

Challenges and opportunities in surgical cancer research in the UK



NCRI

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Executive summary

There have been a number of practice-changing advances in cancer surgery brought about by a small but active pool of UK surgical researchers. However, the surgical profession does not yet have an embedded culture of taking on peer-reviewed, prospective research, and academic capacity and experience tends to be lower than for other clinical specialties engaged in cancer medicine. The aim of this report is to identify ways that surgeons, research funders and other stakeholders can advance surgical research through individual or collective effort, with the aim of more high quality, peer-reviewed research being conducted into aspects of cancer surgery that will have an impact on patients.

The most prominent use of surgery in the cancer pathway is for treatment, and it is often the modality that carries the greatest potential benefit (cure/not cure) and potential harm (risk of morbidity/mortality). It is also a treatment for which there is well-documented variability in outcomes. Putting these facts together, there is great potential for improving outcomes through well-conducted surgical research. Surgery can also have a role in preventing cancer, detecting it earlier or treating it more effectively, as well as being used in palliative care or post-treatment reconstruction. Technological advances such as robotics play a big part in the progress being made and often happen in leaps rather than increments; when new technologies become available, the surgical community needs to be in a position to properly evaluate their use. So there is no shortage of research questions that could be asked – though the nature of the questions will often differ from those for drugs or radiotherapy.

Research spend in surgery is currently low, as highlighted by the Royal College of Surgeons of England in 2011 and verified within the field of cancer by an analysis of the NCRI Cancer Research Database. Where surgeons participate in clinical research in the multidisciplinary environment, this is often supporting and enabling non-surgical and translational research, with research into questions relating to surgery less often performed. Opportunities exist for surgeons, as for other medical professionals, to seek funding to undertake surgical cancer research. However, experience shows us that they may be less adept at accessing funding streams and infrastructure support, or be hampered in doing so by factors that are specific to their working environment and training.

The actions proposed in Section 3.2 of this report are intended to help the UK to grow and sustain a critical mass of research-active surgeons, who are skilled at designing and delivering both surgical research and multidisciplinary cancer research that takes place in the surgical setting. They focus on three overarching ambitions as shown on page 3, and actions would be shared between the surgical community and other organisations with a stake in cancer research. Research funders and surgical researchers whose roles extend beyond cancer are likely to find that the suggested approaches can be applied more broadly to surgical research in other disease areas.

Ensuring surgery can compete equitably against other disciplines. Research funders and research support organisations should critically appraise the suitability and accessibility of the opportunities they offer, to ensure that surgeons can compete fairly against other disciplines where the research culture is more embedded. Action is needed to:

- Publicise current funding opportunities directly to surgeons
- Ensure surgical research is able to compete effectively within existing funding streams
- Review the effectiveness of central mechanisms for supporting surgical research.

Supporting surgeons already contributing to research. Research funders and other organisations with a stake in surgical research should consider ways to offer enhanced support for current surgical researchers, to help today's leaders to deliver research, build capacity and train the leaders of the future. Action is needed to:

- Ensure recognition of individuals' and centres' contributions to research
- Seek ways to accelerate the development of surgical research ideas in cancer
- Use current structures to support skill sharing for surgeons.

Engaging a new cadre of surgeons in research. As well as stakeholder organisations, surgical researchers themselves are well placed to help a new generation of surgeons to gain research skills, whether by working on a local level, communicating opportunities to colleagues, or making applications to appropriate funders to run training and educational activities. Action is needed to:

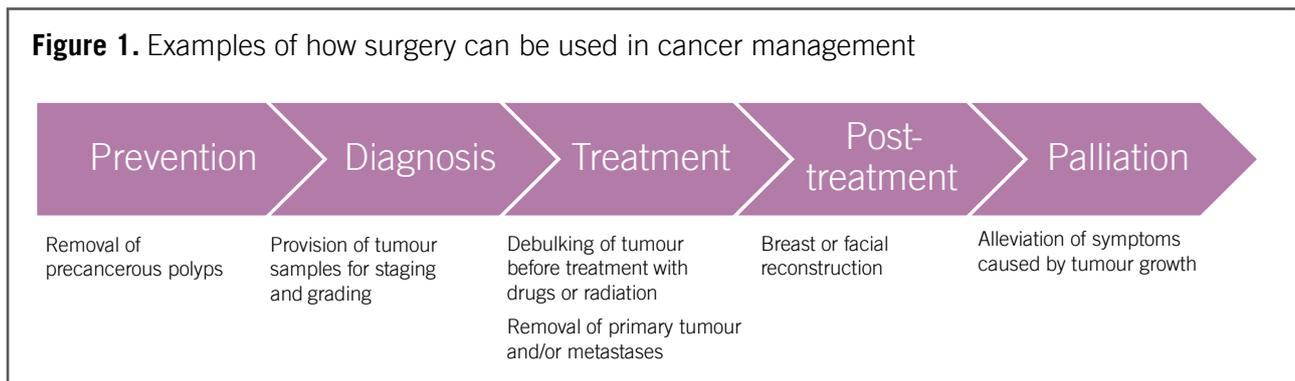
- Increase exposure to high quality surgical research activity
- Create opportunities for surgical research skills training
- Create opportunities for junior surgeons to interact with experienced researchers.

1 Introduction

1.1 Background to this report

Surgery is central to the management of cancer, and is the modality that makes the greatest contribution to cure. As well as being a key component of treatment for many primary tumours and metastases, surgery has a role at other stages of the patient pathway, from prevention to palliation (Figure 1).

In the National Cancer Research Institute (NCRI) 2008–2013 Strategic Plan, surgical research was highlighted as an area under threat, with a need to build capacity, encourage multidisciplinary working and facilitate development of centres of research excellence.¹ Concern has also been voiced by surgical bodies about the future of academic surgery in the UK, and the level of current research activity.^{2,3}



This report has been compiled by the NCRI Secretariat with input from surgeons and members of the research community to appraise the current situation and determine how collaborative efforts could contribute to the overarching goal of increasing high quality surgical cancer research conducted in the UK. Section 1 sets the scene with information on the current situation, Section 2 considers key challenges and drivers for increasing surgical research activity, and Section 3 proposes opportunities for action by surgeons, surgical organisations, research funders and others.

Although the emphasis of this report is on cancer, many of the challenges and potential solutions have wider relevance across surgical specialties. It is also important to note the distinction between research carried out by surgeons (which may be laboratory based and unrelated to the field of surgery), surgical research *per se* and multidisciplinary research that takes place in the surgical setting. This paper focuses on the second and third of these categories – namely, research that has the aim of advancing the way surgery is used in cancer, or enabling cancer research that takes place in the surgical setting.

