

The Role of the Neurosurgeon in the Community With a Specific Eye Toward Injury Prevention and ThinkFirst

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Every neurosurgeon is called on to treat a victim of brain or spinal cord injury at some point in his or her career. It is estimated that in the United States approximately 1.7 million people sustain a traumatic brain injury annually. Traumatic brain injury is a contributing factor to a third of all injury-related deaths in the United States. Approximately 75% of all traumatic brain injuries each year are concussions or other forms of mild traumatic brain injury.¹ Although the age-adjusted rates for traumatic brain injury deaths declined slightly from 1990 to 2007, certain segments of the population showed an increase. This includes the elderly who sustain traumatic brain injury resulting from falls, often while on anticoagulant medication.¹

It is difficult to obtain recent data on spinal cord injury in the United States. It is estimated that the incidence is 12 000 new injuries per year with a prevalence of 270 000 (range, 236 000-237 000).² The average lifetime care cost in 2012 for a patient who has sustained an injury at 25 years of age is estimated at \$2.2 million for paraplegia and \$4.54 million for high quadriplegia (C1-C4).² A review in 2006 indicated that the incidence and prevalence of spinal cord injury worldwide did not change significantly from 1977 to 2005.³ The incidence remains steady at about 30 per 1 million inhabitants per year. The prevalence is approximately 500 per 1 million inhabitants per year.³

Unlike other diseases treated by neurosurgeons, most cases of brain and spine injury are preventable. The mission statement of the Congress of Neurological Surgeons (CNS) states that “the Congress of Neurological Surgeons exists to enhance health and improve lives world-wide through the advancement of education and scientific exchange.”⁴ The ThinkFirst National Injury Prevention Foundation was established by neurosurgeons > 26 years ago. The mission of ThinkFirst is “to prevent brain, spinal cord and other traumatic injuries through education research and advocacy.”⁵ Given the congruency of these mission statements, we suggest that participation in ThinkFirst by neurosurgeons is an effective way to participate in brain and spine injury prevention.

ThinkFirst was found in 1986 by neurosurgeons Clark Watts and E. Fletcher Eyster with the assistance and under the aegis of the CNS and the American Association of

Neurological Surgeons. Initially, the program was known as the National Head and Spinal Cord Injury Prevention Program. In 1988, it received the Ronald Reagan Presidential Citation for Private Sector Initiatives. In 1989, it received the American Medical Association’s Adolescent Health Congress award for excellence in education and prevention.

In 1990, the program changed its name to ThinkFirst and created a separate charitable 501c3 foundation. The period of 1986 to 1990 was a one of rapid growth: 100 ThinkFirst chapters were formed, presenting injury prevention programs to > 1 million children and teens. A University of Toronto study identified ThinkFirst as a “best practice” in comprehensive, community-based prevention strategies in 2001. In 2002, the ThinkFirst for Kids curriculum was approved for the state of California through the California Healthy Kids Resource Center, California Department of Education. In 2009, ThinkFirst received the CNS Distinguished Service Award. ThinkFirst celebrated 25 years of head and spine injury prevention in 2011.

The mission of ThinkFirst is carried out through the cooperation of the national office and local chapters. The national office is responsible for strategic initiatives, including the development of educational programs, chapter training, marketing, and finance. The local chapters organize presentations to children and teens. Each local chapter has a neurosurgeon or other physician who serves as the sponsoring physician.

The ThinkFirst injury prevention programs are based on the Health Belief Model, a theory-based health model for attaining behavior change.⁶ Currently, ThinkFirst offers 3 programs, each aimed at different age groups. The message is focused on making safe choices: “Use your mind to protect your body.”

ThinkFirst for Kids is aimed at children in grades 1 through 3. This is a literacy-based, interactive program with a flexible format. The syllabus may be implemented in the classroom by a teacher or the local school nurse. There are 6 injury prevention topics included: brain and spinal cord anatomy; protect your body; vehicle safety; bicycle safety; playground safety; water safety; and violence prevention.

