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Does your metastatic breast cancer (MBC) patient have a germline *BRCA* (g*BRCA*) mutation?

THERE'S

POWER

IN

KNOWING

THERE'S POWER IN TESTING FOR g*BRCA*

4th ESO-ESMO International Consensus Guidelines for Advanced Breast Cancer

In the ABC setting, results from genetic testing may have therapeutic implications and should therefore be considered as early as possible.

Genes to be tested depend on personal and family history; however, at present, only germline mutations in *BRCA*1/2 have proven clinical utility and therapeutic impact.[1]

What g*BRCA* mutations account for

~3-6%
of all breast cancers[2-5]

~4-16%
of male breast cancers[6]

~25%
of hereditary breast cancers[7,8]

Testing at MBC diagnosis

Testing for a g*BRCA* mutation at MBC diagnosis may help inform treatment planning.[9*]

*Relevant for patients who did not receive previous g*BRCA* testing and/or for patients who received only somatic *BRCA* testing.

ABC=advanced breast cancer; *BRCA*=breast cancer susceptibility gene; HER2=human epidermal growth factor receptor 2; HR=hormone receptor; TNBC=triple-negative breast cancer.

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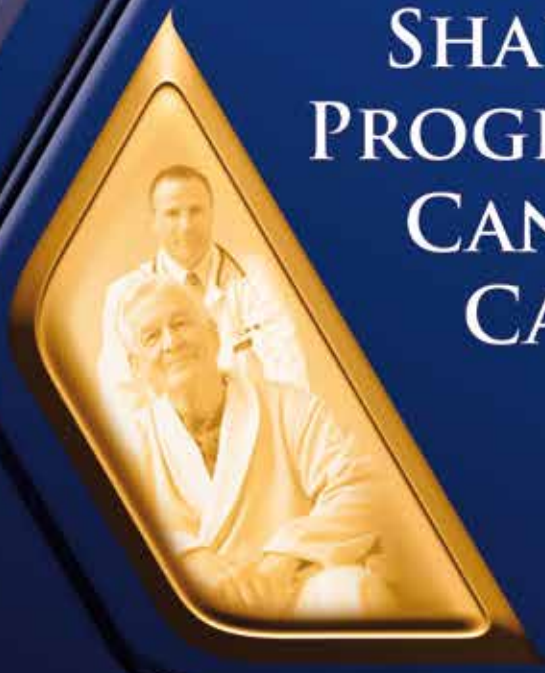
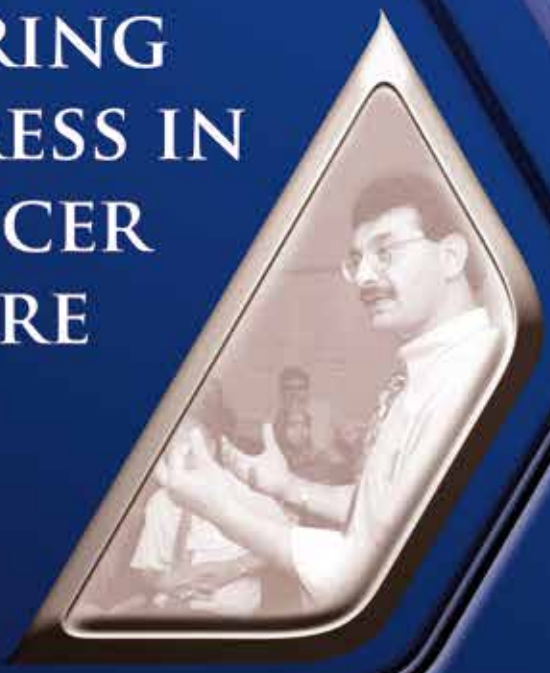
Learning to care

Sharing Progress in Cancer Care





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Team members learn from one another

Alberto Costa, Editor

"Multidisciplinary team meetings have become meaningless." "It's a rubber stamp." "It's a bureaucratic exercise." These comments, made by oncologists from a number of countries at an ESO meeting to discuss training needs, paint quite a dispiriting picture.

It seems we still need to win the argument with key clinicians about why care is better when voices from across cancer disciplines are heard, and we need to explain to hospital administrators what has to happen to make MDTs viable.

The good news is that Europe's professional cancer societies seem to be very willing to deliver those explanations and win those arguments.

First up, the European Society of Pathology – a very lively scientific society, with more than 3000 members and over 50 years of history. In this era of personalised cancer medicine, pathologists view the heavy responsibility they have in determining treatment decisions, and even communicating their findings to patients, with a mixture of nervousness and enthusiasm.

At a strategy retreat held in Athens in January, they took a close look at how they can best discharge that responsibility. They also considered how moving to digital scanning of specimens could help their efforts to explain their findings at MDT meetings, as well as facilitating teaching and second opinions.

ESTRO, Europe's radiation oncology society, has also been arguing the case for more effective multidisciplinary treatment planning and decision making, through their Marie Curie Legacy Campaign. They have compiled evidence to show that a least one in four patients in Europe who could benefit from radiotherapy do not get it.

At a meeting with policy makers at the European Parliament, at the end of January, they argued for the need to address shortfalls in training, capacity and research. But they also pointed to a pattern of failure by clinicians from other disciplines to offer radiotherapy to patients who could benefit.

Mention was also made, at that meeting, of the 'Essential requirements for quality cancer care' recommendations, which are being drawn up by ECCO, and will be presented later this year at ASCO.

But responsibility also lies with every cancer professional to understand and respect the contribution made by everyone else involved in a patient's care.

The take home message: talk more to your pathologist and other members of your team, and learn about what they do. You may find yourself becoming a better clinician!

To comment on or share go to bit.ly/CW85-TeamLearning

Brachytherapy: halting the spiral of decline

Brachytherapy, a standard of care for some cancer indications, which involves delivering radiotherapy from a source within the tumour, is underfunded, increasingly marginalised and in decline across much of Europe. **Janet Fricker** talked to specialists from ten countries, and asked why is this happening, does it matter, and what can be done about it?

In the past few years a spate of editorials have been published in medical journals with emotive headlines including "Brachytherapy: where has it gone?", "Resurrecting brachytherapy from brink of oblivion" and "Brachytherapy: a dying art or missed opportunity?" Such coverage raises questions about whether brachytherapy is truly moribund, and if so should efforts be made to rekindle its flame?

To gain a snapshot of trends in brachytherapy use across Europe, and explore whether the current patterns of use are optimal in terms of benefit to patients and sustainability of health services, *Cancer World* spoke to radiation oncologists from nine European countries, and one from the United States – almost the sole source of data on trends in use.

The picture that emerged reveals that use of brachytherapy does appear to be declining in most countries we spoke to; the decline is not primarily driven by evidence of patient benefit or value for money; and many patients who might benefit are never offered brachytherapy as an option.

Three common themes emerged: challenges in the education of the next generation of radiation oncologists; the need to rebrand the image of brachytherapy; and the farce of achieving adequate reimbursement for brachytherapy.

Brachytherapy is a form of radiotherapy involving placement of a short-range radioactive source within or close to the site of cancer. Dating back to the discovery of radioactivity in 1898, it represents one of the oldest forms of radiotherapy, but perhaps the least known today.

In the past few years, the technology has undergone a period of renaissance. Modern brachytherapy consists of a series of steps involving insertion of applicators (catheters or needles) to transmit the radioactive material into the patient's body, followed by delivery of the radioactive source into the applicator by the afterloader device, which stores the source safely between use. Image acquisition, using ultrasound, CT or MRI scans, supports physicists using complex software to plan treatment to sub-millimetre precision, precisely contouring the

Many patients who might benefit are never offered brachytherapy as an option

Austria: fewer procedures done in regional centres

"Around 12 of Austria's 14 radiotherapy centres perform brachytherapy, with the highest number of procedures done at the Medical University of Vienna. Top indications for brachytherapy are prostate, cervical/endometrial, breast, anal, rectal, head and neck, skin and bronchus, in that order. The Medical University of Vienna has a strong tradition of brachytherapy research and coordinates EMBRACE, a multicentre study of MRI-guided brachytherapy in locally advanced cervical cancer.

"In Vienna, the number of brachytherapy patients we treat has remained more or less stable, although this is probably due to increased referrals from regional centres, where numbers are consequently falling.

"We feel it is important for patients to be treated by brachytherapy specialists with experience performing a high number of similar procedures each year. Just because they perform brachytherapy for one indication doesn't mean that they know how to perform it for another. Such levels of specialisation can create training issues, however.

"Radiation oncologists trained at radiation oncology institutes may not have been exposed to all types of brachytherapy. We need to find a way to achieve a balance.

"In Vienna, we've no problems with brachytherapy reimbursement, which is calculated according to the number of publications and trainees. However, we believe that regional reimbursement levels fail to take into account the true costs of brachytherapy to the service."

Christian Kirisits, Medical University of Vienna

Czech Republic: access depends on who the patient sees first

"Out of 25 radiotherapy centres in the Czech Republic, 15 offer brachytherapy. Studies suggest that around one-third of Czech cancer patients receive radiotherapy, which is considerably fewer than our 50% target, with 7–9% of these receiving brachytherapy.

"The main indications are for gynaecological cancers, especially cervical and endometrial, which account for 70% of all brachytherapy procedures. Additionally, three to four centres perform prostate and a few head and neck and breast boost, including partial breast irradiation. We also perform limited procedures for bronchial, skin, and penis cancers and soft tissue sarcomas.

"Learning brachytherapy techniques is an integral part of radiation oncology training, with all trainees required to spend at least three months in brachytherapy departments. Stays, however, are limited, making it hard for them to acquire sufficient skills, especially manual skills, to practise independently.

"We would like to rationalise the service, offering it in fewer centres to allow clinicians to acquire greater expertise. However, this is unpopular politically as patients want to have the service located close to their homes.

"Access to brachytherapy procedures is often determined by the clinician who patients consult first, with many urologists and dermatologists being reluctant to refer patients for brachytherapy. Insufficient reimbursement of brachytherapy procedures in particular, as well as radiotherapy in general, is another issue we are facing."

Hana Stankusova , University Hospital Motol, Prague

radiation to the volume needing treatment.

According to Bradley Pieters, a radiation oncologist from the Amsterdam Academic Medical Centre, who chairs the GEC–ESTRO Brachytherapy Committee, the great advantage of brachytherapy lies in its "unparalleled ability" to direct large doses of radiation to the tumour while more or less sparing healthy tissue in the neighbourhood. Placing the radiation source inside the affected organ also has other benefits. It avoids the hazards of aiming for a moving target, which can skew dose delivery with external beam radiation if the tumour shifts position with the movement of a patient's breathing, or normal changes in their bowels or bladder. It also avoids the prolonged period of frequent hospital visits usually required for courses of external beam radiotherapy, thereby enabling patients to get on with their lives, and reducing adherence problems.

Downsides include the need for local or general anaesthesia, the risks of bleeding and infection involved in any invasive procedure, and challenges posed by access to the tumour site.

The most common use of brachytherapy is for cervical and prostate cancers, but it can also be employed for breast, bladder, oesophageal, head and neck (lip, tongue, cheek and tonsil), lung, gallbladder and anal cancers.

Trends in use

The period between the 1930s and 1970s can be considered the golden age of brachytherapy, when invasive radiation techniques represented the main mode of radiotherapy. But advances in external beam radiotherapy, such as intensity modulated radiotherapy (IMRT) and stereotactic body radiotherapy (SBRT), captivated clinical imaginations, resulting in declining interest in the older technology.

Published evidence regarding how this has impacted on brachytherapy use is sketchy, with much of the data coming from the United States. A study of men treated with either brachytherapy or external beam radiotherapy for low-risk prostate cancer, using the US National Cancer Database, showed the proportion treated with brachytherapy declined from 62.9% in 2004 to 51.3% in 2012 (*J Contemp Brachytherapy* 2016, 8:289–93).

A similar picture has emerged for treatment for locally advanced cervical cancer, with analysis of the Surveillance, Epidemiology, and End Results (SEER) database showing a decline in rates of brachytherapy use following

treatment with external beam radiotherapy, falling from 83% in 1988 to 58% in 2009 (*Int J Radiat Oncol Biol Phys* 2013, 87:111–19). The same study also found that brachytherapy treatment was independently associated with better cancer-specific survival (HR=64, 95%CI 0.57–0.71) and better overall survival (HR=0.66, 95%CI 0.60–0.74).

These findings are a cause for concern says Peter Orio, from the Dana-Farber Brigham and Women's Cancer Center, in Boston, and current President of the American Brachytherapy Society: "Brachytherapy is an extremely important and valuable tool in the armamentarium to cure cancer. As a profession we'd be taking a huge step backward if we allow something that works so well to disappear simply because it isn't perceived as being as exciting or sexy as some of the emerging technologies."

In Europe, the only available data on brachytherapy come from a 2013 review published in *Lancet Oncology*, which revealed there were 657 brachytherapy facilities, representing 52% of all radiotherapy centres (*Lancet Oncol* 2013; 14:e79-e86). No European data are available to indicate whether the number of centres offering brachytherapy has fallen or what has happened with throughput of patients.

On the basis of responses to questions *Cancer World* put to radiation oncologists across nine European countries, we can reveal that brachytherapy use is seen to be in decline in Austria, Czech Republic, Italy, Hungary, Poland and the UK, while in Spain, Slovenia and France, levels of use seem to be more stable.

We also found that the types of cancers treated by brachytherapy vary markedly across Europe. While most brachytherapy centres offer cervical, uterine and prostate procedures, use in breast cancer is less predictable, with countries such as the UK and Slovenia providing no service for this indication. Whether treatments for indications such as skin, head and neck, penile, anal and oesophageal cancers are offered seems largely dependent on local expertise developed at individual centres. Indications for brachytherapy appear in flux, for example in Spain, where overall brachytherapy use remains stable, procedures for

France: many radiation oncologists learn no brachytherapy during training

"Data from the National Cancer Survey show that, out of 182 radiation therapy departments in France, 54 perform some sort of brachytherapy. Forty-one centres offer cervical procedures, 23 prostate and three breast, with brachytherapy also occasionally performed in head and neck, penile, anal and skin cancers and soft tissue sarcoma. In high- and intermediate-risk prostate cancer, we are particularly concerned that only 10 centres offer external beam with brachytherapy boost, which has been shown to deliver better outcomes than external beam alone.

"France used to be famous for brachytherapy. But in 2014, when low-dose sources were removed from the market, many centres were not prepared to buy the high-dose equipment, and stopped offering procedures. This is not necessarily a bad thing, as we feel it would be best to have no more than 30 or 40 dedicated brachytherapy centres in order for radiation oncologists to achieve adequate experience.

"Many radiation oncologists in France have not experienced brachytherapy procedures during training. To address this, the brachytherapy group of the French Society of Radiation Oncology organises annual training programmes to teach 10-15 radiation oncologists who either missed out on brachytherapy during initial training or want to update their technique. Training includes a theoretical component and a practical component, with the chance to practise procedures on a simulator.

"Reimbursement is an issue in France, as no account is taken of the cost difference between easy procedures and more complex procedures requiring imaging and anaesthesia. Some institutions who believe in brachytherapy redistribute money from other sources of funding, but others are not willing to do this, leading to a loss of the service."

Jean Michel Hannoun-Levi, Antoine Lacassagne Cancer Centre, Nice

Hungary: prostate cancer patients are missing opportunity for boost

"In Hungary we have 13 radiotherapy centres serving 10 million inhabitants, with two in Budapest and the rest in the regions. For each radiotherapy centre it's mandatory to have a minimum of two linear accelerators and one high-dose-rate afterloader, which ensures all centres have the equipment to perform brachytherapy. However, in reality 90% of the centres offer brachytherapy only for gynaecological procedures; other indications such as prostate, head and neck, and breast, are only performed at the national centre. Unfortunately, there's no requirement for regional centres to refer patients to the national centre, so they often get external beam only. We're particularly concerned that many prostate cancer patients are missing out on the opportunity for brachytherapy boost, which in some indications is more effective than external beam alone.

"There are two reasons why regional centres may be reluctant to perform brachytherapy. First, radiation oncologists also administer chemotherapy, so they have limited opportunities to get to grips with complex brachytherapy procedures. Second, centres are well aware that brachytherapy treatments are not adequately reimbursed, and they are reluctant to lose money.

"We've been compiling a dossier to support proper reimbursement of brachytherapy, including clinical evidence, the true cost of all the different types of treatment, and cost-benefit ratio comparisons with alternative treatments. This took around two years, and the dossier is now with the national health insurance company. We're confident that we will be successful as we previously undertook a similar process with CyberKnife that resulted in an increase in reimbursement for stereotactic ablative body radiotherapy. Once brachytherapy is adequately reimbursed, we hope that regional centres will be more willing to offer a wider range of brachytherapy techniques."

Csaba Polgár, Director General of the National Institute of Oncology, Budapest

prostate and skin indications have increased, but those for head and neck and gynaecological indications have fallen.

Does it matter?

For certain indications in cervical and prostate cancer, studies have demonstrated that brachytherapy makes a significant difference to overall survival and disease-free survival respectively. In these cases, access to brachytherapy clearly does matter.

Locally advanced cervical cancer

Two retrospective US studies on outcomes in cases of locally advanced cervical cancer, using data from the SEER database (7,359 patients) and National Cancer Database (7,654 patients) respectively, showed that brachytherapy boost versus no boost significantly increased overall survival after external beam radiotherapy, and that using IMRT or SBRT as alternatives to brachytherapy boost also resulted in significantly worse overall survival (*Int J Radiat Oncol Biol Phys* 2013, 87: 111–19; *Int J Radiat Oncol Biol Phys* 2014, 90:1083–9).

Commenting on those and other studies in an editorial titled: 'Curative radiation therapy for locally advanced cervical cancer: brachytherapy is NOT optional,' radiation oncologists from the US and Europe raised concerns about evidence indicating that physicians in the United States may be attempting to replace brachytherapy with external beam boosts, arguing that this could lead to unnecessary recurrences, toxicities, and even deaths. "A new drug yielding a 10% survival improvement would be heralded as a great advance. Ironically, it is likely that we could achieve similar improvements in the outcome of patients with cervical cancer by simply applying tried and true radiation therapy techniques using best practice guidelines," wrote the authors (*Int J Radiat Oncol Biol Phys* 2014, 88, 537–39).

Prostate cancer

The evidence for brachytherapy in prostate cancer is also well established, used as a monotherapy for low- and intermediate-risk patients

Italy: many centres with facilities do not provide the service

"The brachytherapy study group of the Italian Association of Radiation Oncology (AIRO) recently undertook a survey to provide a snapshot of brachytherapy services across Italy, to define policy goals [*J Contemp Brachytherapy* 2018, 10:254–59].

"One third of radiation oncology centres responded – 66 out of 197. Almost half of the responding centres that are equipped with brachytherapy facilities either do not deliver the service at all, or delivered less than the demand for it, because of lack of staff, or expertise, or up-to-date equipment. The majority of treatments were administered to outpatients for gynaecological indications. Fewer centres provided brachytherapy for prostate, breast or head and neck cancers.

"While we don't have data to show a decline in brachytherapy procedures, we have a strong sense this is happening. One reason is skill shortages, as radiation oncologists are not given sufficient time in training to gain interventional brachytherapy skills, which take several years to acquire.

"The legal minimum requirements for accreditation of Radiation Oncology schools include brachytherapy practical teaching. However, our own education survey – yet to be published – shows most departments don't have experts capable of teaching all the potential brachytherapy applications, especially for indications beyond cervical and endometrial cancers. But we have rediscovered a passion for brachytherapy, in Italy, and are making efforts in education, national clinical guidelines and patient/physician communication. We would like to see specific training courses set up, and a Masters' qualification in brachytherapy for radiation oncologists.

"The AIRO study group is also involved in managing national guidelines for brachytherapy in specific clinical practice situations, and is developing a national network for research. We believe brachytherapy for frequent applications, such as cervical, endometrial, prostate and skin cancer, should be available in all centres, but rarer indications, such as sarcoma and eye, should be concentrated in a specialist centres, to achieve sufficient volumes to establish expertise.

"Some types of brachytherapy procedures are not adequately reimbursed in Italy."

Luca Tagliaferri, Fondazione Policlinico Gemelli IRCCS, GEMELLI-ART, Rome

and as a boost, following external beam radiotherapy, for higher-risk disease.

Two recent randomised controlled trials have demonstrated significant improvement in biochemical disease-free survival when brachytherapy was used as a boost strategy for patients with higher-risk disease. In patients with high-risk localised prostate cancer, rates of relapse free survival were significantly higher in patients treated with brachytherapy versus no such boost following external beam radiotherapy (*Radiother Oncol* 2012, 103:217–22).

