

Surgery has been the mainstay for treating solid tumours since the dawn of cancer treatment, and recent decades have seen a huge increase in the complexity and multidisciplinary demands of carrying out cancer operations. So it can come as a surprise to hear that, in most countries, anyone who qualifies as a surgeon can take on cancer patients.

“Surgical oncology as a discipline doesn’t exist in most of Europe,” says Lynda Wyld, a British breast surgeon and someone closely involved with developing surgical breast oncology standards.

“Surgeons are accredited in categories such as general, thoracic, orthopaedic and plastic, and there is no mention of whether that includes cancer,” says Wyld, who is a consultant breast surgeon in Doncaster and professor of surgical oncology at the University of Sheffield. “There isn’t such a person as a cancer surgeon in most countries in Europe.”

Of course, there are comprehensive cancer centres at which surgeons are often exclusively dedicated to operating on cancer patients within multidisciplinary teams (MDTs), and a very few countries do recognise surgical oncologists ([a survey](#) by the European Society of Surgical Oncology in 2018 found just four such countries – the Netherlands, Ireland, Poland and Turkey). There are training curricula for some specialists, [such as gynaecological oncologists in the UK](#) and [in Europe](#). These surgeons also tend to be the ones developing and refining surgical cancer techniques, wearing multiple ‘hats’ in being able to also deliver medical therapies, and leading MDTs in all aspects of care.

But many patients do not attend these centres, at least for common cancers such as lung, breast and colorectal, and the extent of cancer specialism among surgeons and MDTs in hospitals can vary greatly both among countries and within them, as can be seen in variance in procedures and outcomes ([for example in lung cancer in England](#)).

Centralisation and audits

The need to centralise and specialise in high-volume centres is hardly a new cause, and there has been significant progress in some countries such as Denmark, where the number of centres carrying out lung cancer surgery has been pared down to a handful. Across Europe there are a number of audits and indicators for surgery and multidisciplinary performance according to clinical guidelines and targets.

Surgery has long been the focus of auditing, owing to the ease of quantifying it in volume and outcomes such as mortality, and reoperation and complication rates – although in some cancers, such as lung and pancreatic, curative-intent surgery is carried out only in a minority of cases, as most patients present with advanced, inoperable disease. It has been audits of outcomes that have put pressure on healthcare systems to centralise cancer care; surgical outcomes have often been a major driver, but survival rates (mostly at 5 years) as detailed in the [Eurocare study series](#) have also played a big role.

Yet the focus on processes and outcomes misses the status of training and lack of accreditation in cancer surgery among surgeons. As with the other two pillars of cancer treatment, medical and radiation oncology, there have been efforts to raise the profile of surgical oncology in Europe, but progress has been slow. Unlike medical oncology, which, after years of lobbying was [recognised as a medical specialism](#) by the European Commission in 2011, there has been little advancement of the idea of a board certified cancer surgeon, although the European Society of Surgical Oncology (ESSO) says that it is not realistic to expect a surgeon to cover oncological operations in widely different organs.

Many cancer operations are highly complex and subject to rapidly evolving research; they demand both latest technical skills and oncological knowledge

Many cancer operations have become highly complex and subject to rapidly evolving research; they demand both latest technical skills and oncological knowledge, and also coordination of an MDT that also has essential skills and knowledge. Cancer treatments are becoming increasingly multimodal over longer pathways with a surgical direction towards less radical and more organ-sparing procedures, already seen in breast, cervical and rectal, as a [Commission on the Future of Surgery](#) by the UK Royal College of Surgeons notes.

Specialist organ surgeons are of course a staple of hospitals, such as for gastrointestinal (GI) and cardiothoracic procedures, and gynaecologists and urologists have long had command of organs in their remit. But can a cancer patient be confident that a surgeon spends sufficient time on cancer operations within a workload that can include many other conditions, and has up to date skills and knowledge within an expert cancer MDT?

