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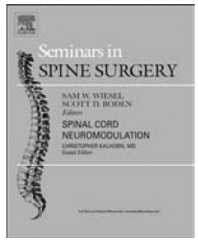

A single payer system and spine surgery: Could it work?

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ABSTRACT

Single payer healthcare systems have features that impact spine surgery. Canada represents the primary example of a single payer healthcare system. The United Kingdom National Health Service has similar characteristics. A single payer system allows governments to more closely control health expenditures. In these systems, the observed impact to the practice of spine surgery has been months long waiting times for patients to see a surgeon, obtain advanced imaging, and have surgery performed. In addition, global prosthetic budgets, restricted operating room time and a beaurocratic process for approval of procedures and new technology may impact treatment options available to patients and surgeons.

1. Introduction

Single payer healthcare systems have features with wide ranging impact for all of medicine, including spine surgery. In the western world, Canada represents the primary example of a single payer healthcare system. The thirty plus year Canadian experience gives us considerable insight into the implications of a single payer system on spine surgery practice. Although the United Kingdom (UK) has a two-tier healthcare system (i.e. private and the government-controlled National Health Service [NHS]), the NHS has many features of a single payer system.

The principal difference between a private and single payer system is the amount of money spent on a country-by-country basis for healthcare. Governmental desire for control of the national healthcare expenditure drives a number of the strategies that have both economic and clinical implications for the practice of spine surgery. The United States (US), with a relatively high percentage of private medical practice, has the largest expenditure for healthcare as a percentage of Gross Domestic Product (GDP), which was 17.1% for 2016. In comparison, it was 10.4% for Canada and 9.1% in the UK[1]. The primary strategy to control healthcare expenditure is to limit access to care, particularly specialty care such as spine surgery. This aim translates to several issues on the clinical side.

2. Limited numbers of specialists

If we look at the manpower numbers for orthopaedic surgeons and neurosurgeons (the principal specialties providing spine surgery services) by country, there are wide differences. In the US, for 2016, there were 9.2 orthopaedic surgeons and 1.6 neurosurgeons per 100,000 people according to the American Academy of Orthopaedic Surgeons (AAOS)[2] and the American Academy of Neurosurgeons (AANS),[3] respectively. In Canada, the Canadian Medical Association (CMA) estimated the 2016 manpower numbers as 4.5/100 k for orthopaedics[4] and 0.9/100 k for neurosurgery.[5] Overall, this represents about a 50% lower number of available specialists per population in Canada to provide spine surgery expertise.

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Despite the relatively low number of orthopaedic surgeons per population, the Canadian residency and fellowship programs still graduate surgeons who find that there are no available jobs in their country due to additional governmental economic restrictions (e.g. obtaining a billing number from the provincial based healthcare plans and the limited operating time available in hospitals). Unemployed orthopaedic surgeons persist despite the reduction of R1 residency slots in Canada from 84 to 64 over the years 2011 to 2016[5]. Dr. Peter MacDonald, 2016/2017 President of the Canadian Orthopaedic Association (COA), was the primary author on a paper addressing this problem in the winter 2017/2017 COA Bulletin.[6] As of June 2016, 182 recent orthopaedic graduates were still seeking full time positions in Canada. The title of MacDonald's article summarizes the dilemma: "Patients Continue to Wait. . .and Orthopaedic Surgeons Continue to Languish in Unemployment." Clearly, this is not a good manpower situation for any surgical specialty group, including spine surgeons.

3. Access to care/wait times

Another consequence of fewer healthcare dollars expended as a percentage of GDP, as well as limited numbers of physicians, are restricted resources for hospitals, operating rooms and global prosthetic budgets (including spinal implants such as pedicle screws). One of the largest impacts on patient care is the resulting difficulty in patient access to high quality, sophisticated specialty care, including spine surgery. This translates into often months long waiting lists for patients to obtain specialty physician/surgeon office appointments, investigation/tests such as magnetic resonance imaging (MRI) and surgical services. In a landmark 2005 decision, the Canadian Supreme Court determined that Canadians were suffering and, in fact, dying on waiting lists[7].

In the Canadian province of Ontario, the Ontario Health Insurance Plan (OHIP) has established a website where patients can look up wait times for services such as appointments with a specialist, MRI and various surgical procedures[8] (https://www.ontario.ca/page/wait-times-see-specialist-and-surgery. As a sampling for spine surgery, the target wait time for an appointment with a neurosurgeon was 182 days (about 6 months). Per recent collected data published on the website, only 67% of patients were seen within that target (i.e. 33% waited longer than 6 months). Time for an MRI was 143 days. Waiting time from decision to surgery was targeted at 182 days;100% of patients met this target with average wait time of 60 days (i.e. 2 months). Thus, a best case scenario of total wait time for a patient from referral to specialist to arriving at the door of the operating room for spine surgery is over one year at 385 days (182 + 143 + 60 days) (Table 1). This does not include the wait time for an appointment with one's primary care physician from whom a specialist referral is generated.

