lesion Detection Rate (≥30%)	427 (36%)	Yes
Appropriate Referral to DAE (≥75%)	138/258 (53%)	No
Capsule Retention Rate (<2%)	1%	Yes
Monitoring of KPIs (≥90%)	100%	Yes

Figure 2. Overall SBCE KPI's

Indication

Ensuring that SBCE is performed for appropriate clinical indications is a vital component of performance monitoring as it is well-established that the diagnostic yield of SBCE increases when employed for approved indications. SBCE is most commonly used in obscure gastrointestinal bleeding, iron deficiency anaemia, suspected Crohn's disease, and small bowel tumours.

Overall, appropriate indications were found in 95% of procedures (range of 85-100%). The data shows that SBCE procedures were used appropriately and in line with guidelines, helping to ensure the right patients received the service, without overuse or underuse. This balanced approach supports both clinical value and cost-effectiveness.

Combined ICaRe group data highlights patients presenting with diarrhoea or abdominal pain alone are the most frequent reason for non-adherence with the standard. Given that SBCE is a non-invasive and highly accurate test, it may be considered that referral is appropriate in this group when other options are not available or have failed to identify the cause for the patient's symptoms.

It should also be recognised that there is a value of a negative result in certain scenarios. In such cases, expanding the indication for SBCE may be justified, as a negative capsule study can help avoid unnecessary invasive procedures.

Appropriate Indication for SBCE

Target >95%

ICaRe Rate 95% (Range 86%-100%)

Bowel Preparation

Clear views of the small bowel are essential for accurate diagnosis and to avoid missing any issues. Poor preparation often means repeat procedures or extra tests, adding both time, cost and inconvenience for the patient.

Cleansing scales are not universally employed, and reporting remains somewhat subjective. While oral purgatives are recommended and have been shown to improve image quality, their impact on diagnostic yield, particularly for significant pathology, remains controversial.

Overall bowel preparation scores were acceptable in 94% of procedures, with all centres meeting the target. The range of 81-100% may reflect the variation in bowel preparation used between sites and warrants further investigation. Purgatives can be unpleasant and difficult for some patients to take; they also represent an additional cost to the procedure, and not all participating centres regularly employed them for SBCE procedures. The analysis of ICaRe data suggests the minimum targets are being met for this KPI, reflecting excellent patient selection and procedure quality.

Rate of Adequate Bowel Preparation

Target >80%

ICaRe Rate 94% (Range 81-100%)

Patient Selection

Capsule retention remains the most significant adverse event associated with capsule endoscopy. Retention can be avoided in most cases by identifying patients who are at increased risk and offering a patency “dummy” capsule before undergoing the capsule procedure.

The appropriate use of a patency capsule has been shown to reduce retention in high-risk groups, such as those with established Crohn’s disease. Risk factors for retention are known, such as chronic nonsteroidal anti- inflammatory drug (NSAID) use, established Crohn’s disease, or previous abdominopelvic radiotherapy.

Adhering and restricting patency capsule use to those truly at risk of retention is important. Otherwise, the high false positive rate for patency tests in low risk subjects could unnecessarily exclude patients from undergoing a capsule endoscopy

Appropriate Patient Selection for Patency Assessment

Target >95%

ICaRe Rate 95%, (Range 93-100%)

Completeness of Procedure

Completion rate is a key quality marker in capsule endoscopy, indicating how often the capsule reaches the caecum/stoma. A high completion rate is essential to ensure the full small bowel is assessed. If the examination is incomplete, important findings may be missed, leading to further investigations or alternative tests.

ICaRe caecal visualisation was achieved in 95% of all small bowel procedures, with all reporting capsule centres achieving high completion rates exceeding the 80% minimum acceptable KPI. There was some variability noted across institutions, with a range between 81-98%.

Caecal or Stoma Visualisation

Target >80%

ICaRe Rate 95%
(Range 81- 97%)

Identification of Pathology

The lesion detection rate refers to the percentage of cases in which clinically significant findings related to the indication were identified. The lesion detection rate reflects adequate inspection of the small bowel mucosa and predicts quality in SBCE. It also reflects the level of appropriate indication for the procedure and reader experience. Overall, the ICaRe diagnostic yield was acceptable at 36%, ranging between 31% and 55% between centres.

A higher diagnostic yield is desirable, as it indicates the procedure's effectiveness in detecting pathology, reducing the need for further testing and expediting clinical decision making. However, setting overly ambitious targets risks limiting access to minimally invasive capsule services where a negative result can still carry important clinical value. Therefore, the current rates likely reflect appropriate and judicious use of capsule technology.