For certain cancers and in certain countries, patients are almost guaranteed specialist surgeons working in such MDTs. These tend to be for rare cancers such as sarcomas, and operations where there is a long and compelling history of the superiority of specialists, such as [gynaecological oncologists in advanced ovarian cancer surgery](#). A team of expert surgeons with various skills may also be needed for 'ultra-radical' operations on cancers where multiple organs are involved (again, advanced ovarian cancer is a good example).

But it is comprehensive cancer centres or departments mainly in teaching hospitals, and not individual surgeons, that tend to get accredited or recognised as specialist, according to audits and indicators such as a minimum volume of cases, and they may be members of a national or European network of audited centres (see for example the [German Cancer Society's certification programme](#), the [Organisation of European Cancer Institutes \(OECI\)](#) and, for a specific cancer-type example, the [centres of excellence at the European Neuroendocrine Tumor Society \(ENETS\)](#)).

Weighing up the evidence

As Kjetil Søreide, a GI surgeon at Stavanger University Hospital in Norway, and professor at the University of Bergen, and on ESSO's training committee, comments, the evidence base for establishing what makes such centres 'excellent' is not set in stone. "We are still debating the effects of high volumes of cases with a high proportion of surgery. Should we also be setting thresholds for number of surgeons, number of surgeries they each perform, or maybe other factors such as the number of patients in the catchment area for a hospital."

The choice of what indicators to use to judge levels of excellence also varies by type of surgery. Some operations are high risk, which makes mortality and complication rates important outcomes indicators. While these have generally improved in recent decades, mortality in particular remains a key indicator in surgical treatment of pancreatic cancer, for instance, where 5% is currently seen as a maximum acceptable rate. In breast cancer, by contrast, surgical procedures are highly unlikely to lead to death, but as Wyld points out, certain breast operations such as complex reconstructions can now take as long as a Whipple procedure for pancreatic cancer, and they too demand high levels of expertise, which need to be judged by different indicators.

Assuming mortality will drop as volume rises may be wrong though. [A study on pancreatic surgery in Italy](#), where there are a lot of hospitals carrying out procedures, found that although many hospitals had low volume that was associated with high mortality, applying a minimum volume of 10 or 25 operations a year would still give a mortality rate higher than 5% in a substantial number of hospitals and more than 10% in some. The authors report that, without considering a mortality threshold, hospital selection based only on surgical volume could prove inadequate.

As Søreide comments, given the supportive environment needed in an MDT where such surgery is performed, the focus is often rightly on the institutional capability to take care of complex cases rather than on an individual surgeon. Pathologists and radiologists contribute to crucial decisions before surgery, such as the operability of borderline cases, and intensive care specialists and anaesthetists, interventional radiologists, gastroenterologists, expert nurses and others span perioperative care, minimising complications and mortality.

This is probably why [a study in England](#) found that, even with a more challenging patient mix, high-volume centres, which are usually at the more prestigious hospitals, performed better with lung cancer than smaller centres. But it is also true that the best surgeons may be at the top hospitals, as they are often also referral centres for the most difficult cases.

The 30-day mortality rate for patients operated at UZ Leuven has been less than one-third of the national average

Take the thoracic surgery department at UZ Leuven in Belgium, which has [reported improving quality in oesophageal cancer operations](#), a major high-risk procedure. There has been a big drop in complications such as pneumonia. But it is hard to say whether one factor has been a main contributor. One clear factor is that it is a high volume centre no doubt with top surgeons, but as Philippe Nafteux, a surgeon in charge of oesophageal care notes: “The increase in the number of minimally invasive interventions (keyhole surgery) and the introduction of a new postoperative care programme also play a significant part.” What is clear is that the 30-day mortality rate for patients operated at Leuven has been less than one-third of the national average – 1.3% vs 4.8%; and after 90 days, 5.5% vs 9.9%. (See also a [‘plea for centralisation’](#) of pancreatic and oesophageal surgery in Belgium.)