In patients with intermediate- and high-risk prostate cancer, randomised to a standard arm receiving 12 months of androgen deprivation therapy and pelvic irradiation, followed by dose-escalated external beam therapy, or to an experimental arm substituting brachytherapy for the external beam therapy, biochemical failure was twice as high in the external beam arm at a median follow-up of 6.5 years (*Int J Radiat Oncol* 2017, 98:275–85). An overall survival advantage has yet to be reported for either study, but, as Orio comments, "The importance of biochemical control cannot be underestimated in prostate cancer treatments, as it triggers a cascade of events that reduce quality of life."

"We're concerned that if brachytherapy isn't made available to some cervical and prostate cancer patients this could jeopardise their chance of achieving good outcomes," says Pieters. His fears are echoed by the radiation oncologists we interviewed, who reported that in Austria, France, Hungary and the US, for instance, there are women who would benefit from cervical brachytherapy who are not being offered it, while in the Czech Republic, France, Hungary, Slovenia, Spain, the UK and US there are men who would benefit

from prostate brachytherapy who are not being offered it.

Other indications

Evidence for differences in overall survival favouring brachytherapy for other indications are less clear. "The sophistication of external beam radiotherapy has greatly increased, becoming much more conformal, with the result that there are fewer situations favouring brachytherapy than a few years back," says Csaba Polgár, Director General of the Hungarian National Institute of Oncology, in Budapest.

In the UK, Li Tee Tan, from Addenbrooke's NHS Trust, Cambridge, takes a pragmatic approach. "We need to fight the battles that really matter in brachytherapy, making sure it's available for indications where there are proven advantages over other modalities. It isn't practical to say everyone should get brachytherapy, because that just won't happen. The reality is that in some circumstances external beam offers competitive results that can provide sufficiently high doses to small areas," she says.

For indications beyond cervical, endometrial, and prostate cancer, studies comparing outcomes for brachytherapy versus other radiation modalities are largely lacking. "The problem is that device companies are reluctant to invest in studies around technology that has a limited turnover," explains Christian Kirisits, a medical physicist from the Medical University of Vienna, who is a past chair of the GEC–ESTRO Committee.

Yet even where evidence of a survival advantage is lacking, the option of brachytherapy as an alternative to daily trips to a radiotherapy centre still offers advantages for many patients, which could translate into a survival benefit if patients forgo the external beam treatment rather than making those journeys.

Shortfalls in education and training

Many of the radiation oncologists we spoke to are concerned that the decline in numbers of radiation oncology graduates with sufficient training in brachytherapy is feeding into a cycle of fewer doctors feeling comfortable to perform brachytherapy, which in turn means that they are not transmitting their enthusiasm to the next generation.

The country representatives we talked to (Austria, Czech Republic, France, Italy, Hungary, Slovenia, Spain, UK and US) felt that too few

Poland: attracting young specialists, and access to imaging, are a challenge

"In Poland 36 out of 45 radiation oncology departments offer brachytherapy. We treat almost all types of cancer with brachytherapy according to the GEC-ESTRO and American Brachytherapy Society recommendations. The procedures offered vary according to expertise at individual centres. Almost every centre offers gynaecological tumour procedures; treatment of other cancer types, such as ocular melanoma, is offered in only a few centres. Due to technical difficulties we don't offer brachytherapy for brain or bladder cancer. Most procedures are done on an out-patient basis by radiation oncologists who must have a specialist degree.

"Although we have no hard evidence from surveys, our general impression is that the use of brachytherapy is declining in Poland. We think this may be due to a tendency to replace it with newer techniques, such as CyberKnife, as well as issues around access to imaging and problems with attracting young specialists. There are definitely patients in Poland who would benefit from brachytherapy but are not getting access.

"The Polish health reimbursement system does little to encourage use of brachytherapy, as the reimbursement does not take into account the location of the cancer or complexity of the treatment. Recently we were forced to stop offering accelerated partial breast irradiation, the SAVI applicator and permanent prostate brachytherapy with seeds, because levels of reimbursement made the service unsustainable."

Janusz Skowronek – Greater Poland Cancer Centre, Poznań

Professor Skowronek (1964–2018) sadly died shortly after this interview

Slovenia: urologists aren't telling men about all their options

"Slovenia, a small country with a population of two million people, has one comprehensive cancer centre employing five radiation oncologists who can perform brachytherapy.

"We treat approximately 500 patients with brachytherapy each year, a figure that has remained more or less stable over the past five years. Cervical and prostate are our most frequent sites, with a few cases of skin, anal and eye cancers performed each year. We know that, compared to western European colleagues, we treat fewer brachytherapy locations, but we hope to start offering accelerated partial breast irradiation after surgery in the near future.

"We enjoy good relations with gynaecology colleagues, who refer all relevant cervical cancer cases to us. One of our biggest concerns, however, is that urologists who diagnose prostate cancer aren't telling men about all their options, and that we only see a small proportion of men we could help.

"Radiation oncology trainees only learn about brachytherapy when assigned to our team; there's no formal training in Slovenia.

"We're currently lobbying the National Health Insurance Institute to improve reimbursement for brachytherapy. To this end, we've undertaken extensive research, costing out each individual brachytherapy procedure. We are aware that for gynaecological cancers, for example, we're only getting one third of our actual costs reimbursed."

Barbara Šegedin, Institute of Oncology, Ljubljana

young brachytherapists are being trained to support a future service.

Across Europe there is no overall official training programme for brachytherapy. While in Austria, Czech Republic, Italy, Hungary, Spain and the US it is obligatory for radiation oncologists to get some experience of brachytherapy in their training, in other countries, such as France, Slovenia, and the UK, no such training is mandated. Pieters wants this to change. "Not every radiation oncologist needs to be able to perform brachytherapy, but they all need to have covered it in specialist training so it's firmly on the menu when talking to patients about options." Not all radiation oncologists, he adds, prove suited to performing the technique. "They need to be surgically minded with good hand–eye coordination."

When radiation oncologists decide that they would like to perform brachytherapy they require sufficient exposure to make them proficient. "Brachytherapy is an art, it's a unique type of radiotherapy combining scientific knowledge, advanced manual skills and judgement. Trainees need at least a year to become proficient to practise," says Pieters. Countries like France and the US, are now coordinating catch-up educational sessions for radiation oncologists who have either missed out on brachytherapy experience in their initial training or need to update their skills.

"Many urologists and dermatologists know little about brachytherapy, and aren't referring patients with skin and prostate cancer to us"

Educational activities also need to target medical students to make them aware of the technology in their future careers. "Access to brachytherapy is often determined by the clinician patients consult first. We've found that many urologists and dermatologists know little about brachytherapy, and as a consequence aren't referring patients with skin and prostate cancer to us," says Hana Stankusova, from the department of Oncology and Radiotherapy, at the University Hospital Motol, in Prague.

Profile and image issues

Many radiation oncologists we spoke to raised the 'image problem'. External beam radiotherapy is currently considered the *zeitgeist*,

Spain: active group has boosted image, new recruits and reimbursement

"Around half of Spain's 120 radiation oncology departments offer brachytherapy.

"For prostate and skin tumours, brachytherapy is on the rise; while for head and neck and cervix it is declining. We are also starting to use brachytherapy to perform partial breast irradiation for low-risk tumours instead of external beam. It has advantages here, including being quicker, offering better cosmetic results, and above all less irradiation of the heart and lungs.

"Spain's strong tradition of brachytherapy can be largely attributed to the enthusiasm of the Spanish Brachytherapy Group, which started in 2001, and with 200 members now represents the largest subgroup of the Spanish Society of Radiation Oncology. Each year the group holds a consensus meeting around specific topics in brachytherapy, exploring how different centres perform the technique, and then reaches a consensus about the best approach. Other achievements for the group include writing two brachytherapy textbooks (published in 2008 and online in 2016), which are used throughout the Spanish-speaking world.

"With such a strong community, Spain has no difficulty attracting young radiation oncologists to brachytherapy. It is mandatory for radiation oncologists in Spain to spend at least two months of their four-year training practising brachytherapy, with the result that everyone has had exposure to the technique. Although new techniques of external radiation are attractive for young specialists, they cannot achieve as high local doses as brachytherapy.

"In Spain we don't have any issues regarding brachytherapy reimbursement, as five or six different levels have been defined that take into consideration the complexity of different procedures."

José Luis Guinot, Fundación Instituto Valenciano de Oncología, Valencia

while brachytherapy is seen as a much more traditional approach to practising medicine, which may not appeal to younger iPad-orientated generations. "With external beam different members of the team work sequentially, with both the clinicians contouring the target and the physicists planning the dose able to work remotely from home without ever having to see the patient," says Kirisits. By contrast, he adds, brachytherapy is often seen as an old fashioned approach, with the different members of the team needing to sit together to plan the procedure, and interact as a group in the operating theatre.

"In the modern world brachytherapy is a completely different beast that involves complex imaging and computing"

The real irony, says Orio, is that the new technologies causing such a flurry of excitement have all been designed to mimic what has been safely done with brachytherapy for many years. "Just because these technologies are shiny and new, regardless of the associated costs, everyone is gravitating towards them," he says. People forget that brachytherapy has also undergone technical advances. "In the modern world it's a completely different beast that involves complex imaging and computing," says Pieters.

A number of interviewees argued in favour of changing the term 'brachytherapy' to 'interventional radiotherapy', which they feel not only sounds more contemporary but would more effectively convey the nature of the technology and help attract young clinicians to train in the technique. The Italian Association of Radiation Oncology has already added 'interventional radiology' into the official name of their brachytherapy study group.

Many also argued that conferences and radiation oncology meetings often reinforce the marginalisation of brachytherapy, by side-lining presentations into specialist tracks. Kirisits would like

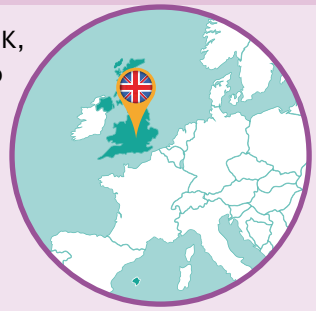
UK: we need to centralise services for less common indications

"In the UK most radiotherapy centres offer brachytherapy in some form or other. The most common tumour sites treated with brachytherapy are cervix, endometrium and prostate, which have remained more or less stable over the past few years. Use of brachytherapy for other sites such as anus, oesophagus, lung, and head and neck is in decline.

"With the exception of anal cancers, where brachytherapy may allow preservation of the rectum and avoid a permanent stoma for patients, I'm not unduly concerned by the reduced range of tumour sites as external beam probably achieves very similar results.

"The Royal College of Radiologists has published guidelines stating that medical oncologists should treat a minimum of 10 patients each year with brachytherapy for each tumour site. However, with the services spread so thin, this in practice is often not achievable.

In a small country like the UK, where patients don't have to travel large distances, it may be sensible to rationalise brachytherapy services, concentrating expertise in a few centres, particularly for less common tumour sites.



"In the UK, clinical oncologists undergo a five-year training programme that covers external beam radiotherapy and chemotherapy for all types of tumours. There is often not sufficient time for exposure to brachytherapy as well. Reimbursement is also challenging, with reimbursement for prostate brachytherapy not even covering the costs of radioactive seeds."

Li Tee Tan, Addenbrooke's NHS Trust, Cambridge

to see this technique better represented in main sessions. "We need a new model where presentations of trial results are scheduled for the main programme to inform everyone about the latest developments, with only the more detailed practical information reserved for specialist tracks," he says.

The reimbursement paradox

While issues regarding training, profile and image can all help explain the decline in the use of brachytherapy across much of Europe, a bigger problem may be that reimbursement levels are typically so poor that hospitals offering the service frequently incur a net financial loss.

Radiation oncologists in Austria, Czech Republic, France, Italy, Hungary, Poland, Slovenia, UK, and US all describe problems receiving adequate reimbursement for brachytherapy from their countries' departments of health. Of all the countries we spoke to, only Spain reported having no issues with funding, describing a system where a range of tariffs had been devised that take into consideration the complexity of different brachytherapy treatments.

At the heart of the problem, says Polgár, from Hungary, is that "health departments reimbursing treatment have no real understanding of the complexity of brachytherapy and how costs go beyond radiation equipment." On top of costs of catheters, needles, and radiation sources, you have to factor in the cost of different imaging modalities and the involvement of multiple different health professionals – not just radiation oncologists, but physicists, anaesthetists and nurses.

Complicating the picture is a wide variation in costs associated with treating different indications, says Tan, from the UK. While the equipment and work flow involved in external beam radiotherapy is largely standardised, the workflow in brachytherapy is far less predictable, making it much harder to estimate costs, she says. "To really drill down on costs you need to collect a lot of additional information such as whether the patient needed to stay overnight or required imaging."

Reimbursement levels are typically so poor that hospitals offering brachytherapy frequently incur a net financial loss

USA: we could lose brachytherapy services if we don't take action

"In the US we train around 180 radiation oncologists each year, of whom only 30 go on to use brachytherapy routinely in their practice. Prostate cancer represents the most common technique, followed by cervix and breast, with less commonly performed techniques including head and neck, lung, gastrointestinal and central nervous system.

"A number of US studies have suggested brachytherapy utilisation is on the decline, especially in prostate and cervical cancers. We are particularly concerned by the cervical cancer situation, as studies show there is a 10% decrease in survival when brachytherapy is omitted from treatment. For other cancers, brachytherapy represents a convenient option – patients require fewer treatments than external beam radiotherapy, but it does not make a difference to survival. The difference in number of treatments can make a difference to quality of life for patients who have to travel vast distances for treatment.

"The US fee-for-service payment system, based around the notion that every time a clinician performs a service they can bill for it, undoubtedly represents one of the reasons for the decline in utilisation of brachytherapy. Taking the example of prostate cancer, external beam radiotherapy requires 44 separate treatments over a nine-week period, while brachytherapy only requires one or two treatments. Such big financial differences provide a disincentive to offer brachytherapy. There is hope that the Department of Health and Human Services' Cost Containment System, scheduled to be introduced in 2020, will improve the situation. The new system, which focuses on quality and treatment outcomes, will penalise clinicians financially if their initial treatment does not work.

"The American Brachytherapy Society is deeply concerned that if we don't take action we could lose this beautiful delivery method that's been the cornerstone of radiation for over 100 years. To this end, we've launched the 300 in 10 initiative, which aims to train 300 brachytherapists over the next 10 years to prevent declining skills. We've also introduced a scholarship programme to fund radiation oncologists and their physicists together to attend residential courses updating them on brachytherapy techniques with the opportunity to practise on simulators. Additionally, with our 'Know Your Options' campaign, we are working to educate patients and to empower them to seek all the information they can about treating their specific disease, including radiation therapies and brachytherapy, so that they can make the most informed decisions regarding the care they elect to receive."

Peter Orio, Chairman of the American Brachytherapy Society, and Dana-Farber Brigham and Women's Cancer Center, Harvard Medical School, Boston, Massachusetts

Jean-Michel Hannou Levi, from the Antoine Lacassagne Cancer Centre, Nice, agrees. "Funders often have no real appreciation that vaginal brachytherapy is an easy technique that just involves placing the source in the vagina, while cervical or prostate brachytherapy are much more invasive, requiring a general anaesthetic," he explains.

The paradox is that brachytherapy equipment is by far the least expensive of all radiation therapy modalities. Installing a brachytherapy unit costs in the order of €400,000–600,000, compared to €2–3 million for an IMRT linear accelerator and €100–300 million for a proton centre, says Pieters. Such economical equipment outlays feed into the overall value of brachytherapy, he argues, even taking into consideration the additional staffing and paraphernalia needed.

A 2011 US study by Chirag Shah investigating the cost of different treatment modalities showed costs for individual patients with low- or intermediate-risk prostate cancer were $2,395 for low-dose-rate brachytherapy, and $5,467 for high-dose-rate brachytherapy, compared to $23,665 for IMRT (*Brachytherapy* 2011, 11:441–5).

"We believe inadequate reimbursement is one of the most important factors suppressing use of brachytherapy in Europe," says Pieters, adding that such penny-

Challenges in brachytherapy service delivery

	Declining use? [1]	Fewer centres offer it? [2]	Inadequately reimbursed? [3]	Mandatory training? [4]	Enough trainees? [5]	Access for all who can benefit:	
						cervical cancer? [6]	prostate cancer? [7]
Austria	√	√	√	√	X	X	–
Czech Republic	√	√	√	√	X	√	X
France	X	√	√	X	X	X	X
Italy	√	√	√	√	X	√	√
Hungary	√	√	√	√	X	X	X
Poland	√	–	√	–	–	–	–
Slovenia	X	X	√	X	X	√	X
Spain	X	√	X	√	X	√	X
UK	√	X	√	X	X	√	X
USA	√	√	√	√	X	X	X

1. Are you under the impression brachytherapy procedures are falling?
2. Is there a tendency for brachytherapy procedures to be referred to larger centres?
3. Do you have problems getting adequate reimbursement for brachytherapy procedures?
4. Is it mandatory to have at least some experience of brachytherapy procedures in radiation oncology training in your country?
5. Are sufficient young brachytherapists being trained to support the future service in your country?
6. Do all patients who would benefit from cervical brachytherapy get the opportunity for treatment?
7. Do all patients who would benefit from prostate brachytherapy get the opportunity for treatment?

pinching makes no sense given the excellent value for money it offers.

Luca Tagliaferri, from the Advanced Radiotherapy Unit of the Gemelli University Hospital in Rome, says that arguments in favour of rebranding the procedure as 'interventional radiotherapy' could be relevant here. "The name 'interventional radiotherapy'… allows health departments to understand instantly that it's an interventional procedure requiring higher reimbursement."

The GEC–ESTRO brachytherapy committee is planning to send out questionnaires to all European centres practising brachytherapy to achieve greater clarity about discrepancies between true costs and reimbursement. The questionnaires will first ask about the range of cancers treated with brachytherapy by the different centres, and then focus on different components involved in the way they deliver cervical cancer brachytherapy.

"We had to start somewhere so we chose cervical cancer first," says Tan, who is leading the questionnaire project. "We're trying to understand variations in practice for the same indication. Things like the different treatment protocols involved, the number of separate treatments, the amount of time taken up by each staff member, type of imaging used, and whether an inpatient bed was needed."

Such data can ultimately be used to calculate the health-economic information, such as quality-adjusted life years (QALYs), needed to make a convincing financial case for adequate reimbursement. The questionnaires will reveal the range of real world approaches that are being used to deliver brachytherapy, and which represents the best value. "In order to inform future services in brachytherapy we want to start with the facts and we think our survey represents the first steps to do this," says Pieters.

To comment on or share this article, go to bit.ly/CW85-BrachytherapyDecline

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New dawn in prostate cancer diagnosis

In expert hands, diagnostic multiparametric MRI is more effective than the dreaded prostate biopsy as the first step in identifying prostate cancers. It is certainly less unpleasant. Guidelines and practice are changing to reflect this, but concerns about capacity, access and risk stratification will need to be addressed, writes **Simon Crompton**.

When Brian Kavanagh saw a urologist after a blood test revealed an elevated PSA (prostate specific antigen) level, the immediate recommendation was a TRUS biopsy. He returned to hospital to have the procedure a few days later, and the experience still lives with him eight years later. First he had to wait two hours. Then the procedure was excruciating. "It was medieval," he says.

He was so shaken afterwards that he fainted as he left the hospital. Then a few days later, he was re-admitted with what turned out to be septicaemia, an infection caused by the biopsy. It took him three months

to shake it off – three months during which Brian felt faint, weak, shivery and unable to live life normally. "It was almost as if the infection was at the core of your being, and it was really frightening," he says.

"I was just devastated by the whole experience," says Kavanagh, who is Chairman of the Irish prostate patients' organisation, Men Against Cancer. "I can't say I was devastated for life, but I was devastated during the experience."

Having a TRUS (transrectal ultrasound guided) biopsy is the standard procedure following a raised PSA reading. It involves inserting an ultrasound probe into the rectum and then, guided by the ultrasound images, firing a fine needle along the probe, through the rectum wall and into the prostate, to remove a tissue core. This happens many times – usually 12 – as the doctor takes samples from different prostate areas.

Kavanagh ended up having a prostatectomy and is now symptom free. But he isn't alone in finding the experience deeply unpleasant – and potentially life changing.

Information given to patients and clinician-authored papers normally stress the rarity of significant side effects, and stress that common complications such as pain, urinary retention and blood in the urine and semen are "typically mild and self-limiting" (see for instance, *Eur Urol* 2013, 64:876–92). Yet serious infections such as septicaemia occur in 1%–4% of men having biopsies. This is sometimes associated with the development of prostatitis, which around 2% of men experience after biopsy.

