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Science Policy

The state of academic cancer surgery in the UK

S. Eckhouse[a], R. Sullivan[a,b,c,*]

[a]European Cancer Research Managers Foundation, London, United Kingdom
[b]Foundation for Genomics & Public Health, Cambridge, United Kingdom
[c]WHO International Agency for Research on Cancer

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ABSTRACT

Despite media and public perception to the contrary cancer surgery is the most important modality for the control and cure of cancer. However, after years of underinvestment by research funders and increasing service delivery demands the academic cancer surgeon is an endangered species. In an effort to improve evidence-based policymaking in this critical domain of cancer research the ECRM has conducted a semi-quantitative assessment of the state of academic cancer surgery in the UK. We have found that the percentage of investment in cancer surgical technologies R&D is less than 1% and even when this is extended to other diseases then this figure is still less than 1%. A decline in the overall numbers of academic surgical staff is paralleled by our finding that over 50% of the academic cancer surgeons in this survey had insufficient time for research. With clinical trials and surgical technology development identified as key research domains the majority (60–80%) did not perceive any benefit for surgical research in these areas as a result of the creation of the UK National Cancer Research Institute. We also found high support for academic surgery from colleagues but medium–low support from many institutions. Key policy conclusions are: (1) greater hypothecated investment by research funders, particularly for the development of surgical technologies as well as clinical trials, and (2) the creation of cancer surgery centres of excellence which have sufficient staffing and institutional support to engendered a creative academic environment.

1. Academic cancer surgery in context

Many of the substantive issues that bedevil UK academic cancer surgery have their roots in the long history of complex organizational changes to the National Health Service and political failures to foresee and/or react to the problems that such changes inevitably bring about. Critically it is impossible to discuss a policy framework for academic surgery in an environment of increasing service pressure and too few surgeons. The number of surgeons per head of population in the UK (1 per 37,000) (Galloway, 2000) is roughly half that seen in most of mainland Europe and, although comparisons are not straightforward, the ratio is even less when compared with the USA. There is a severe shortage of general surgeons

* *Corresponding author*. Department of Social Policy (Health, Population & Society Programme) London School of Economics & Political Science, Houghton Street, London WC2A 2AE, United Kingdom. Tel.: +44 7720398401.
E-mail address: r.sullivan@lse.ac.uk (R. Sullivan).
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in the NHS, a situation which for many years has been accommodated by trainees who have worked excessive hours and by overseas qualified doctors who have served in a sub-consultant role. In addition the introduction of the European Working Time Directive, new immigration policies and Modernising Medical Careers[1] (Osborne, 2006) initiative have all added to the cumulative downward pressures on UK academic surgery. Of course within surgery as a whole the situation is more complex with some disciplines enjoying better fortunes than others.

The importance of academic cancer surgery cannot be underestimated for the control and cure of cancer patients. As Ian Tannock succinctly puts it (Tannock, 1998), despite "*some notable achievements from the use of chemotherapy,…the effects of drugs to cure cancer are small compared to the surgical knife and the linear accelerator*". Cancer surgery remains the main modality of control and cure for the foreseeable future in developed countries and in low-middle-income countries the only modality in majority of cases. Indeed with the burden of global disease in the group II category (chronic, including CVD and cancer) shifting to low-middle-income countries surgical, along with radiotherapy developments will constitute the backbone of cancer management for the majority of the world's patients.

Cancer surgeons have also been instrumental in developing and leading international clinical trials, as well as programmes of research into fundamental aspects of cancer biology. There has been considerable debate about the causes and nature of the problems affecting academic surgery, however, interventions to reverse this 'decline' are mainly the result of opinion-based policymaking. There is precious little intelligence for policymakers and the research community to inform the creation of new initiatives and/or monitor existing trends. In this policy review we have collated data from a number of sources on the current financial support of the UK academic cancer surgery community, and conducted a qualitative, questionnaire based study of this research community to provide a national evidence base for policymakers to address the issues of academic cancer surgery.