A review of reviews on the [relationship between surgeon volume and outcomes](#) has found that, in cancer, the most clear-cut evidence for the effect of volume is in colorectal and breast cancer. [A recent study](#) has found an association between surgical technical skills and long-term survival in colon cancer, as assessed by video reviews of operations; other such studies have focused on short-term outcomes. [Another recent study](#) has shown substantial differences in skills and outcomes in rectal cancer.

The introduction of new surgical techniques can be particularly challenging as they are often introduced without ‘gold standard’ randomised controlled trials. There can also be a steep learning curve that can result in unacceptable outcomes, such as with the relatively recent [transanal total mesorectal excision](#) in rectal cancer, a difficult procedure, and while [frameworks for safe implementation](#) exist there can be a tendency to introduce new procedures too quickly.

In some countries, data on individual surgeons is also available, such as in the UK, where patients can check the reported outcomes for named surgeons in various specialties, including mortality after

colorectal cancer surgery. When this was proposed, there were concerns that surgeons would opt out of operating on high-risk patients or 'game the data' by deeming patients to be more urgent cases than perhaps they were, and so excluding them from elective surgery classification in audits. But [a study in the BMJ](#) did not find adverse effects of public reporting, and even found improved outcomes in colorectal surgery, although this may have been because MDTs started to perform better to support surgeons.

Compliance with clinical guidelines can be a more detailed way of tracking performance, building on data captured by quality indicators (see for example this [US paper on concordance with gastric cancer guidelines](#) from a large clinical registry database). Structured operative and pathology reports can capture more reliable data. Guidelines differ though among health systems, and MDTs have variation in decision making when presented with the same cases, such as whether to [perform pancreatic cancer surgery in borderline cases](#).

A concerning side-effect for surgery is the unintended consequences of the use of new technology, especially robots, now widely used in prostate cancer but also in other urological cancers, rectal and lung. A new generation of surgeons is being trained mainly on minimal invasive and robotic techniques, but the equipment, especially robots, may be promoting inequalities in access, as smaller, outlying hospitals may not be able to afford the equipment and resources.

As Richard Sullivan and Ajay Aggarwal noted in an IARC publication, '*Reducing Social Inequalities in Cancer*' ([see chapter 18](#)), a quarter of locations in the UK that were carrying out radical prostatectomies have closed as patients, possibly the more affluent and more able to travel, choose robotic centres, even though the long-term benefit of robotic surgery is unproven. A further effect is that surgeons who lack open surgery experience may not be able to visit or return to poorer countries that lack such equipment to help with cancer work.

Routes into cancer surgery

The way doctors become surgeons is similar in most countries, as Wyld describes. There is probably at least five years in training, which may include some cancer operations, and for those wanting to pursue a career at a cancer centre in the UK, a further training fellowship in cancer is likely to be a prerequisite. "But it's an informal process, and lot of surgeons doing cancer around Europe won't have done a period of more specialist training," she says.

Søreide agrees, although he says the days of the general surgeon doing 'head to toe' operations is long gone, and in Norway surgeons who develop an interest in say GI surgery are channelled into subspecialists, mainly colorectal, hepato-biliary-pancreatic and gastric-oesophageal which are typical routes in most countries. "But in Norway GI surgeons also cover acute and trauma surgery and relatively minor operations such as laparoscopic hernias and gall bladders – not every specialist has the luxury of choosing one organ and focusing only on that. Cancer needs to be seen in context with other conditions that reduce quality of life."

He adds that operating on non-cancer conditions may use similar techniques and it is important to gain wide experience, and that Norway has, over time, consolidated expert cancer care among various regional centres according to care pathways. "But this hasn't come from a focus on training surgeons as oncologists. It's about systems that implement the standard of care."

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Decision making, he adds, is the central issue. “Of course you need technical skills as a surgeon, but the most difficult thing is to know what all the options are – what to do and what order to do them. And what to do when an option fails or if a patient does not fit the guideline for a particular condition.” That is the essence of surgical oncology and being part of an MDT.