Given that these are investigative procedures on largely healthy men, not cancer treatments, such percentages are worrying.

Sadly, studies seldom look beyond the short-term consequences of biopsy. Anecdotally, men have reported that the effects of prostatitis continue long after biopsy, leaving them with long-term pelvic pain and urination problems. A 2017 study indicated that 1 in 20 men regret having a biopsy (*BMC Urol* 2017, 17:11). Under-reporting is also likely, if Brian Kavanagh's experience is anything to go by.

A sea change is underway in prostate cancer diagnostic procedures throughout Europe

"I suppose when I got over the septicaemia, I didn't want to revisit it. It was past, I was better again, and I didn't want to dwell on it or take it up with the consultant. When you get well you just want to be well."

Recent research has indicated that all this may be unnecessary, and that biopsy is no longer the best first port if there is a risk of prostate cancer. Major studies have provided compelling evidence that carrying out multiparametric MRI (mpMRI) scans before biopsy is the most effective way of detecting the presence of prostate cancer – making thousands of unpleasant biopsies unnecessary. It also provides highly accurate guidance for biopsy if the scan does identify suspicious lesions.

So compelling is this evidence that mpMRI before biopsy is now becoming the new standard of care for diagnosis in England. Norway and other countries in northern Europe are moving in the same direction. Now the European Association of Urology (EAU), which sets the standard in urological clinical practice in Europe and beyond, is revising its diagnostic guidelines to make similar recommendations. A sea change is underway in prostate cancer diagnostic procedures throughout Europe.

What are the implications?

The impetus for change has come from the PROMIS (Diagnostic accuracy of multi-parametric MRI and TRUS biopsy in prostate cancer) and PRECISION (Prostate evaluation for clinically important disease: sampling using image guidance or not) trials, both run from University College London Hospital.

The multicentre PROMIS trial, involving 740 men with clinical suspicion of prostate cancer and no previous prostate biopsy, tested whether an mpMRI scan before biopsy could identify men who might safely avoid a biopsy. It found that using mpMRI to triage men might allow more than one in four men referred on suspicion of prostate cancer (27%) to avoid a primary biopsy.

If subsequent TRUS biopsies were directed by mpMRI findings, up to 18% more cases of clinically significant cancer (measured by the Gleason score) might be detected compared with the standard pathway of TRUS biopsy for all. A linked study found that an mpMRI-first strategy is effective and cost-effective for diagnosing prostate cancer.

The PRECISION trial went on to look further along an mpMRI-based diagnosis pathway, investigating the accuracy of mpMRI in guiding biopsies, when suspicious lesions have been identified through scanning. The study randomly allocated 500 men with suspected prostate cancer

I'm going for a TRUS biopsy – what's it like?

Accounts of the experience of TRUS biopsy suggest levels of pain and short-term effects vary widely. These comments, taken from the Prostate Cancer UK Online Community site, were posted in response to the question: "Going for a TRUS biopsy next Tuesday. Anyone share their experiences?"

"The thought about what's going to happen was far worse than the actual experience."

"For me it was a painful experience, but don't let that put you off. It has to be done and I was probably unlucky on the day or they plain forgot the anaesthetic."

"The anaesthetic seemed to have no effect and the surgeon had to stop after the eleventh sample because I was about to have a heart attack, following which I spent a day in hospital. We are all different and respond in different ways."

"Pretty straightforward, slight discomfort. Be aware that you may have blood in your urine, motions and semen that will take a few days to clear."

"When my consultant suggested I had a TRUS biopsy last summer, after doing a bit of research, I was reluctant, not because of the procedure but more the uncertainty of getting an accurate result. More research lead me to the PROMIS trial, which I got my GP to refer me to. I had an MRI, TRUS biopsy and template biopsy. All biopsies were under general anaesthetic so no discomfort, although I ended up being catheterised for a week cos I couldn't pee!"

"I never felt anything. You will be peeing blood for about two weeks afterwards, but it's only a mild inconvenience."

Source: *https://community.prostatecanceruk.org/posts/t10356-Biopsy-experiences*

from 23 international centres and found that using mpMRI to perform prostate biopsies led to significantly more of the harmful prostate cancers and significantly fewer harmless cancers being diagnosed, compared to standard TRUS biopsy.

When the PRECISION results were simultaneously announced in the *New England Journal of Medicine* and at the EAU conference in Copenhagen in March 2018, it felt like a tangible moment of change. "Everyone in the packed eURO auditorium knew they were witness to a practice-changing presentation," blogged Australian urologist Declan Murphy, "and the swift reaction on social media around the world confirms this."

The research was the culmination of years of global studies indicating the effectiveness of mpMRI scanning in prostate cancer diagnosis. And it is in the UK where progress is fastest to making it the gold standard. In December 2018, the UK's health technology assessment body, the National Institute for Health and Care Excellence (NICE), recommended mpMRI as the first-line investigation for people with suspected clinically localised prostate cancer. This follows NHS England publishing a new pathway for diagnosis of prostate cancer in April 2018, revolving around early mpMRI.

"We are seeing rising incidence of prostate cancer, but very little change in the mortality rate," said Hashim Ahmed of the NHS England Clinical Expert Group for Prostate Cancer. "Our current diagnostic pathway for prostate cancer needs urgent change. The PROMIS trial has shown us that transrectal ultrasound-guided prostate biopsies are inaccurate. They miss significant cancer, overdiagnose insignificant cancers, which leads to overtreatment harms and costs, and biopsies carry risk."

That same trial, he added, showed that using pre-biopsy mpMRI diagnosed over 90% of significant cancers and fewer insignificant cancers.

The EAU is following close behind. Its 2017 prostate cancer

What's the downside? Some reported long-term effects of biopsy

Literature about the effects of TRUS biopsy tend to emphasise that side effects are short-lived and minor. However, studies tend to concentrate on the short term, and the anecdotal experience of many men suggests that lasting physical and psychological effects may not be uncommon. The comments below were posted on the Harvard Medical School health blog after the editor of Harvard Men's Health Watch posed the question: What's the downside to a biopsy?

"I wish I would have never had biopsies done. I think it has contributed to my ongoing difficulty urinating and my lower libido."

"Four weeks after my biopsy I had a prostate infection. I went back to the doctor for a shot and 10 days' worth of antibiotics. I never had a fever but I had lingering pain and couldn't sit on a bike. No cancer was found, but now I think I may be developing erectile dysfunction. I wasn't prepared for this. The doctor said this will go back to normal, but I'm not sure…"

"At 70, I had my second prostate biopsy. Four months later, I'm still recovering from an infection from that biopsy. Two days after the biopsy I went into the hospital because I had a fever of 103.5 [39.7°C]. They kept me in for five days, but two days later the fever came back. Back into hospital, this time for 12 days of intravenous antibiotics. Four weeks after being released, the infection came back. I am taking antibiotics at home at the moment. I urge you to avoid a biopsy if at all possible!"

"I had a template biopsy six months ago. Now I have erectile dysfunction and prostatitis. My PSA before the biopsy was 3.4. Now it's 9.1. I seriously regret having it done. I'm aged 54."

"I had a prostate biopsy two months ago. The results were negative, but I have been getting more and more ill ever since. I have nausea, weakness and chills since, and it seems to be getting worse."

Source: *www.health.harvard.edu/blog/whats-the-downside-to-a-biopsy-20090929174*

guidelines, compiled with the European Society for Radiotherapy and Oncology (ESTRO), recommended mpMRI for men who had had a previous negative biopsy, but said it was too early to make recommendations on routine use of mpMRI before first biopsy. With the publication of PRECISION and other studies, that situation has now changed, and EAU representatives have said at meetings that mpMRI will be recommended as the new diagnostic gold standard in 2019.

Officially, EAU is keeping its cards close to its chest. In a statement to *Cancer World* it confirmed that its guideline group has reviewed recent work on mpMRI and anticipated changes to its diagnosis guideline. But there will be implications both for provision of service, and for ensuring appropriate standards and expectations for patient care, said James N'Dow, Chairman of the EAU Guidelines Office. "This means that we need to be sure that the recommendations we issue are robust and evidence-based, and that takes time and care. So we are still in the final consultation phase." The guideline group is working towards publication at the EAU annual congress in Barcelona in March 2019.

As EAU appreciates, the implications of a Europe-wide change are huge. Even in England, where uniformity of provision has been imposed by a National Health Service, and multidisciplinary working and systems for mpMRI after first biopsy are already well established, there's a tacit acknowledgement that reform won't be easy. Introducing the new prostate cancer diagnostic pathway for England, Hashim Ahmed said it was a "watershed moment". "I trust all of us will fully embrace the change."

The rest of Europe will also have to address issues of capacity, professional working relations, training and culture. Some health systems will be better suited than others. Amid widespread acknowledgement that the change is necessary, there are worries: about the scale of the

investment and training required, and about the dangers of embracing techniques that are still emerging.

Caroline Moore, Reader in Urology at University College London, and senior author on the PRECISION study, says she is "more than delighted" that the EAU guidelines will be changing. This will certainly put Europe ahead of the USA, she says, where professional guidelines only view mpMRI as useful rather than essential.

But she is also all too aware that mpMRI is a complex procedure – both when used to initially spot lesions, and then to guide biopsies. The main challenge, she says, is one of quality. "It's very easy to do bad MRI," she says.

Unlike introducing a new drug, she explains, introducing mpMRI is not automatically standardised. The scanners in each unit will need to be assessed and optimised for prostate cancer. Reporting on the initial mpMRI will need quality standards and guidance – whether done through diagrams, notes or imaging software, it needs to be genuinely useful in guiding biopsies.

Some countries will inevitably find the transition more challenging than others. It's not simply a question of having the technical resources, capacity and skills – though these will clearly determine the rate of change in many countries. It's also a matter of professional cultures and working relationships: introducing the new procedures may involve changes in working practice and a reorganisation of professional roles between radiologists and urologists. Some may feel threatened, as TRUS biopsy is no longer at the heart of diagnosis.

The change may be easier in countries with a history of multidisciplinary working, and with greater specialisation in prostate cancer. In Germany, where there has been recent movement towards a national system of specialist prostate cancer units, mpMRI is currently not widely used in diagnosis, but its use is increasing, according to Günter Feick of the German patients' association Bundesverband Prostatakrebs Selbsthilfe.

"The main challenge is one of quality – It's very easy to do bad MRI"

German interdisciplinary guidelines for the early diagnosis of prostate cancer currently say that mpMRI can have a role in initial prostate cancer diagnosis, but do not recommend routine use. They point to one of the more worrying PROMIS study findings: 10.8% of men with apparently clear mpMRI scans were subsequently diagnosed by biopsy with clinically significant prostate cancer.

This is also a concern for Riccardo Valdagni, Director of the Prostate Cancer Programme and Chair of the Prostate Cancer Unit at Fondazione IRCC at the National Cancer Institute in Milan, Italy. He says that, in general, it is clear the mpMRI is the way ahead. But he is concerned about biopsy studies showing that 10–20% of men with apparently clear scans actually have small-volume, but aggressive, cancers. Although this is a considerable improvement on TRUS, and although definitions of 'clinically significant' vary, this highlights the danger of embracing the technique without also being aware of its predictive limitations, and without conducting further research to overcome them.

Because of this, he believes that – for the time being at least – men with a higher risk of prostate cancer (for example because of family history or a PSA level above a certain threshold) should have a biopsy even after a negative mpMRI scan. The negative predictive value of the technique needs to be moving towards zero, he says – and this means improving technology, specialisation and expertise. Given wide variations throughout Europe, this means the adoption of mpMRI in prostate cancer diagnosis is likely to be very gradual, with expertise slowly spreading from centres of excellence.

"Around 90% of the work on mpMRI in prostate cancer has been done in academic centres," says Valdagni, "and we know from their studies that the reproducibility of the methods is variable among other academic centres and in real life clinical experience. This is because we don't really have standardised methods to store and analyse data on mpMRI, and that the learning curve is long.

"You can consider the situation similar to what happened 40 to 50 years ago with breast mammography, starting in one place and little by little moving and expanding across the whole nation and Europe."

As far as Italy itself is concerned, Valdagni says the past three years have seen a growing demand for mpMRI from GPs, physicians and urologists, accompanied by an explosion in units providing the scans. "Obviously there is still much work to do, but I would say the growth is really satisfying and the technology is present from north to south."

According to Monique Roobol, an epidemiologist and Professor of

mpMRI vs TRUS biopsy in numbers

27% — Percentage of men with PSA suspicion of prostate cancer who can avoid unnecessary TRUS biopsy altogether by having an mpMRI scan as a first step

6,12, or 18 — Number of prostate gland tissue samples commonly taken in TRUS biopsy investigations

18% — Percentage of men with clinically significant cancer confirmed by biopsy following mpMRI, that would have been missed using the standard TRUS–biopsy–first diagnostic approach

1%-4% — Conservative estimate of the percentage of men contracting serious infections such as septicaemia as a result of TRUS biopsy

10.8% — Percentage of men with apparently clear mpMRI scans who were subsequently diagnosed with clinically significant prostate cancer by biopsy

1 in 3 — Estimated proportion of mpMRI diagnostic imaging that could be avoided using risk stratification approaches

Decision Making in Urology at Erasmus University Medical Centre, Rotterdam, a European divide is already emerging. Western and northern Europe countries are already implementing diagnostic mpMRI, sometimes on a widespread basis, whereas eastern and southern European countries have far patchier availability, often limited to larger cities. Radiologist Rowland Illing, Chief Medical Officer for a company that markets imaging and cancer detection services across Europe, says that limitations in resources and expertise mean very little is happening at state level across central and eastern Europe to develop diagnostic mpMRI. "When guidelines change to direct patients to MRI before biopsy, it is unlikely to change practice on the ground any time soon," he says.

In the Netherlands, by contrast, more than half of larger centres are already implementing a pre-biopsy mpMRI policy, says Roobol, and there are very few centres that do not provide access to mpMRI for prostate cancer diagnosis – either directly or by referral.

The EAU and the European Union will need to address such national disparities, she says. "There'll need to be not just investment but training programmes – in the same way that there are already, for example, training programmes in robotic surgery. Luckily, there are already courses on interpreting mpMRIs and performing mpMRI TRUS fusion biopsies. Similar activities can be seen at the radiology associations – which is good, since personnel dedicated to interpreting mpMRI images in prostate cancer is a must, just as there are prostate experts in pathology. A lot of the data published represents expert centres and we must be certain that, if we implement mpMRI and targeted biopsy into daily clinical practice, quality is assured."

It's not simply about having the technical resources, capacity and skills… It's also about professional cultures and working relationships

At the same time, and mainly because resources will always be an issue, unnecessary mpMRI testing should be minimised. Although it is possible that the EAU will recommend pre-biopsy mpMRI for all men with elevated PSA levels, Roobol advocates risk stratification to determine who is most likely to benefit.

"There's a lot of unnecessary

TRUS testing already, and if we go the same way with mpMRI then I am against it," she says. National guidelines in the Netherlands provide risk calculators so that unnecessary pre-biopsy mpMRIs are avoided. For example, PSA density readings (not simply PSA levels) and risk factors such as having had a previous negative biopsy and family history are added into a calculation, which provides a prediction of the likelihood of clinically significant prostate cancer.

"We can save at least a third to half of mpMRIs doing this. And if that would happen across Europe, in daily clinical practice, and we really start to stratify risk, then I'm totally for using the mpMRI before biopsy."

Roobol's qualified welcome of the new diagnostic world for prostate cancer reflects many other specialists' ambivalent views. There is an awareness that, whatever EAU recommends in 2019, the hard work of making mpMRI an effective diagnostic intervention is just beginning. Senior figures like Roobol have seen it all before.

"The research clearly shows the potential benefits," she says. "But we have to keep monitoring. There are constant waves of change in prostate cancer diagnosis. We saw it in PSA cut-offs, which started with PSA above 4.0 ng/ml and ended with 3.0 ng/ml or even 2.0 ng/ml. We saw it in TRUS biopsies, where we started with six cores and now we have 18 or even 24 cores. Then we concluded that this is not going very well because we have overdiagnosis.

"The next wave was active surveillance for increasingly wide groups of men. Things get implemented like crazy, and then we say, 'Oh my God, perhaps it's not the improvement we anticipated. Let's go back again a bit.' So we must monitor what's going on with mpMRI, and make sure that we follow up to find out what happens to patients in the long term."

"If we really start to stratify risk, then I'm totally for using the mpMRI before biopsy"

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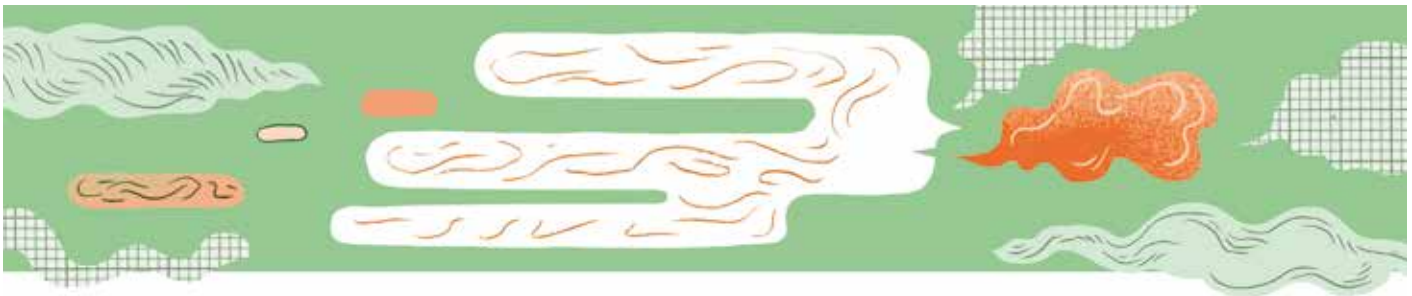
1. Ryan AM et al. Proc Nutr Soc 2008; 67: 111-26. 2. Muscaritoli M et al. Oncologist 2011; 16(4): 411-20. 3. Muscaritoli M et al. Crit Rev Oncol Hematol 2010; 74: 252-9.



Matteo Lambertini: keeping the family dream alive

For many young women with breast cancer, the chance to have a child is a top priority. They want to know what different treatments could do to their fertility and the health of a future baby, whether getting pregnant could make a recurrence more likely, and how to access the services they need. Matteo Lambertini wants women to have that information too. He talks to **Anna Wagstaff** about his part in making it happen.

Getting published as a lead author in *JAMA*, the *Journal of the American Medical Association*, is an achievement any doctor would be proud of. To do so at the age of 30, while still training to be a medical oncologist, is really quite impressive. If any young oncologists were to ask how he managed it, Matteo Lambertini would no doubt reply: motivation and some great mentors.

Both undoubtedly played a part, but his decision to focus his efforts in a niche field that was just taking off as he enrolled in medical school will certainly have helped. Lambertini, who recently returned to his home institution in Genova, Italy, after three years at the Institut Jules Bordet in Brussels, specialises in the management of breast cancer in young women, with a particular interest in fertility and pregnancy-related issues.

Now adjunct professor of medical oncology at the Policlinico San Martino Hospital – University of Genova, he is one of a small number of upcoming oncologists specialising in this poorly funded area; the pioneers number a select few, and he counts pretty much all of them as friends and mentors. The issue is of great importance to many patients and is also fascinating on a biological level, because breast cancer is a malignancy that for the most part is driven by the sex hormones involved in fertility and pregnancy. Premature menopause and infertility are common side effects of anticancer treatments.

Lambertini is interested, for instance, in how to minimise the risk that chemotherapy will damage a woman's future fertility by inducing premature menopause. His *JAMA* paper reported a follow up of a trial led by his Italian mentor, Lucia Del Mastro, asking whether using GnRH (gonadotrophin-releasing hormone) agonist shots during chemotherapy increased the chances of women resuming menstruation after treatment (it did) and of becoming pregnant (there was a trend in that direction).

He is interested in assessing the impact of different breast cancer treatments on the risk of inducing premature menopause and on a woman's chances of a successful pregnancy. He is investigating whether conceiving raises the risk of recurrence for patients with a prior history of breast cancer (the evidence so far indicates not).

Lambertini points out that important questions have yet

Speaking at the 2017 San Antonio Breast Cancer Symposium on the results of an individual patient-level meta-analysis on the safety and efficacy of using GnRH agonists during chemotherapy to preserve ovarian function and fertility in premenopausal women

to be fully answered concerning the use of in vitro fertilisation (IVF) in women with a cancer diagnosis, and on the efficacy and safety data of embryo or oocyte cryopreservation in cancer patients. "These were standard strategies when I started in 2010, because they had been used in healthy infertile women for many years. However, to properly counsel cancer patients, we need to know: is it as effective for them as in infertile healthy women? Is it safe to stimulate breast cancer patients with hormones [to promote ovulation for egg harvesting]?"

