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A Comparison of Physiatrist Life Care Planners versus Non-Life Care Planner Physiatrists' Professional Opinions Regarding Secondary Complications of Spinal Cord Injuries

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Abstract

The specialization of life care planning continues to evolve through empirical research and periodic standards of practice symposiums. Within this evolution, the need exists towards advancing the profession through the creation of a universal and standardized approach among all who operate within the field of life care planning regarding when/when not to include secondary complication costs into a life care plan. Opposing life care planners (LCPs) are sometimes millions of dollars apart in projected costs, often generally attributed to the inclusion of such costs which may be possible (<51%) but not probable (>51%) from a life care planning certainty threshold. The current study surveyed two groups requesting their professional opinions on the frequency of occurrence for 12 most commonly occurring SCs following SCI. The two groups included 71 Physiatrist Non-LCPs (i.e., physiatrists not involved in life care planning) and 46 Physiatrist LCPs (i.e., physiatrists involved in conducting life care plans or who acted as a consultant). Results reveal physiatrist LCPs generally endorsed higher frequency ratings of SCs than Physiatrist Non-LCPs. Both groups reported a general consensus towards SCs as more likely to occur when lack of preventative health measures are not taken. Implications for life care planners are discussed.

A Comparison of Physiatrist Life Care Planners versus Non-Life Care Planner Physiatrists' Professional Opinions Regarding Secondary Complications of Spinal Cord Injuries

The sub-specialization of life care planning has continued to evolve in its more than 30-year existence, most notably by the development of its own organizations, a code of ethics, standards of practice, and periodic symposiums designed to modify standards as the field experiences

changes (Priebe et al., 2007; Sutton, Deutsch, Weed, & Berens, 2010). Unlike other disciplines where all practicing members possess the same credentials or degrees, life care planning is a postgraduate subspecialty that is cross-disciplinary and consists of various degreed practitioners. Disciplines associated with life care planning primarily include nurses, rehabilitation counselors, physical therapists, speech pathologists, occupational therapists, and physicians. The main commonality among the aforementioned disciplines, within the scope of life care planning, is working with and assisting individuals with disabilities towards living an independent life.

When life care plans are used in the legal arena, life care planners (LCPs) are tasked with estimating within a certain degree of probability (defined as 51% or greater) what an injured individual's present and long-term medical and related service needs will be over the remainder of his or her life. The legal arena is an adversarial one, as opinions are not readily accepted based on one's credentials or experience and therefore often challenged by opposing attorneys or an opposing expert (e.g., a life care planner). Indeed, the 1993 *Daubert v. Merrill Dow Pharmaceuticals* ruling ended the practice whereby an expert witness could provide opinions that were not generally accepted by his or her peers or supported by the literature (Johnston & Sartwelle, 2013).

As a result of the *Daubert* and subsequent 1999 *Kumho Tire Company v. Carmichael* rulings, stricter guidelines were culminated for those providing expert testimony (Hoyt & Aalberts, 2001; Rutkin, 1999). Specifically, these cases dictated that experts providing professional testimonial opinions would be required to adhere to a four-part test to include that opinions are (1) generally accepted among the scientific community, (2) supported through the peer review process (i.e., peer reviewed publications), (3) had an established rate of error, and (4) followed a generally accepted and reliable methodology (Hoyt & Aalberts, 2001; Field, 2000). Because life care planning is neither an exact nor a hard science, differences in opinion regarding overall life care plan costs can vary by millions of dollars. Often, it is especially perceived a plaintiff LCP will have taken some liberties to include questionable anticipated future costs that

ultimately increase overall lifetime expenditures within the plan; opposing attorneys will often retain a rebuttal life care planner charged with delineating the reasonableness recommendations in the opposing LCP.

The results of this study were extracted from Ysasi (2015), which focused on obtaining the opinions of two groups: physiatrists not involved in life care planning (Phy-Non-LCPs) and physiatrists who are involved in life care planning LCP (Phy-LCPs). All physiatrists were solicited via email and were asked to take an online survey (Qualtrics™) which either directed them to take the life care planner survey or alternatively the physiatrist-non-life care planner survey. The comparison of their responses was based on education, training, and experience, involving (a) the likelihood of 13 secondary complications (SCs) occurring and (b) the frequency of such occurrences over one's lifetime. In this study, the term "preventative measures" is defined by regular physician visits, adherence to treatment, and follow-through with rehabilitation plan recommendations. The following literature review briefly describes the field of rehabilitation medicine; spinal cord anatomy; SCI and most commonly associated SCs; and the risk and conversely preventative factors of SCs.