ThinkFirst for Youth is a curriculum-based program for grades 4 through 8. Lesson plans and activities are provided for engaging interactive learning. This program meets National Science Educational content standards and National Health Education standards. It also meets the needs of the 2010

Healthy People Agenda for Injury Prevention. Topics include the following: anatomy of the brain and spinal cord; vehicular and pedestrian safety; bicycle and sports safety; water safety; creative problem solving; violence prevention; conflict resolution; and choking and suffocation hazard avoidance.

ThinkFirst for Teens was the first injury prevention program developed by ThinkFirst. It has been revised several times since its introduction 26 years ago. It is aimed at middle and high school students. It can also be used to teach the ThinkFirst message to college students and young adults. It is generally presented as part of health, driver education, science, or other classes. It may be presented in the classroom or at an assembly. The program includes a compelling video followed by a live presentation by a healthcare professional. Topics included are as follows: brain and spinal cord anatomy, injuries, discussion of brain and spinal cord injury secondary injury mechanisms, and strategies for injury prevention.

A unique and compelling feature of the ThinkFirst for Teens program is the use of a Voice for Injury Prevention. This person has sustained either a brain or spine injury and has been trained to educate teens using the ThinkFirst program. The Voice for Injury Prevention explains the choices that led to his or her injury, how his or her life has been affected, and how the injury might have been prevented. These personal stories are the most powerful part of the program. Students hear from someone who has actually sustained a brain or spinal cord injury and learn how the speaker's or perpetrator's action led to a permanent disability. Dialog between the students and speakers facilitates increased understanding. Social media such as Facebook and Twitter can be used to enhance communication and learning between the ThinkFirst chapter and the teens.

Several peer-reviewed publications have documented the effectiveness of ThinkFirst. The San Diego ThinkFirst chapter published a study in 2001 that reported a significant knowledge increase regarding the brain and spinal cord and safety behaviors and a significant decrease in self-reported high-risk behavior among children who had participated in ThinkFirst for Kids.⁷

The ThinkFirst Oregon Study in 2002 reported that the use of the ThinkFirst for Kids curriculum leads to a significant change in knowledge about prevention of brain and spinal cord injuries among first through third grade students.⁸ The study further demonstrated that the curriculum incorporated components necessary to promote positive behaviors. Given the national delivery system of the foundation, the study predicted that ThinkFirst for Kids had the potential to effectively reach > 1 million children per year. According to the 2009 to 2010 ThinkFirst annual report, > 7000 ThinkFirst presentations are given each year in the United States alone.⁹

The purpose of this study is to explore neurosurgeons' general attitudes toward the prevention of brain and spine injury and specific awareness of and attitudes about ThinkFirst. We hypothesized that these attitudes would differ, depending on the respondent's participation as a ThinkFirst chapter sponsor (TFCS).

PATIENTS AND METHODS

We conducted an Internet survey of neurosurgeons during the spring and summer of 2012. Two groups of neurosurgeons were approached by e-mail: members of the Michigan Association of Neurological Surgeons (MANS), not affiliated with ThinkFirst, and TFCSs. Demographic data were collected. The participants were asked to indicate their opinions of statements related to the role of neurosurgeons in brain and spine injury prevention and awareness of ThinkFirst using a 5-point scale. Responses were then dichotomized (strongly disagree, disagree, and neutral vs agree and strongly agree), and responses from both groups were compared by use of the Student *t* test.

RESULTS

Twenty-four of 84 MANS members (28.5%) responded to the survey, and 17 of 46 (36.9%) TFCSs responded. The 2 groups were demographically similar (see Table 1). Significantly more TFCS respondents were employed by a hospital or university and considered themselves actively involved in injury prevention. All respondents indicated awareness of ThinkFirst.