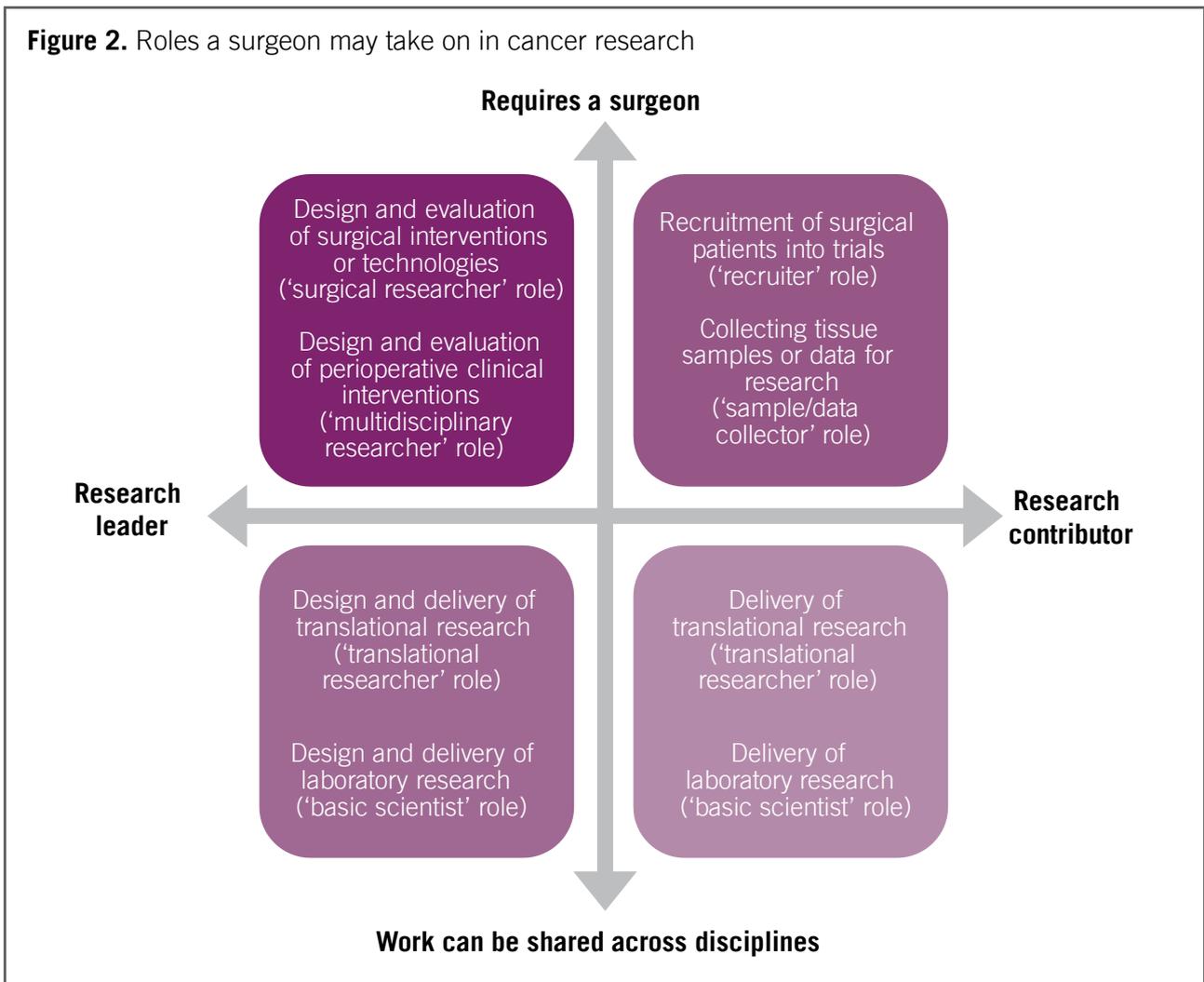
1.2 The setting for surgical research in the UK

The surgical research workforce

Surgeons have the potential to take on a number of different roles in cancer research (Figure 2). They may take a direct leadership role in advancing the field of cancer surgery – for instance as a chief investigator exploring how surgery is best employed to improve clinical or patient-reported outcomes in a particular cancer type, or by undertaking work to develop new surgical technologies and techniques ('surgical researcher' role). As surgery plays such an important role at various stages of the patient journey in cancer, surgeons also need to play an active role in the design and support of multidisciplinary research that takes place in a surgical setting ('multidisciplinary researcher'). Whether cancer research is oncologist-led or surgeon-led, there is a need for a critical mass of surgeons who are willing to refer or recruit patients into clinical trials ('recruiter' role), and to collect tissue samples and data in accordance with study protocols for use in basic and translational research ('sample/data collector' role).

All the roles described so far can only be undertaken by surgeons and as such, the number and expertise level of active surgical researchers is directly related to the chances of research being successfully designed and delivered. The report focuses primarily on these roles, and how they can be better supported.

Surgeons also contribute to laboratory research exploring the biological aspects of cancer ('laboratory scientist' role) or translational work using the tissue samples extracted ('translational researcher'). These roles are important to the wider research effort, but are not solely reliant on surgeons; as such, they are beyond the scope of this report. Similarly, although clinical audit contributes to the understanding of whether best practice is being implemented, it is not in itself classed as a research activity, a distinction that is made clear by the National Research Ethics Service.⁴



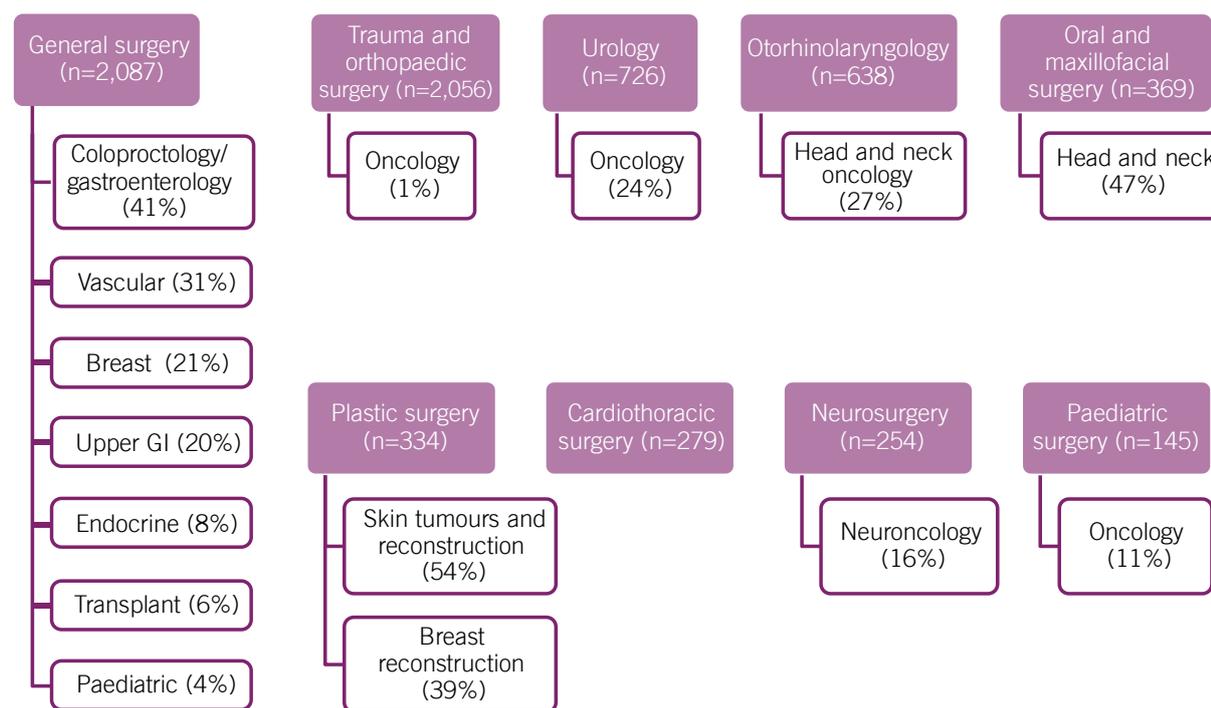
In terms of research capacity within the UK, there were 279 full-time equivalent (FTE) surgical clinical academics reported in the UK in 2010 (95 FTE Professors, 121 FTE Readers/Senior Lecturers and 63 FTE Lecturers) – this is 16% fewer than in 2000.⁵ These posts were funded predominantly by the NHS (55%) and funding councils (39%).⁵ The vacancy rate for clinical academic positions in surgery is 5.6%, which is similar to that in oncology, and at least three medical schools reported surgery as a specialty in which they had difficulty filling vacancies.⁵ In contrast to the situation in academia, the number of NHS consultant surgeons has increased by 79% since 2000, suggesting that there could be scope to increase research capacity by engaging more NHS consultants in the research effort.

Surgery does not operate as a single clinical discipline – it has many sub-specialties and there is no single grouping that unites those with expertise in oncology, as exemplified by the data in Figure 3 on the specialties and self-declared clinical interests of surgical consultants.⁶ Cancer patients are seen by surgeons from different sub-specialties, depending on the type of cancer and the stage of their disease.

This fragmentation makes it imperative for surgical researchers to work closely with colleagues from other disciplines as, for example, a research-active coloproctologist may have little in common with a research-active breast surgeon working within the same hospital.

Figure 3. Surgical specialties (purple boxes) and declared areas of clinical interest (white boxes) of consultant surgeons practising in England, Wales and Northern Ireland in 2010.⁶

All areas of clinical interest are listed for general surgery, and only those that may be relevant to cancer are shown for other specialties.