Recent data from groups in the US, Spain, Belgium and Italy among others, show that these strategies are as effective in women with breast cancer as they are for infertile healthy women, says Lambertini. "They appear also to be safe, in terms of not increasing the risk of disease recurrence for patients who receive this stimulation."

As he explains the issues and evidence, Lambertini is careful to spell out 'the message' to ensure the implications have been understood. This is clearly something he and his colleagues do a lot. While specialist interest in this topic may be confined to a select few, a very large number of patients have a lot at stake, and they and their doctors need the clearest possible understanding of options and the evidence.

Why it matters

Breast cancer is by far the most common cancer in women during their childbearing years, and as the average age for starting families has risen, so has the number of women who find their hopes and plans threatened by a cancer diagnosis. Some of them are actively going through IVF at the time they are diagnosed, says Lambertini, "This is a real tragedy, because you are discussing cancer with a young patient, and telling her she may not be able to have a family any more, and she was actually trying to have one."

Patients and advocates attending the 2018 International Conference of Breast Cancer in Young Women (BCY4) ranked issues related to fertility and pregnancy among their top three areas of concern (together with quality of life and psychological care). For many young women, the chance to have their own child ranks no.1 and they are prepared to take

risks to achieve it, says Lambertini. "In some circumstances, they prefer to receive suboptimal treatment – less active treatment, but less gonadotoxic, so associated with a lower risk of impairing their future chances of having a family."

"For many young women, the chance to have their own child ranks no.1 and they are prepared to take risks to achieve it"

Sticking with adjuvant endocrine therapy for the full recommended five to ten years can also pose a problem, as pregnancy is not possible during treatment. This could be one factor explaining poor adherence to adjuvant therapy among younger women, as reported in several studies. Lambertini also acknowledges other factors, as all current endocrine treatments have side effects, including an impact on women's sex lives, which can be a particular issue for younger patients, and five years (let alone ten) is a long time.

The message to oncologists, says Lambertini, is to ensure a thorough discussion of the pros and cons of proposed treatment options, so that patients know what to expect, and then be proactive in asking how they are getting on with the treatment and whether they are taking it as specified.

One trial – the POSITIVE study – is underway to try to define what additional risk, if any, is posed by interrupting endocrine therapy for up to two years, after a minimum of 18 months of treatment. This could allow women the option of taking a period out and then returning to complete the treatment after their child is born.

On many questions, says Lambertini – including the safety of conceiving for women with a history of breast cancer – available evidence, while reassuring, is almost entirely retrospective. "We need more prospective research, larger numbers of patients, international collaborations, to have more real insights to properly counsel our young patients facing concerns related to fertility and pregnancy" he says.

As breast cancer morphs into distinct biological subgroups, and treatment options become more numerous and complex, evidence generated with respect to one type of cancer and treatment protocol may not apply to others.

Lambertini's PhD, titled, "Unmet fertility and pregnancy-related issues in young breast cancer patients," addressed a number of questions, including the toxicity risk that some newer treatments such as trastuzumab and lapatinib pose to the ovaries. It also explored fertility- and pregnancy-related issues in women whose breast cancer is associated with a germline harmful mutation in the *BRCA* genes.

Some preclinical data show *BRCA* mutations can have a negative impact on female ovarian function and fertility. Lambertini and colleagues are therefore questioning whether breast cancer patients with a *BRCA* mutation may be at increased risk of treatment-induced premature menopause, how effective fertility preservation strategies may be in *BRCA*-mutated patients, and whether it is safe for these patients to become pregnant. "This is an example of an area that has just started to be explored also by our group, so we have very preliminary data. Of course, research and international collaborations are needed, and extremely important in this field."

Spreading the message

Even where the evidence is quite strong, many oncologists have not yet got the message. A survey of physicians who attended either the 2016 BCY3 conference on breast cancer in young women or the 2017 St. Gallen International Breast Cancer Conference, showed significant levels of confusion, says Lambertini, who was lead author of a report published in *The Breast* in 2018 (vol 42, pp 41–49). "Although the survey generally showed a positive and encouraging picture, adherence to guidelines on fertility preservation and pregnancy-related issues in young breast cancer patients remains sub-optimal even in this selected group of physicians with a particular interest in breast cancer care."

More than nine in ten of these physicians do discuss the risk of treatment-induced premature menopause and infertility with all newly diagnosed young cancer patients before starting treatment.

However, fewer than four in ten suggested their patients use embryo cryopreservation, and just over six in ten had discussed oocyte cryopreservation. Uncertainty seems to be a factor here, with almost half of the respondents reporting they lacked adequate knowledge of these primary options for fertility preservation.

Lack of access to specialist facilities was also cited as a problem. Lambertini believes many breast cancer treatment centres could do more to build partnerships with IVF facilities in their region, if they are not available within their centre, to ensure timely access. Women who want to preserve their fertility are usually highly motivated, he says, and prepared to travel to get it.

The survey of physicians revealed confusion over whether becoming pregnant after completing treatment

A long way from the Institut Jules Bordet. The beautiful Ligurian village of Ferrania (Cairo Montenotte), population 600, where Lambertini learned to love medicine

for breast cancer might raise the risk of recurrence, with almost one in three respondents indicating they thought it might. "Not true," says Lambertini. "On the basis of available evidence, pregnancy after completing treatment and follow-up can be considered safe even in patients with oestrogen-receptor [ER]-positive breast cancer – the most hormonally driven form." That evidence includes an international case-control study of 333 women with a history of ER-positive breast cancer who became pregnant (matched 1:3 to non-pregnant patients of similar characteristics), which was published last year with Lambertini as lead author (*JNCI* 2018, 110:426–29)

Even among this fairly specialised group of respondents, fewer than half had consulted the available international guidelines on fertility preservation and pregnancy in breast cancer survivors, and more than one in ten did not even know such guidelines existed."Further educational initiatives are needed to improve physicians' knowledge and adherence to available guidelines," the authors concluded.

The Italian Breast Group (GIM) may be ahead of the game here. They are running the PREFER (PREgnancy and FERtility) study "as a national comprehensive programme aiming to optimise care and improve knowledge around these topics," (*BMC Cancer* 2017, 17:346; *The Breast* 2018, 41:51–6). The stated objective is to gather prospective data about patients' preferences and choices towards the available fertility preserving procedures, and then monitor the success and safety of these strategies and the hormonal changes during chemotherapy. But it is also seen as an effective way of getting oncologists in the participating centres to routinely discuss these issues with patients, says Lambertini, since they are more likely to have those discussions if their centre is part of a study.

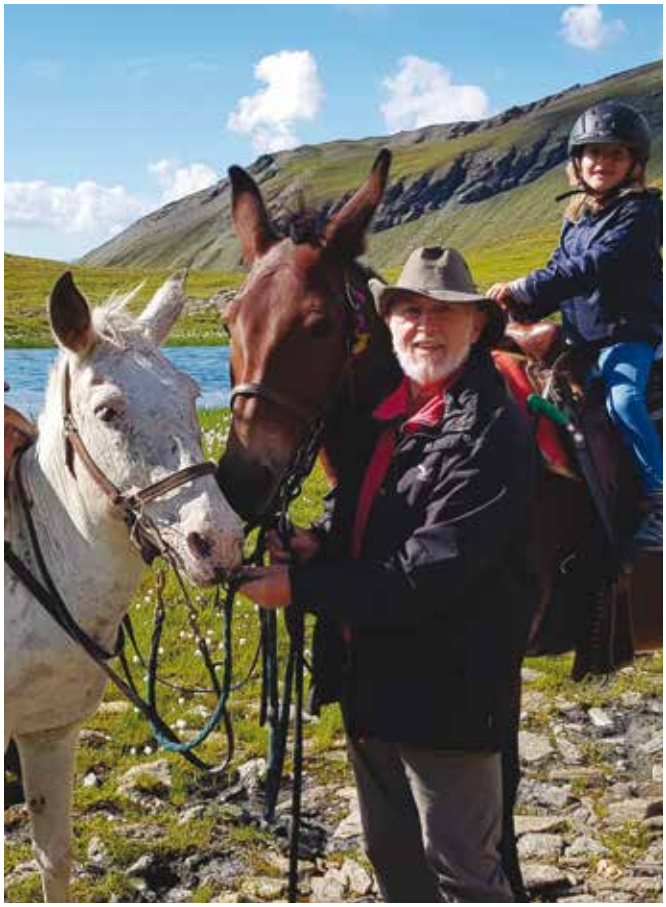
"Almost half the respondents reported they lacked adequate knowledge of the two primary options for fertility preservation"

That study, now running in more than 25 centres across Italy, marks another early professional achievement. Lambertini wrote the study protocol, at the tender age of 25. "My Italian mentor has been always very supportive since I was a medical student, so while waiting for my oncology residency to begin, she gave me a contract to start working in the hospital helping them with some clinical work, but mostly with research-related activities." Writing the PREFER study protocol was the first task he was allocated.

A family doctor

The irony is that Lambertini does not seem to be driven by an ambition to get published and fight his way to the top. His goal, from an early age, was to be a general practitioner, like Benvenuto Serafini, the family friend he knew from childhood, who took care of the health and wellbeing of the 600 residents of Ferrania – the village around an hour's drive from Genova, where Lambertini was born and raised.

His father worked as agronomist, his mother taught physical exercise at the secondary school. There were no doctors



Role model. Benvenuto Serafini, the Ferrania GP who inspired Matteo to go for a career in medicine, pictured here with his grandchild (Matteo's niece) Daniela

in the family, so the young Matteo thought he'd like to try something new. That remained his motivation until half way through his medical training, when his mother was diagnosed with a stage 4 aggressive gastric cancer. "I was very near the phase of studies when I had to decide what to do – stick with the idea of becoming a GP, or move to a speciality, and at that time I could not think about anything other than oncology.

"After this devastating event, my family and I had to go through, I started to think that the only real disease was cancer, and in each department where I trained as a medical student, only when there were patients with cancer did I feel that these were the people who really need help. So I felt this is what I have to do, as if my mother made me recognise what path to take. So I started being more involved in the oncology department."

With Del Mastro as mentor, Lambertini developed his interest in breast cancer and the care of young women, including managing fertility- and pregnancy-related concerns. After qualifying, he applied for a fellowship to work at the Institut Jules Bordet in Brussels, alongside Hatem Azim (junior), a young Egyptian oncologist who was publishing prolifically on the topic while researching for his PhD, and Evandro de Azambuja, the head of the Breast Data Centre.

An ESMO fellowship enabled Lambertini to stay at the Institut Jules Bordet to do his own PhD, which he finished at the end of 2018 – thanks, he says, to the help of "several fantastic national and international mentors" including Isabelle Demeestere (Brussels), Fedro Peccatori (Milan) and Ann Partridge (Boston).

"Only when there were patients with cancer did I feel that these were people who really need help"

After an intense few years, Lambertini is determined to pay more attention to his work–life balance back in Genova. This may be easier said than done, as he now has to divide his time between research and clinical practice.

While in Brussels he married Giulia Viglietti – a biologist from a small village close to his own, who joined him at the Institut Jules Bordet to work in the breast cancer translational research laboratory, led by Christos Sotiriou. "I pushed a lot on my career, I did as much as I could, I published a lot. Now I am back and in a different phase of life. Of course I am very dedicated, I really like my job, so I will keep working on the same path, but it is now time also to dedicate more time to my family and try to enlarge it as well."

It could be argued that Lambertini has stayed true to the spirit of his early goal of becoming a 'family doctor'. His clinical and research work is all about helping women diagnosed with breast cancer start their own families, he is committed to putting his own family first, and he still enjoys close ties to the community he comes from.

His father, approaching retirement, was recently elected mayor. His sister is married to the son of the GP who first inspired Lambertini to go for a career in medicine. His mother-in-law still lives in the neighbouring village, where she runs a small restaurant. Lambertini and his wife, meanwhile, are busy setting up their own home in Genova. He will not be short of things to do on his free time – and there are plenty of people around to remind him about giving family life a chance to flourish alongside his work.

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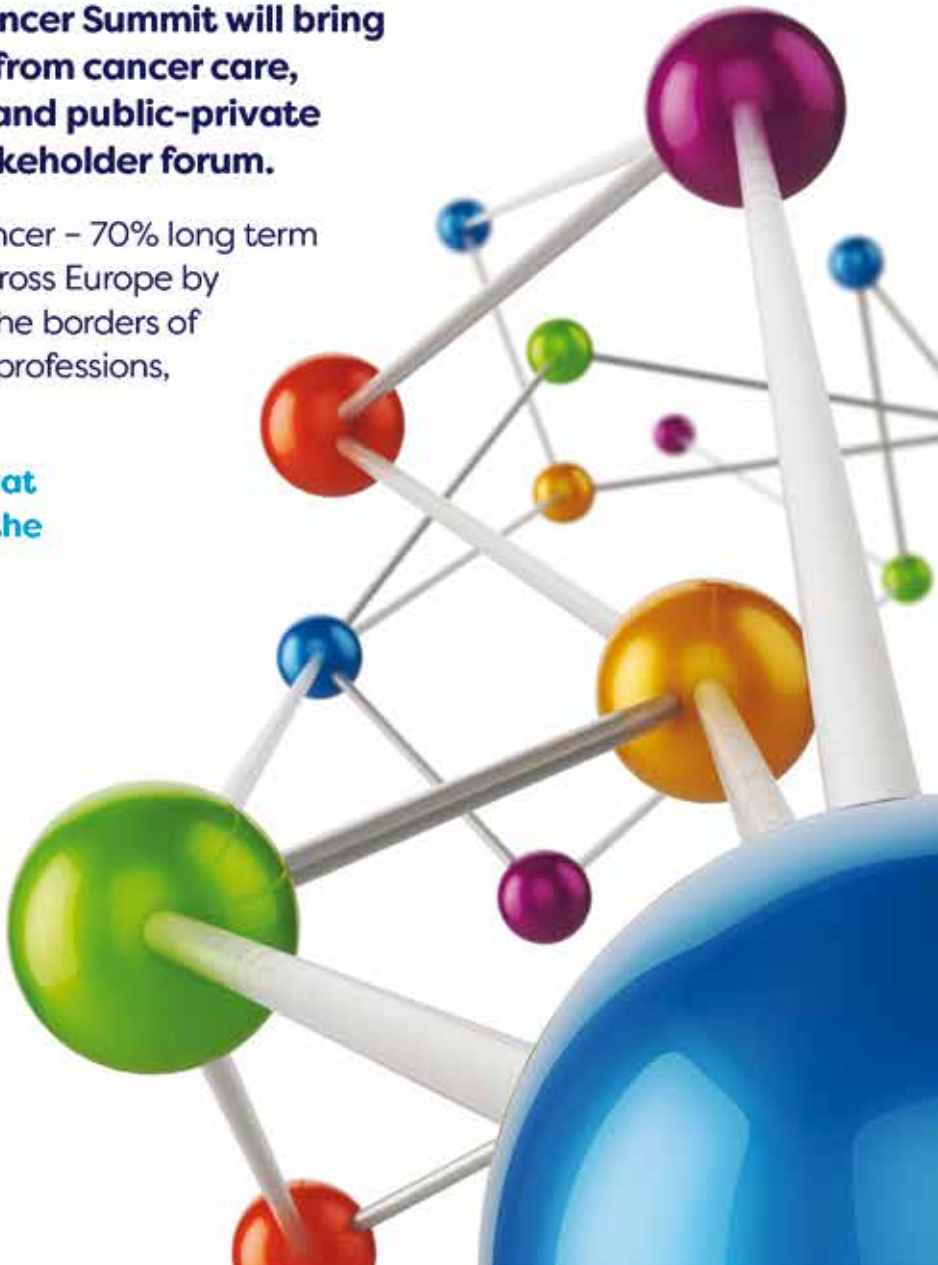

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Comprehensive cancer care networks

Test driving the model in southern Czechia

What does an ideal cancer service look like and how can countries/regions make that transformation? A European collaborative project spent two years trying to answer this question. The solution they came up with is now being piloted in the Czech Republic, as **Sophie Fessl** reports.

"How do you reconcile providing cancer services near a patient's home with ensuring they get the best possible care?" It's the fundamental question that has been asked in every country and region where efforts have been made to reorganise fragmented cancer services into a coherent structure able to optimise the experience and outcomes of every patient.

Sweden, England, the Netherlands, France, Ireland, Portugal, Italy and Spain, are some of the countries that have gone a long way towards developing and implementing their own solutions, each

applying a broadly similar set of principles, adapted to the culture and structure of their own health services.

Yet in the majority of countries, particularly in central and eastern Europe, efforts to improve the way cancer services are delivered have hardly begun. As a result, big improvements in standards of diagnosis and care over recent decades have often been limited to flagship national cancer centres, while the majority of patients are still being diagnosed and treated in facilities that lack the necessary mix of expertise, teamwork, and governance. This failure to raise standards across entire systems is hampering efforts to close the east–west survival gap.

Even among countries that have done a lot to ensure that treatments are planned and delivered by the right people in the right places, diagnostic, primary and community care services often remain poorly integrated, hampering access to early and accurate diagnosis, and psychosocial, supportive and survivorship care.

Finding ways to guide and to galvanise countries to improve the integration of cancer services has been one of the more ambitious projects of the European Joint Actions on cancer – a series of three-year voluntary collaborations between EU states aiming to improve national capacity and European coordination in cancer control and care (see also In the Hot Seat, p 70).

As part of the CanCon Joint Action (2014–17), Lucio Luzzatto, a former director of the Tuscan Cancer Institute, in Italy, led a project on 'comprehensive cancer care networks', which sought to define the key elements of a networking model that could be implemented in any territory, to enable people to access the best and most comprehensive pathways for cancer care as near as possible to where they live, "through the synergy of all relevant institutions that have complementary expertise," (CanCon Executive Summary 2017, bit.ly/CanCon_ExecSummary).

"I was never hoping for as much: that, within the life span of the project, we would have a CCCN built *ex novo*, based on the CanCon principles"

The concept was broadly based on an approach developed and implemented across the Tuscan region, drawing also on the experience and expertise of collaborating partners from many European states including France, Germany, Ireland and Norway. But it was the involvement of the Czech Republic, which had less experience in restructuring cancer services than any of those countries, that arguably did most to ensure this project will have real relevance and impact in the countries that need it most.

The Czech participants, led by Ladislav Dušek, from the Masaryk University Institute of Biostatistics and Analyses, were so convinced by the idea that they decided not only to talk the talk but also walk the walk, by implementing such a comprehensive cancer care network as a 'real-life, real-time example'.

The concept developed through a European collaboration is now being taken through a test drive in Vysočina and Southern Moravia, neighbouring southern regions which are considered broadly representative of the Czech Republic as a whole. With a combined population of 1.7 million inhabitants, they are large enough to be self-sufficient in all cancer diagnoses, including childhood cancer, according to Dušek.

"We were very lucky that in the Czech Republic they became very enthusiastic about this idea," says Luzzatto. "Ladislav Dušek, in particular, said 'why don't we do this'? I was never hoping for as much: that within the life span of the project, we would have a comprehensive cancer care network built *ex novo*, based on the principles defined in CanCon. But that is what happened."

The hope is that the Czech example will offer a real impetus to other countries and regions that may be struggling to build the momentum and political will to restructure their own cancer services.

Speaking at the Regional Cancer Control Baltic Policy Conference held in Riga in January 2017, Dušek explained why he had found the network idea to be so attractive within the Czech setting. "By 2013, regional cancer centres were established in all regions. But we still faced a growing inequality in cancer care, and cancer centres even started competing with the general hospitals in their catchment area… At this time, the key words of cancer care were 'inequality' and 'competition'. The main question was: how do we manage the growing burden

of prevalence, and how patients should be treated? I really appreciated the idea of networking. … Networking is communication, it is the organisation of community-based services for all patients in the catchment area."

Defining the ideal network

The basic idea behind a comprehensive cancer care network, explains Luzzatto, is to provide access to all the different elements of cancer care that are covered by leading comprehensive cancer centres – from diagnostics to care planning, treatment delivery, supportive care, psychosocial support, palliative and survivorship care, and research – but without having to have everything focused in a single centre.

This was the concept he and colleagues at the Tuscan Cancer Institute developed and set up in 2003 to raise standards of care across the region. "Without moving either patients or cancer care experts, we built a strong network of as good a quality as a major centre, but diffuse. This is how we came up with the term comprehensive cancer care network – or CCCN for short."