Physiatry

This study focused exclusively on the opinions of physiatrists who were also life care planners versus those physiatrists who were not involved in life care planning. Physiatry is a subspecialty of medicine where practitioners earn a medical degree and specialize in physical medicine and rehabilitation (PM&R). Physiatrists are uniquely qualified to work with people with various physical disabilities (e.g., spinal cord injury, amputees, stroke, cerebral palsy). They work closely with physical and occupational therapists in designing a muscle strengthening and physical independence to enhance optimal functioning of patients. Physiatrists are generally affiliated with one or more of several associations, namely the Association for Academic Physiatrists or the American Academy of Physical Medicine and Rehabilitation, and may be certified by the American Board of Physical Medicine and Rehabilitation.

Spinal Cord Anatomy and Injury

Blackwell, Krause, Winkler, and Steins (2001) described the neurological classifications of the spinal cord and injury. The spinal cord is contained within the spinal canal and surrounded by vertebrae in downward sequential order of cervical, thoracic, lumbar, and sacral regions. Extruding out between the vertebrae are 30 pair of motor and sensory spinal nerves: eight cervical, 12 thoracic, five lumbar, and five sacral at the tailbone. Each set of nerves is responsible for specific motor and sensory abilities, which provide medical practitioners with some indication of the degree of injury severity and residual functions.

When an individual sustains a cervical or neck injury

(termed tetraplegia), he or she generally has all four limbs impacted in some way. When the thoracic, lumbar, or sacral region is injured (paraplegia), there is potential varying loss of trunk and lower extremity motor and/or sensory impairment. A spinal cord injury is also classified as incomplete or complete. An incomplete injury may spare some motor or sensory function below the level of injury, whereas a complete injury typically presents with no motor or sensory function below the level of injury (American Spinal Injury Association [ASIA]/International Medical Society of Paraplegia, 2000). The neurological extent of spinal cord injuries is measured by the ASIA Impairment Scale which assesses specific pairs of spinal nerves and their adjacent responsibilities in the body for sensory and motor function (see the National Spinal Cord Injury Statistical Center [NSCISC, 2013]). The ASIA Impairment Scale rates level of neurological function on a seven-point motor and sensory scale at each spinal nerve neurological level. The results help better determine an individual's motor function is absent, active with or without gravity, and normal with resistance. Sensory function is also determined below level of injury is absent, impaired, or normal. Another scale is the Spinal Cord Independence Measure (SCIM). This 19-item scale addresses three domains: self-care (feeding, dressing, bathing and grooming), respiration and sphincter management (respiration, bladder and bowel management, and use of toilet), and mobility (tasks in the room and toilet, and indoor/outdoor mobility) (Catz, Itzkovich, Agranov, Ring, & Tamir, 1998).

Secondary Complications of SCI

Individuals with SCI are susceptible to a variety of SCs such as pressure ulcers, urinary tract infections, spasticity, chronic pain, deep vein thrombosis, and respiratory dysfunction (Blackwell et al., 2001; Krause, Saunders, DiPiro, & Reed, 2013). Specific to the current study, 12 such complications were explored, including: pressure ulcers with/without necessitated hospitalization, pneumonia/atelectasis/aspiration, heterotrophic ossification, autonomic dysreflexia, deep vein thrombosis, cardiovascular disease, syringomyelia, neuropathic pain, respiratory dysfunction, urinary tract infection, osteoporosis/bone fracture, and repetitive motion/overuse syndrome (shoulder). Some SCs such as autonomic dysreflexia are restricted to certain levels of injury (in this case, T6 injuries and above), while others such as repetitive motion/overuse syndrome are for those individuals who use manual as opposed to power wheelchairs. Greater detail about each of these SCs can be found within this special edition titled: *Comprehensive Literature Review of Secondary Complications of Spinal Cord Injury*.

Increased Risk and Preventative Factors of Secondary Complications

Krause et al. (2013) discuss the *theoretical risk and*

prevention model (TRPM) they developed in 1996, which identifies a number of risk and protective factors related to secondary complications of SCI. In this model, Krause et al. describe a number of risk factors that increase the likelihood of SCs, as well as a number of preventative health maintenance and proper equipment usage factors to minimize such complications. Krause (1996) originally studied the positive and negative behavioral risk factors that reduce and increase the incidence of SCs. Health maintenance and wellness are key factors, and Krause noted three levels of risk factors for SCs: biologic, psychological and environmental, and positive/negative risk factors that ultimately interact with one another. Biologic factors that are uncontrollable include one's gender, race, time since injury, and injury severity. However, other biologic factors such as diet, ingestion of alcohol or smoking, vitamin intake, and fluid intake are controllable in nature (Krause, 1996).