Lesion Detection Rate

Minimum Standard ≥30%

ICaRe Rate 36%
(Range 31-55%)

Management of Pathology

DAE is a specialised advanced endoscopic used to examine the small bowel. It enables both tissue sampling and therapeutic interventions. When used appropriate after a SBCE, DAE offers strong diagnostic value and can lead to meaningful treatment decisions for patients.

Overall, the ICaRe referral rate for DAE is below the minimum standard, at 53%, with significant variation between centres (range 33% - 72%). DAE continues to be underused. This is due to limited access and a lack of awareness about its diagnostic and therapeutic value. Increasing understanding of when and how DAE can benefit patients is essential to improving referral patterns. It is also important to recognise that not all patients with positive findings on SBCE will benefit from DAE. For example:

- Patients with known Crohn's disease, where findings may not change management
- Those with stable anaemia and minor angiodysplasia who have significant co-morbidities, for whom intervention may carry greater risk than benefit

By refining referral pathways and improving awareness, centres can more effectively align DAE use with clinical need, improving outcomes and making best use of available resources.

Appropriate Referral for Device Assisted Enteroscopy (DAE)

Minimum Standard≥75%

ICaRe Rate 53%

Complications

Capsule retention, while a rare event, remains a concern in capsule endoscopy. Retention rates were low, occurring in 1% of cases, reinforcing the overall safety of the procedure. This is however based on limited data capture from only one of the reporting centres. Due to the nature of retention, being at a point distant from the ingestion and reporting of the capsule procedure, when data capture normally happens.

Capturing this data remains outside the current dataset for the registry. High capsule retention rates would suggest suboptimal patient selection and procedure quality and thus should be audited on a site-by-site basis until it is included in the registry

Capsule Retention Rate

Target Rate <2%

ICaRe Rate 1%

Colon Capsule Endoscopy

Irish CCE/PIC KPIs n=704

Key Performance Indicator (Target)	iCaRe Performance	KPI Met
Appropriate Indication (100%)	704 (100%)	Yes
Rate of adequate bowel prep (≥90%)	582 (83%)	No
Complete Transit (≥90%)	576 (82%)	No
Polyp Detection rate (≥15%, ≥25%)	316 (45%)	Yes
Appropriate follow up if incomplete (100%)	148/209 (71%)	No
Diagnostic Yield	389 (55%)	NA
Post CCE tests - Colonoscopy - Sigmoidoscopy	 - 214 (30%) - 65 (9%)	NA
Appropriate Indication (100%)	704 (100%)	Yes

Figure 3. CCE/PIC KPIs *NA = No Standard*

Key Performance Indicators in CCE

There are no well-established performance indicators for colon capsule endoscopy due to its recent introduction. According to clinical guidance from the HSE Endoscopy Programme, while standard colonoscopy remains the gold standard for examining the colon and detecting significant pathology, CCE offers a safe, minimally invasive alternative for visualising the colon."

The National GI endoscopy quality improvement programme launched in 2011 has well-established performance indicators for colonoscopy in Ireland. Until international performance measures are available and with the need to monitor performance in CCE, we adopted where it was felt appropriate the colonoscopy performance indicators as a target for CCE. This will remain an area under review and while it is difficult to draw concrete conclusions from the reported data, it does reflect variations between sites and provides an important insight into colon capsule services nationally.



Appropriate Indication

Ensuring that CCE is performed for appropriate clinical indications is a vital component of performance monitoring.

Used correctly, CCE reduces the need for avoidable follow-up investigations. In this review , all studies met the HSE Endoscopy Programme's clinical guidelines for appropriate CCE referral, supporting effective and response use of this value diagnostic resource.

Appropriate Indication for CCE

Target 100%

ICaRe Rate 100%

Bowel Preparation

One of the foremost considerations in CCE is the adequacy of bowel preparation. Unlike conventional colonoscopy, where suboptimal bowel preparation can at times be addressed interprocedurally by the endoscopist, any inadequate cleansing in CCE can significantly impact diagnostic yield and may require patients to undergo repeat or alternative procedures. Adequate bowel cleanliness, therefore, is essential for reliable interpretation.

There is acknowledgement that bowel cleanliness in CCE is an issue. The largest meta-analysis to date of 3,789 CCE procedures found an overall adequate cleanliness rate of 77%. In the ICaRe data adequate bowel preparation overall was found in 83% of procedures with a broad range across the centres of 79-94%.