"Comprehensive cancer centres are certainly a good thing," he says. "The long established ones, like the Royal Marsden, Memorial Sloan Kettering or Gustave Roussy, are unquestionably good, and a part of history. However, the reality even in Europe is that cancer is not always treated optimally. When someone in a small town is treated locally, I'm not sure if the care is always up to the standards of major institutes. The notion of a CCCN is to form a network that is as good as a comprehensive cancer centre, but multicentric. It is as simple as that."

While the concept may be simple, getting a network to work rarely is. Luzzatto says he and his CanCon collaborators spent nearly two years defining the key elements of a comprehensive cancer care network. "We worked very hard because we wanted to distil the essentials."

"The notion of a CCCN is to form a network that is as good as a comprehensive cancer centre, but multicentric. It's as simple as that"

CCCNs, as defined by CanCon, are made up of units and institutions along the pathway from research, prevention and diagnosis to end-of-life care or survivorship. They are characterised by:

- a formal agreement for cooperation among network partners,
- interprofessional teams that work together in tumour management groups,
- treatment protocols that are the same across all hospitals in the network,
- a quality assurance system, and
- a common IT infrastructure.

Together, these measures aim to improve quality of treatment and outcomes for all people living in an area. Patients, expertise and data are all supposed to flow between the participating institutions. Multidisciplinary, tumour-specific tumour management groups provide care to all patients with a specific tumour living in the CCCN's catchment area.

Luzzatto sees some of the elements as non-negotiable, but others less so, which he says can be an advantage. "The beauty of the CCCN concept is that it is flexible. The networks set up in different places need not be identical, as we do not intend to impose a hard and fast template. At the Istituto Toscano Tumori, which certainly served as a model, we have three major centres in Florence, Pisa and Siena that work together in the network, alongside other units throughout the region of Tuscany. The CCCN in the Czech Republic is rather different, as one major institute already existing in Brno [South Moravia] was clearly the hub around which a network could be built. So there, the network is essentially a centre with several satellites."

Piloting the concept in real time

Addressing an audience of Baltic-region decision makers, at the Riga Cancer Control Conference, Dušek described how they went about organising their fragmented cancer services into a CCCN "as a cascade of many steps". The first step was to change the data protection laws to allow the centralised sharing of data between hospitals and registries that is required to "predict capacities, budget impact, and numbers of patients to be treated".

These data were then used to get local and national political support for the idea of establishing a

CCCN essentials – the CanCon recommendations

Equal access
To reduce travel distance to quality cancer care, access points and patient pathways within a comprehensive cancer care network (CCCN) should be clearly defined, with access points as close as possible to where patients reside, and uniformly optimal care should be provided as close to home as possible.

Structure and governance
CCCNs should be multicentric, combining units dealing with the management of all aspects of cancer care. These units will be in different locations and under a single governance structure. They should collaborate consistently in a structured way, to pursue their common goal with greater effectiveness and efficiency.

High-quality care
CCCNs should adopt a multidisciplinary personalised approach based on tumour management groups integrating specialised hospital care with care in the community, palliative care, psychosocial support, rehabilitation and survivorship care.
Quality of care should be measured with quality indicators. A process for continuous quality improvement should be put in place and implemented.
For each type of rare cancer, a unit within the network should be identified that can provide the necessary expertise. If for a certain cancer no suitable unit can be identified, patients should be referred to an appropriate unit outside the CCCN.

Research
CCCNs should take full advantage of the proximity of patients, researchers and care providers to pursue high-value basic, translational, clinical outcome and population research programmes to support the delivery of optimal patient care within the CCCN.

Setting up a CCCN: when and how
Given the benefits that a CCCN can provide with respect to equity of access as well as quality of cancer care, it is recommended that the creation of one or more CCCNs be always considered when making decisions about the structures and governance of cancer care. Where an area is already served by a comprehensive cancer centre, a CCCN can be built around it.
Performance indicators and evaluation models should be defined from the outset of the network.

The full CanCon summary of recommendations for comprehensive cancer care networks can be found at https://cancercontrol.eu/archived/guide-landing-page/Summary_of_Guide-2.html#a2

CCCN. Finally, the reimbursement system had to be changed so that the CCCN could be accepted by health insurance companies – the payers in the Czech healthcare system.

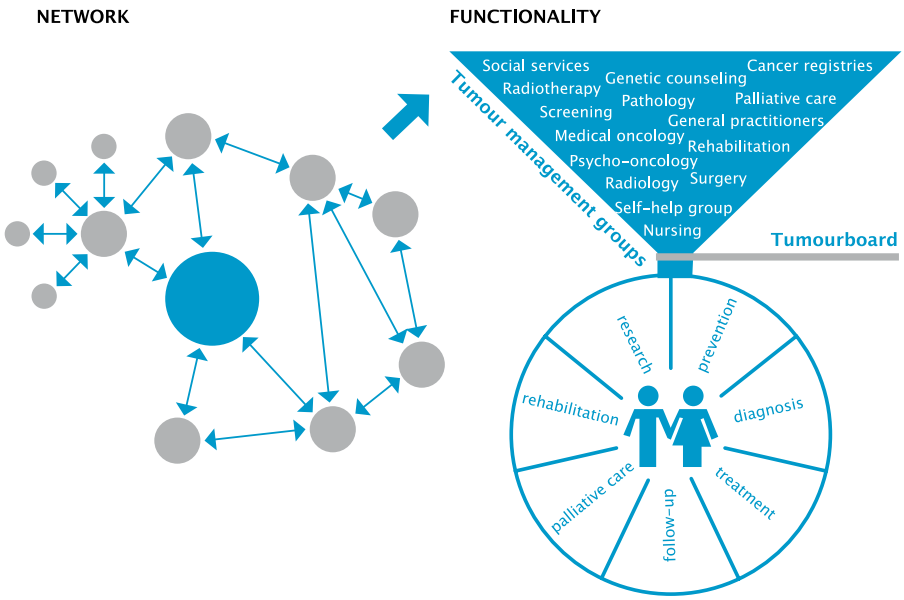
Common governance is achieved through managerial leadership that coordinates the network, a clinical leadership that defines standards of care, and an independent evaluation team that judges quality and performance.

The pilot network was officially launched in September 2016, when all the partner organisations signed cooperation agreements covering issues relating to governance, cancer management teams, quality evaluation, and information sharing. The four core members include the Masaryk Memorial Cancer Institute in Brno – certified by the Organisation of European Cancer Institutes and by the US Joint Commission International; the Jihlava Cancer Centre, in the capital city of the Vysočina region; the University Hospital Brno, which specialises in haemato-oncology and childhood cancers; and St Ann's University Hospital, Brno.

The first step was to change the data protection laws to allow the centralised sharing of data between hospitals and registries

Four general hospitals in the Vysočina region that treat patients with cancer are also part of the

CCCNs: Patient-centred but geographically diffuse



Source: T Albreht, R Kiasuwa and M Van den Bulcke (eds) (2017) *European Guide on Quality Improvement in Comprehensive Cancer Control*. National Institute of Public Health, Ljubljana and Scientific Institute of Public health, Brussels. © 2017 National Institute of Public Health, Slovenia. bit.ly/CancerQual_Improve
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By linking cancer centres, regional hospitals, primary care services and many other providers of services along the cancer care pathway, comprehensive cancer care networks are designed to ensure all aspects of a patient's care are managed to uniformly high standards and protocols, as close to home as can safely be achieved, with clear pathways of referral between the different parts of the network. A network should be responsible for providing comprehensive cancer care to the entire population within its catchment area. Responsibility for planning and delivering all aspects of a patient's care is in the hands of inter-professional, multidisciplinary, tumour-specific tumour management groups within the CCCN.

network, allowing multiple entry points, and helping ensure patients can undergo as much of their care as close to home as possible. The CCCN is also closely associated with the Masaryk University medical school, cancer research teams, tissue banks and bioinformatics facilities. All partners in the CCCN use standardised guidelines and referral pathways to help ensure uniformly high levels of care across the network.

Common cancers continue to be treated at all partner institutions as before, but that treatment now has to be in line with agreed protocols. This is what Luzzatto regards as the essential basis of a CCCN: "The main principle… is that patients are treated according to fully unified protocols. It doesn't matter whether a patient goes to hospital A, B or C – wherever a patient comes in, he or she gets treated at that hospital according to the same high quality protocol." This did not happen prior to the establishment of the network, says Dušek.

One caveat is surgery, where Luzzatto insists that, for particularly tricky operations, the patient must be referred to the best place in the network, even if their chemotherapy and radiotherapy is delivered nearer home.

Referral to specialist centres is also mandatory for any patient presenting with childhood cancers or haematological malignancies, who are all managed by specialist teams at Brno University Hospital.

Management of all patients with other rare cancers is concentrated at the Masaryk Memorial Cancer Institute.

For Dušek, a data analyst, setting up a common information system has to be the first step in efforts to develop a CCCN, "because we need comprehensive and representative data on patient flow and patient presence in the region where you would like to change the structure of care. Without such data, you cannot convince stakeholders, you cannot convince politicians to do anything. And you need data to generate economic predictions."

Customised software was developed early in the pilot and installed at every hospital in the network to enable common data sets to be gathered in a uniform way, for benchmarking and to facilitate tracking and analysis of transfer of patients among participant hospi-

A pilot CCCN for Poland

Planning has begun for piloting a comprehensive cancer care network in Lower Silesia, a Polish province that borders on Germany and the Czech Republic. The pilot will be developed within the framework of the iPAAC European Joint Action on Cancer, which is taking forward the work started during the previous – CanCon – Joint Action.

The network will be centred around the Lower Silesian Oncology Centre, a comprehensive cancer centre that was established in the provincial capital Wroclaw in 1954. After several expansions, a new hospital with 600 beds is planned for 2023.

The Lower Silesian Oncology Centre, directed by Professor Adam Maciejczyk, is currently the only hospital in the region that offers all oncology treatment modalities. It caters not just for the inhabitants of Lower Silesia, but for people in the surrounding regions – about 10 million in all.

Two branches of the Lower Silesian Oncology Centre, in Legnica and Jelenia Gora 70–100km from Wroclaw, give patients who live further away access to radiotherapy.

The plans for developing a comprehensive cancer care network in the region are still at an early stage. Dorota Dudek-Godeau, one of the coordinators of the project, who is based at the National Institute of Public Health-National Institute of Hygiene in Warsaw, says a review of options was scheduled for an iPAAC meeting in February 2019, and would take reviews of the literature and results of surveys as the starting point.

Decisions on which units will join the network have yet to be finalised, she says, but regional hospitals have already indicated an interest in joining.

Unlike the networks being implemented in the Czech Republic, says Dudek-Godeau, this initiative is not being driven by national policy. The hope is that successfully planning, implementing and demonstrating the value of the Lower Silesia cancer care network, as part of the iPAAC project, could offer some solutions and recommendations for the National Cancer Network, the concept of which is currently being worked on by the Polish Ministry of Health.

An adaptable blueprint

A key element of the iPAAC Joint Action will focus on developing a generic model for setting up CCCNs that could apply in every national setting, and could be adapted by member states to fit their specific legal framework and health systems.

The pilot study will also develop tumour-specific service guidelines, to ensure that patients are treated with identical diagnostics and treatment protocols regardless of which hospital they present at, with a particular focus on management of colorectal and pancreatic cancer. The same work package of iPAAC will develop models for how to derive quality indicators, implement patient-reported experience and outcomes measures (PROMs and PREMs), as well as create and implement patient pathways. These models will also be used in the Lower Silesian CCCN.

tals, survival outcomes and volume of care.

Much of this data on the pilot region, together with some analytic tools, are publicly available on the onconet.cz portal, which Dušek refers to as a "backbone of the eHealth system" in the Czech Republic. The portal aims to offer a 'one-stop shop' for patients and relatives seeking information on cancer care in their region, including details of how to contact the CCCN and individual contact details for the helpdesk of each tumour management group.

From competitors to partners

Dušek describes the establishment of the pilot CCCN as "a step-by-step transformation from the position of what I would call random assembly of hospitals to a well-organised and internally collaborating and communicating structure."

But as Luzzatto admits, even if you know the steps to take, instituting change in complex systems that have set ways of doing things and are beset with vested interests can be a challenge.

"At the beginning, there can be friction," he says, "but in the spirit of the CCCN, the participants must work together. Once the resistance is overcome, cooperation between major centres and smaller hospitals tends to work very well."

"Of course, there are political

issues," he adds. "Comprehensive cancer centres are not always happy about CCCNs. In big cancer centres there may be big egos; sometimes they may look down on smaller centres. The pride of a comprehensive cancer centre is, justifiably, having a big institute with lots of patients, and a world-class research centre with up-to-date, expensive equipment within the same building or in the building next door. Of course, it is an advantage to have these under one roof… but this tends to empty other places of research.

"In my view, all those who are interested and capable, in whatever unit of a CCCN they find themselves, should be encouraged to take part in research. Otherwise, you create a 'colonial situation' in which the major centre uses others as satellites without involving them in the interesting stuff."

"All those who are interested and capable, in whatever unit of a CCCN they are in, should be encouraged to take part in research"

By the same token, involving all the partners in developing the common treatment protocols is also important. "We shouldn't belittle the peripheral hospitals." Cooperating in research and treatment also has the added benefit of increasing the numbers of patients eligible for clinical trials."

Do CCCNs improve outcomes?

As the Czech pilot CCCN has only been up and running for around two years, there is not yet enough evidence to attribute any improved survival to the changes in cancer care. What we do know, however, is that the way cancer patients are cared for has changed, says Dušek. "Results are very preliminary, but we very dramatically changed access to high-level, highly specialised cancer care for all citizens in the region, especially in Vysočina.

"Prior to the CCCN, only around 50% of cancer patients contacted cancer centres in their region; the rest were treated in general hospitals with some competing strategy." Once the network was up and running, he says, "more than 80% were treated in touch points of the network and consulted primarily in tumour management teams, and haematological malignancies were transferred to Brno city."

At least in the Czech Republic, the CCCN model seems likely to transform cancer care beyond the pilot region. "Of course, we would like to continue in improving the CCCN established in the pilot region," said Dušek, "but the results are so convincing that we convinced … our minister of health, to export this model to the other regions of the country... The political leaders of healthcare accepted our strategy to distribute the CCCN model as an offered – not obligatory – model of cancer care in our country."

More pilots planned

But the CCCN model may also have an impact beyond the borders of the Czech Republic. While

"More than 80% of patients were treated in touch points of the network and consulted primarily in tumour management teams"

the CanCon Joint Action ended in 2017, its successor, iPAAC (Innovative Partnership for Action Against Cancer, 2018–2021), includes a project to design a roadmap for implementing actions for cancer control.

Led by Simone Wesselmann, of the German Cancer Society (Deutsche Krebsgesellschaft), this work focuses on governance of integrated and comprehensive cancer care, and will include developing a framework for implementing and monitoring CCCNs.

Wesselmann sees this as an opportunity to help ensure the CCCN work done by CanCon translates into improved care and outcomes across Europe. "I think this is a great and important opportunity to deepen what was achieved in CanCon and ensure that the results aren't lost but instead implemented."

Two new CCCNs, one in Berlin, Germany, and one in lower Silesia, Poland (see box p 37), will be implemented and audited as a pilot, she says.

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Bad for budgets, but also for patients

Challenging the in-patient culture of central and eastern Europe

While many western countries are pioneering safe delivery of more cancer care in primary, community and home settings, across central and eastern Europe, beds in university hospitals and cancer centres are still filled unnecessarily with people requiring diagnostic procedures, routine care and check-ups. **Marc Beishon** looks at the implications and explores prospects for change.

When healthcare analysts examine disparities in outcomes among cancer patients in Europe they often focus on availability of treatments such as new oncology drugs and access to radiotherapy, and on screening, late diagnosis and prevalence of risk factors, especially smoking. Underpinning the discussion is expenditure on healthcare, and there is a stark divide between central and eastern Europe (CEE) countries and those in western Europe in what is spent on health. Luxembourg and Norway, at one extreme, spend almost seven times more per person than Albania and Romania, at the other.

The relationship between health spend and cancer outcomes is by no means straightforward, however – a point that was acknowledged by a group of clinicians from CEE countries in 2016 paper which set out recommendations on the changes needed most to pull up standards of oncology care in the region (*Oncologist* 2016, 21:1183–90).

Certainly, they say, even allowing for lower costs of some inputs, with such large disparities in healthcare budgets it is not realistic to expect outcomes comparable with western countries. Yet plotting per capita health expenditure against outcomes (measured as the mortality-to-incidence ratio) shows that some countries get much better results than others for an equivalent health spend, which indicates that some countries could be spending their money a lot more effectively.

While Austria spends more per capita on health than Sweden, note the authors, Sweden has had a significantly better mortality-to-incidence ratio for all cancer types. A similar equation holds for Switzerland, which spends per capita 72% more on health than Finland, for an equally good mortality-to-incidence ratio. Within the CEE region, looking specifically at spending on oncology drugs, the authors point out that the Czech Republic achieves a significantly better mortality-to-incidence ratio in breast, lung, colorectal, and renal cancers than countries like Hungary, Croatia and Poland, which spend a similar amount.

Achieving the best benefit from health spending is becoming increasingly pressing, as the rising age profile and high costs of sophisticated new health technologies push health budgets to their limits. A major focus, not least in cancer, has been to limit the involvement of expensive in-patient care to where it is really needed, and transfer a lot of care delivery to outpatient, primary and community services.

When done safely and well, this can benefit patients, who are more able to get on with their own lives. And while developing the capacity of other services to play this role requires serious investment, taking the burden off high-end tertiary services should result in overall savings.

Effecting such system-wide changes is never easy, but many health services have been trialling these principles in various cancer care settings for many years now. The trouble is, the great majority of that work is being done in western countries, whereas it is the health services of CEE countries – the ones with the smallest per capita health budgets – where the reliance on hospital-based care is greatest.

This is a point that was flagged up by the authors of the *Oncologist* article, who in their recommendations call for the current preference for in-patient/hospital-based care in CEE to be changed to modern forms of ambulatory, day hospital and clinic treatments, "as day and ambulatory treatments may be superior in both direct and indirect costs, as well as quality of life for patients and families". They also call for the development of clinical guidelines and training for general practitioners (GPs) for management and follow-up of cancer patients and survivors.

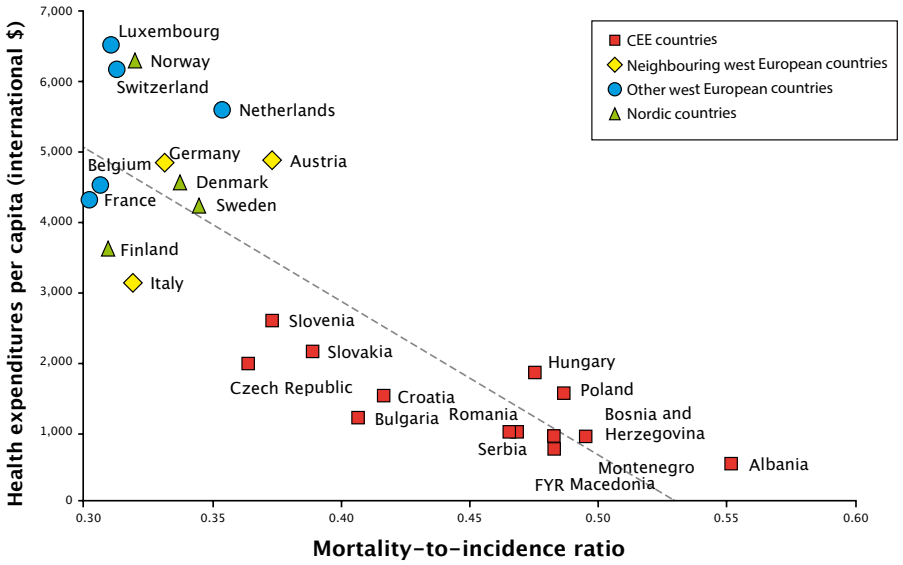
Excessive in-patient use

The extent of overuse of in-patient care across CEE countries may surprise some who are unfamiliar with the region. In most hospitals that treat cancer in western Europe, outpatient care for routine treatments such as intravenous chemotherapy and radiotherapy are the norm. Instead, in CEE countries people are often admitted to hospitals as in-patients to receive the same treatment, taking up expensive beds and hospital resources that could be better used to improve care. It is a hangover from the centralised Soviet-style healthcare that has been neglected for reform, mainly by authorities in charge of health policy.