Behavioral risk factors identified by Krause (1996, 2013) overlap to some degree with biologic that involve smoking, excessive alcohol use, poor diet, poor hygiene, not engaging in pressure release to minimize pressure sores, weight gain, not exercising, and self-destructive activities. Krause (1996) distinguishes between the absence of health behaviors versus positive health behaviors, and negative self-destructive behaviors versus the absence of self-destructive behaviors. Noting the frequency, or lack thereof, of such behaviors can factor the statistical prediction model for the occurrence of SCs.

Finally, Krause (1996) also factors in psychological and environmental contributors that can additionally impact the potential for various SCI secondary complications to occur. These may include employment, social support, education, marital status, socioeconomic status (e.g., to afford better healthcare, accessible transportation for independence and spontaneity of participating in social events), as well as the conditions with which one lives and availability of personal care assistance. DeVivo, Black, and Stover (1993), as well as Nehemkis and Groot (1980), additionally found predisposing characteristics such as depression as a result of personality traits or reaction to a recently acquired disability as having the propensity to negatively impact one's quality of health including poor self-care, thoughts of suicide, and/or neglect.

Overall, a limitation to this or any other study regarding the prevalence of SCs must ideally address each individualized person's holistic life circumstances. Since there are numerous factors that must go into any predictive model as Krause et al. (2013) outline, researchers should consider as many of these independent variables as possible. Jensen et al. (2011) similarly discuss secondary health conditions for individuals aging with SCI, noting that any predictive model needs to acknowledge whether the health condition is a direct result of the impairment such as

spasticity, or is indirectly caused because of limitations posed by the impairment (e.g., catheterization for neurogenic bladder). Their review of the literature outlines 22 secondary health conditions of SCI.

The purpose of the present exploratory study was to obtain the professional opinions of physiatrists involved in life care planning (Phy-LCPs) and physiatrists not involved in life care planning (Phy-Non-LCPs) and examine the likelihood and frequency of occurrence of 12 secondary complications (SCs) among people with a SCI. Authors also sought to explore whether preventative measures decrease the likelihood of occurrence for these SCs.

Method

Participants

Respondents were solicited via email by the first author who contacted the American Board of Physical Medicine, the Association for Academic Physiatrists, and the American Academy of Physical Medicine and Rehabilitation and solicited them for member mailing lists. In addition, Dr. Paul Deutsch, Susan Grisham, and the second author contacted physiatrist colleagues to participate and to call upon their colleagues to take the survey as well. Of the 1,000 emails sent out, 123 completed physiatrist surveys (12.3% response rate) were used in the analysis. This was only a sampling of the far more than 1,000 physiatrists belonging to the organizations above. Of these, 117 responded to the question differentiating who was a physiatrist not involved in life care planning ($n = 71$; 60.7%) and those physiatrists who were involved in life care planning ($n = 46$; 39.2%). Additional demographic data can be found in tables 1 and 2.

Table 1

Physiatrist Participant Demographics

<i>Identified Demographic</i>	<i>n</i>	<i>%</i>
Race/Ethnicity		
Caucasian (non-Hispanic)	84	67
African-American	8	5
Hispanic	10	7
Asian	27	21
Gender		
Male	59	42
Female	71	58
Certified vs. Non-Certified		
Board Certified Physiatrist	92	74
Non-Board Certified Physiatrist	31	26
Area of Employment (Multiple Answer Choices Were Allowed)		
I have worked at a SCI model system.	59	48
I am currently working at a SCI model system.	28	23
I have worked at a university hospital.	65	53
I am currently working at a university hospital.	71	58
I have never worked at any of the SCI medical systems above.	10	8
Spinal cord injury patients seen per year		
Less than 25	7	18
26-50	3	8
51-75	5	13
76-100	8	21
101+	15	39
Employment Status		
Employed FT as a Physiatrist and develop LCPs part time	12	10
Employed PT as a Physiatrist and full time develop LCPs	2	2
Employed FT as a Physiatrist but only consult on LCPs	36	29
A full or PT Physiatrist who is not involved in LCP	74	60
Total	123	50.6

Note. LCP = life care planner, LCPs = life care plans, FT = full time, PT = part time.

Table 2

Physiatrist-LCP Demographics

<i>Identified Demographic</i>	<i>n</i>	<i>%</i>
LCPs developed (total to date) for individuals with SCI		
1-25	26	68
26-50	6	16
51-75	3	8
76-100	0	0
101+	3	8
Percentage of your current/past LCPs as plaintiff cases		
0	7	18
1-25	9	24
26-50	7	18
51-75	8	21
76-100	7	18
Bulk of your LCPs		
Plaintiff cases (more than 51%+ of the time)	24	71
Defense cases (more than 51%+ of the time)	10	29
Total	46	39.3

Note. LCP = life care planner, LCPs = life care plans.