Royal colleges

There are three surgical royal colleges in the UK – the Royal College of Surgeons of England (RCS England), the Royal College of Surgeons of Edinburgh and the Royal College of Physicians and Surgeons of Glasgow. Welsh and Northern Irish surgeons are eligible to join the royal college of their choice, after completion of approved training and examinations. There is also a royal college in Ireland, based in Dublin, which UK graduates are able to join.

Historically, the colleges have not been strong champions of interventional research, with the bulk of activity being clinical audit and laboratory science rather than prospectively designed clinical or translational studies. More recently, the RCS England has been raising the profile of surgeon-led research and during the development of this NCRI review, released the report, 'From Theory to Theatre: Overcoming barriers to innovation in surgery'.³ This included a series of recommendations (Figure 4) and provided additional stimulus for this report. RCS England has also recently appointed a clinical director of research and is exploring ways to champion research to its members.

Figure 4. Recommendations from the 2011 Royal College of Surgeons of England report³

1. As part of implementing its Plan for Growth, the government should undertake a review of public funding of translational research in surgery and academic departments of surgery in delivering this research.
2. Research modules should be incorporated into surgical training. For example, these could include study design, randomisation or good clinical practice (GCP) training for research.
3. Surgical trainees should be encouraged to participate in ongoing research. For example, trainees could be encouraged to work with multidisciplinary research teams to design studies and contribute to research portfolios.
4. Personal incentive schemes for clinicians, such as clinical excellence awards, should be used to reward both surgeons who undertake high quality surgical research and those surgeons who successfully participate in large trials, for example by recruiting significant numbers of patients.
5. Consultant appointment panels should place a greater emphasis on participation in clinical research, rather than simply the publication of papers, in their selection criteria.
6. Providers of NHS services should be motivated to support surgical trials through the use of incentives such as the Commissioning for Quality and Innovation (CQUIN) framework.
7. A network should be established to enable aspiring researchers to make contact with, and seek guidance from, more experienced surgeons and other clinicians in their field who may be able to act as research mentors.
8. A mechanism should be designed to help surgeons identify opportunities to learn and collaborate with experienced academic surgeons. This would enable training in grant writing and mentoring, and increase awareness of potential sources of commercial funding.
9. Funders should give explicit consideration to supporting research on surgical innovation and the basic science and engineering that support it. Funders should also consider relaxing the stipulation that clinician-scientist awardees should spend the majority of their time on research, for example a 50:50 split is recommended for surgical academics.
10. The NHS Commissioning Board should make full use of the range of options available to encourage the spread of surgical innovation. As part of its duty to promote innovation, as set out in the NHS Constitution, the Board should publish annual updates on the extent to which new, proven technologies have been adopted in routine NHS practice and set out what steps will be taken to address any barriers.
11. The Department of Health and the surgical profession should explore how the best information on new technologies (with appropriate evaluation) can be disseminated to all relevant surgeons.
12. Participation in established clinical audits should be mandated through commissioning contracts, ensuring that providers only receive full payment for an activity when data are submitted. Audit participation can also be strengthened through revalidation. Where clinical audits exist they should be fully exploited for research purposes.
13. New clinical audits should be developed for areas of practice where audits do not exist. New and existing audits should include the facility to capture data on the use of new techniques. Information about research projects and new techniques should be available through the audit to surgeons who contribute data to allow them to keep up to date with developments in practice.
14. The Department of Health should consider how the efficiency and quality benefits of nationally commissioned training programmes can be retained as part of the reforms to the funding of training in the NHS. A clear and consistent mechanism for funding high quality training on new surgical techniques and interventions should be identified, thereby enabling surgeons to make use of new techniques as and when they are proven to be effective.
15. As part of the payment system for surgical activity, providers should be incentivised to release surgeons to participate in appropriate continuing professional development programmes.

Surgical associations

UK surgical associations are numerous and active, offering a forum for surgeons to collaborate within their own niche area. There are at least 24 different societies in the UK, most of which focus on particular clinical areas; several with relevance to cancer are listed in Figure 5. The societies are run independently, though a number are administered from the headquarters of RCS England in London. Some multidisciplinary societies also have strong representation from surgeons among their membership, such as the British Association of Head and Neck Oncologists.

The largest surgical society is the Association of Surgeons of Great Britain and Ireland (ASGBI), which represents general surgery and has 2300 members. Its 2010–2012 strategic plan notes the aim of providing leadership and a unified voice for surgeons, seeing itself as a federation of the specialty interests.⁷ It includes within its remit continuing professional development, international service and training, peer support and development of its annual International Surgical Congress, though has little mention of research.⁷ There is a society with an explicit research focus, the Society of Academic and Research Surgery (SARS), and its 2012 annual meeting attracted 300 delegates. The ASGBI and SARS held a joint conference in 2005 to produce a consensus statement on academic and research surgery, which included education and training recommendations and noted the importance of the surgical profession supporting academic work.⁸

Figure 5. Key surgical associations relevant to oncology

- Association of Surgeons of Great Britain and Ireland (ASGBI), www.asgbi.org.uk
- Society of Academic & Research Surgery (SARS), <http://surgicalresearch.org.uk/>
- Association of Surgeons in Training (ASIT), www.asit.org
- British Association of Surgical Oncology ~ Association for Cancer Surgery (BASO ~ ACS), www.baso.org
- The Association of Breast Surgery, www.associationofbreastsurgery.org.uk
- British Association of Urological Surgeons, www.baus.org.uk
- Association of Coloproctologists of Great Britain and Northern Ireland, www.acpgbi.org.uk

1.3 Current investment in surgical cancer research

An analysis of peer-reviewed cancer research funding in surgery was undertaken from the 2010 NCRI Cancer Research Database (CaRD), focusing on project/programme grants and personal awards. Entries relating to surgical cancer research were categorised as:

- Surgical research: Research that directly concerns the use of surgery, for example, comparison of surgical techniques, development of a surgical technology, or assessment of quality of life after surgery.
- Research in the surgical setting: Research that does not answer a question about surgery, but takes place in or around the surgical setting, for example neoadjuvant/adjuvant treatment trials.
- Personal awards: fellowships and other awards that are declared in the abstract as being related to surgery.

Core infrastructure and centre grants were excluded from the denominator, as it is not possible to split out the surgical component. However, the support provided by initiatives such as the National Institute for Health Research (NIHR) Biomedical Research Centres, Experimental Cancer Medicine Centres, Medical Research Council (MRC) Methodology Hubs, and Cancer Research UK Centres is key to supporting researchers and building collaboration across a range of specialties. NCRI Partners with a focus beyond cancer (for example, the UK Health Departments and the MRC) will also be investing in surgical research on non-cancer topics, but this data is not collected by NCRI.

Overall, 106 surgery-related project/programme grants and personal awards were funded in cancer by NCRI Partners in 2010, representing 3.7% of the total (Figure 6). It is noteworthy that only 51 awards focused explicitly on a question relating to the use of surgery. Surgery-related spend in cancer accounted for 2.8% of the total invested in project/programme grants and personal awards. There are limitations to this analysis – for instance, it is reliant on the level of detail supplied in abstracts and does not weight awards where surgery is one component of a wider project. However, the figures are in the same region as those in the RCS England report, which found 1.5% of government medical research spending was on surgical research.³

What is clear is that the volume of surgical research – and particularly research into questions that relate directly to surgery – that can be identified within the NCRI portfolio is surprisingly low given its prominent role in the management of cancer. This should be considered a call to action for surgeons, surgical organisations, and research funders.