"Hospitals have inherited a centralised structure and continue to apply a model that isn't applicable to modern cancer treatment"

Paradoxically, this means that some CEE countries have more in-patient beds per 100,000 people than most in western Europe, which some might see as a positive indicator – but which in most cases indicates a potentially wasteful use of resources. For example, figures for 2016 from Eurostat show that Bulgaria had 603 beds per 100,000 population, while France had only 314, and Sweden had among the lowest, at 215. Lithuania, Romania, Poland and Hungary also had high bed numbers, as did some western European countries – a possible indicator of the way their healthcare systems are managed: Germany, at 606 tops the list, and Austria and Belgium are also high up

Cancer outcomes by per capita health spend



Mapping per capita health spend against cancer outcomes, measured by the ratio of deaths to new cases (all female cancers), shows that health spend has a big impact on outcomes, but some countries spend their health budgets much more effectively than others

Source: E Vrdoljak et al (2016) *The Oncologist* 21:1183–90, republished with permission

the order. Comparisons are not definitive, as some countries count psychiatric beds in their 'curative' bed count, and Germany's count is higher still if its tradition of providing rehabilitation in-patient beds is included.

As Alexandru Eniu, a medical oncologist at the Ion Chiricuta cancer institute in Cluj-Napoca, Romania, and co-author of the CEE paper, comments, today's hospitals in CEE countries have inherited a centralised structure and continue to use a disease model that just isn't applicable to the multiple visits that modern cancer treatment requires. It is mainly the reimbursement systems that continue to support this out-of-date model, he adds. While having centralised systems is good for consolidating expertise, there are fewer centres and it means that patients often have to travel long distances to receive treatment, and they do not receive financial help with transport or with staying in hotels near to hospitals. "And in Romania, as with other CEE countries, a key obstacle has been that state reimbursement in public hospitals is mainly for in-patient care, with little allocated for outpatient departments – and this is still the case."

"Reimbursement in public hospitals is mainly for in-patient care"

This means that procedures which in western Europe are routinely done on an outpatient basis, such as chemotherapy, CT scans and radiotherapy, are often carried out on patients admitted to hospital over several days, simply because hospitals are reimbursed at a far greater rate.

As Eniu, who is a breast oncologist, says: "If I have a patient receiving a cycle of adjuvant chemotherapy there is no need to hospitalise her – but if I do it in our outpatient department the hospital gets paid a great deal less than if she is admitted as an in-patient say over three days. This is a bad incentive and the difference in income is big."

For radiotherapy, there are different pressures at work. While hospitals are not financially incentivised to admit patients for the full five or six weeks often needed for a course of therapy, the shortage of machines in the region mean patients often have to travel long distances to receive treatment. If they cannot afford accommodation, they could miss out on care unless hospitals admit them for the full period.

The upshot, says Eniu, is that care is compromised in several ways. Admitting patients for long periods means delays for other patients who must wait for a place; people may forego treatments as they cannot afford the time or money to receive inflexible, in-patient care; and the inefficient use of resources means that there is shortage of funds for the treatments themselves. Eniu says that in Romania there is still concern about access to essential drugs, let alone new targeted agents. "If you don't have cisplatin for lung and testicular cancer it's hard to worry about a lack of TKIs," he says. "If you hospitalise people for CT scans you don't have money to spend on other things."

There are outpatient facilities though – at Eniu's hospital a majority of chemotherapy is delivered there but only through staff working probably double time in overcrowded conditions with little regularised income to fund the department. It is a juggling act between in- and outpatient resources, and it is not possible

to hire more people, he adds. "We also have little time for other services such as patient education and management of side effects – we can only focus on essential treatment. Our treatments are good, but quality in cancer care means integration and paying attention to detail. We know that our patient experience is not the best; our care in alleviating fears and symptoms is lacking compared with western Europe."

In Romania, Eniu places much of the blame on a lack of a national cancer plan – it is hard to attract more money for cancer, or make more of existing money, as it is addressed just as other diseases, and hospitals are funded with the general disease-related-group system for reimbursement. "This is suited to episodes of treatment and not for cancer, where you may not see outcomes for many months and patients need to come in for different things at various times."

Healthcare culture

It's a point echoed by Richard Sullivan, director of the Institute of Cancer Policy at King's College London, who says that everything stems from the overarching health policy in countries – "How is health seen generally? and how is cancer seen?" The big picture tends to set the agenda, and smaller challenges further downstream often won't be tackled well if cancer is still seen by policymakers as just a serious hospitalised condition.

That said, it is not just politicians and policymakers who set the agenda, although state insurance systems that incentivise in-patient care are a major component of lack of resources. Sullivan says that entrenched healthcare culture – such as always admitting people for radiotherapy – plays a part, and indeed is manifest in other countries such as Germany, as well as being a hangover from Soviet times. The 'ego' of clinicians who insist on seeing patients in the acute setting can also be a factor, he says, and can be reinforced by 'dyadic' relationships with patients who express preferences to always see them.

"Entrenched healthcare culture, such as always admitting people for radiotherapy, plays a part, as does the ego of clinicians"

Paying for favours from doctors is also still part of the culture in many CEE countries, and it has been reported by Transparency International that in Lithuania one in four people who visited a healthcare institution admitted to paying a bribe. Patients also face co-payments for their care, and they generally lack trust in, and receive little support from, their general practitioners to help them navigate their cancer journey.

Sullivan cautions, however, that outpatient settings are not necessarily panaceas for cost savings and efficiency, because of the growing number of toxic treatments and complex surgical interventions. The emphasis must, he says, be on high-quality multidisciplinary treatment in high-volume centres that embraces concepts such as enhanced recovery after surgery (ERAS) to minimise readmissions. It must also be recognised that outpatient settings will need more resources for a wide range of treatment and survivorship care, often for older people with complex needs. He also stresses that palliative care is increasingly important in cancer and is adding to pressure on in- and outpatient costs.

Sullivan is a firm believer in collecting data that can inform policy rather than relying on modelling to improve quality. He mentions Avedis Donabedian's landmark work on health quality frameworks: "This won't tell you what is wrong but identifies outliers," he says.

Poland in focus

Poland looks to have followed this advice in analysing activity and spending as a precursor to recent cancer care reform.

A 2016 paper led by Barbara Więckowska at the Warsaw School of Economics found that spending on cancer in 2012 accounted for 6% of healthcare and more than 10% of the services funded by the country's National Health Fund (*J Cancer Policy* 2016, 8:42–50). A mere 8% of the spend was on ambulatory care, and only 39% was on day case admissions. The authors reported that excessive hospitalisation in chemotherapy, radiotherapy and for diagnosis accounted for 23% of total cancer spending, and that Poland had more in-patient bed days than England (5.3 million vs 3.2 million), even though it had half the reported number of new cases.

Given that the share of health spending on cancer was about the same as for other countries, the authors commented that there was "a huge window of opportunity to restructure the financing mechanism

Mobile chemotherapy units like this one, which was provided by a charity working with the UK's National Health Service, enable patients to safely receive treatment close to home (www.hopefortomorrow.org.uk)

for oncology in Poland". They found that 50% of all admissions and 28% of money were spent on purely medical admissions and small diagnostic procedures such as a CT scan and bronchoscopy – involving no surgery, chemotherapy, radiotherapy or any other active treatment. Together these cost about five times more than had they been delivered in the ambulatory setting. Making savings would release funds for rapid diagnosis, surgery and ambulatory radiotherapy, and providing hostels and transport for patients where daily travel is currently not feasible.

A recent paper looked at how effective changes have been in Poland's cancer reform, noting progress in introducing waiting time limits, multidisciplinary consultations, and a care coordinator position (*Int J Health Plann Manage* 2018, doi:10.1002/hpm.2635). But there is still a long way to go in centralising specialist treatment and addressing fragmentation, and shifting diagnostics and treatment to outpatient settings – moves that have been "recommended by numerous Polish national experts as contributing to both the cost-containment objectives and improvement in health outcomes".

Moving away from in-patient care

There are numerous initiatives, especially in western Europe, that aim to provide better patient-centred cancer care in the outpatient setting. For example, a number of locations in England have established nurse-led clinics in primary care practices to care for prostate cancer patients; Ireland has an oncology education programme for community nurses that was set up in response to the country's national cancer strategy; Sweden has a number of cancer rehabilitation centres staffed by multidisciplinary teams. In Liverpool, England, women can even receive a certain drug treatment in their own workplace, thanks to a version of trastuzumab that can be delivered by nurses subcutaneously, and several health districts have mobile chemotherapy units in large trucks.

There is also growing interest in using routine remote symptom monitoring to ensure timely help and advice for people undergoing chemotherapy, while avoiding unnecessary hospital check-ups. One example is the Advanced Symptom Management System (ASyMS) remote technology currently being trialled across Europe for people undergoing chemotherapy for breast, colorectal or haematological cancers (see *BMJ Open* 2017, 7:e015016).

Even people being treated for diseases like acute myeloid leukaemia, where the treatment makes them highly vulnerable to infection, are being offered the option of spending their treatment period at home, and in the case of one Danish haematology department, even get to self-administer their own chemotherapy (see opposite).

The new systems for delivering care still cost in staff time and resources, especially if other clinic facilities have to be set up. A com-

Making savings would release funds for rapid diagnosis, surgery and ambulatory radiotherapy

Pushing the boundaries of home-based care

An outpatient chemotherapy service that not only keeps patients out of hospital but even allows them to manage their therapy at home has been developed at Denmark's Rigshospitalet by Lars Kjeldsen, head of the haematology department. As he explains, there is considerable pressure on hospital resources, as medical expenses keep on rising, and one way to spend more on say new drugs is to save on inpatient beds and related staff costs.

Patients who often take up lot of bed time are those treated for acute myeloid leukaemia (AML), as it has an intensive complex chemotherapy regime that can induce bone marrow failure and low white blood cell counts, which increases risk of infection. "We were admitting patients for as long as three to four weeks following chemotherapy if their counts were low, to prevent infection," says Kjeldsen.

That started to change more than 10 years ago when patients were first given prophylactic antibiotics and sent home to monitor themselves, but what was missing was also delivering the chemotherapy, which often has to be scheduled for as long as 30 days during treatment periods. Now certain patients, especially those with support at home, can take home several doses of chemotherapy that are delivered by a programmable digital pump into a central line, and they just return for refills.

This change of management for AML patients, and other initiatives such as pump-administered antibiotics, has allowed Kjeldsen to close 10 beds in his haematological department, cutting the number to 42 from 52, but he says there have been obstacles. There has been little support from doctors as they are, he says, mainly interested in prescribing drugs, not in how they are delivered. It needed financial support to get off the ground – in this case he had to rely on an innovation award. "We need to spend more

money to change things in healthcare," he says. Then there is evidence that it would work: "Some said we should do a randomised trial, but sometimes you set out to prove things that are self-evident and an RCT would only have served half of the patients. Instead we made the change and gathered information to prove it was feasible and safe, and we have had few patients coming in with severe infections or problems with the pump."

Patients are always in touch over the phone if they have problems, he adds, but to expand services like this, primary healthcare professionals also need to take on certain aspects such as supervising intravenous antibiotics, as hospital resources will always be limited. Kjeldsen also notes that as more people get more treatments given the introduction of new drugs and regimes there will also be a growing number of very sick patients who cannot be taken care of at home and they will require inpatient care from existing staff.

A 2018 paper by Kjeldsen and colleagues details the use of home chemotherapy administration for AML and lymphoma patients (see *Br J Haematol* 2018, 181:637–41)

munity prostate cancer initiative started by the Christie cancer centre in Manchester, England, for instance, reported that more than 1,000 patients have been moved into community follow-up clinics set up in six locations, with more planned. On the plus side, this freed up more than 1,500 hospital appointments. A majority of men were able to self-manage when supported with the right advice, so cost savings are likely as well as less tangible benefits in quality of life.

Primary and community care

This also indicates that it is not just in-patient but also outpatient resources in hospitals that could be freed up, and a direction of travel is now back towards primary care,

In-patient care across Europe: the numbers

23%

The proportion of cancer spending in Poland going towards excessive inpatient hospitalisation for chemotherapy, radiotherapy and diagnosis (*J Cancer Policy* 2016, 8:42–50)

603
314
215

The number of hospital beds per 100,000 population (from top to bottom) in Bulgaria, France and Sweden respectively (Eurostat figures for 2016)

1,500

The number of hospital appointments freed up by moving prostate cancer follow-up to community clinics in the city of Manchester (bit.ly/Christie_CommunityCare)

which is the gatekeeper to cancer services in countries such as the UK. This is not just GPs, but also community pharmacists, psychologists, nurses, occupational therapists, geriatricians and others, including the army of unpaid carers (informal care costs for breast cancer alone in Europe are estimated at more than €3 billion a year – more than 20% of the entire care costs, according to research by Sullivan and colleagues – *Lancet Oncol* 2013, 14:116–74).

Primary care is likely to come under increasing pressure to be involved in the care pathways of cancer patients, especially in optimising physical and psychosocial care during extended periods of treatment and survivorship. Social care, especially for older patients, is also vital. A Lancet Oncology Commission of 2015 examined in great detail the expanding role of primary care in cancer control, noting that shared care approaches between primary care and oncologists is key, with evidence from the US that patients who see both are most likely to get the full array of care they need.

Developing the role of primary care, particularly the pivotal role of the GP, in follow-up and survivorship care of cancer patients faces significant barriers, in time, education and communications with specialists. While GP practices in countries such as the UK have expanded to be multiprofessional and based in much larger facilities, if GPs are to take more responsibility in cancer their role needs to be formalised, with guidelines for the many subgroups of patients, as Annette Berendsen commented in *Cancer World* in 2018 ('In the Hot Seat', issue 82).

In the CEE region, Eniu comments that primary care involvement in cancer is rudimentary and GPs are fearful, and few think they can help, further burdening already overcrowded hospitals. Indeed, Sullivan also comments that in some countries patients are simply lost to primary care altogether and are destined to seek care only at secondary level.

The sequence of European cancer initiatives – EPAAC (European Partnership for Action Against Cancer), CanCon (the Cancer Control Joint Action, which published the European Guide on Quality Improvement in Comprehensive Cancer Control) and now iPAAC (Innovative Partnership for Action Against Cancer) have all addressed the governance of integrated cancer care and national policy in various ways, as have a number of European cancer societies. But the structure of national healthcare systems and changes in political direction can be frustrating barriers to progress (see also Spotlight on moving towards an integrated cancer care network in the Czech Republic, p 32).

In the UK, the government has published an ambitious 10-year plan for the National Health Service that promises to boost out-of-hospital care, and "finally dissolve the historic divide between primary and community health services", and increase the use of digital technologies such as video consultations. A key aim is to reform outpatient services to reverse a major rise in visits. Cancer patients should have access to a personalised care plan and rapid access to clinical support.

The capacity of a health system to embrace holistic and community-focused cancer care alongside all the other competing chronic conditions will be a big test, but one that people will value, considers Sullivan. "People want to be normal and not be never-ending cancer patients. Disease is not a normal state of being."

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Philip Poortmans - ECCO President (2018/2019) and Head of the Department of Oncological Radiotherapy at Institut Curie, Paris

Artificial intelligence: responding to a new force for change in cancer care

There was nothing artificial about the intelligence of the late Professor Stephen Hawking. He lifted our horizons on all manner of topics, not only mathematics and cosmology. When considering the future of computer technology, he warned: "Computers will overtake humans with AI within the next 100 years... When that happens, we need to make sure the computers have goals aligned with ours."

Artificial intelligence in cancer care is now well past the realm of science fiction. It is here already. Some examples include:

- The use of AI to evaluate whether an X-ray is normal, allowing radiologists to focus their time more effectively on the analysis of abnormal images
- Machine learning techniques to improve the identification of DNA mutations within cancers and even to forecast future genetic changes; and,
- A surge of start-up companies focused on using AI and machine learning to accelerate new drug discovery and optimal use of technology in surgery and radiation oncology.

However, as might be imagined, and with Professor Hawking's message much in mind, the introduction of artificial intelligence into cancer care is not without controversy nor unresolved issues. For example, a report by STAT (www.STATnews.com) claimed so-called 'supercomputers' have been making invalid conclusions about cancer treatment, raising concerns about whether healthcare professionals will be able to detect and prevent such new forms of potential error in treatment decisions. Equally, there is a need to manage effectively the shift in healthcare professional roles that must surely follow the introduction of artificial intelligence in the conduct of tasks currently conducted by humans.

As Co-Chair of the ECCO 2019 European Cancer Summit, I am convinced that the cancer community needs to come together urgently to focus on this topic. We must further shape our collective response to this irresistible force for change, and in so doing, shape the future well. We need to maximise the benefits of AI for cancer care, while simultaneously taking action to prevent unintended harmful impacts.

Or to steal some phrasing from that Oxford mathematician whom I mentioned, we need to better align the goals of computers with those of the cancer community.

The ECCO 2019 European Cancer Summit takes place from 12th to 14th September in Brussels, Belgium. More information at www.eccosummit.eu

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Communicating with patients with advanced and metastatic cancer

People with incurable cancer need doctors who offer them hope but also give them a clear idea of what is realistically possible. Doctors can find it hard to be both empathic and honest when the news is bad. Psycho-oncologist **Lesley Fallowfield** outlines the key issues that need to be addressed in consultations, and the pitfalls to avoid.

This grandround was first presented by Lesley Fallowfield, from Sussex Health Outcomes Research & Education in Cancer, Brighton, UK, as a live webcast for the European School of Oncology. Richard Simcock, from Sussex Cancer Centre, Brighton, UK, poses questions raised during the presentation. It was edited by Susan Mayor. The webcast of this and other e-sessions can be accessed at e-eso.net.

What are we doing when we communicate with our patients? William Osler (1849–1919) suggested, "The practice of medicine is an art, not a trade, not a business; a calling in which your heart will be exercised equally with your head." One of the primary difficulties that clinicians face is achieving this balance.

Apart from the fact that patients deserve to receive good communication from healthcare professionals in any setting, good communication is necessary to ensure they can provide truly educated and informed consent to the management strategies they are offered.

Research has clearly demonstrated the value of effective communication. It is key to providing good clinical care and has beneficial effects on doctor/patient relationships. However, discussing a cancer prognosis and the complexity of modern diagnostics and treatments and therapeutic aims is not always easy.

There are many evidence-based courses to help doctors communicate in a clear, honest and empathic manner, but fewer on how to navigate the boundaries between personal and professional involvement with patients. One of the problems that has become increasingly apparent over the past few years is that encouraging doctors to get closer to the emotional needs of patients and their families puts them at psychological risk.

Key elements of good communication

Good communication in a clinical setting must include something on the therapeutic intent of treatment, such as palliation or controlling cancer when dealing with metastatic disease. Doctors are required to discuss all available options, including referral for supportive care. It is important to make sure patients understand everything that is involved in their treatment, such as treatment regimens and the visits required. In addition, it is essential to achieve the right balance in talking about the associated risks and harms of treatment compared to the likely benefits, as part of ensuring patients are able to give truly informed consent.

Encouraging doctors to get closer to the emotional needs of patients puts them at psychological risk

There is growing recognition of the importance of involving patients in decision making; however, this can be quite difficult in practice. The relationship between a patient and doctor is not symmetrical. Doctors have considerable power because of their knowledge, and they do not have to experience the consequences of treatment. A further ethical problem is that it can be difficult to genuinely share decision making with a patient if a doctor has a clear view, from a professional point of view, of what really would be in the patient's best interests. It is also important to bear in mind that it can be difficult for a patient who is sick and anxious to convey their values, and aspects of their lifestyle, that impact on their treatment preferences.

Question: When you talk about psychological harm to doctors, can you explain the types of harm they might experience?

Answer: There has been a lot of work over the past decade looking at the levels of emotional burnout that many oncologists, in particular, experience. This is partly due to the fact that they are generally really empathic people. Doctors can sometimes be criticised for being cool, but some degree of detachment can protect them from being hurt. If you care about your patients you are inevitably going to expose yourself to trauma, particularly when sharing difficult news. However, at least we now talk about these issues and recognise that being truthful and honest can have a personal impact on some doctors. It is no longer seen as a weakness for a clinician to admit that they are finding things emotionally challenging. There are courses and sources of support that doctors can access to help with this. It is important that healthcare professionals are given support so they can provide the best support to patients.

What information do patients want and what do they get?

There is plenty of evidence from surveys around the world that patients generally want more information about their treatment options than they usually receive (*Br J Cancer* 2001, 84:48–51). There are ethical, legal and social imperatives for patients to be more active, autonomous or collaborative rather than passive in decision making, which requires providing them with sufficient information. However, studies across tumour sites over the past 20 years have shown

a mismatch between the information that patients want and their preferences for decision making, and what actually occurs in practice (*Ann Onc* 2010, 21:114–51).