Overall, the majority of physiatrists were Caucasian females, 74% of which were board-certified in rehabilitation medicine. Almost half (48%) had worked at a Spinal Cord Injury Model Systems hospital specializing in SCI, and 23% were still employed at such a Center. Although only 38 physiatrists responded to the question regarding how many patients with SCI they see annually, 39% reported seeing over 100 patients with SCI annually, and an additional 23% reported seeing 76-100 patients over the time span. Regarding their work commitments of part time, full time, as a consultant, or no involvement in life care planning, 50 reported to be involved in some capacity with life care planning, and 74 reported no involvement.

In further delineating demographic information regarding the physiatrists who were involved in life care planning, it appears the majority ($n = 26/38$; 68%) reported developing no more than 25 life care plans per year, and the next highest reporting was an additional six (16%) who developed between 26-50 life care plans per year. Separately, the largest majority of physiatrist life care planners ($n = 24$; 71%) reported that over 51% of their life care plans were developed for plaintiff attorneys, and of these, 24% developed up to 25 plaintiff-retained life care plans per year, 18% developed between 26-50 plaintiff-retained life care plans per year, 21% developed 51-75 plaintiff life care plans per year, and 18% developed over 76-100 plaintiff life care

plans per year (see Table 2).

Instrumentation

The first two authors developed the survey based on the medical literature surrounding the most common SCs of SCI. Two overlapping but somewhat different surveys were developed for the study and configured in Qualtrics™. The survey developed included “blocked sections” for different groups in where respondents were only given select questions based on whether they were LCPs, Phy-Non-LCPs, or Phy-LCPs. For example, LCP physiatrists were asked to indicate whether they were a certified or non-certified LCP, employed full/part time as a LCP or consultant, number of life care plans produced for people with SCI, number of patients seen per year with SCI, and percentage of life care plans for plaintiff attorneys. For a full review of the survey, please see the Appendix.

Following the demographic questionnaire, four scenarios were given (two involved a male with C5-C6 injury and two involved a male with a T6 complete paraplegia injury). The first pertained to an individual with C5-C6 tetraplegia and queried respondents on a five-point Likert scale (0%, 1%-25%, 26%-50%, 51%-75%, and 76%-100%) regarding 13 secondary complications of SCI and their legally defined possibility versus probability of occurrence. Readers should note that we have referred to either 12 or 13 secondary

complications interchangeably. This is because one of the questions deals with a secondary complication that requires surgery (specifically pressure sores), and a follow-up question also addresses pressure sores requiring wound care only. Therefore, although there are only 12 medical conditions, a 13th question differentiates between surgery and wound care.

The first case scenario asked the following: *Please consider an otherwise healthy lifestyle male in his mid-20s with a C5-C6 complete tetraplegia, of average height and weight, with no pre-injury medical conditions or diseases. In your professional opinion, how likely will it be that the following secondary complications occur at least once in one's lifetime if reasonable and medically necessary life care planning preventative care and treatment measures are taken?*

The second case scenario involved the same patient from scenario one; however, respondents were given numerical answer choices ranging from 0-25+. Specifically, the case scenario asked the following: *Considering our same patient in scenario one with a C5-C6 injury, how frequently are the following conditions likely to occur that require hospitalization and/or treatment in one's lifetime if reasonable and medically necessary life care planning and treatment preventative measures are taken?*

The third case scenario involved an individual with T6 complete paraplegia and queried respondents on a five-point Likert scale (0%, 1%-25%, 26%-50%, 51%-75%, and 76%-100%) regarding 13 secondary complications of SCI. Specifically, the case scenario asked the following: *Please consider an otherwise healthy lifestyle male in his mid-20s with a T6 complete paraplegia, of average height and weight, with no pre-injury medical conditions or diseases. In your professional opinion, how likely will it be that the following secondary complications occur at least once in one's lifetime if reasonable and medically necessary life care planning preventative care and treatment measures are taken?*

The fourth case scenario centered on the aforementioned patient with a T6 complete paraplegia injury; however, respondents were given answer choices ranging from 0-25+. Specifically, the case scenario asked the following: *Considering our same patient in scenario three with a T6 injury, how frequently are the following conditions likely to occur that require hospitalization and/or treatment in one's lifetime if reasonable and medically necessary life care planning and treatment preventative measures are taken?*

Content validity in developing the surveys was initially obtained from the medical literature on the prevalence of common SCs and SCI (Blackwell et al., 2001; DeVivo et al., 1993; Garshick et al., 2005; Krause et al., 2013). Content validity was further obtained by soliciting two experienced LCPs and one physiatrist to review and make recommendations to strengthen the survey. As a result, one additional question was added to the surveys. Although there are arguably more than 12 secondary complications, the

more commonly cited complications were deemed important to be in the final inquiry.

