

SUBSPECIALIZATION IN THE FIELD OF ORTHOPAEDIC SURGERY

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ABSTRACT

Background: Subspecialization within the various specialties of medicine is on the rise in the world. The orthopaedic community is experiencing the same with academic centers tending to develop subspecialty practices in the developing world.

Objectives: This article reviews literature on the history of subspecialization in medicine, the current status of subspecialization in orthopaedics, the perceived benefits and challenges of this process; and suggests a rationale for the application of orthopaedic subspecialization in the developing world.

Data source: A pubmed search with the mesh term "subspecialization."

Data selection/extraction: Using the pubmed search engine, 452 abstracts were found discussing subspecialization. Twenty two relevant articles were found, studied and used in this review.

Results: Subspecialization involves physician focus on a certain area of practice. This leads to better results, progress in the area of choice, higher surgical case rates, fewer complications; and to some extent, lower healthcare costs. However, it causes artificial shortages of surgeons, decreased generalist entry to the field, fragmentation of the specialty field with loss of unity, less trainee experience for residents and does not necessarily translate to a higher income.

Conclusions/Recommendations: The developing world faces an enormous shortage of orthopaedic surgeons. A balance is needed in order to provide an orthopaedic surgeon who can take care of most orthopaedic problems; while also providing a subspecialist orthopaedic surgeons in subspecialty centres and academic centres to manage complex and rare conditions. A middle ground would be an orthopaedic surgeon with a subspecialty area, who practices general orthopaedics in addition to the subspecialty area of interest to manage orthopaedic problems in most hospitals in the developing world.

INTRODUCTION

The Department of Orthopaedics and Trauma in Moi Teaching and Referral Hospital was re-organized into subspecialty practices in January 2013. Specific groups of orthopaedic surgeons were created to tackle the various subspecialty areas including orthopaedic trauma, paediatric orthopaedics, tumour and sepsis surgery, spine surgery, upper limb /hand surgery, pelvis and acetabular surgery, and arthroplasty. This is the first time in Kenya, to the best of our knowledge, an orthopaedic department had made a decision to institute subspecialty practices. The question that subsequently arose was whether institution of subspecialty practices was beneficial or not.

There are approximately eighty orthopaedic surgeons in Kenya. Twenty eight of these (35%) have graduated from in-country orthopaedic surgery training programs in the last five years. This number is expected to continue to rise in coming years. It is expected that more surgeons in the country and the region will choose subspecialty practice. It is important, at a national and regional level, to understand the implications of such a trend.

The author, therefore, sought to review English literature that discusses the history of orthopaedic subspecialization, the benefits and challenges of subspecialization; and suggest an implementation strategy for a developing country like Kenya.

METHODOLOGY

A pubmed search was done using the term "subspecialization" and a total of 451 abstracts were found. Each of these abstracts were examined to find out whether they addressed any or all of the following: the history of subspecialization, the benefits of subspecialization or the challenges of subspecialization. Twenty one abstracts were found to meet the above inclusion criteria. These articles were then used in this literature review.

HISTORY OF SUBSPECIALIZATION

The earliest reference to physician specialization is in the records of Herodotus. He commented that in Egypt, unlike Babylon, physicians treated only one illness. As a result, there were physicians everywhere in Egypt (1).

Dentistry was the earliest discipline to separate from medicine in Canadian history. This occurred in the late 19th century. The Royal College of Physicians and Surgeons of Canada was formed in 1929, and at that time recognized only two disciplines: medicine and surgery. The contemporary notion of specialization was born out of various disciplines asserting themselves as separate areas of practice. The first disciplines to do so were ophthalmology, otolaryngology and urology (all 3 recognized in 1937), obstetrics and gynaecology in 1943, orthopaedic surgery in 1944, neurosurgery in 1945, and plastic surgery in 1946 (2).

Early in the second half of the twentieth century, the specialty of traumatology was created in north central Europe. Traumatologists were physicians trained to provide comprehensive care of acutely injured patients. The specialized training allowed them to assume the care not only of injuries involving the musculoskeletal system but also of traumatic conditions affecting the abdominal cavity, chest, genitourinary system, vessels and nerves (3).

John Charnley introduced the concept of subspecialization to the field of orthopaedic surgery in the 1960s. He demonstrated, with his focus on total hip replacement surgery, that focus on one body part can achieve excellence in that area. Previously, a good surgeon was regarded as the one who could do everything. An orthopaedic surgeon would perform surgery on all musculoskeletal areas. Charnley's work led to a springing up of multiple special societies that focused on particular anatomical areas. The Hand Society was the first musculoskeletal subspecialty society established in the United States. By 2003, there were nineteen such societies, including foot and ankle, hip, knee, shoulder and elbow, spine, and paediatric orthopaedics among others (3,4).

BENEFITS OF SUBSPECIALIZATION

The place for subspecialty services in orthopaedic trauma has been established by a study done by Clement *et al* (5). They evaluated injured patients amongst both orthopaedic non-traumatologists and subspecialized orthopaedic traumatologists. They concluded that between 13.5% and 25.7% of all injured patients should, if resources permit, receive subspecialty orthopaedic trauma care.