2. Methodology

Funding data from the public (charitable and governmental) funders in the UK was obtained through an interrogation of the funding databases, in particular the partners of the National Cancer Research Institute (NCRI) and UK Clinical Research Collaboration (UKCRC). In the USA data has been extracted from the RAND's RaDIUs database and directly from federal and charitable funders identified in the second European Cancer Research Managers report (Eckhouse et al., 2007).

We also undertook a questionnaire based survey of the academic cancer research community in the UK. The survey was developed with key academic cancer surgeons and used a Likert preference scale. All data was captured between January and August 2007.

The questionnaire was set up in an on-line format and emailed invitations sent out to specific members of the major UK cancer surgery learned societies, i.e.

- All surgeons identified on the National Cancer Research Institute databases
- Society of Academic and Research Surgery (SARS)
- Association of Surgeons of Great Britain and Ireland (ASGBI)
- Association of Surgeons in Training (ASiT-sub group of ASGBI)
- British Association of Surgical Oncologists (BASO)

There were 173 responses (84% male, 16% female; 93 full time, 7% part time) from 233 questionnaires (response rate 74%). The characteristics of the these responders were as follows (Figures 1–3). MD[2] (in combination with an MSc) was the most common formal post-graduate degree obtained by the cancer surgeons in this survey (49%). However, just under 30% of responders had no formal postgraduate research qualification but were nevertheless engaged in some form of research. Gastro-intestinal (GI) (upper and lower) surgeons were the dominant speciality of those surveyed (58%), followed by breast cancer surgeons (29%).

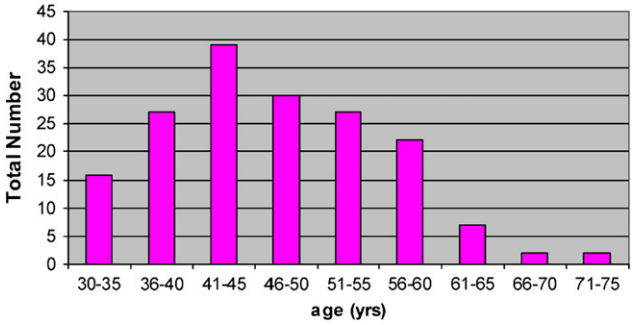

Figure 1 – Demographic (age) profile of academic cancer surgeons in survey.

3. The funding of academic cancer surgery

In the UK all public sector cancer research funding is coded through the Common Scientific Outline and collated by the National Cancer Research Institute (NCRI) (O'Toole et al., 2003). From this database we identified 56 surgeons who were current investigators on project/programme grants (out of a list of some 2890). However, only 19 of these had ever been the research lead (Principle/Chief Investigator) on a grant in the last 5 years (2002–2007). Indeed as of April 2007 only 10 surgeons held 20 grant awards from the NCRI funding partners. Furthermore many (circa 60%) of the grants held by cancer surgeons were in research domains not directly related to the development of surgical technologies and/or

[1] The origins of MMC lie in a consultation document Unfinished Business: proposals for reform of the Senior House Office grade by England's CMO, Sir Liam Donaldson, 2002, which proposed to restructure the SHO grade.

[2] In the UK 'MD' is a postgraduate qualification, a 2-year research programme leading to the award of a Doctorate of Medicine. It is not a primary medical qualification.

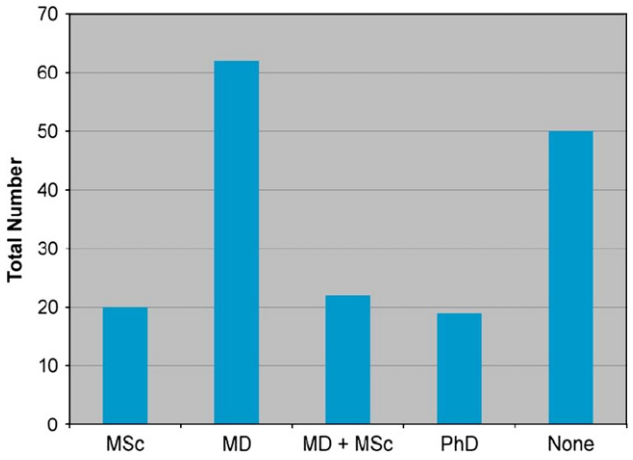

Figure 2 – Postgraduate research qualifications of academic cancer surgeons in survey.

surgery-specific research questions. This picture gives some indication of the scale of the under-investment in academic cancer surgery. To determine whether this was an isolated, disease-specific issue we also interrogated funding data from across the public grant sector covering a broad range of diseases available from the UK Clinical Research Collaboration (UKCRC).

