Appraisal of the Quality of Neurosurgery Clinical Practice Guidelines

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OBJECTIVE: **The rate of neurosurgery guidelines publications was compared over time with all other specialties. Neurosurgical guidelines and quality of supporting evidence were then analyzed and compared by subspecialty.**

METHODS: **The authors first performed a PubMed search for "Neurosurgery" and "Guidelines." This was then compared against searches performed for each specialty of the American Board of Medical Specialties. The second analysis was an inventory of all neurosurgery guidelines published by the Agency for Healthcare Research and Quality Guidelines clearinghouse. All Class I evidence and Level 1 recommendations were compared for different subspecialty topics.**

RESULTS: **When examined from 1970–2010, the rate of increase in publication of neurosurgery guidelines was about one third of all specialties combined ($P < 0.0001$). However, when only looking at the past 5 years the publication rate of neurosurgery guidelines has converged upon that for all specialties. The second analysis identified 49 published guidelines for assessment. There were 2733 studies cited as supporting evidence, with only 243 of these papers considered the highest class of evidence (8.9%). These papers were used to generate 697 recommendations, of which 170 (24.4%) were considered "Level 1" recommendations.**

CONCLUSION: **Although initially lagging, the publication of neurosurgical guidelines has recently increased at a rate comparable with that of other specialties. However, the quality of the evidence cited consists of a relatively low number of high-quality studies from which guidelines are created. Wider implications of this must be considered when defining and measuring quality of clinical performance in neurosurgery.**

INTRODUCTION

"Quality"in health care takes on several distinct meanings. "Health care quality is getting the right care to the right patient at the right time—every time," according to the Agency for Healthcare Research and Quality (AHRQ). The AHRQ further defines the mission of the agency as developing information that "reduces the risk of harm from health care services by using evidence-based research … and … encouraging providers, consumers, and patients to use evidence-based information to make informed treatment decisions." In highly prevalent diseases there is a strong evidence base that guides treatment and decisions.[1] Adherence to practice guidelines, while not currently incentivized in neurosurgery, can be considered a measure of quality, so it is important to assess the quality of our literature base. To what extent does the neurosurgical literature support the practice of evidence-based medicine? To investigate this, the authors performed a search of the rate of guidelines publications of all medical specialties, as well as each published guideline relevant to neurosurgery with an aim to characterize the level of evidence offered.

METHODS

An initial aim was to characterize the evolution of neurosurgery guidelines over time. To do so, the authors performed a PubMed search for "Neurosurgery" and "guidelines" and recorded the number of publications per year. The search was then repeated by replacing "Neurosurgery" with each specialty recognized by the American Board of Medical Specialties. The number of guidelines publications per year were plotted for "Neurosurgery" and

Key words
- Clinical guidelines
- Evidence-based medicine
- Practice guidelines
- Quality of health care

Abbreviations and Acronyms
AANS: American Academy of Neurological Surgeons
CNS: College of Neurological Surgeons
CT: Computed tomography
EMG: Electromyography
TBI: Traumatic brain injury

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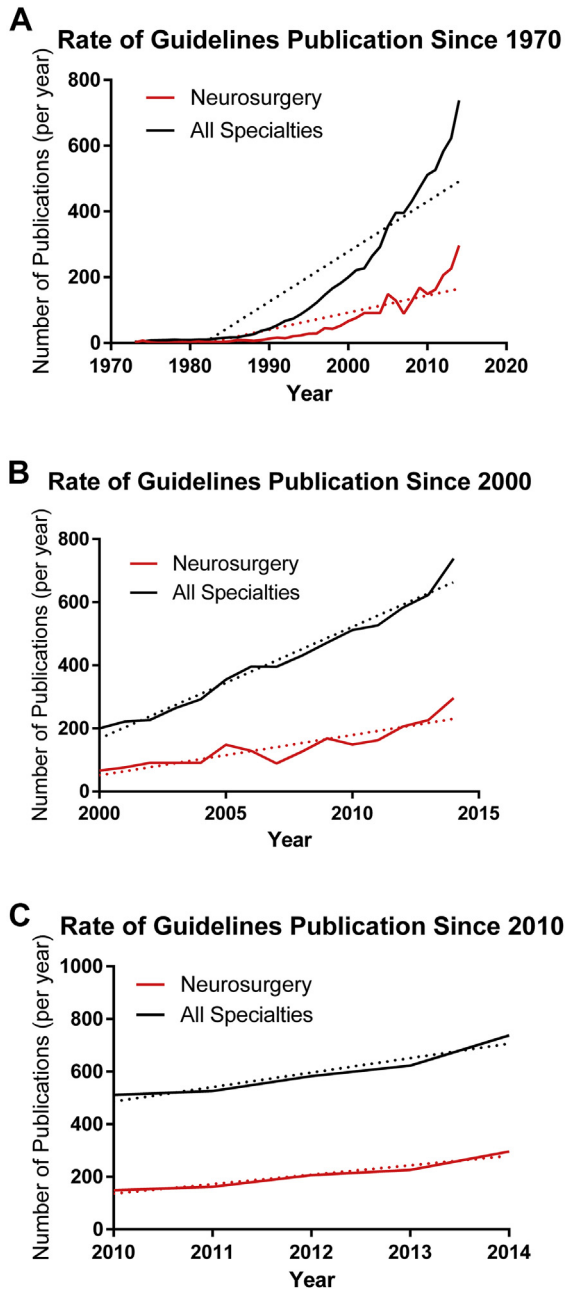