Procedure

As previously noted, the surveys were developed based on the medical literature citations of the most commonly reported SCs of SCI. Building on this information, the first and second authors of this article developed the survey and obtained further content validation from two reputable life care planners in the field and one board certified physiatrist. The next step involved obtaining Institutional Review Board permission to conduct the study and developing the online questionnaire using Qualtrics™. Physiatrists solicited for the study were contacted by email, and their names obtained from the three associations noted earlier, representing a non-probability convenience sampling method. Potential participants were also encouraged to inform their colleagues about the survey with the hope that they too would participate. Information was collected and stored with the Qualtrics™ program. Reminders were emailed out after two weeks at which time no further contact was made. Advertisements were also placed in several journals, and in particular to this study the *Journal of Spinal Cord Injury Medicine*. Soliciting for the study also included a trip and exhibit booth in Minneapolis at a life care planning conference where interested respondents completed either a hard copy survey or one online, using a laptop. After 10 weeks of funding for data collection ended, solicitation for additional participants concluded. Information was coded and analyzed using SPSS version 21 and STATA software.

Data Analysis

Data analysis was conducted using SPSS version 21 and STATA software. Authors explored descriptive statistics for the demographic questions that included ethnicity, gender, whether board or non-board certified, area of employment (i.e., whether they ever worked at a SCI model system), number of SCI patients seen per year, and employment status. Additional demographic variables intended only for Phy-LCPs included LCPs developed for individuals with a SCI, percentage of current/past plans as plaintiff cases, and bulk of life care plans (i.e., plaintiff or defense). In addition, descriptive statistics were used to evaluate how respondents reported the likelihood and frequency rates of the four scenario questions noted earlier. When assessing for group differences for ratings pertaining to the likelihood of SCs if preventative measures are/are not taken, generalized ordered logistic regression using the *gologit2* program in STATA was utilized with all explanatory variables.

Results

Physiatrist-LCP Descriptive Statistics for Cost Inclusion within a Life Care Plan

Proceeding demographic questions, Phy-LCPs were

asked the types of costs often included within a plan (i.e., possible, probable, possible and probable), their belief of how costs should be included, and specifically, what determines how they include costs within a life care plan (i.e., if deemed probable by empirical statistics or a physician). Physiatrists who were not involved in life care planning did not have to complete any of these questions. Although Table 3 has the complete results, several highlights are noteworthy for discussion. Specifically, 56.7% of Phy-LCPs disagreed or strongly disagreed that one should include costs of secondary complications even if they only had a possible statistical prevalence. Conversely, an even larger percentage of them

(62.2%) disagreed or strongly disagreed that costs should be included even if the SCs were deemed probable by empirical prevalence statistics. This group was almost evenly split concerning whether costs of SCs should be included if deemed probable by a physician (54% agreed or strongly agreed), and slightly less agreed with the question to include SC costs if deemed probable by a physician and empirical statistics (51.3%). Overall, almost half of the Phy-LCPs disagreed or strongly disagreed on reliance of empirical statistics or a physician when considering including costs for SCs, tending to rely solely on their own knowledge.

Table 3

Physiatrist-LCP Descriptive Statistics for cost inclusion within a life care plan

Types of costs often included in plan	<i>M</i> (SD)	Possible n (%)	Probable n (%)	Possible and Probable n (%)	
	2.77 (.758)	6 (16.2)	11 (29.7)	20 (54.1)	
Belief that plans should include costs even if only possible	<i>M</i> (SD)	Strong. D. n (%)	Disagree n (%)	Agree n (%)	Strong. A. n (%)
	2.76 (.760)	N/A	16 (43.2)	14 (37.8)	7 (18.9)
Include costs in plans if deemed probable by empirical statistics	<i>M</i> (SD)	Strong. D. n (%)	Disagree n (%)	Agree n (%)	Strong. A. n (%)
	2.38 (.828)	4 (10.8)	19 (51.4)	10 (27)	4 (10.8)
Include costs in plans if deemed probable by a physician	<i>M</i> (SD)	Strong. D. n (%)	Disagree n (%)	Agree n (%)	Strong. A. n (%)
	2.46 (.803)	5 (13.5)	12 (32.4)	18 (48.6)	2 (5.4)
Include costs in plans if probable by emp. stats. AND physician	<i>M</i> (SD)	Strong. D. n (%)	Disagree n (%)	Agree n (%)	Strong. A. n (%)
	2.59 (.798)	2 (5.4)	16 (43.2)	14 (37.8)	5 (13.5)
Include costs in plans if probable by emp. stats. OR physician	<i>M</i> (SD)	Strong. D. n (%)	Disagree n (%)	Agree n (%)	Strong. A. n (%)
	2.54 (.691)	2 (5.4)	15 (40.5)	18 (48.6)	2 (5.4)

Note. Strong D. = Strongly disagree, Strong. A = Strongly agree; *M* = mean; SD = standard deviation