In 2006 the UK Clinical Research Collaboration (UKCRC) conducted the first analysis of medical research funding across each of the major UK funders (UK Health Research Analysis, 2006). Analysis of this data set indicates that health research investment is heavily focused on the development and evaluation of therapeutic interventions, and expenditure on R&D into surgical interventions is significantly lower than average (Table 1).

Although the perception in the UK is that academic surgical oncology is better supported and funded than in the USA we have found that investment in the latter country is also extraordinarily low (Table 2). Over the past 20 years the Division of Cancer Treatment of the NCI has sponsored 20 separate initiatives to try and foster capacity and quality in surgical oncology research with little discernable improvement (Avis et al., 1988). Invariably the downward pressures

Table 1 – Expenditure on the Development & Evaluation of Therapeutic Interventions by UK public funding organisations (as of April 2007)

	Percentage of research activity		Percentage of total spend	
	UKCRC	CRUK	UKCRC	CRUK
DEVELOPMENT of treatments and therapeutic interventions				
Pharmaceuticals	45.3	67.0	3.9	11.6
Cellular and gene therapies	25.1	12.7	2.1	2.2
Medical devices	8.4	0.0	0.7	0.0
Surgery	**6.6**	**0.7**	**0.6**	**0.1**
Radiotherapy	3.4	6.1	0.3	1.1
Psychological and behavioural	1.7	0.0	0.1	0.0
Physical	0.3	0.0	<0.1	0.0
Complementary	0.1	0.0	<0.1	0.0
Resources and infrastructure	9.1	13.6	0.8	2.3
EVALUATION of treatments and therapeutic interventions				
Pharmaceuticals	36.2	57.3	2.9	6.7
Cellular and gene therapies	3.1	4.6	0.3	0.5
Medical devices	5.1	0.2	0.4	<0.1
Surgery	**8.7**	**1.2**	**0.7**	**0.1**
Radiotherapy	5.3	7.9	0.4	0.9
Psychological and behavioural	5.1	1.1	0.4	0.1
Physical	4.6	1.0	0.4	0.1
Complementary	1.5	0.6	0.1	0.1
Resources and infrastructure	30.4	26.3	2.5	3.1

Key: UKCRC – partners within the UK Clinical Research Collaboration, CRUK – Cancer Research UK.

on NCI budgets continue to have had a widespread effect. However, the current view is that in the USA the academic surgical oncologists have failed to develop and sustain an adequate research force and have fallen behind non-clinical researchers in winning NIH grants. Studies of NIH funding (Rangel et al., 2002) and special committee reviews (Scott and Debas, 2004) support this view but without coming to any conclusion on whether this is due to less quality proposals from departments of surgery, inherent bias in the system and/or too few surgeons on study sections, or a combination of all three. Whilst the USA has been active in trying to promote academic surgery through such ventures as the American College of Surgeons Initiative the initial assessments are