Figure 6. Number of awards and spend on surgical cancer research by NCRI Partners in 2010

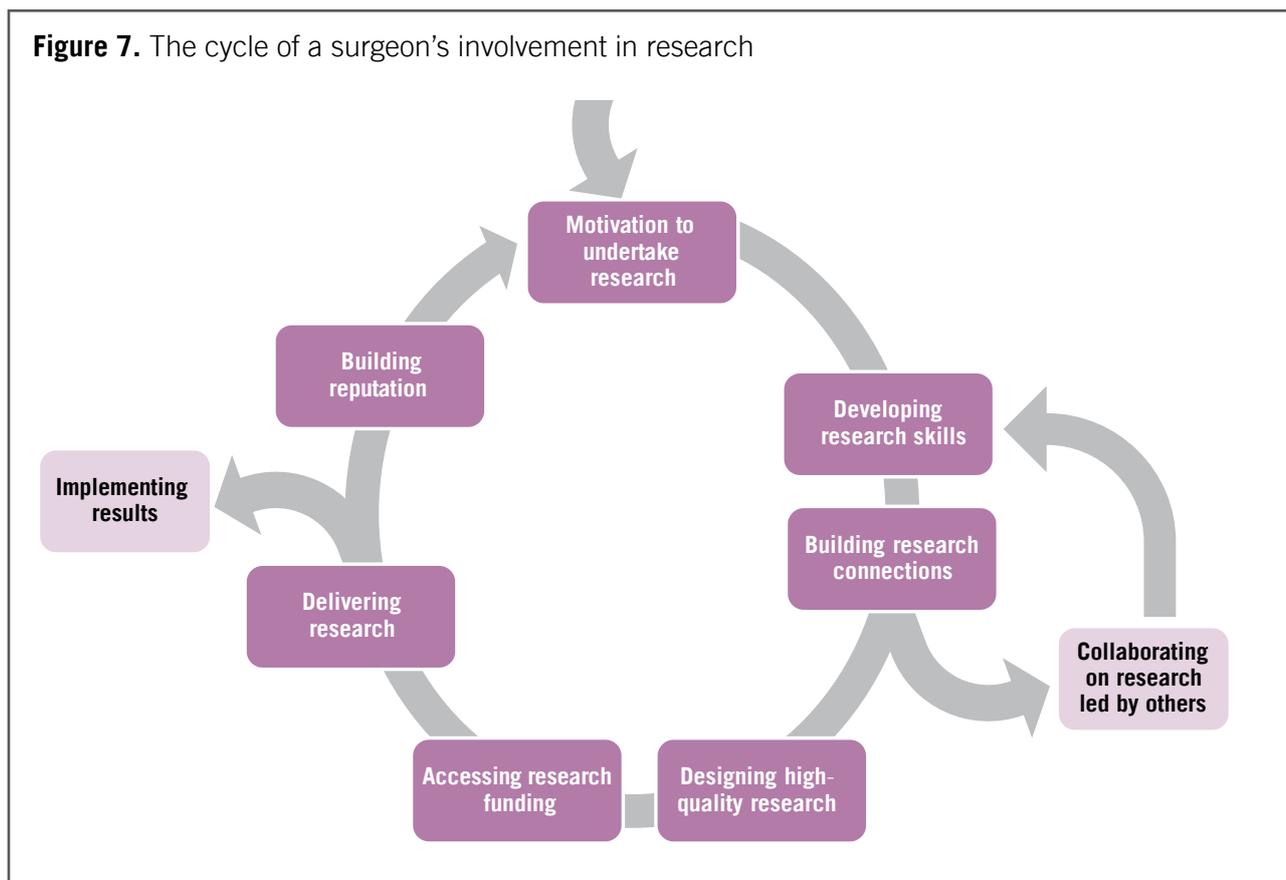
Number of awards		Spend	
Number of awards in NCRI database*	2831	Spend in NCRI database*	£404.2 million
Number of surgical research awards	106	Spend on surgical research	£11.4 million
Surgical question	51	Surgical question	£6.4 million
Research in surgical setting	50	Research in surgical setting	£4.5 million
Personal award	5	Personal award	£0.4 million
Surgical research awards as a percentage of all awards	3.7%	Surgical research spend as a percentage of total spend	2.8%

*Excludes 158 awards that support core/centre funding across multiple disciplines where the surgical component could not be estimated, with a value of £100.0 million

2 Challenges in surgical cancer research

2.1 A framework for ideas

Taking a pathway approach, the challenges of surgical research can be mapped onto a cycle of the stages of a surgeon's involvement with research (Figure 7). There is natural overlap between these stages and some of the opportunities for action, which are considered separately in the next section. Some of the issues faced are common to clinical research rather than being unique to surgery, for example the burden of regulatory processes and the difficulties accessing funding to cover excess treatment costs; these issues are being addressed elsewhere. Much of what follows applies to surgical research generally, although examples are taken from the cancer field where possible.



2.2 Motivation to undertake research

Any increase in surgical research activity first requires surgeons to have the will to undertake research. There are pockets of strong activity where surgical cancer trials are being successfully designed, funded and implemented – landmark trials have been conducted in the UK and triggered changes to clinical practice. Notable examples include the ALMANAC trial showing that sentinel lymph node biopsy caused less unwanted side effects than standard axillary surgery in node-negative breast cancer⁹ and the CLASICC trial of conventional versus laparoscopic surgery for colorectal cancer^{10,11} which provided high-level evidence that informed national recommendations.¹² However, the bulk of surgical research appears to be driven by a small number of individuals,¹³ and there is a need to expand the researcher pool.

There is not a strong tradition of prospectively planned clinical and translational research in surgery, with surgeons being less research oriented and less likely to recruit patients into clinical trials than other members of the oncology multidisciplinary team (MDT).¹⁴ There is a tendency towards use of audit to evaluate clinical activity, and where research is undertaken by surgeons in training, it is often in laboratory science rather than

on topics that relate directly to advancing surgery. For instance, an analysis of research fellowships funded by RCS England found that three-quarters were laboratory-based, with only around a quarter conducting patient-based clinical research.¹⁵

There is believed to be a willingness amongst the younger generation of surgeons to engage in research, which is not being realised due to insufficient access to support and mentorship, and negligible exposure to research activity during training. Influences within the clinical environment may dissuade surgeons from participating in research – for instance, in one survey 80% of NHS-based surgeons felt that the pressure in their hospital to participate in randomised clinical trials was low,¹⁴ and a quarter of surgical cancer researchers felt their institution (hospital or university) was not supportive of their need to balance research and service delivery.¹³ Coupled with the fact that higher degrees and research activity are not essential for a surgeon's career advancement at present, the culture gives little impetus for individuals to take on research.

The surgical royal colleges and associations have significant influence, but have traditionally been stronger voices for training and continuing professional development (CPD) than for prospective, randomised research. That said, they are very well placed to promote research activity and support surgeons in the development of research skills, and the release of the RCS England report calling for more surgical research should offer a platform for closer working. Funders have a role to play in increasing their level of communication with the colleges and associations to highlight opportunities and gaps, and joint working should be encouraged.

Key points

- There is a need to expand the current pool of surgeons participating in surgical cancer research.
- Trainee surgeons get little exposure to research but may be willing to engage if given appropriate support from their institutions and senior surgeons.
- The royal colleges and surgical associations are influential voices, and closer working amongst them and with research funders would be beneficial.

2.3 Developing research skills

Academic leadership

Many of those who lead today's surgical cancer trials have learnt about the research process through an iterative 'trial and error' process, with little peer support or guidance – even for high-flying trainees, this is not an easy undertaking. There is a shortage of research-experienced surgeons in the UK, so those at the forefront of trial development are not as numerous as needed to deliver local skills training for junior surgical researchers as well as delivering research. Across all specialties, the proportion of clinical academics aged 46 or over has increased substantially since 2004,⁵ suggesting that academic leadership in the multidisciplinary setting may also be compromised unless this gap can be filled.

The Academy of Medical Sciences is very active in mentoring on a national level, particularly at the Clinician Scientist and Clinical Lecturer level, and also takes on outreach work to support and encourage early-career clinicians to embark on research, for example at regional events and workshops; this activity is supported by the four UK health departments. In respect of surgical research specifically, these central opportunities would be complemented by ideas arising from current surgical researchers and within the new research institute of RCS England about how surgical research could be championed and skills shared between centres.