The access to care/wait times issue has led to exploration of alternate methods for patients to access spine specialty care. Sarro and Rampersaud[9] described a nurse practitioner (NP) staffed surgical spine consultation clinic established at the Toronto Western Hospital, part of the University Health System at the University of Toronto. They reported that the average wait time to see one of their physician surgical consultants was one year. The time to have an appointment with a nurse practitioner who could instigate care and order supplemental tests was three months. In their tabulation, 74% of patients calling the clinic for an appointment opted to begin care with a nurse practitioner appointment and 26% elected to wait the one year for a clinic visit with a spine physician. Treatment recommendations from the NP's were compared to the evaluation when the patients had a follow up with a consultant spine physician. No substantial differences in diagnosis/treatment were found, suggesting that reasonable interventions could be initiated by the NP's, thus shortening the waiting time to access spine care.

Table 1 – Summary of wait times published on line by the Ontario Ministry of Health for the Toronto University Health System. https://www.ontario.ca/page/wait-times-see-specialist-and-surgery Accessed April 22, 2018. Does not include wait time to see a primary care physician who can institute the referral to a specialist. Total waiting time (385 days) is over one year.

Waiting time in days from patient referral to a neurosurgeon	182
Waiting time in days for Magnetic Resonance Imaging (MRI)	143
Waiting time in days from time a decision made for surgery to procedure performed	60
Total waiting time in days	385

In the United Kingdom, the National Health Service (NHS) is the single payer equivalent. The NHS has employed other strategies to address wait times. The NHS has consolidated specialty services[10] (such as spine surgery and pain injections) at certain hospitals (similar to the US Centers for Medicare and Medicaid Services [CMS] demonstration projects for centers of excellence[11]). The NHS publishes stats on the various centers (infection rates, time to next available appointment with a specialist) and have recently introduced the "choose and book" program[12] which they have touted as a benefit for patients. Patients can choose which hospital to which they want to go for a specialist appointment and surgery (once a referral has been made by their primary care MD). With this program, however, patients do not have the ability to choose their surgeon, so the surgeons are not too keen on the program. Patients are slotted into the first available appointment in the surgical specialty clinic.

4. Approvals for surgical and medical procedures/new technology

This is another area where economics play a large role in determining treatment options in clinical care. The United Kingdom UK) has the longest standing quasi-governmental institution providing evaluation of procedures, tests and new technology for the purpose of making recommendations to the single payer insurance (in this case the UK National Health Service) for which services should be paid. This is the National Institution for Health and Care Excellence (NICE).[13]

NICE evaluations are generally performed using a comparative effectiveness research (CER) methodology (Table 2).[14] In the United States, the Congressional Budget Office (CBO) has published a white paper which includes a definition of CER.[15]

Table 2 – Comparative effectiveness research (CER) economic analysis methodologies. The different methodologies are specified at the top of the four columns. The three rows outline the characteristics of each methodology. The first row, Procedure Factor is generally the cost. Direct cost is always calculated. Indirect cost such as related to time off work, lost production etc. is also sometimes taken into account. The second row, Comparative Factor is the change in health outcomes for one intervention vs. another. For cost minimization, there is no difference in the change in health outcomes. The third row is Value Unit/Assumptions.

	Cost minimization	Cost utility	Cost effectiveness	Cost benefit
Procedure Factor	Direct Cost	Direct Cost (Indirect)	Direct Cost (Indirect)	Direct Cost (Indirect)
Comparative Factor	None	Health Outcomes	Health Outcomes	Health Outcomes
Value Unit/ Assumptions	Assume options have similar outcome	Different measurements converted to a Utility Score	Expressed in QALY's (Calculated from Utility Score)	Assigned Monetary Value in units such as $ or € or£

The definition is used by US government agencies such as the Agency for Healthcare Research and Quality (AHRQ) and reads: "A rigorous evaluation of the impact of different options that are available for treating a given medical condition for a particular set of patients... The analysis may focus only on the relative medical benefits and risks of each option. Or it may also weigh both the costs and the benefits of those options."

The "currency" of CER is the quality adjusted life year (QALY).[16] Given the focus on cost with governmental and insurance company decision makers,[17] it is in the best interest of patients and the medical profession for surgeons to become familiar with issues such as CER and QALY's. The NICE glossary[18] defines a QALY as: "A measure of the state of health of a person or group in which the benefits, in terms of length of life, are adjusted to reflect the quality of life." One QALY is equal to 1 year of life in perfect health.

QALYs are calculated by estimating the years of life remaining for a patient following a particular treatment or intervention and weighting each year with a quality-of-life score (on a 0 to 1 scale). It is often measured in terms of the person's ability to carry out the activities of daily life, and freedom from pain and mental disturbance.[18]

A commonly used CER methodology is cost effectiveness (seen in third column in Table 2). The results are generally expressed as a cost (in dollars, pounds, euros etc.) per QALY (year of perfect health) gained by the intervention under study. There are various issues of application of this methodology that physicians should be aware of.

