The implications of specialism on surgical practice in the 21st Century
Non omnia possimus omnes

Virgil, 70-19BC
A generalist

“a person competent in several different fields or activities”

Oxford English Dictionary
Wie wol ich bin voll Streicd vi Hochstich
Gemertshaff/verwundet samelich
Styphon der werd mir heuff frey.

Doch hoff ich Gott/künstlich arme
Styphon der werd mir heuff frey.
"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."
Why is specialism growing and what are the impacts on surgical practice in the coming decades?
Semantics

"Them's fightin' words, mister...unless 'n, o' course, them's just semantics."
Your choice of lifestyle is an abomination.

But I've been this way since I was a child.

BEING LEFT-HANDED IN THE MIDDLE AGES

It's EVIL! You must renounce this behavior!

What if it's NATURAL? There's NO proof of that!

BEING LEFT-HANDED IN THE MIDDLE AGES
“general”

“not specialised”, or
“limited in range of subject”
Size of the field of knowledge
Science Citation Index Papers Covered, 1955-2006
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Specialism is also a generational trend
Nose job $7,500...Facelift $10,000
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Ms. Flossbottom, it's great to see you...you look like a million bucks.
Workplace changes
Opt-out equals Burn-out
EU Working Time Proposals are Surreal!
of 4 November 2003
concerning certain aspects of the organisation of working time

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE
EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 137(2) thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Economic and Social Committee (5),

Having consulted the Committee of the Regions,

Acting in accordance with the procedure referred to in Article 251 of the Treaty (6),

Whereas:

(5) All workers should have adequate rest periods. The concept of ‘rest’ must be expressed in units of time, i.e. in days, hours and/or fractions thereof. Community workers must be granted minimum daily, weekly and annual periods of rest and adequate breaks. It is also necessary in this context to place a maximum limit on weekly working hours.

(6) Account should be taken of the principles of the International Labour Organisation with regard to the organisation of working time, including those relating to night work.

(7) Research has shown that the human body is more sensitive at night to environmental disturbances and also to certain burdensome forms of work organisation and that long periods of night work can be detrimental to the health of workers and can endanger safety at the workplace.
Reimbursement
• Inability to provide acute and time-critical generalist care
• Increasing difficulty in dealing with patients in interface areas
• Clinical blind spots
• Marginalisation in healthcare
• Abrogation of professionalism
Inability to provide acute and time-critical generalist care
Increasing difficulty in dealing with interface areas
Clinical blind spots
Marginalisation in healthcare
Generalism

Specialism
Societal need not met
“You can never plan the future by the past”

Edmund Burke, 1791
THE IMPACT OF SPECIALISM ON SURGERY IN THE 21ST CENTURY

*Non omnia possumus omnes* (2)

This statement, meaning “we can’t all do everything”, is attributed to Virgil who lived from 70-19BC. And in broad terms of course he was right. From the general to the specific. That natural progression has affected so much of the world throughout history. It has certainly affected science, art and culture and is particularly relevant to surgery. Taken to the extreme or even in moderation this progression results in increasing dependence on the other craft groups to determine who needs surgery and in some cases what operation should be performed.
When surgery was born out of our barber heritage it was inherently general and everyone was a generalist (3). The Oxford English Dictionary (4) describes a generalist as “a person competent in several different fields or activities” and the associated noun in generalism. The original surgeons (who dealt predominantly with trauma (5) were generalists not only because they dealt with what are now recognised as different areas of practice but also because they dealt with the patient (or the population of potential patients) both before and after the disease presentation. This implies a broad understanding of human anatomy and physiology as well as epidemiology and rehabilitation. With relevance to surgery it also implies a facility with surgical technique not restricted by anatomic boundaries (6). Specialism is the direct opposite of generalism. In its most extreme form, itinerant technical specialism, it implies knowledge and expertise limited to a particular technical procedure which is applied on an intermittent basis to patients without any involvement with other aspects of their care. It may even involve expertise limited to a part of a single operation.

Why is specialism growing and what are the impacts on surgical practice in the coming decades? (7)
For a start off, semantics encourages specialism and discourages generalism (8). “General” as a word related to nature of work has some of the connotations that “left” has in discussions on sidedness. The Latin “sinistra” is associated with less that desirable “sinister” characteristics (9). This cartoon highlights the insistence on being right handed despite ones natural tendency which was very common in my generation at school. While “general” does not have quite such specific undesirable characteristics it is nevertheless often used in derogatory tones in relation to “special” (10). The OED provides one use of the word general as “not specialized or limited in range of subject”. General is thus seen as “limited” or “basic” and those in the audience who started life as general surgeons will have had the experience of being asked when or if they are going to specialize. Thus semantics provide significant pressure away from generalism.