Likelihood of SCs for C5-C6 SCI (Scenario 1)

Physiatrist life care planners (Phy-LCPs) and physiatrist non-life care planners (Phy-Non-LCPs) were asked about the likelihood of occurrence for 13 SCs described earlier for an otherwise healthy weight C5-C6 male in his mid-20s with no premorbid medical conditions. We estimated the overall mode frequency count between both physiatrist groups concerning whether 13 complications were likely to occur 0%, 1%-25%, 26%-50%, 51%-75%, and 76%-100% over a lifetime. In this first scenario, 34 Phy-LCPs and 54 Phy-Non-LCPs responded. Tables 4 and 5 detail the overall responses for both groups along this scale of 13 complications. Phy-LCPs endorsed a majority likelihood of occurrence within the 1%-25% percentage range; the following was observed: syringomyelia (82.4%), pressure sores requiring hospitalization and surgery (61.8%), heterotrophic ossification (70.6%), deep vein thrombosis (55.9%), and pneumonia/atelectasis (38.2%).

Of the Phy-Non-LCPs group in this same 1%-25% range likelihood of occurrence, this group endorsed seven SCs: heterotrophic ossification (75.9%), deep vein thrombosis (67.9%), pressure ulcers requiring hospitalization (66.7%), pneumonia/atelectasis (44.2%) cardiovascular disease (37.7%), respiratory dysfunction (32.1%), followed by repetitive motion injury or overuse syndrome (24.5%).

In the next likelihood category of 26%-50%, approximately 38.2% of Phy-LCPs endorsed neuropathic pain in this percentage range, 35.3% endorsed cardiovascular disease, and 32.4% equally endorsed deep vein thrombosis, repetitive motion injury or overuse syndrome, and autonomic dysreflexia. Conversely in the 26%-50% range, Phy-Non-LCPs most highly endorsed repetitive motion injury or overuse syndrome at 34%, pressure sores requiring wound care and autonomic dysreflexia tying at 32.1%, cardiovascular disease and osteoporosis/bone fractures at

30.2%, and pneumonia/atelectasis at 26.9%.

In the next overall mode category of 51%-75%, Phy-LCPs endorsed five overall probability occurrences including: osteoporosis/bone fracture (44.1%), repetitive motion injury/overuse syndrome, neuropathic pain, pressure ulcers requiring wound care (38.2%), and cardiovascular disease (35.3%). Conversely in this range category, Phy-Non-LCPs most highly endorsed neuropathic pain at 32.1%, autonomic dysreflexia and osteoporosis/bone fracture at 24.5%, and cardiovascular disease with respiratory dysfunction tied at 20.8%.

Finally, in the highest overall mode category of 76%-100%, approximately 50% of Phy-LCPs endorsed urinary tract infections, and 29.4% endorsed respiratory dysfunction for the individual with a C5-C6 SCI. Also in this category, Phy-Non-LCPs only endorsed urinary tract infections at 49.1% as a high-level secondary complication occurrence over a lifetime.

Overall, neither group of physiatrists for scenario one had a consensus of participants to render a probability opinion (>51%) of any SC. Conversely, all Phy-LCPs believed such a patient would likely encounter at least one episode of autonomic dysreflexia, cardiovascular complications, neuropathic pain, respiratory dysfunction, UTI, osteoporosis/bone fracture, and repetitive motion overuse syndrome. Phy-Non-LCPs agreed on at least one episode of autonomic dysreflexia, cardiovascular disease, neuropathic pain, UTI, and osteoporosis/bone fracture; however, one participant responded such a patient would have no episodes of heterotrophic ossification, deep vein thrombosis, and respiratory disease; while two participants agreed that this individual would have no episodes of pressure ulcers requiring hospitalization/surgery, syringomyelia, and repetitive motion overuse syndrome.

Table 4

Likelihood of Secondary Complications of a C5-C6 Injury (Scenario 1).

SC	Phy-LCP				
	0% n (%)	1 – 25% n (%)	26 – 50% n (%)	51 – 75% n (%)	76 – 100% n (%)
SB-S	5 (14.7)	21 (61.8)	6 (17.6)	2 (5.9)	N/A
SB-H	3 (8.8)	5 (14.7)	10 (29.4)	13 (38.2)	3 (8.8)
PNA	1 (2.9)	13 (38.2)	9 (26.5)	8 (23.5)	3 (8.8)
HO	3 (8.8)	24 (70.6)	4 (11.8)	3 (8.8)	N/A
AD	N/A	8 (23.5)	11 (32.4)	9 (26.5)	6 (17.6)
DVT	1 (2.9)	19 (55.9)	11 (32.4)	3 (8.8)	N/A
CVD	N/A	5 (14.7)	12 (35.3)	12 (35.3)	5 (14.7)
SMI	1 (2.9)	28 (82.4)	4 (11.8)	1 (2.9)	N/A
NP	N/A	3 (8.8)	13 (38.2)	13 (38.2)	5 (14.7)
RD	N/A	7 (20.6)	8 (23.5)	9 (26.5)	10 (29.4)
UTI	N/A	1 (2.9)	5 (14.7)	11 (32.4)	17 (50.0)
OP/F	N/A	9 (26.5)	9 (26.5)	15 (44.1)	1 (2.9)
RMI	N/A	2 (5.9)	11 (32.4)	13 (38.2)	8 (23.5)