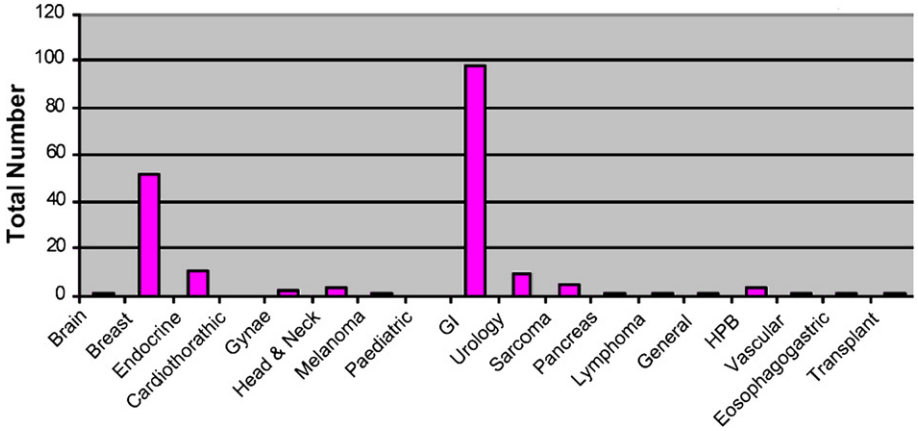

Figure 3 – Site specialisation of academic cancer surgeons in survey.

Table 2 – Expenditure on academic surgical research by USA public funding organisations

Organisation	Country	Timeframe from which spend data extracted	Average spend (pa, $)	No. of active projects (2006/2007)
Oncology Nursing Society	USA	1989–2007	69,675	9
American Cancer Society	USA	Current in April 2007	4,903,000	8
CDMRP (Department of Defense)	USA	Grants active between 2004 and 2006	146,685,351	246
National Cancer Institute[1]	USA	2004–2006, 2007 to date	288,567,345	837

that they are having little impact (Panesar et al., 2006). Added to this is a situation where both the funding and practicalities of carrying out clinical trials of surgical interventions are considered 'too difficult' and one sees a picture not dissimilar to the UK.

There is clearly funding for academic cancer surgery through other routes, for example, from the device industry, general infrastructure funds and as add-on to large multicentre clinical trials, which we have not been able to identify. However, experience tells us that this will be modest and, at the very best around 30% of the identifiable public expenditure from research funding organisations (this figure is derived from previous funding studies by the ECRM). The question of quality versus activity has been addressed through the UK academic cancer research survey where we found moderately high levels of success (64%) in winning research grants that compare favourably with most other disciplines, e.g. medical oncology (data not shown). We have also found that there a very few new funding streams and initiatives offered by the UK funders targeted at academic cancer surgery, compared to those weighted in favour of medical oncology. However, this is not to argue that there is over-investment in the latter areas but rather that there has been under-investment in academic cancer surgery. Why then is the funding base for academic cancer surgery so narrow? In the Sections 3 and 4 we have investigated specific issues around training and career development and socio-cultural factors relevant to this question.

4. Training and career development in academic cancer surgery

Changes to surgical training brought about by European legislation (European Working Time Directive) and domestic initiatives (Modernising Medical Careers (MMC) and the related but separate Medical Training Application System (MTAS) initiatives) have elicited considerable, often hostile debate and comment. The first attempt to codify the problem was led by the Association of Surgeons of Great Britain and Ireland (ASGBI) in 2004 which focused on an initial impact assessment of MMC on surgical training and career development (ASGBI, 2004). This was quickly followed in 2005 by a second consensus conference on the problems of academic surgery (ASGBI, 2005). Whilst wide ranging both reports brought into sharp relief the impact of these dramatic changes to UK medical training and career development in prosecuting an academic career as a surgeon. In particular, shortened, inflexible training left little time for the development of research interests. An already over-stretched workforce, through combination of increasing work-load (secondary to the ageing population) and specialisation, would face even more pressure to focus entirely on service delivery rather than consider an academic path. And finally a UK research environment that neither valued nor rewarded surgical research because of the focus by Universities on journal impact factors (Research Assessment Exercise) and by funders on pharmaceutical-centric research.