Another significant underlying drive towards specialism is the size of the field of knowledge.
It is generally accepted that the growth of knowledge in the world is exponential and surgery is not excluded from this trend. \((11)\) As an example, here is an indication of the number of patents applied for over the last 150 or so years. Since 1990, 4 times as many patents have been applied for than in all the years prior to that time. In the last 15 years there have been four times as many patents in the previous 150 years. Every 10 years sees a doubling of knowledge has increased in the past 20 years equivalent to a doubling of all knowledge in the world prior to the 20\(^{th}\) Century. Another example of this \((12)\) relates to the number of scientific citations that are reported, currently over 1.2 million/year. When I bought my first computer in 1985, somewhat like this \((13)\) it had a brick-like hard drive that stored 10Mb. A huge amount of data in its day. My current pocked sized backup is 1.5Tb, which is the same as 1.5 million Mb \((14)\).
Knowledge now increases somewhat more than 5 Exabytes per year, or 5 million Tb per year. Actual data transfer, as opposed to new knowledge is far greater. Global monthly internet traffic in March last year was estimated at 21 Exabytes, or 21 million Terabytes. Scientific knowledge as applied to medicine is not immune to this degree of knowledge expansion. It is not surprising then that specialism develops to maintain a body of knowledge that an individual can be expected to remain familiar with. The increase in knowledge in medicine is both broad and deep so that generalism and specialists are challenged by a field which is increasingly large. Limiting practice to a small area with a focus on a limited number of technical skills is one of the direct consequences of the increase in knowledge.

Specialism is also a generational trend (15)
The “baby-boomers” (16) (born 1946-1964) have almost had their day with generations X (born 1965-1981) superseding them both in the training population and in the workplace as trained surgeons. These younger generations have quite different characteristics that influence their working practices. Members of generation X (17) have been described as pragmatic, perceptive, savvy but amoral, self-centered, fickle and focused on money. While these are gross generalizations, these characteristics result in a population exhibiting quite different aspirations and expectations than those present in earlier generations. This group want defined subspecialised areas of practice but are quite prepared to be comprehensively responsible for such areas. On the other hand generation Y (18) are the children of the baby boomers and are the most computer literate group ever seen. They are grown up with computers most of their lives, have always had cellphones and i-pods and most have a Facebook account. Their personal interactions are driven by the technology and so too their personal styles. They will communicate electronically by preference and regard this as a better way of interacting with patients too.
This group is fascinated by technology and very adept at using it in the surgical arena. Combining this with their preferred style of interpersonal interaction, this is the group that you could see providing robotic telemedicine from the comfort of their area of interest. Generational changes then are one of the drivers to specialism.

Another of the drivers towards specialism is the changes that have developed in the workplace for all workers (19).

The key change in the workplace, although not related to the generational change, is the change in working time (20). Although baby boomers were prepared to work long hours it has been well documented that this results in the potential for workplace error. Fatigue is no longer a personal burden but a safety risk. In various jurisdictions around the world different “safe hours” legislation has been introduced. The European Working Time Directive is probably the most restrictive with hours of work limited to 48 per week and more reductions planned (21). In the US, recent legislation has restricted trainees hours to 80 per week.
From the trainee's perspective, the demands of generalism, which were met in the past by the sheer volume of experience that trainees obtained, is not tenable under safe hours. What is much more achievable is a smaller field of interest which can be effectively learnt, practiced, and skills maintained on less hours per week. At the employers' level, safe hours means that more trainees and surgeons must be employed to deliver the same amount of surgical output and handover must be refined and perfected. That patient care is handed from one team or individual to another team or individual is another driver towards specialism. If a surgeon is only ever going to look after part of a person part of the time, why should general competency be maintained?

Another workplace driver towards specialism and in particular, technical specialism, is reimbursement (22).
Surgeons are all well aware, even if they choose to ignore it, that society at large rewards technical specialism way above and beyond other non-technical cognitive activities. On an hourly-rate basis undertaking surgery is associated with much greater financial reward than consulting or ward rounds for example. Many justifications have been advanced for this fact. Certainly some of the reward is based on the risk involved. Undoubtedly surgical intervention is associated with risk of errors of commission and as a result, bad outcome and medico legal threat. However, non-technical decisions made by surgeons in non-technical environments such as a trauma team leader (23) in a trauma resuscitation for example are likely to be associated with just as grave outcomes as a result of technical errors of commission or omission. Technical skills are associated with additional learning and skill maintenance requirements (as compared to consulting) and have time pressure on them. But again, educational background, the necessity to lead a team effectively and the pressure of time are all as great in the multidisciplinary surgical environment. Despite this paradox, reimbursement will remain one on the drivers away from generalism and another challenge for the future of surgery.
So what are the implications for surgery of a continuing trend towards specialism? Broadly speaking they are (24)