Indeed, only one Irish centre at 94% has met the adopted criteria. Factors such as variations in preparation regimens, differences in patient instructions and protocols may contribute to inconsistencies in bowel cleanliness, as well as patient compliance with bowel preparation. There are significant opportunities to use the registry data to develop QI initiatives to improve bowel cleanliness scores in CCE. Using the registry explore differences in bowel prep and patient education offers a valuable opportunity to tackle existing challenges and support consistently higher quality examinations in the future.

Rate of Adequate Bowel Preparation

Target ≥90%

ICaRe Rate 83%
(Range 79 – 94%)



Transit

The complete transit rate in CCE is defined as the percentage of capsules successfully reaching the end of the bowel. A high completion rate is crucial for accurate polyp detection in colorectal cancer screening and polyp surveillance. In comparison to colonoscopy, it is equivalent to the caecal intubation rate and an indication that the entirety of the colon has been visualised.

With a minimum target of ≥90%, complete transit was found in 82% of capsule procedures with a range of 60-94%. Again, there was significant variability between centres, suggesting an opportunity to learn from high- performing centres on possible improvement in patient preparation, protocols and procedural standardisation

Complete Transit

Target ≥90%

ICaRe Rate 82%
(Range 60 – 94%)

Polyp Detection

Significant polyps in CCE trigger a referral for colonoscopy and polypectomy and include polyps ≥6mm or three or more polyps on CCE. Those with low-risk findings of less significant polyps can be monitored.

As with colonoscopy, polyp detection rates are a crucial outcome measure for CCE. The ability to detect pre-cancerous lesions is frequently regarded as an overall marker of the accuracy of any bowel test. With a minimum target of ≥15%, taken from colonoscopy standards, overall polyp detection rates were high for CCE in the ICaRe registry. Polyps were found in 45% of procedures, range 15-73%.

As such CCE can be considered highly accurate. Further analysis may refine CCE practice, to maintain accuracy but avoid over detection with the need to proceed to colonoscopy in the majority of CCE cases.

Significant Polyp Detection

Target >15% any age,
>25% over 50 years

ICaRe Rate 45%
any age



Insights & Future Directions

By Professor Deidre McNamara

It would be an oversight not to take what lessons we can from the registry data to improve the efficacy and clinical impact of colon capsule endoscopy (CCE). As mentioned previously, CCE has the potential to reduce the burden of colonoscopy waiting lists across Ireland. As a new technology, we are still learning how, when and where to employ CCE to maximise the benefit, where CCE is used as a timely accurate diagnostic test while avoiding the need for traditional colonoscopy. The data in this report highlights several opportunities to introduce targeted interventions that can improve patient outcomes, strengthen efficiency in our healthcare system and improve the overall quality of CCE.

CCE Application

Patient selection is a key determinant of the efficacy of any diagnostic test as demonstrated by its inclusion as a quality measure. Our data confirms CCE is highly accurate with an overall diagnostic yield of 55%. Clinicians can therefore be confident that CCE will find pathology. However, simply employing CCE to detect pathology that requires a subsequent further interventional colonoscopy would be counterproductive, adding just another unnecessary layer to the pathway. Ideally, we would select patients for CCE who, after appropriate vetting, need a diagnostic test but who are at low risk of requiring a colonoscopy for intervention. Overall, 39% of CCE patients were referred for a full colonoscopy or a sigmoidoscopy after their capsule.

While incomplete capsule transit and poor image quality was a reason for some, the need for polypectomy accounted for a quarter of all follow up colonoscopies. In particular, CCE procedures performed for polyp surveillance had a statistically higher requirement for a follow up colonoscopy, 49% compared to 34% for the remainder of the cohort. Indeed, CCE's performed for all forms of surveillance (patients who previously had a colonoscopy with polyps, and/or family history) were almost four times more likely to need a colonoscopy. This data supports the preferential use of CCE for the investigation of patients with new symptoms, while avoiding CCE as a surveillance investigation. By inference, those participating in the national bowel screen programme, with a positive FIT test, and therefore at higher risk of significant polyps and cancers, may benefit from a direct to colonoscopy approach.

CCE Quality

There is significant room for improvement in the technical aspects of colon capsule endoscopy. In particular, the development of an optimal bowel preparation to ensure adequate image quality and improved boosters to promote complete transit of the capsule. While research continues into these areas with promising results, the registry, because of the standardised national protocols employed by participating centres, is unable to add significantly to these questions. However, the registry does provide some useful insights. Of interest, women were twice as likely to have a complete CCE, 77% versus 55%.