A study of information preferences in 2,331 UK cancer patients (*Br J Cancer* 2001, 84:48–51) showed that the overwhelming majority of patients (91%) felt they needed to know their week by week progress, with only a small proportion (9%) preferring not to know. There were similarly strong preferences for knowing about the chances of cure (95% vs 5%), about all possible treatments (94% vs 6%) and about all possible side-effects (97% vs 3%). The researchers recorded the interactions in the clinic and assessed whether patients' pre-stated information preferences had been met. Results showed that, on the whole, they were not.

The type of decision being made influences the level of involvement that patients want. A large US study (*JCO* 2010, 28:4364–70) showed that if there was strong evidence for efficacy regarding the treatment a doctor was about to discuss, then they were very prepared to share control of decision making with the patient. The highest rates of patient control were seen in chemotherapy decisions, while the highest rates of physician control occurred in decisions on surgery and radiation.

There was a strong expectation that, if a discussion was about treatment of metastatic breast cancer, then patient preferences should predominate because the evidence of benefits was more modest and the potential toxicity was high. However, this expectation was not realised at all, and the study revealed low patient control and high physician control in discussions about metastatic disease. Better strategies are clearly needed to engage patients in decisions when treatment is not curative.

Another key factor underpinning decision making is whether lengthier survival is worth treatment side effects. It is important to discuss the survival benefit a patient considers worth gaining to trade off the disadvantages or harms of a treatment. Studies have suggested that patients are willing to accept very high toxicity for minimal benefit. However, much of this research is flawed, being often based on hypothetical scenarios or involving patients who have already survived treatment, which biases the findings. If there is no clear survival benefit with a particular treatment option, then information on quality of life is crucial and may influence patient preferences.

Better strategies are clearly needed to engage patients in decisions when treatment is not curative

Research has shown that cancer patients value quality of life on a par with length of life. For example, a study involving 459 patients with advanced cancer found that more than half (55%) viewed quality of life and length of life as equally important (*Cancer* 2008, 113: 3459–66). Just over one quarter of patients (27%) saw preservation of quality of life as being their priority, while 18% opted for length of life as their preference. Further findings showed that patients most interested in quality of life had lower cancer-related distress, while those prioritising length of life were more distressed generally and wanted more supportive and less pessimistic communication styles.

This is interesting because, if a doctor taps into the fact that the patient is very distressed and wants optimistic communication, then there is a strong risk of overemphasising the potential benefits of a treatment and underestimating the possible disadvantages.

How patients perceive messages

A recent study of 100 patients with locally advanced or metastatic cancer explored their perceptions of the compassion and trust demonstrated in two filmed doctor/patient consultation scenarios (*JAMA Oncol* 2015, 1:176–83). Both scenarios involved patients with advanced cancers who had received several lines of chemotherapy, had a poor performance status, and who were poor candidates for further treatment. The doctors made equal numbers of empathic statements and used similar body language in both scenarios, but the messages being conveyed differed in their level of optimism. The doctor in the first video was explicit about the lack of further options, while the doctor in the second scenario gave vague information about the possibility of some further options if the patient's performance status improved.

The results showed that patients rated the physician's compassion higher after watching the more optimistic video. Just over half (57%) of patients preferred the doctor delivering the more optimistic message, 21% had no preference and 22% preferred the less optimistic message. Higher perceptions of compassion

were associated with greater trust in the doctor, independent of the message type. These findings demonstrate that communicating in a way that is honest but also compassionate will engender trust in patients, which is reassuring for doctors concerned that sharing difficult information will somehow lose a patient's trust.

Question: Given that the research showed some patients preferred a more optimistic message while others preferred a less optimistic approach, is there any value in trying to determine a patient's preference before having a consultation?

Answer: Doctors with good communication skills can usually work this out. In addition, with the exception of patients who initially present with metastatic disease, oncologists usually already know a patient with advanced cancer, and have already built up a relationship and understanding of how they prefer to receive information. An even more important issue is that one can always be optimistic and positive about situations that can potentially be improved, such as reassuring the patient that the team will manage their pain better or look for ways to increase their appetite.

Comment: It reminds me of something I was told early in my career, 'Never tell a patient there's nothing you can do.'

Challenges within the doctor/patient relationship

There are several challenges that affect the relationship between a doctor and patient. Healthcare policy in different countries affects the throughput of patients, potentially leading to very busy clinics, with targets and cost-containment impacting on the amount of time available to spend with each one. Patients' expectations have a major impact on communication during consultations, particularly when they have seen the possibility of new 'wonder drugs' in the media. Doctors have to manage a great deal of misinformation from the media and the Internet, which can use up consultation time. Access to novel therapies can also be variable, affecting the options that may be discussed.

Patients' expectations have a major impact on communication during consultations

Another factor now affecting the doctor/patient relationship is that most doctors now use computers to make notes during a consultation. A very interesting paper, 'You, me and computer makes three' (*J Gen Intern Med* 2015, 30:1–2), explored how the presence of a computer makes dyadic exchanges more complicated. The challenge of truth telling is a further crucial issue in effective communication between doctors and patients.

Key aspects of effective communication

Patients need more honest information about the therapeutic intent of treatment than is generally realised. Information should be delivered in a kindly, well-paced and non-patronising manner that is appropriate for the individual. The danger of failing to provide patients with sufficient information is that they then become easy prey for charlatans trying to sell treatments on the Internet.

Censoring of information

Doctors often try to 'protect' patients from sad and bad news, particularly regarding prognosis, based on the well-intentioned but misguided notion that what a patient does not know will not harm them.

There is an expectation that patients will ask if they want to know, which commonly they do not, and that sharing difficult news may cause them unnecessary emotional distress or make them lose hope and not enjoy the time they have left.

Thinking that a patient may lose hope if given accurate information is based on the assumption that hope is solely centred around cure and so truthful disclosure will destroy this. However, this is unethical. Preservation of unrealistic hope prevents energies being directed towards realistic, achievable goals and hopes. It is important that doctors consider whether it is ethical to encourage physically weak and exhausted patients to keep fighting for implausible outcomes.

Doctors may consider that outcomes are too difficult to predict with accuracy, so are better not discussed. Modern western cultures have a tendency to deny death and focus on new medical advances. This results in healthcare professionals and patients harbouring unrealistic expectations about the likely therapeutic benefits of modern medicine.

Failure to prognosticate is not just about unpredictability. Research suggests that the accu-

racy of clinicians' predictions for prognosis is poor, with errors being almost always (90%) in an optimistic direction. There is evidence to show that the better a doctor knows a patient, in terms of length and intensity of contact, the more likely they are to overestimate survival (*BMJ* 2000, 320:469). These factors mean that doctors sometimes adopt 'doing something' behaviours rather than focusing on the honest but painful conversations that are needed.

Ensuring patients understand the benefits of treatment

When discussing new drug options with patients, it is important to remember that many have been approved based on progression-free survival (PFS) data without having demonstrated increased overall survival.

Discussions should help patients to be clear on what progression-free survival means and the therapeutic intent of the treatment they are being offered, checking their goals and priorities and the trade-off between toxicity, quality of life and survival.

A study of consultations between 32 oncologists and 90 patients with a range of metastatic cancers showed that the therapeutic aims of offering drugs that improve only PFS are generally misunderstood by patients, and oncologists may be overly optimistic about likely benefits (*Support Care Cancer* 2017, 25:237–44).

After consultations, only 4 of the 90 patients recalled any explanation of the therapeutic aim or PFS for the new drug treatment their oncologist had discussed with them; 57% had 'no idea' or were 'unclear' what PFS meant, 32% knew it was about 'controlling cancer' and 11% said it was about 'extending life'.

From the oncologists' perspectives, the benefits they expected with treatment often exceeded trial results. They predicted no likely benefit or uncertainty for 44/90 (49%) of patients who were nevertheless prescribed treatment. Just over half (51%) of patients said that palliative care options were not discussed with them.

There can be a mismatch between what oncologists believe they have said in a consultation and what patients believe they have heard. A study of 50 consultations found that clinicians said they discussed prognosis in half of cases (25/50) (*JCO* 2011, 29:61–68). However, only 12% of patients (6/50) said it was discussed. Observers of the consultations reported hearing prognosis discussed in 20% (10/50) of cases.

Question: Is there a hope from clinicians that the patient in front of them will outperform the median in terms of benefit from treatment?

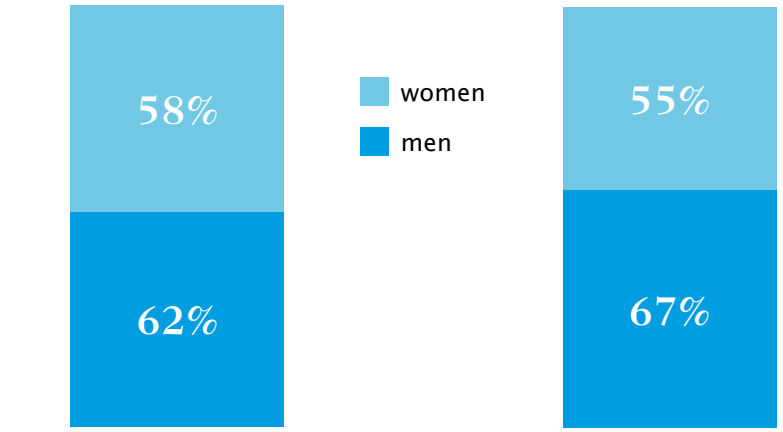
Answer: That's probably true, but the median survival comes from clinical trial data in patients fulfilling the stringent eligibility criteria, while patients in real-life clinical practice may have comorbidities

A survey of 338 young oncologists conducted in 2014 for a workshop run by the European Society for Medical Oncology showed the blurring of personal and professional boundaries (see figure).

Personal and professional boundaries

"I find it hard to be truthful about prognosis with patients I like"

"If I am too empathic I cannot make objective decisions"



A survey of young oncologists found that many doctors feel that having an empathic relation with their patients makes it harder for them to be objective about, and communicate clearly, information that could be upsetting.

Source: L Fallowfield et al (2014) *Lancet Oncol* 15:1423–24

Nearly two-thirds of male oncologists (62%) and 58% of female oncologists agreed with the statement, "I find it hard to be truthful about prognosis with patients I like." Similar numbers (67% of men and 55% of women) agreed with the statement, "If I am too empathic I cannot make objective decisions" (*Lancet Oncol* 2014, 15:1423–24). The results illustrate how difficult doctors find it to share bad news with patients.

Early referral to palliative and supportive care services

Many data show that early referral to palliative and supportive care services benefits patients' psychological and physical well-being and improves survival, as well as benefiting caregivers. However, doctors can find it difficult to initiate discussions about palliative care, particularly if they have close emotional bonds with the patient and their family (*Support Care Cancer* 2016, 24:3873–81).

Some clinicians feel it is an admission of defeat and personal failure, while others may be responding to unrealistic hopes of the patient and their family for a miracle with further anticancer treatment.

A study of 160 haematologists and oncologists taking part in 1,039 patient consultations about palliation and 1,768 consultations about active treatment or remission showed the doctors were significantly less satisfied with consultations when palliation was discussed, even when communication was good ($P<0.0001$) (*Pall Med* 2002, 16:297–303). Rating their self-confidence, doctors were more confident talking with patients about side effects of treatment (mean of 7.28 on 10-cm visual analogue scale) than telling them they have a recurrence (6.62) or that active therapy is being replaced with symptomatic care only (5.76).

Doctors can find it difficult to initiate discussions about palliative care, particularly if they have close bonds with the patient

Results from a study on the impact of the 'Choosing Wisely' campaign run by the American Society of Clinical Oncology (which encourages clinicians to avoid treatments not supported by evidence) showed that 71–76% of 28,731 patients aged 65 years or less, who died from metastatic cancer, were still receiving aggressive anticancer treatment within the last 30 days of life (*JCO* 2016, 10.1200/JCO.2016.34.18_suppl. LBA10033).

Almost one-third of the patients died in hospital, with only 14–18% receiving hospice care, suggesting substantial overuse of aggressive treatment at the end of life.

In colorectal and breast cancer, the proportion of patients treated with anticancer agents during their last month of life had remained unchanged since the campaign; in other cancers it had increased.

Optimal communication in metastatic cancer

Clinicians should start communication with advanced cancer patients with a platform of certainty about the issues that are clear and reinforce the message that many patients with metastatic disease live well with a good quality of life.

Hopefulness is important, but this should be grounded on credible, reality-based possibilities of likely prognosis with and without different treatment options. Doctors should know the data and also recognise and question their own motives for recommendations they make.

It is essential to provide positive information about the benefits of good quality supportive care, stressing that something can always be done to relieve many of the worst symptoms of advanced cancer, explaining the options for pain relief, stopping nausea and improving appetite.

There are many evidence-based courses that can help doctors to communicate in a clear, honest and empathic manner. However, there are fewer on navigating the boundaries between personal and professional involvement.

It is important to recognise that encouraging doctors to get closer to the emotional needs of patients and their families puts doctors at psychological risk and to support them with this. Doctors should also be aware of their own neediness and motives in discussing treatment options with patients, and be less nihilistic about supportive care.

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On a Mumbai street, aspiring soldier endures India's cancer-care crisis

Recent studies have begun to quantify the size of India's cancer burden, and the barriers to accessing diagnosis and care. This article, first published in *IndiaSpend*, presents those data to a mass audience through the stories of patients waiting for treatment outside Mumbai's Tata Memorial hospital. It won reporter **Swagata Yadavar** the overall *Cancer World* Journalism Award 2018.

Mumbai: For the past four months – as his life turned from college student in Bihar to cancer patient on a Mumbai footpath – Arvind Kumar, 24, has been bothered by one question: How did I get oral cancer?

Kumar never smoked, chewed gutkha, paan (betel leaf) or tambaku (tobacco), the source of cancers in four of ten Indians so afflicted. His right eye eaten away by cells growing out of control, Kumar found it difficult to speak. So his brother-in-law explained how the Bachelor of Arts student from Bettiah district in western Bihar – and, as his family's most educated member, their great hope – came to be here, after visiting seven doctors in five cities over five months, more than 1,866 km from home.

Sitting on a thin, plastic mat, Kumar – who is checked bi-weekly and gets chemotherapy and radiation once in three weeks – is one of about 50 patients who, on any given day, are spread across the footpath of Jerbai Wadia road at the front and rear of Tata Memorial Hospital's Homi Bhabha Wing in central Mumbai. Either sitting or lying down on thin mats, they are usually accompanied by family members. Their medical files and medicines are placed in plastic bags hanging on a wall. A bag full of clothes is usually next to them. Some have a thin tarpaulin for a roof and a stove.

Run by the Department of Atomic Energy, the 76-year-old Tata Memorial Hospital – India's leading tertiary referral centre – is ground zero of India's unfolding cancer-care crisis. Although India's incidence of cancer is still low compared to the West, it is spreading, and the lack of quality cancer care sets people like Kumar on trans-subcontinental journeys that end on the pavement of Jerbai Wadia road.

That is why *IndiaSpend's* three-part special report on cancer treatment is focussed on the Tata Memorial Hospital. In part one [published here], we describe Kumar's journey to Mumbai and the trauma his family endures. In part two [bit.ly/CancerBankrupt_inMumbai], we calculate the economic and social cost of cancer through a survey of cancer patients living on Jerbai Wadia street's pavements. In the third part [bit.ly/CancerJourneyMumbai], we investigate the government's programmes for cancer care for its poorest patients.

Cancer is now known to strike at any age, as cells grow out of control due to multiple reasons: A flaw in your genes, toxins in the air and in your food, or consumption of tobacco or excess alcohol. Cancer's changing characteristics are made worse by India's inability to even gauge the disease's spreading tentacles.

India's (man-made) cancer-care crisis

A million Indians are diagnosed with cancer every year, and 680,000 die from a disease once regarded as an affliction of the western world. India's cancer burden is now expected to rise 70% over the next 18 years, from nearly

IndiaSpend/Emmanual Yogini

A cancer patient resting, with his wife, on the divider under the monorail station near Tata Memorial Hospital, Parel, Mumbai. Many cancer patients, unable to afford a hotel or a dharmshala (rest house), stay on the pavements around the hospital till their treatment is complete

1 million new cases in 2012 to 1.7 million by 2035 according to GLOBOCAN, an international initiative on cancer data.

These may be underestimations because there were 1.45 million new cases of cancer and 736,000 deaths in India in 2016, expected to increase to 1.73 million in 2030, with 880,000 deaths by 2020, according to data from the National Cancer Registry Programme of the Indian Council of Medical Research.

The most common cancers in Indian men are oral and of the esophagus, stomach and lung; in women oral and of the cervix, breast and esophagus.

Although the incidence of cancer in India is half the world average – 94 per 100,000 compared to 182 per 100,000 – and a third of the incidence in developed countries (268 per 100,000), cancer care is scarce.

India has no more than 250 dedicated cancer-care centres (0.2 per million population in India vs 4.4 per million population in the US), 40% of which are present in eight metropolitan cities and fewer than 15% are government-operated, noted a 2015 study, 'Call for Action: Expanding Cancer Care in India,' by Ernst and Young, a consultancy.

That is why 80% of India's cancer cases come to medical attention at an advanced stage, one reason why 68% of patients with cancer die of the disease in India, compared to 33% in the US. India also has 0.98 oncologists per million population, compared to 15.39 in China, 25.63 in Philippines and 1.14 in Iran.

So, many cancer patients must travel great distances to only 27 government cancer referral centres and 250 cancer centres nationwide. That explains the patients on the footpaths outside Tata Memorial Hospital and India's high mortality and morbidity from and expenditure on cancer.

"The reason patients come to Tata Memorial Hospital are two – first is (because of) the 76-year-old brand value and trust among the public, and second, thanks due to generous funding from government of India, we have a decent price structure, where for the same service, patients in private wards pay ten times more," said Anil D'Cruz, director of the Tata Memorial Hospital.

Government spending on cancer in India 1/10th average of high-income countries

Public expenditure on cancer in India remains below US $10 per person, compared with more than US $100 per person in high-income countries. Furthermore, the care provided at many cancer centres in India is often dictated by facilities available. For example, many centres nationwide do not have access to radiotherapy. On average, there are 2–5 million people per radiotherapy machine, ten times more than the 250,000 people per

IndiaSpend/Tushar Mane

Scene at the head-and-neck cancer department in Tata Memorial Hospital, it sees 300 patients in the out-patients department and conducts seven surgeries every day

machine in high-income countries.

Cancer in India differs from western countries because many cancer cases in India are associated with tobacco use (40%), infections (20%), and other avoidable causes. "Social factors, especially inequalities, are major determinants of India's cancer burden, with poorer people more likely to die from cancer before the age of 70 years than those who are more affluent," said a 2014 paper in *Lancet Oncology*, a global medical journal.

Kumar's story reflects the characteristics of India's cancer-care crisis, as identified by researchers and medical professionals.

A toothache leads to six doctors, five cities and a 5,500-km journey

When we first met him in May 2017, Kumar was dressed in a loose, white shirt and loose black pants, much like the thousands who migrate to India's richest city from small towns. The handkerchief tied on his head, covering his right eye, gave away his cancer. He opened it to show us how a tumour had taken over his eye, the area from head to eye socket swollen.

It began five months ago in March 2017, with a pain in Kumar's teeth. As the pain grew, a swelling began in his mouth and within 45 days had spread to his right eye. These niggles came at a time when Kumar had been watching his diet, jogging every morning and working on his physique to realise his ambition – to enlist in the Indian army.

His family took him to Patna Government Hospital, 200 km to the south, where the doctors told him that a surgery was needed. It would cost Rs 250,000 [around € 3000]. The family then travelled 260 km north to Gorakhpur where a biopsy revealed cancer. They consulted six doctors, travelling over three months and about 1,000 km, from Gorakhpur in Uttar Pradesh to Motihari in Bihar to Varanasi in Uttar Pradesh, and spent Rs 100,000.

Kumar did not get better. Then, someone from Kumar's village told him to go to Mumbai for medical care. Three of the family – Arvind Kumar, his brother-in-law Chand Singh Mahto, 30, and his mother, Nirmala Devi, 55, made the journey to Mumbai in April 2017.

In seeking cancer care, savings exhausted, Rs 50,000 loan from relatives

Kumar's dream of becoming a soldier has been swept aside by a string of concerns: Will he live? Will he look normal again? When will the doctors allow him to go home? Will he be able to help his family pay back the loans they have taken?

Kumar's family borrowed Rs 50,000 from their relatives, after exhausting their own savings.

Once in Mumbai, when Kumar and his family found hotels and guest houses charging anything from Rs 600 to Rs 2,000 per day, they saw other patients living on the footpath and joined them.