Our research revealed a general feeling of pessimism about the future involvement of surgeons as academic leaders/principal investigators in the UK. This is certainly backed up by the findings of the Clinical Academic Staffing Survey produced annually by the Medical Schools Council (formerly the Council of Heads of Medical Schools). This survey has provided strong evidence of a long-term decline in numbers of academic surgery posts, reaching a low in 2004, when the CHMS noted that *''radiology and surgery should now be added to the specialties in crisis, both having lost more than a quarter of their clinical academic numbers since 2000''*. In the last year for which data is available surgical staffing had recovered somewhat, growing by 7% between 2005 and 2006 (Clinical Academic Staffing Levels in UK Medical and Dental Schools, 2007). The UK has also seen nearly a 50% decline in the number of mid-career academic surgeons (Lecturer grade) since 2000 and an overall decline of 20% in the total numbers of academic surgeons in the same period (Tables 3 and 4). A study by the Royal College of Surgeons of England also found that over half of all 1 year research fellows did not progress their academic training (Nuttall et al., 2005). However, in this latter context this data could also be seen as a successful 'triage' rather than academic attrition. Finally we do know that cancer surgeons have successfully entered academic training, completed an MD or PhD but then subsequently dropped out further academic career development (Sullivan, 2008). Academic critical mass post-MD/PhD (from clinician scientist through to

Table 3 – Clinical academic staffing levels in the UK: lecturers

Speciality	Total no. of lecturers			% Change since 2005	As % of 2000
	2000	2005	2006		
Pathology	64	19	16	−15	26
Physicians/ medicine	188	133	131	−2	70
Psychiatry	114	45	46	1	40
Public health	62	17	18	6	30
Radiology	8	3	4	38	45
Surgery	98	46	52	13	53
Other	125	21	11	−47	9
Total	845	424	403	−5	48

Table 4 – Clinical academic staffing levels in the UK: all academics

Speciality	Total no. of clinical academics			% Change since 2005	As % of 2000
	2000	2005	2006		
Anaesthetics	100	73	67	−9	67
General practice	152	199	186	−7	122
Infection/ microbiology	*	67	71	6	*
Medical education	*	23	22	−4	*
Obstetrics and gynaecology	177	139	119	−14	67
Occupational medicine	15	10	11	12	75
Oncology	*	113	100	−12	*
Ophthalmology	40	40	40	0	100
Paediatrics and child health	246	229	215	−6	88
Pathology	371	192	191	−1	51
Physicians/medicine	973	1084	1073	−1	110
Psychiatry	393	294	296	1	75
Public health	215	165	168	2	78
Radiology	60	33	39	18	66
Surgery	331	253	271	7	82
Other	476	54	67	23	14
Total	3549	2968	2937	−1	83

academic heads of departments) is a substantial issue. It is worth reiterating that these figures on academic surgical oncology need to be seen in the light of the low UK workforce base and a long-term, rather than acute decline.

We have also investigated the attitudes amongst the UK cancer surgeons as to the best framework for academic training and career development. The majority of the interviewees (>88%) at the time of this study remained ambivalent or hostile towards MMC. The majority (76%) felt that the change in medical training would have a negative impact on recruitment and retention in academic cancer surgery. Cancer has not been the only surgical community to raise substantial concerns about the impact of MMC. Following the debacle of implementing the Run Through Training schemes of MMC through the Medical Training Application Service a complete overhaul was initiated. Input from the surgical community was again coordinated by the ASGBI with a 2007 consensus report (MMConsensus, 2007). Academic surgery featured prominently in this report, however, many of the statements – 'rigidity of the MMC must be avoided'; opportunity of trainees to enter research outside the regimentation of the Walport route must be available (Academic Sub Committee of MMC and UK Clinical Research Collaboration, 2005) – remain aspirational rather than a real sea change in policy towards creating a sustainable and sympathetic environment for training and career development in academic surgery.

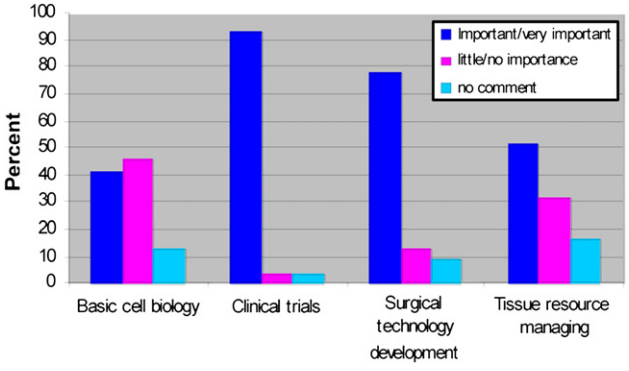

Figure 4 – In what areas can surgeons contribute the most to academic cancer research?