Table 2 compares "agree" and "strongly agree" responses to statements between the MANS group and the TFCS group. There was no significant difference in response to 9 of 13 statements regarding injury prevention. Significantly, a greater percent of TFCS respondents viewed participation in injury prevention as a professional responsibility and would like to participate in an effective injury prevention program. More TFCSs significantly indicated advocacy to administration to support an injury prevention coordinator for community outreach. None of the TFCS respondents and only 16.9% of the MANS respondents agreed with the opinion that neurosurgeons do not have time to be involved in head and spine injury prevention. This difference was statistically significant.

DISCUSSION

The MANS and TFCS groups were demographically similar except that more of the TFCS neurosurgeons were employed by a hospital or university. This could account for differences in responses to the statements regarding attitude toward prevention as a professional responsibility, time to

TABLE 1. Survey Respondents^a

	MANS, %	TFCSs, %	<i>P</i>
Neurosurgeons responding	27.3	36.9	.24
General neurosurgeons	60.8	52.9	.66
10-20 y in practice	47.8	41.1	.71
Hospital or university employed	26.0	58.8	.01
Aware of ThinkFirst	100	100	— ^b
Currently involved in prevention	39.1	82.3	.001
Contribute money annually	56.5	64.7	.49

^aMANS, Michigan Association of Neurological Surgeons; TFCS, ThinkFirst chapter sponsor.

^bUnable to calculate *P* value.

TABLE 2. “Agree” and “Strongly Agree” Responses^a

	MANS, %	TFCSs, %	P
Neurosurgeons have a professional obligation to participate in head and spine injury prevention programs.	62.5	88.2	.005
Neurosurgeons are uniquely qualified to participate in head and spine injury programs.	100	88.2	.15
The role of the neurosurgeon in head and spine injury prevention should include teaching classes on safe behavior.	87.5	76.5	.30
The role should include providing injury prevention information and literature to patients.	91.3	94.1	.63
The role should include raising money for evidence-based safety programs.	56.5	76.5	.07
The role should be to advocate for laws mandating safe behavior.	87.5	94.1	.26
The role should be to advocate for their administration to support an injury prevention coordinator to provide injury prevention programs to the community	75.0	94.1	.004
The role of the neurosurgeon in head and spine injury prevention should include conducting research to determine the most effective methods of head and spine injury prevention.	73.9	70.6	.77
Neurosurgeons should work collaboratively with other healthcare professionals, teachers, and advocates to prevent head and spine injury.	87.5	100	— ^b
ThinkFirst offers comprehensive, effective head and spine injury prevention programs.	87.5	94.1	.26
I would like to be a part of an effective head and spine injury organization.	60.9	88.2	.003
I do not have time to be involved in head and spine injury prevention.		16.7	0
I think it is important that I ensure that someone in our organization is providing injury prevention programs to the community.	79.2	94.1	.02

^aMANS, Michigan Association of Neurological Surgeons; TFCS, ThinkFirst chapter sponsor.

^bUnable to calculate P.

devote to prevention, and approaching administrators to advocate for prevention. More of the TFCS respondents viewed participation in injury prevention as a professional responsibility. Self-employed neurosurgeons may be limited in the amount of time they can devote to prevention and may not need to advocate through administrators. These conclusions are speculative because this study is limited by small numbers of respondents and the types of statements presented. Further study is required to confirm these differences.

There were no significant differences between the MANS and TFCS groups in responses to 9 of 13 statements. This suggests that neurosurgeons, regardless of their participation in ThinkFirst, view participation in head and spine injury prevention as an important, positive part of their professional lives. All of the MANS respondents, who were not involved in ThinkFirst, expressed an awareness of the organization and its mission to prevent head and spine injury.