It is relatively easy for surgical consultants to move from the NHS environment into private practice (or to combine both), so there is a risk of attrition in senior research leadership if barriers to taking on academic posts are too high or incentives too low. Clinical excellence awards are one mechanism that may contribute to

keeping high-performing consultant surgeons within the NHS environment, and both the English/Welsh and Scottish schemes assess contributions to research as one of their domains, as well as rewarding contributions to training.^{16,17} Based on England/Wales data, the application numbers from surgeons are high, and their success rate matches or exceeds that of most other specialties – although the total number of awards made has fallen recently due to financial pressures.¹⁸ The Scottish scheme is on hold for 2011/12 due to the financial climate and concerns about sustainability,¹⁹ and the England/Wales scheme for 2012 is also awaiting a decision from ministers about its future.²⁰

Combining research and clinical training

RCS England has highlighted the need for greater exposure to research during clinical training, and proposed that research modules should be incorporated into surgical training to cover topics such as study design, randomisation and good clinical practice (GCP).³ Early, universal exposure to research in this way would be a step towards developing a surgical research culture and may encourage more trainees to consider taking on either a training fellowship (Walport post) or a personal fellowship.

In 2009, 131 fellowships were held by UK surgeons, as reported in the Office for Strategic Coordination of Health Research (OSCHR) survey of fellowships supported by 12 of the major UK funders.²¹ Eighty out of the 131 fellowships held by surgeons were pre-doctoral or doctoral; surgery was highlighted as having a very low number of senior level fellows compared with other specialties, which is a concern for research leadership. Notably, around two-thirds of the surgical fellowships were on underpinning research or aetiology,²¹ rather than investigating surgical research questions.

Particularly in a craft specialty such as surgery, there is a need to strike a balance between time in the theatre to develop and retain clinical skills, and time spent on research; the RCS England report suggests a maximum of 50% academic time.³ This is compatible with the NIHR Academic Clinical Fellowships (open to applicants from England, Wales and Northern Ireland) and NIHR Clinical Lectureships, but may be harder to attain for those wishing to undertake personal fellowships.

A number of funders have taken steps to try to address this within their personal award schemes. For example, Cancer Research UK Clinician Scientist fellowships, including their current joint fellowships with RCS England, allow applicants to spend up to 50% of their time in clinic if desired. The MRC Clinical Research Training fellowship and Clinician Scientist fellowships also make allowance for surgeons to spend three rather than two sessions per week on NHS clinical work, and a patient-oriented track can be selected that allows Clinician Scientists to spend 40% of their time on clinical work. However, in practice, it can still be a challenge for individuals to make this split work, with spending 50% of time in the clinic being more achievable for trainees and those with clinically oriented projects.

Keeping research momentum can be difficult for those pursuing an academic pathway, particularly in the time after completion of a PhD and before taking on a Clinician Scientist position. To help fill this gap, Cancer Research UK has recently created a number of post-doctoral surgical research training positions within their network of Centres, to allow trainee surgeons to remain research-active while they complete their surgical craft training.

Workshops and other educational opportunities

Central research training opportunities can be accessed by surgeons and physicians alike, for example the NIHR provides good clinical practice (GCP) training and the NIHR Cancer Research Network (NCRN) runs courses on a variety of topics such as communicating randomised clinical trials. However, in a craft specialty such as surgery where CPD tends to focus mainly on maintaining and updating skills, it may be that imaginative approaches are needed to create space for direct engagement with research.

Some surgical researchers have been taking the initiative to set up bespoke workshops and training days, which have been enthusiastically received and often oversubscribed. For instance, a very successful event was held in September 2011 with funding from the MRC Hubs for Trials Methodology research, and support from the NIHR and RCS England. This was advertised nationally and had 200 participants, with a further 150 on the waiting list – its popularity reinforces the view that surgeons will engage with research when given the opportunity. Stable funding for surgeon-led education would promote research skills and engagement amongst those not taking on formal academic qualifications.

As well as leadership from the surgical world, multidisciplinary clinical research can offer a useful entry point for research-naive surgeons, learning from colleagues in medical oncology and other disciplines; this approach is also supported by RCS England.³ Channels that might provide skill sharing across disciplines in cancer include the appointment of high-performing senior trainees on relevant NCRI Clinical Studies Groups and subgroups, or surgeons' involvement in activities delivered via the Experimental Cancer Medicine Centres and the Cancer Research UK network of centres.

Key points

- There is a need to support senior surgical researchers in the UK, to ensure that research leadership is available on a national level.
- An increase in exposure to research skills as part of clinical training is desirable.
- Surgeons are competing well with other specialties in the number of fellowships awarded, and some funders have recently made additional opportunities available. However, balancing clinical and academic time often remains a challenge.
- Surgical researchers in the UK have been providing opportunities for skill development by running bespoke training days and workshops for surgeons. Mechanisms are also needed for surgeons to engage with multidisciplinary groups, to allow skill transfer from disciplines where the research culture is more embedded.

2.4 Building research connections

Forming collaborative links is an essential component of all biomedical research, and for clinical trials there is the added need to establish links across a number of centres, sometimes nationally, in order to recruit sufficient numbers of patients. While this can be time-consuming initially, it pays off in the longer term in respect of trial delivery and the sharing of skills, ideas and research methods.

One of the strengths of clinical research in the UK is the potential for trials to be truly national in reach. A considerable investment of time is needed to engage new investigators and keep recruitment on track, and the task is even greater for surgeons as the culture of prospective research is less ingrained than in other disciplines. However, there are examples (such as the AXIS trial in colorectal cancer, the ProtecT trial in prostate cancer and the PET-NECK trial in head and neck cancer) that show that with the appropriate effort, large numbers of surgeons can be mobilised to take part in research under the leadership of an experienced surgical chief investigator. As well as gaining the results of the trials, there is a knock-on effect of this kind of large-scale engagement in creating a body of research-capable surgeons, and may be one of the most effective momentum-building approaches. For subsequent trials, researchers then have an informal network of collaborators to tap into, and with additional administrative support, it might be possible to get more longevity and educational value from these connections.

An alternative approach to building research connections was set up in the West Midlands, where a surgical trainee-led research collaborative has been set up to capitalise on the natural network formed by surgical trainees rotating between hospitals in the region (www.wmresearch.org.uk). The trainees have

been working together to design and deliver multicentre trials, with input from clinical trials units (CTUs) and senior surgeons. The group is financed by sponsorship from various organisations, which covers the monthly meetings and an annual national meeting; the trials themselves are funded through conventional local or national channels. The group's focus has been on colorectal trials, in and beyond cancer, and other tumour sites might need equivalent backing if it proves successful at generating momentum. Other locations such as Bristol are putting similar regional programmes in place, suggesting that this model could have the potential to evolve into a national programme if given sufficient stable funding.

Key points

- Outreach from the chief investigator to get co-investigators engaged in research is a time-consuming but essential part of trial planning.
- Large multicentre surgical trials can have a knock-on benefit of engaging new surgeons and creating informal 'surgical researcher networks', but the degree of benefit would be greater with dedicated resource.
- A trainee-led surgical research collaborative set up in the West Midlands is providing opportunities for novice researchers, and has the potential to evolve into a wider scheme.

2.5 Designing high quality research

Research questions in surgery

When evaluating new cancer medicines, the focus of research is generally on improving patient survival. Surgery already contributes to cure more than any other type of treatment for cancer, and by the process of removing a tumour, it could be argued that the majority of survival benefit has already been realised with present-day surgical procedures. However, surgery also carries a risk of morbidity and mortality, and in some cancers the outcomes of surgery vary markedly by unit and by surgeon,^{22,23} indicating potential for improvement. There are many important questions to answer about the extent and timing of surgery, fitness for surgery, surgical morbidity, quality of life and recovery after surgery that could improve the surgical management of cancer patients, as noted in the Department of Health's 2011 cancer strategy.²⁴ If earlier diagnosis and treatment leads to more patients being free from cancer, there is an even greater imperative to minimise the short- and long-term morbidity from surgery to ensure that survivors have the best possible quality of life. Technological advances aside, many of the possible innovations in surgery such as changes in technique and timing are likely to be highly cost-effective compared with drug developments, and some may even be cost-neutral.

Not all surgical cancer research will be at the treatment stage of the patient pathway. The removal of precancerous tissue can be preventive, as has been seen with bowel polyps and cervical or oral dysplasia, and in this context, research to better predict malignant potential will help to define the role of surgery and avoid overtreatment. Technological advances such as new surgical devices or improvements in imaging could also make cancer surgery safer, more accurate or more cost effective, no matter what stage of the patient pathway it is used in. Finding ways to define and assess the quality of surgery and determine the impact of quality on outcomes are also challenging but important areas for study.