Towards harmonised qualifications: breast leads the way

ESSO has a core curriculum in surgical oncology, which was first proposed in 2008, although the [published version](#), dated 2013, is now quite old; Søreide says it is being updated and a new version should be out this year. There is also a position paper on a [global surgical oncology curriculum](#). The [European Board of Surgery of the Union of European Medical Specialists](#) (UEMS) is the main umbrella body for qualifications, and currently conducts exams in [general surgical oncology](#) and also [breast cancer surgery](#), both with curriculum input from ESSO. (ESSO also has two specialist schools, in [soft tissue sarcoma](#) and [peritoneal surface oncology](#), run jointly with associated societies.)

The UEMS exams judge only knowledge, although applicants do have to submit a logbook of operations. Wyld and colleagues are now taking European breast cancer surgery to the next level with [BRESO](#), a certification platform that aims to review training comprehensively as well as test knowledge.

The breast cancer community has long been in the vanguard of calling for and implementing dedicated resources such as breast units (the latest ‘[requirements of a specialist breast centre](#)’ from EUSOMA and ECCO specify that such units must have two surgeons available spending at least 50% of their time on breast disease and similar requirements are made in other tumour types in the [European Cancer Organisation Essential Requirements series](#)). Wyld notes there is good reason for the cancer focus in breast – “About 80% of our procedures in breast are on cancer.” [BRESO draws on ESSO’s curriculum and that of other bodies](#).

As Wyld adds, review of a putative breast surgeon for eligibility for BRESO will specify at last two years spent working at breast units, one at a high volume centre, and a wide range of evidence will be taken into account to reflect differences in European healthcare training systems. A formal qualification in breast practice is required such as the UEMS breast exam; others that can be considered are the University of East Anglia’s masters in oncoplastic surgery – which has a fee of about £7,500 (€8,700) – and the European School of Oncology’s [Certificate of Competence in Breast Cancer](#), developed with Ulm University in Germany. The partners in BRESO also see it as a key part of the lobby to improve breast care in Europe, [as advocate Shirley Bianca wrote recently in Cancer World](#).

In the UK, says Wyld, while breast still comes under the ‘specialism’ of general surgery, the country has gone further than most to develop a pathway for breast surgery to become a subspecialism, not least because oncoplastic procedures were introduced into training some time ago.

Through the [Intercollegiate Surgical Curriculum Programme](#) (ISCP) platform, trainees can develop a portfolio of formally assessed breast cancer surgeries, she says. “For example, the other day I was supervising a trainee doing a breast reconstruction with axillary clearance. After the surgery, she sent me a link where I gave her a detailed assessment of how she performed the operation and how much support she needed from me. In this way we can see the trainee gaining skills and becoming more independent. They can build up a portfolio of specialist ‘index’ operations as they near the end

of the training, attesting to their competence before they are allowed to practise independently.” The ISCP system is excellent and the result of many years of hard work to set up and perfect, notes Wyld.

[Discussions are ongoing](#) as to whether breast surgery becomes a fully fledged speciality that integrates plastic procedures, which could free trainees (who can join a trainee group called [Mammary Fold](#)) from also being ‘on call’ to do emergency and other non-relevant work after deciding on a career as an oncoplastic breast surgeon. There is a [new UK surgery curriculum](#) that will see oncoplastic surgery start to diverge from mainstream general surgery part way through training, resulting in better trained breast cancer specialist surgeons. (See also [this paper](#) by Wyld and colleagues on the status of breast surgery training in the UK and elsewhere.)

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So the aim in the UK and with BRESO, says Wyld, is to embed a widespread pathway to being a certified breast cancer surgeon rather than it being an adjunct to general surgery – and in so doing to address the [gaps in breast surgery training](#) and in care that are still common in Europe. “A lot of older surgeons are not trained in oncoplastic reconstructions, so many women are being offered only mastectomies, and some are also suffering bad outcomes from lumpectomy because surgeons don’t understand therapeutic mammoplasty,” she says. A lack of knowledge of the latest research on neoadjuvant medical therapy (before surgery) is another shortcoming.