CONCLUSION

Our survey supports the view that neurosurgeons believe that they should play a role in supporting brain and spinal cord injury prevention programs. ThinkFirst is such a program that was founded by neurosurgeons and has been honored for its exceptional content and reach. ThinkFirst has 147 national and 40 international chapters. Programs have been translated into Spanish and French language versions. The current leadership of ThinkFirst would like to expand programs to reach parents of infants and the elderly. There are plans to develop a special ThinkFirst program for members of military and their families. Unfortunately, we are limited by our resources. Although neurosurgeons believe that they

should support injury prevention, only 8% of the 2010 ThinkFirst budget came from donations by neurosurgeons, notably the Trauma Section, the Louisiana Neurosurgical Society, and 32 neurosurgeons not on the ThinkFirst board of directors.⁹

Dr Elisha S. Gurdjian, pioneering head injury researcher and 1971 CNS Honored Guest, stated the following: “All of us, young and old, if in good health, should do a little more than is needed to carry on the routine activities of our existence. To rationalize our preoccupation with various duties and become less and less productive may mean that we are developing an acquired or real intellectual menopause.”¹⁰

We thank the CNS for the opportunity to present this information and ask that we embrace our mission to enhance health, improve lives, prevent brain and spinal cord injuries, and avoid “intellectual menopause.” We ask neurosurgeons to consider participating in ThinkFirst by sponsoring a chapter or considering a financial commitment. We believe that this is an efficient and effective way for neurosurgeons to promote brain and spine injury prevention. For further information, contact ThinkFirst Executive Director Debby Gerhardstein (e-mail dbg@thinkfirst.org or telephone 630-961-1400) or visit the ThinkFirst website at www.ThinkFirst.org.

For related video content, please access the Supplemental Digital Content: <http://www.youtube.com/watch?v=NL-PIXO6SBY>

Disclosure

Dr Michael serves as chairman of the Board of Directors of ThinkFirst without compensation. D. Gerhardstein is executive director of ThinkFirst and is compensated for this activity. The other authors have no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

REFERENCES

1. Faul M, Xu L, Wald MM, Coronado VG. *Traumatic Brain Injury in the United States: Emergency Department Visits, Hospitalizations, and Deaths*. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control; 2010.
2. University of Alabama National Spinal Cord Injury Statistical Center, National Spinal Cord Injury Statistical Center (NSCIS). *Spinal cord injury facts and figures at a glance, February 2012*. https://www.nscisc.uab.edu/PublicDocuments/fact_figures_docs/Facts%202012%20Feb%20Final.pdf. Accessed December 14, 2012.
3. Wyndaele M, Wyndaele JJ. Incidence, prevalence and epidemiology of spinal cord injury: what learns a worldwide literature survey? *Spinal Cord*. 2006;44(9):523-508.
4. Selden NR. *Congress of Neurological Surgeons Bylaws, October 9, 2012*. Chicago, IL; Congress of Neurological Surgeons. www.cns.org/about/pdf/cnsbylaws.pdf. Accessed December 14, 2012.
5. ThinkFirst. *ThinkFirst mission statement*. www.thinkfirst.org/About/Mission.asp. Accessed December 14, 2012.
6. Rosenstock IR, Strecher VJ, Becker MH. Social learning theory and the Health Belief Model. *Health Educ Q*. 1988;15(2):175-183.
7. Gresham LS, Zirkle DL, Tolchin S, Jones C, Maroufi A, Jiranda J. Partnering for injury prevention: evaluation of a curriculum-based intervention program among elementary school children. *J Pediatr Nurs*. 2001;16(2):79-87.
8. Greene A, Barnett P, Crossen J, Sexton G, Ruzicka P, Neuwelt E. Evaluation of the THINK FIRST for KIDS injury prevention curriculum for primary students *Inj Prev*. 2002;8(3):257-258.
9. ThinkFirst. *ThinkFirst mission 2009-2010 annual report*. http://www.thinkfirst.org/Documents/AnnualReports/AnnualReport_09-10.pdf. Accessed December 14, 2012.
10. Gurdjian ES. Certain autobiographical impressions in the life of a neurosurgeon. In: Tindall GT, ed. *Clinical Neurosurgery*. Baltimore, MD: Williams and Wilkins; 1972:58-68.