With the great variety of possible questions to be asked about how surgery should be used in cancer, a consensus-building process could be undertaken by surgeons, oncologists and other stakeholders, to draw out priorities for research. This would help to encourage collaboration between researchers and provide bottom-up input to funding panels about priorities within the field; the CSGs are well placed to achieve this on a tumour-specific basis, supplemented by wider surgical input. Some other organisations have already taken steps to draw out research priorities by cancer type, for example the Gynecologic Cancer InterGroup (GCIG)

set up an international meeting to identify priorities for clinical trials, some of which were related to surgery.²⁵ Documents such as NICE interventional procedures guidance, technology appraisals, clinical guidelines and medical technologies guidance frequently contain research recommendations that relate to various surgical procedures used in cancer, and could provide additional stimulus for research prioritisation.

Trial design

Methodological expertise is necessary to turn strong ideas into scientifically sound, deliverable protocols. While double-blind randomised controlled trials (RCTs) are favoured as the most robust way to assess one intervention against another, they are not always desirable or feasible for all surgical questions. There are specific challenges in performing surgical trials, including cultural resistance to randomisation, infeasibility of blinding, the learning curve that must be undergone for new techniques, and the difficulties of attaining clinical equipoise – these have been widely explored in published literature.²⁶⁻²⁸ Overall, the most suitable design will depend on the question being asked and the level of evidence that might be required to change practice. There is undoubtedly scope for more RCTs to be done within surgery, and RCTs are more likely than other types of studies to influence policy recommendations,²⁹ but well conducted research using other methods may be more appropriate in some situations.

Unlike drug trials where the dose and administration schedule are selected based on preclinical and early clinical data, the technique and timing of surgical interventions may vary between institutions, making it essential to check the level of consensus before a protocol is designed. In some cases, as was done in the ALMANAC trial of sentinel lymph node biopsy in breast cancer,⁹ a pre-randomisation feasibility stage may be needed to ensure that surgeons reach a certain standard or consistency of technique. Surgeons also need to be interested in the research question in order to be motivated to enrol patients. Trials with a clear-cut, relevant surgical question have been successful in recruiting large numbers of patients (for example, the ASTEC endometrial cancer trial³⁰ and ALMANAC⁹), providing a level of evidence with the potential to change clinical practice. Randomised trials investigating surgery versus no treatment, or surgery versus some other treatment that appears very different to the patient, have been found to be difficult to recruit to and this should be considered at the trial planning stage.

Surgeons need to know how to access trial design support, as well as how to tailor it to the surgical setting. The NIHR provides a regionalised Research Design Service (RDS) across England, whereby local researchers can access expert advice to help them develop and design high quality research proposals for submission to national, peer-reviewed funding streams. This could be a good opportunity for surgeons with some prior experience of research. For the surgeon with little or no prior research experience, more tailored learning opportunities such as surgical mentorship and bespoke trial development workshops may be a necessary first step.

The MRC complex interventions guidance, developed in 2000³¹ and updated in 2008,³² is a useful starting point for considering how to gather evidence when faced with challenges such as those in surgical research. The Balliol Collaboration, a group of clinicians and methodologists who undertook a series of workshops at Balliol College in Oxford in 2009, focused on ways to overcome methodological challenges in surgical research; the resulting publications provide a useful framework³³⁻³⁶ and this work continues to be developed.

Previous trials can also give insight into how study design can help or hinder recruitment in the surgical setting, and several examples have been shared constructively in published literature. For example, the ProtecT trial in prostate cancer yielded several papers on how to optimise recruitment into this complex randomised trial,³⁷⁻⁴⁰ and although the SPARE trial in bladder cancer did not succeed in overcoming its enrolment problems, some useful lessons were learnt.⁴¹ For example, it is important for recruiters to have a simple way to articulate the study design to prospective participants, and the choice of terminology and order of presentation can unwittingly bias a patient's perception of the treatment options. It is also important that investigators do not overestimate centres' potential to recruit, as this can affect the overall viability of the trial.⁴¹

These lessons are now influencing the development of several new and ongoing randomised surgical trials. This kind of experience could be consolidated by one or more CTUs becoming formally recognised for their experience in developing surgical trials and the methodology, protocol and logistical arrangements required.

Pre-submission guidance

The NCRI CSGs are one forum in which surgical trials cancer and trials in the surgical setting can be developed and critiqued prior to submission for funding. The importance of surgery as a treatment modality varies between tumour sites and universal representation is not expected, but 16/22 CSGs have surgical representation, with five groups currently chaired by a surgeon. As at January 2012, renal, colorectal, breast, head and neck, gynaecological and psychosocial oncology CSGs all had portfolios with 10% or more of studies involving surgery or in the surgical setting (Figure 8); having a surgeon as a CSG chair or having a surgery subgroup tended to correlate with the percentage of surgical studies within a group's portfolio.

Figure 8. Analysis of Clinical Studies Groups' portfolios and surgical representation, January 2012

CSG	Percentage of surgical studies*	Total number of surgeons in CSG (on main CSG; in subgroups)	CSG Chair a surgeon?	Surgery subgroup?
Renal	≥10%	27	4 (4; 4)	Yes
Colorectal		17	14 (3; 14)	
Breast		15	4 (3; 2)	Yes
Head & neck		14	15 (6; 14)	
Psychosocial oncology		10	0	
Gynaecological		10	8 (5; 7)	
Palliative care	<10%	8	2 (1; 2)	
Bladder		6	12 (9; 4)	Yes
Brain		5	4 (4; 0)	Yes
Lung		5	6 (1; 6)	
Upper GI		4	9 (4; 7)	Yes
Children's cancer and leukaemia		3	8 (1; 8)	
Prostate	None	3	12 (6; 9)	
Sarcoma		0	6 (4; 3)	
Melanoma		0	1 (1; 0)	
Complementary therapies		0	1 (1; 0)	Yes
Primary care		0	1 (0; 1)	
Biomarkers and imaging		0	1 (0; 1)	
Haematological oncology		0	0	
Lymphoma		0	0	
Testis		0	0	

*Includes studies with a surgical component and those in the surgical setting, open and in setup
Data obtained from CSG Secretariat and information on www.ncrndev.org.uk
Teenagers and Young Adults CSG does not hold its own portfolio so no data are shown

Surgeons have a reasonable share of voice at CSG meetings, but the wider pool of surgical researchers outside the CSGs still needs a forum to connect. Surgery-specific meetings may therefore be needed to support trial development, to supplement the CSG development processes. Trial development workshops or 'surgical boot camps' have recently been run by surgical leaders, where experienced researchers guide prospective researchers through the process of working up a particular proposal idea. This could be an efficient way of driving up the number and quality of research projects successfully funded in surgery, given

the need to learn from past experience of what works in surgery trials and to ensure sound methodology. With appropriate resources, this kind of interaction that combines training and hands-on trial development could be developed into a more formally badged initiative.

While groups such as the NCRI CSGs make an initial judgement on the level of interest and feasibility of a proposed surgical trial, there also needs to be early involvement of research network managers, CTUs, clinical nurse specialists and patient representatives in the trial design process. Appropriate feasibility work and a breadth of early input can help to avoid recruitment or delivery difficulties that might have been foreseen. Surgical trials are often complex and multidisciplinary, making them more resource-intensive to deliver. Lessons have been learnt from studies such as the SPARE trial in bladder cancer, where the recruitment pathway was convoluted, the complexity of the design was difficult for recruiters to explain to prospective trial participants, and clinicians and patients often had a personal preference for one or other of the arms.⁴¹ With appropriate intervention such challenges can sometimes be turned around, as in ProtecT,⁴⁰ but these challenges emphasise the importance of pilot work and early peer input.

Key points

- While survival is often the primary focus of interventional cancer trials with drugs or radiotherapy, surgical research questions in cancer may look at aspects such as extent of surgery, fitness for surgery, surgical morbidity, postoperative quality of life, or recovery after surgery.
- Clear-cut surgical questions are helpful for engaging researchers and recruiters.
- Particularly where trials are complex, strong feasibility work with appropriate input from stakeholders is important to give the best chance of successful trial recruitment and delivery.