This is in contrast to colonoscopy, where female gender has been associated with longer procedure times and discomfort, as well as a tendency to looping and more technical difficulties. While capsule transit through the entire colon was similar, women were twice as likely to have an adequate bowel preparation and image quality. Better bowel preparation has also been reported for women in colonoscopy cohorts.

Tolerance and related compliance with bowel preparation, in general can be a challenge, even more so for CCE as the preparation continues after the capsule is taken. This may explain the advantage seen for women in our CCE cohort. These considerations should be taken into account when selecting the most appropriate investigation for an individual, and when counselling and advising on bowel preparation.

In addition, the registry included CCE data from patients of all ages, including one aged over 90 years. Age had no impact on CCE outcomes, performing similarly in all age groups. Suggesting age alone should not be a factor when choosing a bowel investigation.

Finally, establishing a CCE registry has enabled us to determine the likely requirement for repeat and interval procedures. Overall surveillance or repeat CCE's were recommend in 7% of the ICaRe cohort, mostly (90%) as a surveillance option for low-risk pathology. This rate again reflects the high CCE diagnostic yield and could vary if selection criteria, as suggested previously were employed to reduce the yield of polyps. The burden of repeat procedures may also change with future international CCE guidelines for low-risk surveillance.

As with standard colonoscopy it is important we understand the mechanism driving the requirement for surveillance CCE procedures, as this will allow us not only to plan appropriately for future workloads but also to adjust our selection and preference for CCE or colonoscopy to map our capacity with demand.

CCE Complete Study (Transit + Preparation) by Gender

	Complete	Incomplete	Total
Male	117	96	213
Female	318	113	431

Fisher's exact test. The two-tailed VP value is less than 0.0001

Odds ratio	2.3091
95 % CI:	1.6355 to 3.2599
z statistic	4.756
Significance level	P < 0.0001

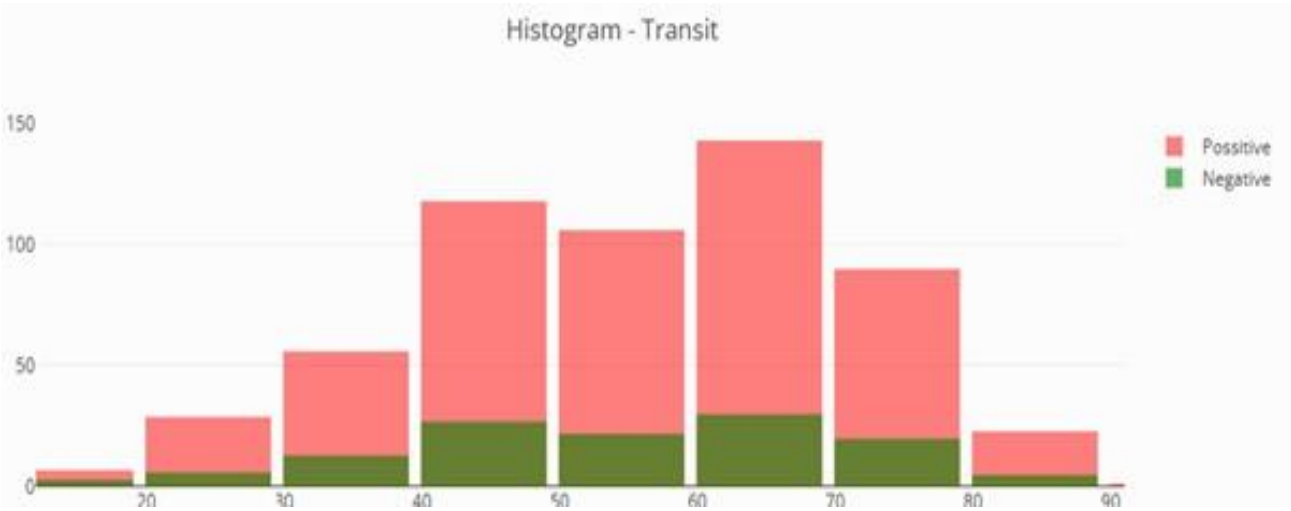
Analysis of Bowel Preparation & Image Quality by Gender

	Adequate	Inadequate	Total
Male	212	61	273
Female	369	62	431
Total	581	123	704

Fisher's exact test. The two-tailed VP value is less than 0.0080

Odds ratio	1.7125
95 % CI:	1.1574 to 2.5338
z statistic	2.691
Significance level	P = 0.0071

Analysis of Age & Capsule Transit



Conclusion

The ICaRe 2024 report demonstrates strong overall performance in capsule endoscopy across Irish Centres.