As Wyld notes, a complex breast reconstruction with LD [latissimus dorsi] flap can take more than five hours, as can bilateral therapeutic mammoplasty. “Many general surgeons don’t know how much more complex breast surgery has become.” (See also a paper on [knowledge gaps in oncoplastic breast surgery](#) by the Oncoplastic Breast Consortium.)

It’s early days for BRESO, but Wyld can envisage a time where European women will be able to visit the site to find a certified oncoplastic breast surgeon, and a number of surgeons are already signed up. Taking a formal exam in breast surgery is also becoming more popular. As an indicator of numbers, there were about 70 applicants for the most recent UEMS breast exam and the pass rate is usually about 60–70%.

Also, from the cancer side, a society that has made much progress is the [European Society of Gynaecological Oncology \(ESGO\)](#), which has had a certification programme for ovarian cancer surgery centres since 2016, and this year launched a new [curriculum for trainees](#), who must have two or three years training at an accredited gynaecological oncology unit. The impact of doing an accredited fellowship is [discussed here](#).

Models from the US - and finding common ground

The US looks to be a leader in surgical oncology certification. For example, the BRESO team cites [a breast surgery fellowship](#) in the US overseen by the Society of Surgical Oncology (Australia and New Zealand also have breast fellowship schemes). In 2011, the [American Board of Surgery introduced certification](#) for what it terms ‘complex general surgical oncology’. It’s a two-year fellowship that, apart from surgical management of cancer, includes multidisciplinary care, basic research and

clinical trial design, patient counselling and even oncology leadership.

The journey to recognise surgical oncology at this level has been a long one in the US – unofficial fellowship training dates back as far as 1947

It's certainly ambitious, as it aims for experience in surgery with most organ sites, but [a recent article on how to implement it](#) recognises that an oncology related subspeciality such as breast may be a more appropriate pathway in some institutions. The authors also note that the journey to recognise surgical oncology at this level has been a long one in the US – unofficial fellowship training dates back as far as 1947.

An aspect raised by such fellowships is the role of surgeons in research, as there are concerns that the 'surgeon scientist' is becoming an [endangered species](#) amid pressures on time, support and funding, including in cancer, [as this article discusses](#). Surgical oncology does not seem to be as widely recognised as an academic discipline as it should be but appears to be on more solid ground in the US.

Another initiative in the US is the [Commission on Cancer](#), a consortium of organisations including the American College of Surgeons, which has set standards for accreditation for cancer programmes. Among them are surgical oncology standards for sentinel node and axillary lymph node procedures in breast cancer, excision of primary cutaneous melanoma, colon resection, total mesorectal excision (TME) in rectal cancer and pulmonary resection. To achieve these standards, reviewers need to see synoptic (not narrative) operative and pathology reports, and it is a developing programme – as new procedures have only recently been added – with a deadline for organising more reporting systems set for 2023.

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This all sounds basic oncology and similar standards are in place in some European countries, but raising the level to the gold standard across Europe is a big challenge, as Søreide confirms. “Many countries are still stuck in the old general surgery paradigm, but when we start to encourage subspeciality training it is hard to find common pathways, because there are so many specialist interest organisations.”

By this Søreide means the organ societies such as the European Society of Coloproctology, which has a large number of members and multiple interests with cancer being only one. “It can be hard to get a consensus on surgical oncology,” he says. “I’m on the training committees of ESSO and the [European-African Hepato-pancreato-biliary Association](#), but even though we have common interests there are so many other issues that it is sometimes hard to find common ground.”

This isn't to say that the organ societies are not engaged with cancer – the [European Respiratory](#)

[Society](#), for example, has been a leader in uncovering shortcomings in European lung cancer care in recent years, and UEMS is currently calling for [harmonisation of thoracic surgery in Europe](#), within which thoracic oncology probably accounts for [about 50% of workload](#). But progress is often slow in Europe, and people and initiatives come and go.

The common ground must be that no matter how the health system is organised, cancer patients must be on a pathway that finds them operated on by surgeons trained and assessed, and with ongoing education, in the standard of oncological care as part of an expert MDT.

Illustration by Sara Corsi