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome. Phy-LCP = physiatrist life care planners; N/A= none.

Table 5

Likelihood of Secondary Complications of a C5-C6 Injury (Scenario 1).

SC	Phy-Non-LCP				
	0% n (%)	1 – 25% n (%)	26 – 50% n (%)	51 – 75% n (%)	76 – 100% n (%)
SB-S	2 (3.7)	36 (66.7)	11 (20.4)	4 (7.4)	1 (1.9)
SB-H	N/A	18 (34.0)	17 (32.1)	10 (18.9)	8 (15.1)
PNA	N/A	23 (44.2)	14 (26.9)	9 (17.3)	6 (11.5)
HO	1 (1.9)	41 (75.9)	11 (20.4)	1 (1.9)	N/A
AD	N/A	14 (26.4)	17 (32.1)	13 (24.5)	9 (17.0)
DVT	1 (1.9)	36 (67.9)	13 (24.5)	3 (5.7)	N/A
CVD	N/A	20 (37.7)	16 (30.2)	11 (20.8)	6 (11.3)
SMI	2 (3.8)	44 (83.0)	5 (9.4)	2 (3.8)	N/A
NP	N/A	12 (22.6)	14 (26.4)	17 (32.1)	10 (18.9)
RD	1 (1.9)	17 (32.1)	14 (26.4)	11 (20.8)	10 (18.9)
UTI	N/A	7 (13.2)	14 (26.4)	6 (11.3)	26 (49.1)
OP/F	N/A	10 (18.9)	16 (30.2)	13 (24.5)	14 (26.4)
RMI	2 (3.8)	13 (24.5)	18 (34.0)	9 (17.0)	11 (20.8)

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome. Phy-Non-LCP = physiatrists who are not involved in life care planning. N/A= none.

Likelihood of SCs for T6 SCI (Scenario 2)

Following the same two physician groups and all the same criteria for Scenario 1, the same question was asked of these participants in this second scenario with the exception that the hypothetical individual had a T6 paraplegia and was similarly an otherwise normal weight, mid-20s healthy male with no premorbid medical conditions. Overall in this scenario, 32 Phy-LCPs and 54 Phy-Non-LCPs from both groups endorsed the likelihood of far fewer SCs for someone with paraplegia as opposed to the C5-C6 tetraplegic scenario.

In the 0% likelihood category, the majority of Phy-LCPs endorsed no occurrence in order of complications including: syringomyelia (81.3%), pneumonia/atelectasis (71.9%), pressure ulcers requiring hospitalization and autonomic dysreflexia at 65.9%, heterotrophic ossification and respiratory dysfunction at 62.5%, and deep vein thrombosis at 59.4%. Among Phy-Non-LCPs, 86.8% endorsed no episodes of syringomyelia, 72.2% each regarding no episodes of pneumonia/atelectasis and autonomic dysreflexia, 71.7% endorsed no episodes of respiratory dysfunction, 68.5% at no episodes of heterotrophic ossification, and similar to Phy-LCPs, 59.3% indicated no episodes of deep vein thrombosis would occur.

Reviewing the lower endorsed *possibility* range of 1%-25%, 53.1% of Phy-LCPs opined the possibility of neuropathic pain, followed by 43.8% regarding osteoporosis/bone fractures, 37.5% endorsed the possibility of deep vein thrombosis, and 31.3% each endorsed autonomic dysreflexia and heterotrophic ossification. The remaining complications fell below 30% agreement. Among Phy-Non-LCPs, 40.4% endorsed a possible likelihood of osteoporosis/bone fracture occurring, 33.3% deep vein thrombosis, and 32.1% for pressure ulcers requiring wound care and heterotrophic ossification. The remaining complications fell below 30%. Table 5 has complete details surrounding the T6 case scenario.

In the higher *possibility* range of 26%-50%, Phy-LCPs

endorsed highest ratings for the following SCs: 37.5% for repetitive motion injury, 34.4% for cardiovascular disease, 21.9% for pressure ulcers requiring wound care, and 28.1% each for osteoporosis/bone fractures. All other complications fell far below 20%. The Phy-Non-LCPs in this possibility range endorsed few SCs with greater than 20% agreement. The highest complication in this range was neuropathic pain at 32.1%, repetitive motion injury at 30.2%, urinary tract infection at 26.9% and cardiovascular disease at 22.2%.