5. Perspectives from the academic cancer surgery community

Most surgeons recognised academic cancer surgery as having a broad academic base (Figure 4) but with their most important contributions in the broad domains of clinical trials and surgical technology development. Unsurprisingly fundamental biology was considered the least 'important' area. The situation around the role of surgeons in managing tissue resources for secondary research was more complex with a free text responses being equally divided as to those who thought it was an important role to those who felt this was in no shape or form a 'research activity'.

The creation of the NCRI in the UK brought about rapid changes and improvements to the funding environment for cancer research as a whole. Despite this increased research and funding focus the perception amongst the academic cancer research community in the UK 7 years after it's formation is of little impact to their research (Figure 6). However, at least a third of those surveyed did perceive a positive effect of the creation of the NCRI (and in particular the National Cancer Research Networks which mandate involvement of surgeons on site specific Clinical Study Groups) on surgical involvement in clinical trials. However, the overall picture is suggest that little of the benefits (aside from improvements in clinical trials involvement) have been shared with academic cancer surgery. In addition there remains the majority view of too little time available for research (Figure 5) although we found that

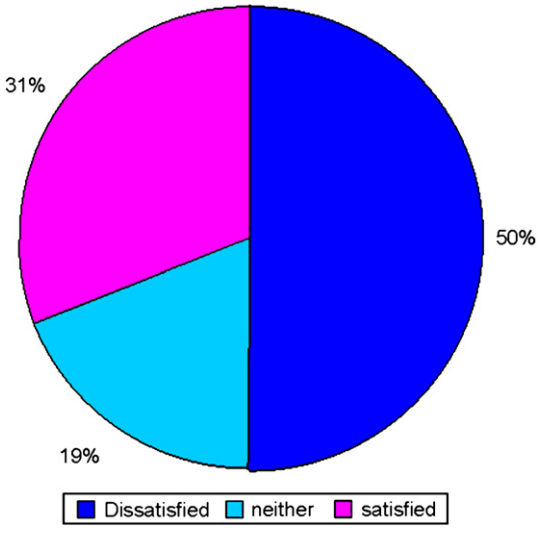

Figure 5 – How satisfied are cancer surgeons with the time they have to spend on research?

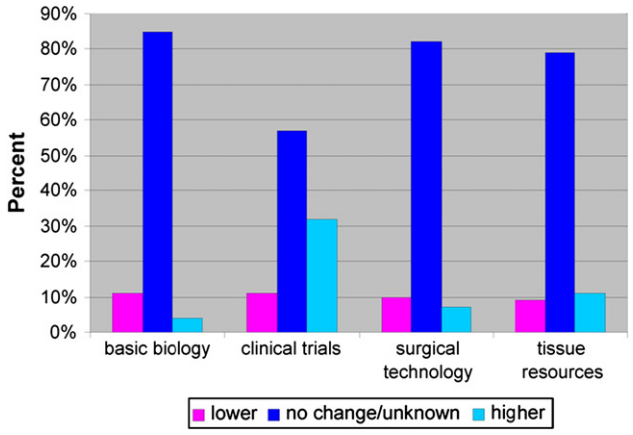

Figure 6 – What impact has the establishment of the National Cancer Research Institute had on the involvement of surgeons in each of the following areas of cancer research?