Irish small bowel capsule endoscopy performance was excellent across the board when benchmarked to international standards. Including high completion rates, preparation scores and lesion detection rates. This reflects positively on the quality of small bowel capsule endoscopy in centres across Ireland.

Further work is needed to broaden the registry data in regard to complications of SBCE, which although rare are significant. Capsule retention rates will be an important KPI to include in years to come. What data was available is reassuring, with retention rates again within internationally accepted parameters.

In colon capsule endoscopy, there are excellent rates of polyp detection with CCE, comparable to standard colonoscopy. This is in line with international data, which suggests CCE may be even better at detecting polyps than standard colonoscopy. This raises a number of issues in regard to appropriate patient selection for the test as significant polyps found on CCE, by current guidelines, will trigger a referral for standard colonoscopy for polypectomy.

There are also clear issues with bowel preparation and complete transit rates in CCE. Only one centre at 94% has met the adopted criteria here. Factors such as variations in preparation regimens, differences in patient instructions and protocols may contribute to inconsistencies in bowel cleanliness as well as patient compliance with bowel preparation. Already, CCE centres are adopting alternative booster medications in their CCE protocols, with early data showing significant improvement in completion rates.

As highlighted from these early results, there are significant opportunities to use the registry data to develop QI initiatives. Use of the registry to investigate differences in procedure protocols and patient education will hopefully mitigate challenges and ensure higher quality examinations in the future. With the continued investment in clinician training, protocol optimisation, and inter-institutional collaboration, capsule endoscopy can further evolve into a highly reliable and effective diagnostic tool. Future advancements, including artificial intelligence and refined quality assurance frameworks, can only further solidify its role in modern gastroenterology.

In conclusion, the analysis of KPIs for SBCE and CCE in participating ICaRe centres highlights strong overall performance while identifying key areas for improvement.



Proposals

- **Strengthen KPI Monitoring** In line with the 2025 ESGE guidelines for small bowel endoscopy, all centres should monitor key performance indicators (KPIs) for at least 90% of their capsule endoscopy procedures.

- **Expand ICaRe Participation** Broaden ICaRe registry involvement to include all capsule centres.

  The registry should be further developed to capture additional KPIs such as:

  - Percentage of completed capsules recorded
  - Capsule retention rates
  - Time to capsule in bleeding studies
  - Develop CCE-Specific KPIs. Existing KPIs are largely adapted from colonoscopy and may not reflect the unique characteristics of CCE. Development of tailored, CCE-specific metrics is essential.

- I**mprove Bowel Cleanliness Scoring** Current scoring systems for bowel cleanliness in CCE are suboptimal. Further research and standardisation are needed to enhance reliability and comparability.

- **Optimise Preparation & Protocols** Refining clinical indications, preparation regimens, and booster protocols is key to improving CCE completion rates—both in terms of preparation quality and capsule transit.

- **Regular Audit of Retention Rates** Capsule retention events should be tracked and audited regularly, with root cause analyses conducted for each case to inform prevention strategies.

- **Address Data Upload Challenges** Upload inconsistencies will be reviewed by the ICaRe working group. Engagement with non-reporting sites is ongoing, with consideration given to ethical and operational factors. All centres are encouraged to upload data consistently and promptly.

- **Prioritise Industry Collaboration** Strengthen collaboration with industry partners to streamline and standardise data collection process

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Appendix 1. Recent Published Capsule Endoscopy Related Research from ICaRe Centres

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Appendix 2: Patient Feedback

"It was a very good experience, I was comfortable."
Thank you

"Very efficient experience. I was in and out in 20 mins. The nurse was very nice and professional. The worst part of the experience was the fasting."

"A very good experience overall. I received a phone call appointment first, informing me of the procedure, risks and benefits. The procedure in Tallaght University Hospital was great, was informed again by the nurse and everything went on smoothly."
Thank you

"I was nervous and didn't know what to expect, but it was explained to me very well from start to finish, which relaxed me and I had no problem swallowing the capsule."

"Very positive. First class information given before capsule – both by phone and in person. All questions answered. Very efficient procedure."
Thank you

"It was fine but seemed to gone for a long time – two days prep & almost one day for the endoscopy. Big benefit is no sedation and therefore no recovery time!
Thank you

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

tagg
Trinity Academic Gastroenterology Group



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