- Inability to provide acute and time-critical generalism care
- Increasing difficulty of dealing with patients in interface areas
- Clinical blind-spots
- Marginalization of surgery in health care

Unbridled specialism is inherently detrimental to patient care and the health of the community in general.
Patients who present acutely with surgical conditions often do so with undifferentiated problems (25). While these may occasionally overlap between medicine and surgery (for example abdominal pain which could be either cholecystitis or myocardial ischaemia) they largely fall into one of the nine surgical domains. Once those nine domains become subdivided additional clinicians are required to determine into whose care the patient should be directed. Traditionally those clinicians have been generalist surgeons. So the generalist on-call orthopaedic surgeons determined when a patient is best managed by the specialist shoulder surgeon or the specialist knee surgeon. I would have to agree that some of those decisions may not be rocket science and could be made by a competent non-surgeon. But what about the patient with undifferentiated abdominal pain. Who should best decide whether the patient should be managed by the specialist colorectal surgeon, or the specialist hepatobiliary surgeon? A generalist surgeon or a non-surgeon? If there are too few generalist surgeons, particularly in the large specialities of general surgery and orthopaedics then the ability of surgery to respond to patient demand for acute and time critical illness will be diminished. Non-surgeons will fill the need at least as far as triage is concerned and the outcome both for patients and for the surgeons may be less than ideal.
To maintain an adequate workforce for acute and time critical care generalism must be maintained and supported by appropriate working time and reimbursement parameters.

Even in the non-acute arena, interface areas are problematic for medicine (26). Shoulder pain might be a rotator cuff tear to the orthopaedic surgeon, cholecystitis to the general surgeon, myocardial ischaemia for the cardiologist and a pulmonary embolus for the respiratory physician. The greater the number of potential interfaces in medicine, the greater the number of potential conflicts and potential blind spots (27). Breaking orthopaedics into spine, should, upper limb, pelvis, lower and foot and ankle with joint replacement, and tumour surgery surgery as well creates interface areas where diagnostic uncertainly has the potential to flourish. Similar subspecialty splits in other disciplines of surgery are equally problematic. Overwhelming specialism in the medical workplace has the potential to diminish the quality of care available to patients and create areas of risk for the clinician.
Another risk of specialism (28), and in particular itinerant technical specialism in the field of surgery that surgeons will be seen as increasingly irrelevant to the management of patients as a whole and therefore marginalized in medicine (as indeed they were in the days of the barber surgeon). Itinerant technical specialism (29), “operation to go” could see the care of surgical patients largely determined by non-surgeons with reliance on surgery only for specific technical exercises. Disease prevention and rehabilitation, where surgeons have been also been active could fall to our non-surgical colleagues. While this pattern of medical care may conceivably not have too many disadvantages in some surgical domains, it would be inherently detrimental in many others. Without doubt, the position of surgeons as influential contributors to the health care universe would diminish. Perhaps our non-surgical colleague could see some advantages in this but as “physicians who operate” our current generalist ability to provide a board perspective (30) on surgical disease as well as its operative management is a distinct advantage for the surgical patient.
Of course specialism is not all bad. That a group of surgical clinicians have extended knowledge in a particular area and expanded technical expertise is good for society in general and patients with problems in particular. What is not good is when the balance between specialism and generalism moves to far in the direction of the former (31).

As outlined previously all the relevant drivers presently are towards specialism and thus the direction of movement. Some of the drivers are so broadly societal that surgeons can have a little impact on the direction. Others are more directly under surgeons control and thus some influence could be exerted.

Perhaps the greatest risk of widespread specialism is that of loss of professionalism. This occurs when a societal need, such as care of acute and emergency problems cannot be met (32). While it is not necessarily the responsibility of every surgeon to maintain competency in emergency surgery, it is certainly a responsibility of the profession. As professionals we are meant to not only be competent at what we do, but we must be honest, altruistic, and put patients and societies needs ahead of our. When we fail to meet these requirements, particularly those of society at large, we risk losing the privileges of professionalism granted to us by society.
Surgeons can do little about semantics, generational changes or the size of the field of knowledge. Where surgeons can have some impact is in the workplace. It we wish to have the balance between generalism and specialism appropriate we must ensure that the working conditions for generalists are no less desirable than for specialists. Working hours and conditions should be equivalent with the added impost of the requirement to see and treat patients at unsociable hours appropriately recognized.

“You can never plan the future by the past” (33) said Edmund Burke in 1791 in a letter to a member of the National Assembly. Looking at the past will not help us plan the future of surgery but looking at the present tells us that we must engage in the contest between generalism and specialism. The rewards will not be financial or societal but professional and personal. The philosophy of generalism which pervades all surgery must be nurtured and supported, despite all opposition so that the future generations of patients can enjoy the level of care than many have had the benefit of in recent times.