Figure 1. (**A**) A query of PubMed for "Neurosurgery" and "Guidelines" was performed and plotted by publications per year. Repeated queries were performed for each specialty identified by the American Board of Medical Specialties, and these were combined and similarly plotted. The *dashed lines* represent the lines of best fit. The slope for those lines when evaluated over the entire time epoch differed by a factor of 3 (5.19 additional publications per year for neurosurgery vs. 15.26 for all other specialties; $P < 0.0001$). (**B**) When the time period was shortened to include only those publications since the year 2000, there was an increase in the slopes, but there remained a relative 3-fold lag of neurosurgery (12.79 additional publications per year) when compared with all other specialties (35.44; $P < 0.0001$). (**C**) When just the past 5 years were examined, the rate of neurosurgical guidelines publications has approximated that for other specialties (slope = 35.80 vs. 55.01; $P = 0.134$).

compared with the number of publications for "All Specialties." There has been a continued upward trend in rate of guidelines publications across specialties, and it was the relative rates of growth that were analyzed for neurosurgery and compared with all specialties across different epochs of time.

The second aim was to characterize the strength of evidence and recommendations provided by guidelines published on neurosurgical topics. The authors performed a search of the AHRQ National Guidelines Clearinghouse. The authors searched for "Neurosurgery" and "Neurological Surgery." Two authors reviewed all abstracts. Abstracts were excluded if they did not grade the level of recommendations or classify the strength of evidence. Abstracts were also excluded if they were not deemed relevant to neurosurgical practice. The authors catalogued the levels of evidence according to the classification scheme used in each individual reference. Classification of the levels of evidence of individual papers varied from 3-tiered to 5-tiered systems and were not recategorized. Nomenclature varied but for consistency within the class of evidence will be represented using Roman numerals I through V here. The term "Class" is used to refer to the strength of an individual study cited. The strength of a recommendation, alternatively referred to as the "Grade" or "Level," is a reflection of quality of the supporting evidence, based on the "Class" of the resource, and similarly was not recategorized here. Here, the "Level" of a recommendation is represented with numbers 1 through 5. The number of "Class I" papers and "Level 1" recommendations were tabulated and then combined by subspecialty topic. The proportion of "Class I" studies and "Level I" recommendations were compared between groups using a chi-square test using analysis of covariance, with $P < 0.01$ defined as significance.

RESULTS

The pace of neurosurgical guideline publications has consistently increased over the years. Since 1970, the rate of increase of guidelines publications in all specialties has outpaced that in neurosurgery (Figure 1A). This is still true when examining only those contributions since 2000 (Figure 1B). For both time epochs, there was a 3-fold lag in the relative rate of neurosurgery guidelines publications ($P < 0.0001$). However, in the past 5 years, the rate of increase in number of guidelines published per year in neurosurgery has kept pace with all specialties (Figure 1C). The rate of increase in publication of neurosurgery guidelines in the past 5 years is nearly 10-fold that from the preceding decades (35.80 additional publications per year since 2010 vs. 3.79 from 1970–2010; $P < 0.0001$).

For the second aim, the search query identified 190 unique results. Of these, 110 were excluded because they were deemed not relevant to neurosurgical practice. Examples of those ranged from "Management of cat and dog bites[2]" to "Practice guideline for the treatment of patients with obsessive-compulsive disorder.[3]" The former guideline made a recommendation to obtain a neurosurgical consult in the event that an animal bite produced a skull fracture. The latter publication made an ungraded recommendation to consider deep brain stimulation in refractory cases of obsessive-compulsive disorder. Another 31 results were excluded because the strength of evidence was not graded in any