The developing world has more pressing problems like malnutrition, communicable diseases and trauma. Consequently, it can be questioned whether advanced subspecialty medical practice is necessary. Muzumdar (6), while discussing the Indian situation, states that "the broad specialties as well as the established subspecialties will continue to play a crucial role in maintaining the balance in medical practice and the importance of these basic services can never be undermined." He further asserts that, on a global level, the current era is of refinement in subspecialization and that it is here to stay. The need for advanced subspecialization has arisen since one cannot maintain expertise in all aspects of a sub-specialty. Earlier, subspecialization came into being to provide advanced and focused care in terms of critical care, trauma services, cardiology etc. However, the rapid pace of globalization and economic upsurge in the recent years as well as technological advances have generated innovative treatment options viz. cosmetic surgery (plastic surgery), joint replacement surgery (orthopaedic surgery), bariatric surgery (abdominal surgery) and so on. This has brought a radical change in

the manner in which medical subspecialty is perceived by doctors and patients alike. The comprehensive care provided by an advanced subspecialist will be certainly superior to those involved in the management of this disease along with other diseases.

The general perception is that overspecialization is responsible for increased medical costs. Smith *et al* (7) reviewed hospital charges and length-of-stay data for children treated for closed femoral shaft fractures and SCFE. The average hospital charges were less and length of stay was shorter when the child was treated at the children's hospital by paediatric orthopaedic subspecialists, thus suggesting that hospital utilization and charges were significantly decreased if the care was provided by a subspecialist. Similar results were seen in thyroid surgery and paediatric surgery (8-10).

Agada *et al* (9) evaluated the effect of subspecialization on outcome and case load of thyroid surgery in otolaryngology. Following the introduction of a multidisciplinary thyroid clinic, he found that permanent vocal cord palsy rates fell from 8% to 0%, while haematoma rates fell from 5% to 2% and permanent hypoparathyroidism rates fell from 8% to 2%. In addition, case load had markedly increased, preoperative investigations were reduced and types of surgery standardized.

The number of cases done also increases with subspecialization. Goodfellow *et al* (11) reviewed the changes in workload and practice in a teaching hospital over a 4 year period, during which a hepatobiliary subspecialist unit was developed. In their study, the proportion of cholecystectomies performed by hepatobiliary surgeons significantly ($P < 0.001$) rose from 40.4% to 58.5%.

Subspecialization has also occurred in the field of pathology. In 2011, the Northshore-LIJ health system consolidated its anatomic pathology services. It was observed by Groppi *et al* (12) and Jawaid *et al* (13) that subspecialization allowed them to better meet the needs of their in-system health care community while increasing access to the competitive outreach marketplace following the consolidation. This has also been demonstrated in paediatric surgery.

CHALLENGES OF SUBSPECIALIZATION

The president of the South African Orthopaedic Association in 2011 stated that "while recognising the need for subspecialization, orthopaedic associations across the globe are starting to realise its possible shortcomings with regard to patient care and unity in orthopaedics." Similarly, Sarmiento, a past president of the American Academy of Orthopaedic Surgeons, is of the opinion that there is too much fragmentation in orthopaedics today and the proliferation of many subspecialties has led to disunity within orthopaedics (14).

The impact of subspecialization on training has been felt in the developed world where there are fewer and fewer medical students choosing general surgery as a career. In 1981, 12.1% of senior medical students selected general surgery as their first choice of specialty. Twenty years later, in 2001, only 6% chose general surgery as a career. A survey by the Massachusetts Medical Society puts the shortage of general surgeons at 32%. A shortage of general surgeons on a national scale is very worrying because general surgeons are critical in provision of surgical care. Similar trends are being observed in internal medicine, otolaryngology and orthopaedic surgery (15-19).

The projected shortage of orthopaedic surgeons in America is possibly related to subspecialization. Subspecialization does lead to inability to practice in smaller cities because such cities would not have enough numbers to support subspecialized services. On the contrary, they would be able to support several general orthopaedic surgeons. This would also mean that the bigger cities would be 'overloaded' with surgeons whose practice is limited to certain areas. Most trainees would also prefer to spend a year or more of subspecialty training because of a feeling of inadequacy in their residency training. This has arisen because fellows are allowed to get more operating room experience at the expense of residents (20,21).

Gaskill *et al* (22) evaluated the financial return post-fellowship training compared to immediate entry into general orthopaedic practice. Their study found that investment in an orthopaedic fellowship yields variable returns. Adult spine, shoulder and elbow, sports medicine, hand, and adult arthroplasty may yield positive returns. Trauma yields a neutral return, while paediatrics and foot and ankle have negative net present values. When working hours were controlled for, the returns for adult arthroplasty and trauma became negative.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, it is clear that a balance is needed to produce enough generalists to meet the society needs while also accommodating individual interests in certain areas. The developing world has a great need of general orthopaedic care in addition to subspecialized care. The numbers of orthopaedic surgeons are much fewer with most countries in Sub-saharan Africa having less than 100 surgeons to serve populations of tens of millions. The general orthopaedic surgeon is therefore much needed. The subspecialized orthopaedic surgeon seems to fit best in an academic or in a subspecialty center. Since individual interest influences the path the individual surgeon takes, it is probably more prudent to have generalists with a subspecialty area of practice.

That way the general population is served and at the same time the individual interest is taken care.

Resource-shortages do plague the developing world. The subspecialized surgeon is likely to experience this because subspecialization demands resource-intensive surgical procedures. However, the population does also require this type of care. The solution seems to be the development of subspecialty centers that are equipped with the infrastructure and resources necessary to optimally take care of these complex cases; while the existing institutions are further equipped to take better care of general orthopaedic procedures. The latter can be manned well by general orthopaedists or general orthopaedists with a specialty area.

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