2.6 Accessing research funding

The current volume of surgical research both within and beyond cancer is low, despite the availability of funding streams managed by NCRI partners and others to support surgical research projects and programmes. The 2011 RCS England report³ considered actions that could be taken by funders, but broader cultural and capacity issues would need to be addressed in parallel if the volume of activity is to be increased. The lack of a widespread research culture in surgery and the small numbers of surgeons who have developed a track record may limit the number of proposals coming forward, and it is also unclear how well these proposals are competing against applications from other specialties.

Capacity building and research skill development, as discussed above, are fundamental to increasing surgeons' potential to make successful applications for funding, and could be matched by targeted information and support from funders. For instance, the NIHR held a half-day workshop on surgery research in early 2012, to enhance understanding of its funding streams and give advice on how to put forward a successful application. A number of Academy of Medical Sciences mentoring workshops have included presentations from funders on how to access funding, though whether these were well attended by surgeons is not known. The NIHR also recently released a call for surgical research applications across six of its funding streams, which has been well received and promoted by RCS England and should be a stimulus for activity.

The challenges of designing and delivering surgical research, as well as the research priorities within and across cancer types, also need to be understood by multidisciplinary funding panels to ensure that proposals are competing on a level playing field. A consensus-building process within the surgical specialties on key research themes in cancer could be useful in providing some wider, bottom-up input to funders about which areas are priorities, and the most appropriate methods for tackling them. Funders also need to ensure that peer review panels are well briefed on methodological issues in surgical trials.

More structured feedback from funders about reasons for proposal rejection would also be welcomed to contribute to a two-way learning process; this could avoid discouraging less experienced researchers from future attempts.

Key points

- Funding streams are available to support surgical research, but the volume of activity remains low. Wider capacity and skill building efforts could enable surgeons to put forward higher numbers of fundable applications.
- Research funders could support this process by targeting information on funding opportunities directly to surgeons, and by ensuring that peer review panels are well versed on the complexities and priorities for surgical cancer research.
- Research funders and the scientific community should engage in two-way communication to help overcome these obstacles.

2.7 Delivering research

When the NHS research networks were established in the early 2000s, the emphasis was on cancer trials and much of the infrastructure provision was in the form of research nurses in the oncology setting. With the more recent advent of the NIHR and its Comprehensive Local Research Networks (CLRNs), there is now a route for research support to be provided directly to surgical teams for studies that are entered onto the NIHR Clinical Research Network (CRN) portfolio. Eligibility depends primarily on the source of research funding, but both commercial and non-commercial studies can be included.⁴²

The majority of funding to CLRNs is allocated through an activity based model, so as the volume of surgical trials increases within a network, the potential to obtain surgery-specific support staff also increases hence the need to build a critical mass of research. A move away from non-portfolio surgical studies and better prospective cost attribution might also increase local enthusiasm for academic surgical work, with the additional resources seen as a benefit to the department. It would be beneficial to determine whether surgical researchers are aware, and making full use, of the support that can be gained by having eligible studies listed on the portfolio.

There may be specific difficulties in accessing this support for cancer trials that recruit in the surgical setting. Accommodating research activity in a new specialty without a track record of activity or a limited portfolio can be challenging, as research support staff may be fully utilised covering the existing trials portfolio. New funding needs to be identified or existing workloads reorganised to take on this activity. Surgical clinics often have a varied case mix that includes cancer and non-cancer patients, and thus may have a low proportion of eligible participants for cancer trials. Ensuring that resource can be used effectively in this situation may be challenging, but can be overcome – for example by effectively identifying potential participants at MDT meetings so that research support staff attend clinics only when there are eligible patients, or establishing research clinics at different times when research support staff can be available. Engaging the relevant Trust management and local research network as early as possible is essential to successful acquisition of research support, be that funding or staff.

The challenges of recruiting to surgical trials have been recognised by the NIHR and structures do exist to provide additional support to address these. The NIHR CRN has established a Surgery Specialty Group (SSG) to promote local leads in each network to become involved in portfolio trials and to help resolve difficulties in recruitment. Each lead has to develop a good rapport with their CLRN to make this model work. A small amount of resource is available to convene the national group, which helps to develop a shared knowledge

of how to make surgical trials more successful and how to undo the blocks to surgical research. An NCRN working group on Portfolio Balance and Delivery is also looking at ways to give more support to surgical trials, and to identify factors associated with trial success or failure to inform trial design and delivery.

A working group entitled Growing Recruitment to Interventional Surgical Trials (GRIST) is also supported by the NIHR, and is comprised of surgeons from a number of specialties who act as an ideas forum and 'clinic' for developing trial-specific recruitment solutions for studies on the NIHR CRN portfolio.⁴³ It is not a cancer-specific group, but in practice many of the studies discussed are in oncology. The group is also starting to see a role for itself in strategic tasks such as providing information and guidance to trialists and trainees to deal with trial delivery barriers upfront, before reaching the delivery stage.

Where studies are ineligible for CRN support, recruitment will be reliant on the investigators and local clinical resources (which can be of concern to Trust managers) or on support sought via independent means. One example of independently procured support is the model of Research Trial Recruiters, where posts are created for staff to recruit to surgical studies; they are sought by trial investigators and financed by individual charities either in disease-specific areas or for specific studies. This support can be invaluable, but at present is not well integrated into existing NHS research staff infrastructure.

Key points

- Clinical research network support for delivering NHS-based surgical research is available, though surgeons may find it challenging to access until a critical mass of portfolio studies is built up. Early communication between surgeons and their local research networks is needed.
- Creative approaches to obtaining trial-specific resources include the model of independently-funded Research Trial Recruiters, but efforts should be made to ensure these integrate well with the formal research support channels.

2.8 Building reputation

With successful research delivery and a steady build-up of the local portfolio, individual researchers and their institutions stand to increase their reputations in the research community over time. An ongoing portfolio of activity is needed within a centre in order for surgical cancer research to succeed in the long term, and this process must take its impetus from surgeons at the grass roots level. Among surveyed research-active cancer surgeons, it is notable that those who were satisfied with their time available for research tended to be housed in major UK centres with substantial ongoing research commitments.¹³ This takes us back to the start of the cycle (Figure 7) where we considered motivation. The work of senior researchers benefits from the stability that comes with increasing local activity, and junior surgeons need access to major teaching centres to engage with and thrive in research.

The standing of surgical departments within universities was raised as an area of challenge. While the role of chief investigators is visible through publications, surgeons who are active recruiters or tissue sample collectors also need their activity to be recognised and rewarded. To some extent this challenge will always remain a local one, with surgeons taking responsibility for their own communication with other departments and Deaneries. Bringing research-active surgeons together at Trust and research centre level could help to build a collective pride in surgical research, which would contribute to building a common purpose and achieving recognition.

There may be other ways in which contributions to clinical surgical research could be better acknowledged on a national scale, such as accrediting surgical centres for participation in clinical trials, or publishing accrual or sample collection rates between centres or regions. Developing a track record of strong recruitment will also support future funding applications.

The lack of emphasis on academic credentials for a surgeon's clinical career progression means there is little pressure to present their work at conferences, and this may be a missed opportunity for surgeons to increase the visibility of their work amongst peers and research funders. Most surgeons report a preference for attending and participating in conferences linked to their clinical specialties rather than research-oriented groupings,¹⁴ which is consistent with the observation that the NCRI Cancer Conference does not attract a large surgical audience at present.

The NCRI conference secretariat has begun to work more closely with royal colleges and societies to optimise participation across disciplines; a surgical focus could be delivered through the main programme or events run in parallel. Incorporation of a greater research component into surgical society meetings would also be a useful approach, to increase opportunities for research recognition amongst surgical peers and promote a wider culture of research participation.

Key points

- Building reputation and increasing the portfolio of research activity within an institution is important to give stability to senior surgical researchers and opportunities for trainees, and is key to the growth of surgical research in the UK.
- Recruiters and sample collectors as well as chief investigators need to be recognised for their contributions to research, and better tools may be needed to ensure this recognition.
- Conferences are one channel by which research contributions can be shared and celebrated. Surgical engagement with research-focused conferences tends to be low, while specialty association conferences often have a limited research component, suggesting new programme formats may need to be trialled.