When *IndiaSpend* met them, the family had spent Rs 60,000 [around € 700] on treatment over two months in Mumbai. While consultation is highly subsidised, patients above the poverty line must pay for tests and medicine at Tata Memorial Hospital (free for those certified as poor). The family's daily expenses range from Rs 200 to Rs 300 in Mumbai. Their finances have been hit hard by Kumar's cancer. Aside from losing their savings and the pending loans, they have lost the income they might have earned during this time.

Mahto, a labourer, gave up work to be with Kumar. His wife, Kumar's sister, is at home, taking care of their two daughters, brother and father. Kumar's father, an agricultural worker, is the sole earning member. Kumar's younger brother is a Class X student.

Lining up at 4 am to see the doctor at 2 pm

Since he came to Mumbai, Kumar received swift treatment. Tuesdays and Wednesdays are for out-patients at the head and neck cancer department, and even though consultation begins at 8 am, the line to enter the hospital begins to form four hours earlier, at 4 am. The gates open at 7 am.

"If you line up early in the morning, the doctor sees you at 2 pm," said Mahto, Kumar's brother-in-law. Inside the hospital, the patients get free snacks and meals during out-patient department (OPD) hours, attendants must pay between Rs 50 and Rs 100 for each meal.

Kumar suffers from the side-effects of the chemotherapy and radiation that he receives every three weeks.

"I feel very nauseous and I throw up everything I eat," he said. The skin of his forearms had gone dark because the radiotherapy which is supposed to kill cancer cells by high energy radiation also affects normal cells.

Life on the street: Nights are the worst

Life on the footpath isn't easy. Patients spend Rs 5 to use the toilet and Rs 20 to bathe in a public restroom. Drinking water must be filled from a hospital canteen. "The worst of the ordeal is every night," said Nirmala Devi, Arvind's mother, referring to the policemen who rouse and drive away patients and their families, who gather their reports, medicines, clothes and other belongings and find shelter alongside the awnings of closed shops.

Why don't they move to a dharmshala (non-religious rest house)? "I have been to Nana Palkar (a dharmshala run by a private trust) four times," said Mahto. "They say bring a letter from social worker; the social worker says we do not fit the criteria (they are not poor enough). We don't want to live on the footpath, but we can't find accommodation anywhere."

Although Kumar's father is a labourer, he is officially above the poverty line – he has an above-poverty-line (APL) ration card and, so, cannot get what is called an NC, or no-charges approval, which allows minimal charges for some hospital services and no charge for investigations or consultation.

When *IndiaSpend* met them again in early June 2017, the family was worried about the monsoons. "We found shelter in the monorail station nearby last night when it rained," Mahto said as the rain bucketed down.

Why patients return to the footpath

While the Tata Memorial Hospital's social service provides needy children with free cancer treatment and accommodation, their families are also, sometimes, given skill training and a living space at St Jude's, an NGO. But adults with cancer have fewer options. The hospital makes periodic attempts to move them off the street.

"We had moved all the patients (living on the footpath) and given them free accommodation in 165 rooms at Bombay Port Trust quarters, but they all came back," said S H Jafri, Public Relations Officer (PRO), Tata Memorial Hospital. "There are enough NGOs to accommodate all cancer patients at affordable rates, but those who stay on the footpath do not want to move due to free food distributed here."

Every day Taj Hospitality, a part of the Taj Hotels group, provides free lunch to about 300 patients in Tata Memorial Hospital; they also get breakfast at 6 am. Other non-profits and trusts also provide food and other essentials from time to time. "This may be true for the patients who stay on the other side of the hospital," said Mahto, reacting to the PRO's comment. "They have been treated years ago but still stay there."

Interviews with other cancer patients on the footpath revealed that while some patients do not relocate to other affordable options out of choice – living outside the hospital is convenient and gets them to the 4 am line quicker – many said they did not know about other accommodation facilities. Some said they tried and returned to the footpath.

As you read this story, Arvind Kumar – now too weak to stand or walk – is undergoing free chemotherapy and, after staying under a monorail station for two months, has moved to the nearby Nana Palkar dharmshala, where he will get free food and accommodation – for a month.

This article was first published by IndiaSpend, India's first not-for-profit data journalism initiative, on 4 September 2017, and is republished here by permission.

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PALAZZO DEI CONGRESSI
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Should breast surgeons use ultrasound?

Surgeons are increasingly using ultrasound for visual guidance, both in an interoperative setting, to help ensure a clean cut around the tumour, and also to guide breast biopsies. Radiologists however are warning that performing and interpreting ultrasound scans can be trickier than is often assumed and that, in untrained hands, ultrasound could harm patient care. They worry in particular that, if surgeons get an official go-ahead to use ultrasound to help them visualise tumours, there is nothing to stop them also misusing the technique, eg to screen for or characterise lesions, which requires multimodal imaging and great expertise.

Should surgeons ever be allowed to use ultrasound? Does it make sense – and would it even be possible – to stop them using something that helps them do their job better? Is the answer to ensure any surgeon who uses ultrasound has the necessary training and experience? Or to define strict boundaries about who should do what? Or just rely on surgeons and radiologists to sort it out for themselves within the context of multidisciplinary collaboration?

Would it even make sense to operate a single approach across Europe, given that in some countries, particularly in southern Europe and the UK, the role of surgeon and radiologist have traditionally been strictly separated, while other countries, such as Germany, have a long tradition of interdisciplinary cooperation in breast cancer, and most breast surgeons are gynaecologists who learnt ultrasound as part of their obstetrics training?

The European School of Oncology invited breast surgeon Francesco Meani, Clinical Director, of the Swiss Italian Breast Centre, to debate the issue with two radiologists: Rubina Trimboli, a leading member of the European Society of Breast Imaging, EUSOBI, from the Department of Biomedical Sciences for Health, Università degli Studi di Milano, Milan; and Alexander Mundinger, from the Department of Radiology at the Niels-Stensen-Klinik, in Osnabrück, Germany, who is chairman of the executive alumni of IBUS, a non-profit organisation that has trained more than 12,000 participants in more than 120 courses since its foundation in 1991.

The debate was co-chaired by IBUS President Erkin Aribal and Alberto Costa, CEO of the European School of Oncology.

Francesco Meani

To me it seems obvious why the surgeon should use ultrasound, even as a general concept. Using a device that can help you see better is a no-brainer, and should be no surprise to anybody. When you are driving a car, you prefer to drive on a sunny clear day rather than to find yourself in a bank of fog. As a surgical patient, would you like your surgeon to see the lump they are operating on, or would you prefer them to be working on you blindly?

I think we need to draw a distinction between using ultrasound for the discovery and characterisation of breast lesions on the one hand, and using it to improve localisation and spatial allocation of a lesion, to guide clinical interventions, on the other. The first of these requires high-resolution ultrasound equipment, specific training and experience for imaging interpretation, and integration of different complementary modalities, and is best done by the radiologist. The second can be done by the surgeon and must be a skill acquired by both the radiologist and the surgeon.

Pre- and intraoperatively there is a lot of assistance we can get from the ultrasound. We can precisely localise the lesion and evaluate the surgical margins; check the placement of the marker wire, if we used one; and check the presence and placement of the metallic clip. We can use it for intraoperative radiotherapy; and postoperatively to check the tumour bed, keep an eye out for seroma, check for abscesses and see whether we have fluid around an implant.

The only two published surveys I could find on this topic indicate that surgeons are under-using this technique, probably due to lack of confidence, lack of time, limited access to ultrasound devices, and, importantly, restrictions from the radiology department or hospital.

Rather than approaching this issue as a clash of interests, we should be asking what is required to give breast surgeons the capacity to use ultrasound in the best interests of patients, and we should define the boundaries we want to give the surgeon for using ultrasound, to make a good collaboration between the two parties.

Rubina Trimboli

I agree that we are a multidisciplinary team, so we have to work together in a constructive perspective for obtaining the best for our patients.

But I don't agree that there is a problem of radiology departments keeping control of the ultrasound machine. The big problem is that, if surgeons can get certification for carrying out breast ultrasound, it will be very hard to stop them from using it in the sort of discovery and diagnostic settings that we both agree are not appropriate for surgeons.

We have to be responsible and only do what we are confident with and know how to do. If, as Meani says, surgeons generally lack the confidence, the time and access to up-to-date equipment to do effective ultrasound examinations, then why should they do it?

Breast ultrasound is not as easy as might be assumed. There is a high proportion of human variability in determining the diagnostic result, so while the quality of the equipment clearly matters, it is one of the cases where the expertise of the examiner matters more. And with manual ultrasound examinations, quality control is difficult, because if the initial examiner overlooks an abnormality during the ultrasound examination, an image showing that abnormality will not be available for later review by a third party.

We radiologists are trained to look at images. Our knowledge and understanding of ultrasound technology allows us to optimise the image to see findings that might otherwise be occult. We are also the only ones who can synthesise those findings with information that we get from other imaging modalities and clinical information of the patient. Various MRI modalities, tomosynthesis, contrast-enhanced mammography, even breast CT are all used alongside ultrasound, to build up the most reliable and accurate picture.

I don't think surgeons actually want to look at all these images, because they are more practical, and we are more… maybe philosophical.

Even localisation of the lesion, one of the tasks Meani suggests can be carried out by surgeons, can

be surprisingly difficult. If you ask a surgeon where is a lesion that they see in the outer quadrant on the craniocaudal view and at nipple level on the mediolateral oblique view, they will usually say it is at 3 o'clock. But actually it can be in the lower quadrant, or an inner lesion in the upper quadrant, because the oblique view is not a lateral view. And we have many cases where a surgeon or physician, sometimes even a radiologist, says 'OK there is no lesion,' because it is not well localised.

Alexander Mundinger

Though I'm a radiologist, I learned breast ultrasound from gynaecological colleagues, who were better at it than I was, many decades ago.

This is how it started. I am now the director of several departments of radiology, and I find it difficult to interest my young colleagues in breast imaging and also breast ultrasound. They are much more interested in MRI, CT and intervention procedures. I am happy if some of them are ready to do breast ultrasound in the multidisciplinary setting.

I also work at a breast centre, and our breast surgeons there do more ultrasound in daily work than the radiologists, because it doesn't matter who does it. Some surgeons are very interested in ultrasound: they have a visual approach, including when they are in the operating theatre. Others are more kinaesthetic – they like to palpate, and they don't really benefit from intraoperative ultrasound.

Everybody can learn how to do ultrasound. But of course I agree that if you are going to do it, you need to understand the physics, and know how to adjust all the variables available to get the best from the technique, which is what we teach in our IBUS courses. It's about multimodal problem solving and making smart decisions.

I think it's important to emphasise again that, however expertly used, ultrasound alone is not enough for characterising or staging a lesion. We often use several imaging modalities, and have to try to make sense of the whole picture, seen from different angles, highlighting different physical properties, and with the breast in different positions, which leads to the lesion itself changing shape. It is difficult to do and can be very time consuming.

That said, I agree that surgeons should be able to use ultrasound to assist with clinical procedures. If that makes it easier, why not? And now that more and more ablative techniques are developing, maybe surgeon and radiologist have to work together. Radiologists have to know some basic knowledge in surgery and surgeons need to have some basic knowledge in radiology.

The problem remains, however, once we accept that surgeons can do ultrasound, it is difficult to stop them using it in outpatient settings.

I'm not sure surgeons are particularly motivated to do ultrasound examinations beyond what they need to know regarding where a palpable finding is, or where a preoperative lesion lies, or intraoperatively to help guide their surgical procedure. A lot can depend on how it is reimbursed, and in most countries the reimbursement is fairly limited, or it is covered by a whole budget. It is notable that, a decade ago, our

gynaecologists in Germany were very interested in performing ultrasound, but now that the reimbursement is included in the total budget, they use it much less. So if everybody is working in a close financial environment, no breast surgeon will invest a lot of time in diagnostic ultrasound.

I don't think this should anyway be about prohibiting surgeons from using ultrasound in the outpatient clinic, or their office. The important thing is that they understand that breast diagnostics is a multimodal imaging modality and that the ultrasound examination they are doing cannot be enough. If I visit a patient, apply my ultrasound, and see something, I have to send that patient to the radiologist. That's it.

On the other hand, that shouldn't stop me doing a core biopsy, if I think it is needed. For instance, if I have a patient on my bed on a Friday afternoon, palpating something, very afraid of what it might be, and if referring her for a biopsy would entail a week's wait, there is no point in delaying a procedure that I am perfectly capable of doing.

I agree that both the radiologist and surgeon can perform a core biopsy. But in a workflow in a hospital where we are very subspecialised there are some tasks that are optimised in the radiology department.

On the other hand, if you look at some of the emerging techniques… when I use a 9-gauge biopsy needle, for instance, I feel I need a surgeon! The work is not so different between the two fields. There is some overlap. Local policies should decide who does what.

Anybody can learn to do a biopsy. It is not difficult.

In the UK even technical assistants are allowed to perform them, after adequate training. It is a question of the local system.

Personally I'm happy for every biopsy my surgical colleagues perform.

I and my colleagues see between 500 and 600 new cancer patients a year and an abundance of surveillance patients, and we don't have time to do all the biopsies. It's a question of your resources, and how you organise your workload.

I agree. There are many things that can be done by both professionals. Using ultrasound to decide which surgical incision and which kind of resection and reconstruction is going to be done is a matter for the surgeon. Diagnostic use of ultrasound is for the radiologist. But there is a grey zone, which is a field for both of us.

We now need to train a new generation of breast surgeons, we need to give them adequate experience

in the field and continuous practice, and we need to define indicational boundaries for the use of what I call 'clinical interventional breast ultrasound'.

That will require a structured training course that combines theoretical and practical skills, possibly with a radiology placement, exposing the surgeon to a large enough case load. Ultrasound training should be included in every curriculum for breast surgeon trainees, and radiologists should be the ones to set up and lead these programmes.

I agree that it is the radiologist who has to teach ultrasound to the surgeon. But radiologists can also learn from spending time with surgeons.

I've learned many useful things in my practice from attending multidisciplinary team meetings. It is very difficult trying to discuss the implications of our findings when it's just radiologists talking, without the involvement of a surgeon.

I always send my young radiologists to accompany the breast surgeon for a week in the operating theatre, to understand what is going on. If you only have the theory but no practical experience, it's not enough. Though again you need to consider the local situation and the local interfaces between radiologists and breast surgeons. I think the training faculty at IBUS, who run ultrasound training courses, and the executive of EUSOBI, the European Society of Breast Imaging, share a similar multidisciplinary approach to education and practice, and certainly at IBUS we would welcome greater involvement by surgeons. This debate has been very helpful not least in acknowledging the reality that surgeons are increasingly using ultrasound, and that we need to ensure the training is in place and the overlap and the limits to that overlap are clear.

This is an edited version of a debate that was staged at the 20th World Congress of the Senologic International Society on Breast Healthcare, in Strasbourg, on 6 December 2018.

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In this Issue:

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Tit Albreht

Europe's unofficial head of cancer policy

In 2006, Slovenia staged the 'United Against Cancer' summit, with a view to closing the gap in prevention and survival between 'old' and 'new' Europe. Tit Albreht, from the National Institute of Public Health, was a key player. He went on to pioneer a series of EU Joint Actions on cancer, where member states collaborated on approaches to planning and implementing patient–centred integrated cancer services. *Cancer World* asked him why he did it, what the impact has been, and what should happen next?

Cancer World: *The 2006 'United Against Cancer' summit in Ljubljana took place in the context of a 'new Europe', with EUROCARE data revealing a large survival gap between old and new member states. What were you hoping to achieve?*

Tit Albreht: Central and eastern European (CEE) countries were not happy about lagging behind western Europe. The idea behind that conference was to highlight the possible reasons for that survival gap. At that time people tended to assume the reasons were purely financial: western countries have more to spend on sophisticated expensive technologies that we cannot afford, so we are condemned to lag behind. By that logic, the only option was to focus attention on prevention, health promotion, and maybe also screening programmes for early detection. But cancer is a unique and complicated disease, and we wanted to highlight the importance of all the disciplines, all the professions, and all the topics that need to be covered – not only epidemiology, or diagnosis, but also treatment, palliative care, survivorship, rehabilitation, research, and strengthening the registries.

Even when it came to screening, which many CEE countries were very enthusiastic about, the policy focus tended to be on the technology: we will buy machines, mammograms, laboratory equipment and everything will be sorted out. So we addressed this topic in the first Joint Action, which, in addition to developing recommendations on national cancer plans, also drew up guideliens on how to set up quality assurance systems to make sure the training, quality control, and structures are in place to make the programme work well.

CW: *Healthcare is done very differently across Europe. Can policy on cancer services developed at a European level affect what health services actually do?*

TA: The approaches and methodologies are often more important than how they are carried out. Take the example of multidisciplinary teams. MDTs are a necessity nowadays. It cannot be only the surgeon, or the first doctor to see the patient, who decides that patient's fate. But even if everybody is convinced of the need to work in MDTs, it can be difficult

to do if the policy makers don't understand what they must do to make it happen. I was in Serbia recently, where people told me they are expected to spend up to four or five hours in MDT meetings that are held in the evening and are unpaid, because it is not recognised as work. This doesn't make sense in a country where human resources are relatively cheap – at least compared to the cost of technologies, where poor countries pay the same as richer ones. And this is not limited to Serbia. There are still many countries where the key decision remains with the surgeon alone.

Then there are the broader questions about what is involved in delivering care along the whole pathway, starting with screening or early detection and ending with palliative care or rehabilitation or some other intervention. For every step of this trajectory we need quality guidelines and we need to map needs and capacity to secure resources. Once we map it, we can say: we need more trained providers of supportive care, or psycho-oncological support and so on. That mapping approach applies everywhere, even if countries differ in the way they address those unmet needs.

CW: *Countries don't like being told how to run their healthcare. Were you able to overcome that resistance?*

TA: The thing about Joint Actions is they are part funded by the EU but are led by member states, so they are not seen as 'top down'. That helps, not just because of the current political concerns of many countries, but also because people from each country are involved in developing the recommendations or at least have that opportunity. It is also helpful not to feel constrained by having to produce a legal document or guidelines that would be seen as binding. It is a more open way of reaching consensus on topics of common interest.

CW: *After the Joint Actions end in 2021, will that be the end of European collaboration on cancer services?*

TA: After nine years, and a lot of work done, I would be really sorry if we cannot find a body to take some of this work forward. We are talking to the Commission about where we could make a repository and which topics could be kept alive. We need a structure, for instance, that can update and respond to the challenges in cancer screening. The EU recommended screening for colorectal cancer in 2003, more than 15 years ago, but so far only eight members states have fully put that in place. And now we have demands for new types of screening for cancers such as lung and prostate.

One possible body to take this forward would be the Joint Research Centre in Ispra, Italy, which is home to the European Network of Cancer Registries. They've also done a great job with the European Commission Initiative on Breast Cancer, and they are currently doing something similar for colorectal cancer.

CW: *What role do you think ECCO, as Europe's multidisciplinary cancer organisation, should play in taking forward the cancer care policy agenda?*

TA: Everyone who has a clear idea of the changes they want to see should get involved. In that respect, I think ECCO has the right people and they know the issues. The problem is that this work needs proper funding. Everybody talks about policy, and everyone wants to influence policy, but nobody wants to finance this work. This is also our problem with the Joint Actions. When you call a meeting to discuss policy on a particular cancer issue, you will always have a large audience. But when you say "let's work together on topics of common interest, but you will all have to input your efforts and energy and money for this to go further," then you face a problem.

The reality across healthcare in general is that health systems research is insufficiently funded. You may get €500,000 for a project where you have to do a lot of work and surveys and so on, while people who do basic research will get €10 million. When the two types of research go hand in hand, as they do for example in the UK, it is possible to identify the gaps and issues that need to be addressed. But not all countries are equipped to do that research at different stages of the system. I think this is probably the most important challenge for the future.

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Tit Albreht is Senior Health Services and Health Systems Researcher at the Slovenian National Institute of Public Health. He helped organise two European cancer conferences in 2006 and 2008, hosted by Slovenia. He led the National Cancer Plan work of the first Joint Action (EPAAC 2011–2014) and coordinated the CanCon Joint Action 2014–2017 and the current iPAAC Joint Action 2018– 2021. Recommendations from those European cancer policy collaborations were published in a series of e-books:

Responding to the challenge of cancer in Europe (2008) bit.ly/CancerChallengeEurope

Boosting Innovation and Cooperation in European Cancer Control (2013) bit.ly/Innovation_Cooperation_Cancer

European Guide for Quality National Cancer Control Programmes (2015) bit.ly/Quality_National_CancerControl

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