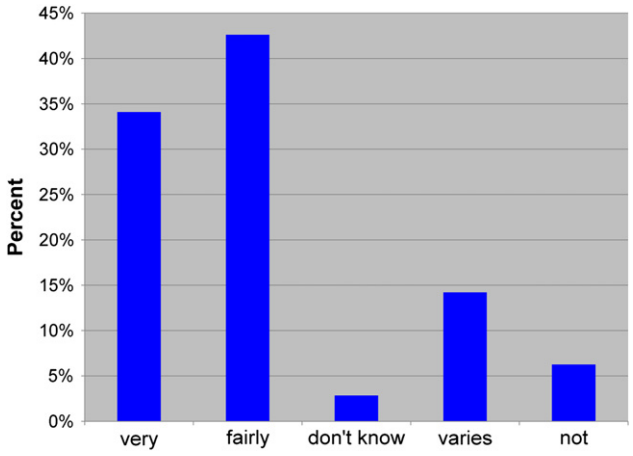

Figure 7 – How supportive are your colleagues towards your need to balance research and service delivery?

those who were satisfied with their research time were housed in major UK centres with substantial ongoing research commitments.

How can we promote more surgical involvement in clinical trials? Surgical involvement as facilitators and research leaders in clinical trials has improved since the establishment of the NCRN and the consequent availability of new research funds. However, the improvement appears to have occurred within a very narrow population of surgeons, with the same surgical Principle Investigators putting in more of a concerted effort. This suggests a need to diversify the number of surgeons involved in research. This may occur naturally over a period of time but there may be a case for positive intervention. Our findings also indicate a need to potentially re-think how research and development of surgical techniques is conducted, i.e. supporting the early development of new surgical techniques and technologies. A review of NICE assessments into interventional procedures guidelines (IPG) indicates an urgent need across a number of techniques to conduct high quality clinical trials.

The majority (76%) of surgeons felt that their surgical colleagues were supportive towards those who undertook research in their department (Figure 7) but this view needs to be balanced against far less institutional support for academic cancer surgery (Figure 8). Despite the relatively consistent picture of personal support for academic cancer surgeons the heterogeneity in institutional support is a major concern. Given political priorities in the UK for service delivery it is perhaps not surprising that many hospitals see academic surgery as neither necessary nor integral to hitting targets (Harrison and Appleby, 2005).

6. Policy recommendations

This research supports the urgent need for new policies to support academic cancer surgery, namely:

- Ring-fenced investment to support programmes and networks working on the R&D of surgical technologies. The current level of funding is so low that a strong case for pro-active initiatives must exist.
- Continuing and increased support of surgical participation within clinical trials and the promotion of clinical trials of surgical technologies.
- A integrated approach between funders and training bodies to supporting, in a bespoke case-by-case manner, young surgeons who choose an academic path. The benefits of such a career choice need also to be disseminated far wider than they are now.
- Finally it is in the long-term interests of academic surgery that the multiple societies, Royal Colleges and other bodies act as collective advocates for academic surgery.

How do the UK findings fit with a more global picture? Clearly the unique histories and healthcare structures in each country will give rise to a different configuration of issues and priorities but universals around R&D activity within cancer surgery, clear and well supported academic pathways for cancer surgeons do exist. As part of its ongoing policy research work the European Cancer Research Managers

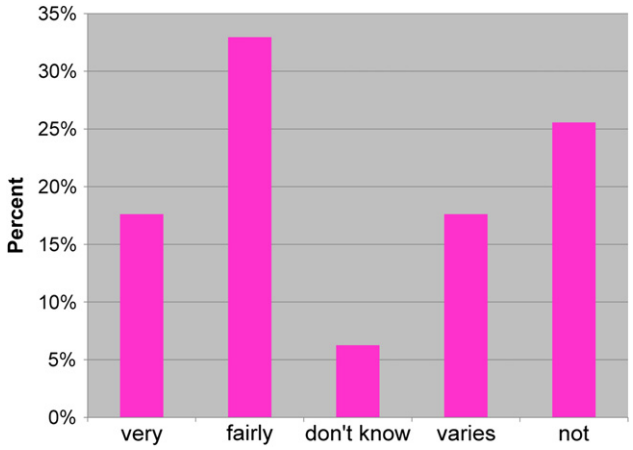

Figure 8 – How supportive is your institution (hospital and university) towards your need to balance research and service delivery?

Foundation is now broadening its scope to the international setting for academic cancer surgery.

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