3 Opportunities for action

3.1 Principles of engagement

There are pockets of strong surgical research activity in the UK that need to be supported to succeed, and a wider body of surgeons who are potentially willing but currently disengaged from research. To increase the amount of high quality surgical cancer research conducted in the UK, there are actions that could be taken by NCRI Partners, other organisations and surgical researchers themselves to help overcome the barriers outlined above. This does not necessarily require a single, highly resourced initiative, but rather, a series of interlinked activities that would require relatively modest investments of time and money across a number of organisations. During the course of discussions that helped to formulate this report, a number of principles of engagement have also been drawn out that should underpin any steps taken (Figure 9).

Figure 9. Principles of engagement to support an increase in surgical research

Go where the energy is. The research leaders in cancer surgery will self-select, and need to be supported to help engage others. The growth of centres of excellence should be encouraged.

Support the next generation of surgeons. Real increases in research capacity are likely to result from engaging more surgeons early in their careers, and efforts are needed to increase research skills training and mentorship opportunities.

Create opportunities for hands-on learning. Expanding the surgical research culture will take time, but could be accelerated by providing practical, tailored opportunities for surgeons.

Surgery should not stand alone. Multidisciplinary working is central to cancer care and needs to be embraced. While increasing research capacity and skill development may require approaches tailored to surgeons, in the long-term it is appropriate that surgical research both works with, and competes against, other specialties for funding.

3.2 Proposed actions

Drawing from the challenges outlined in Section 2, this report concludes by identifying opportunities to support and develop surgical research in the UK. These have been grouped into three main areas:

- **Ensuring surgery can compete equitably with other disciplines**
Research funders and research support organisations should critically appraise the suitability and accessibility of the opportunities they offer, to ensure that surgeons can compete fairly against other disciplines where the research culture is more embedded.
- **Supporting surgeons already contributing to research**
Research funders and other organisations with a stake in surgical research should consider ways to offer enhanced support for current surgical researchers, to help today's leaders to deliver research, build capacity and train the leaders of the future.
- **Engaging a new cadre of surgeons in research**
As well as stakeholder organisations, surgical researchers themselves are well placed to help a new generation of surgeons to gain research skills, whether by working on a local level, communicating opportunities to colleagues, or making applications to appropriate funders to run training and educational activities.

Proposed actions are put forward in Figure 10, and call upon different sections of the UK research community to consider their roles in supporting this. For this purpose, all organisations that fund surgical research, including its associated infrastructure or professional education activities, are encouraged to consider themselves as being under the heading of ‘research funders’.

This report has been prepared with a focus on surgery in cancer and the following steps have been identified in order to benefit cancer research. At the same time, it is likely that the proposed actions will be relevant across surgical research more generally. We urge research funders, surgeons and other organisations to work together towards these aims, to expand and sustain a vibrant community of researchers in the surgical field.

Figure 10. Proposed actions for the research community to support surgical research

1. Ensuring surgery can compete equitably against other disciplines		
Action	Example activities	Action by
1A. Publicise current funding opportunities directly to surgeons	<ul style="list-style-type: none"> • Run bespoke workshops with a focus on funding • Publicise funding streams at surgical association annual meetings • Form connections with royal colleges/others with wider mailing lists to cascade opportunities effectively • Collate a package summarising surgical research funding opportunities 	<ul style="list-style-type: none"> • Research funders • Research funders • Research funders • Research funders
1B. Ensure surgical research is able to compete effectively within existing funding streams	<ul style="list-style-type: none"> • Review the ability of peer review panels to deal with surgical research applications, and address any gaps • Issue generic advice highlighting common errors or recommendations for surgical applications, and enhance individualised feedback to failed applicants • Undertake a prioritisation process with the surgical research community to identify surgical topics of high potential impact on cancer care (see also Action 2B), to provide bottom-up information that will support funding panels in understanding the field 	<ul style="list-style-type: none"> • Research funders • Research funders • Research funders, NCRI CSGs
1C. Review the effectiveness of central mechanisms for supporting surgical research	<ul style="list-style-type: none"> • Review effectiveness of current research nurse/data manager support for surgery clinics • Optimise communication channels between central structures (e.g. Surgery Specialty Group, NCRN) and surgical researchers • Ensure that advice/guidance on the process for accessing surgical research support is disseminated appropriately in all regions • Flag trials that recruit in a surgical setting for special monitoring/assistance 	<ul style="list-style-type: none"> • Clinical research networks • Clinical research networks and associated groups • Clinical research networks and associated groups • Clinical research networks

2. Supporting surgeons already contributing to research

Action	Example activities	Action by
2A. Ensure recognition of individuals' and centres' contributions to research	<ul style="list-style-type: none"> Consider accreditation or badging for research-active surgical departments Consider ways to recognise high-recruiting surgical departments Sponsor surgical poster prizes or awards at relevant UK conferences 	<ul style="list-style-type: none"> Royal colleges, research funders Clinical research networks Research funders, royal colleges, surgical associations
2B. Seek ways to accelerate the development of surgical research ideas in cancer	<ul style="list-style-type: none"> Run bespoke workshops with a focus on building collaborations and prioritising core surgical research questions, to stimulate development of proposals on topics with high potential impact on cancer care (see also Action 1B) Support fixed-term working groups for cross-cutting topics, e.g. endpoints for surgical trials and assessing quality in surgery Issue highlight notices on surgical research Provide additional low-level resource to leverage networking benefit from multicentre studies 	<ul style="list-style-type: none"> NCRI CSGs, surgical researchers NCRI CSGs, research funders, surgical associations, royal colleges Research funders Surgical researchers, research funders
2C. Use current structures to support skill sharing for surgeons	<ul style="list-style-type: none"> Encourage methodology hubs to work with surgical researchers to support skill training and trial design Equip one or more CTUs to develop specialist expertise in design and delivery of surgical trials 	<ul style="list-style-type: none"> Methodology hubs Research funders, UKCRC/NCRI-accredited CTUs

3. Engaging a new cadre of surgeons in research

Action	Example activities	Action by
3A. Increase exposure to high quality surgical research activity	<ul style="list-style-type: none"> Present a showcase of landmark trials and lessons learnt Include sessions at NCRI conference and other surgical association annual meetings 	<ul style="list-style-type: none"> Surgical researchers, oncology researchers NCRI, surgical associations, surgical researchers
3B. Create opportunities for surgical research skills training	<ul style="list-style-type: none"> Run bespoke workshops with a focus on trial design and research skill building 	<ul style="list-style-type: none"> Surgical researchers, research funders, royal colleges, surgical associations
3C. Create opportunities for junior surgeons to interact with experienced researchers	<ul style="list-style-type: none"> Include high-performing junior surgeons on CSG subgroups Publicise CSGs as an avenue for putting forward surgical trial ideas Develop bespoke initiatives such as trainee research collaboratives and mentoring opportunities 	<ul style="list-style-type: none"> NCRI CSGs NCRI CSGs Surgical researchers

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Glossary

ASGBI	Association of Surgeons of Great Britain and Northern Ireland
CaRD	NCRI Cancer Research Database
CLRN	Comprehensive Local Research Network
CPD	Continuing professional development
CRN	Clinical Research Network
CSG	Clinical Studies Group
CTU	Clinical trials unit
FTE	Full time-equivalent
GCP	Good clinical practice
GI	Gastrointestinal
GRIST	Growing Recruitment to Interventional Surgical Trials working group
MDT	Multidisciplinary team
MRC	Medical Research Council
NCRI	National Cancer Research Institute
NCRN	NIHR Cancer Research Network
NHS	National Health Service
NIHR	National Institute for Health Research
RCS England	Royal College of Surgeons of England
RCT	Randomised controlled trial
RDS	Research Design Service
SARS	Society of Academic and Research Surgery
SSG	Surgery Specialty Group
UKCRC	UK Clinical Research Collaboration

NCRI Partners





National Cancer Research Institute
Angel Building
407 St John Street
London EC1V 4AD
UK

tel: +44 (0)20 3469 8460

fax: +44 (0)20 3014 7658

email: info@ncri.org.uk

web: www.ncri.org.uk