5. The cost per QALY threshold

NICE uses a cost per QALY threshold of a maximum of £30,000 (approximately $50,000 USD) per QALY for approval of procedures and technology.[14] There has been speculation that in the US the threshold would be $100,000 USD.[16] However, it is little known that CMS has used a threshold of $50,000 per QALY for years in some conditions such as dialysis for end stage renal disease.[19] Thus, the cost per QALY threshold is an issue in the CMS/single payer situation in the US which potentially could impact spinal surgery.

6. CER Spine Surgery Example-Potential Impact Cost/QALY

Some spine surgical studies have included a cost effectiveness analysis. From these, we can get a sense of cost per QALY for surgical interventions. Kuntz[20] published a systematic review of cost effectiveness studies looking at the cost per QALY in patients with spinal stenosis and associated spondylolisthesis having a decompression/fusion surgery. They found that a laminectomy and non-instrumented fusion had a cost per QALY of approximately $56,000 (right around the $50,000 cost per QALY threshold). This corresponded to a fusion rate of 70% and 80% of patients having significant clinical improvement. The cost per QALY with a laminectomy and pedicle screw instrumentation fusion was $3,112,800 (approximately 62 X the $50,000 threshold). This calculation was based on a union rate of 90% (20% more than an uninstrumented fusion) but a finding of 80% of patients having significant clinical improvement (identical to the non-instrumented cohort). Clearly, given these parameters, there is a substantial difference in the cost per QALY with instrumented fusion having a cost per QALY of over 3 million dollars. This is where the question arises whether instrumented fusions should be done and paid for.

However, Kuntz also pointed out that relatively small changes in outcome can make large impacts on the cost per QALY. For example, if the number of patients having clinical improvement with instrumented fusion was 90% (rather than 80%) with the same fusion rate, then the cost per QALY dropped substantially to $82,400 (from $3,112,800). This brings into question how postoperative evaluation should be performed and what outcomes instruments to employ.

7. Timing the application of CER methodology

Another issue that requires close observation by physicians and surgeons is the timing of application of CER methodologies by government policy makers, health economists and insurance executives. To illustrate the potential impact of this issue, we can use another example from the spine world. Herkowitz et al.[21] published an initial review of a randomized controlled trial comparing the outcome of surgery for lumbar stenosis and spondylolisthesis without instrumentation and with pedicle screw instrumentation. At two-year review, the original publication indicated that the clinical outcome between the two groups was the same, despite the finding of more non unions in the non-instrumented cohort. In terms of applying CER at two year follow up based on the first publication, the findings suggest that cost minimization (Table 2, first column) would be the appropriate methodology as there was no clinical outcome difference between the two interventions

(see Table 2, third row, "Value Unit/Assumptions"). Cost minimization implies no difference in outcome between two treatments, so only the cheapest approach (no instrumentation) should be approved.

However, Kornblum et al.[22] published the outcomes of this same patient group with an average follow up of 8 years. At this later time point, the patients with a nonunion were developing clinical problems and the outcomes in the non-instrumented cohort were deteriorating. Thus, it took 8 years for the longer-term benefit of using instrumentation in order to obtain a higher fusion rate and a long term clinical benefit became evident. Application of cost minimization methodology at two years may not result in approval of the best surgical option for patients' long term clinical outcome.

8. Conclusions

Spinal surgery is still performed under the single payer systems that we can observe in Canada and the UK. However, multiple challenges exist in a single payer system that would impact the practice of spine surgery as we know it in the US. Examples of differences observed in the present single payer systems include:

- Overall reduced expenditure for healthcare as a percentage of Gross Domestic Product (GDP).
- Limited numbers of specialty physicians.
- Potential for unemployed specialty physicians/surgeons.
- Global prosthetic budgets.
- Limited operating room time.
- Long waiting times for patients and restricted access to care.
- Limited ability for a patient to choose his/her surgeon.
- More restrictive approval process for procedures and new technology.

For spine surgeons and our patients, change would be the order of the day with implementation of any a single payer system in the US. Patients, physicians and society in general would have to come to grips with whether the restrictions under a single payer system would be acceptable in the milieu of the US culture and expectations for medical and surgical care.

Conflicts

Consultant

- Spine Stabilization Technologies

Medical Advisory Board

- United Healthcare

Employment

- Presbyterian St. Luke's Medical Center. Director Advanced Center for Spinal Microsurgery

Research Grant (Group)

- Mesoblast

Royalties

- Lippincott, Williams and Wilkins

Stockholder

- Denver Integrated Imaging and Orthopaedic Centers of Colorado Imaging Centers
- Huron Shores Investments LLC
- Verus Surgical Assistants LLC
- PRO GC/GC OCT LLC Neural Monitoring

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