In the lower but *probable* range of 51%-75%, Phy-LCPs' highest agreement in this range was urinary tract infection at 37.5%, followed by repetitive motion injury/overuse syndrome at 34.4%. Following these complications, a significant drop in endorsed frequency was tied at 12.5% for pressure ulcers requiring wound care, cardiovascular disease, and neuropathic pain. This was the first category for Phy-LCPs to endorse no occurrence (N/A) in this probability range for pressure ulcers requiring hospitalization, pneumonia/atelectasis, heterotrophic ossification, autonomic dysreflexia, deep vein thrombosis, and syringomyelia. The Phy-Non-LCPs endorsed somewhat similarly as the Phy-LCPs. Specifically, urinary tract infection and repetitive motion injury or overuse syndrome tied for the highest endorsed complications at 30%. Following these, the next highest endorsed frequency was neuropathic pain at 13.2% and cardiovascular disease at 11.1%. All other complications fell below 10%. In this category, this Phy-LCPs endorsed no occurrence of all the same SCs the Phy-LCPs endorsed, but included respiratory dysfunction for the T6 injury scenario.

Finally, in the highest *probability* percentage range of 76%-100%, Phy-LCPs only endorsed urinary tract infection at 3.1%, and all the rest of the complications were rated as no occurrence in this range. The Phy-Non-LCPs unanimously agreed that none of the 13 SCs overall occurred within this high level of probability. See tables 6 and 7 below for details.

Table 6

Likelihood of Secondary Complications of a T6 Injury (Scenario 2).

SC	Phy-LCP				
	0% n (%)	1 – 25% n (%)	26 – 50% n (%)	51 – 75% n (%)	76 – 100% n (%)
SB-S	21 (65.9)	7 (21.9)	4 (12.5)	N/A	N/A
SB-H	13 (40.6)	8 (25.0)	7 (21.9)	4 (12.5)	N/A
PNA	23 (71.9)	6 (18.8)	3 (9.4)	N/A	N/A
HO	20 (62.5)	10 (31.3)	2 (6.3)	N/A	N/A
AD	21 (65.9)	10 (31.3)	1 (3.1)	N/A	N/A
DVT	19 (59.4)	12 (37.5)	1 (3.1)	N/A	N/A
CVD	8 (25.0)	9 (28.1)	11 (34.4)	4 (12.5)	N/A
SMI	26 (81.3)	5 (15.6)	1 (3.1)	N/A	N/A
NP	6 (18.8)	17 (53.1)	5 (15.6)	4 (12.5)	N/A
RD	20 (62.5)	8 (25.0)	2 (6.3)	2 (6.3)	N/A
UTI	2 (6.3)	8 (25.0)	9 (28.1)	12 (37.5)	1 (3.1)
OP/F	7 (21.9)	14 (43.8)	9 (28.1)	2 (6.3)	N/A
RMI	5 (15.6)	4 (12.5)	12 (37.5)	11 (34.4)	N/A

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome, Phy-LCP = physiatrist life care planners, N/A= none.

Table 7

Likelihood of Secondary Complications of a T6 Injury (Scenario 2).

SC	Phy-Non-LCP				
	0% n (%)	1 – 25% n (%)	26 – 50% n (%)	51 – 75% n (%)	76 – 100% n (%)
SB-S	35 (64.8)	16 (29.6)	3 (5.6)	N/A	N/A
SB-H	24 (45.3)	17 (32.1)	10 (18.9)	2 (3.8)	N/A
PNA	39 (72.2)	12 (22.2)	3 (5.6)	N/A	N/A
HO	37 (68.5)	17 (31.5)	N/A	N/A	N/A
AD	39 (72.2)	13 (24.1)	2 (3.7)	N/A	N/A
DVT	32 (59.3)	18 (33.3)	4 (7.4)	N/A	N/A
CVD	21 (38.9)	15 (27.8)	12 (22.2)	6 (11.1)	N/A
SMI	46 (86.8)	6 (11.3)	1 (1.9)	N/A	N/A
NP	14 (26.4)	15 (28.3)	17 (32.1)	7 (13.2)	N/A
RD	38 (71.7)	12 (22.6)	3 (5.7)	N/A	N/A
UTI	9 (17.3)	13 (25.0)	14 (26.9)	16 (30.8)	N/A
OP/F	15 (28.8)	21 (40.4)	10 (19.2)	6 (11.5)	N/A
RMI	5 (9.4)	16 (30.2)	16 (30.2)	16 (30.2)	N/A

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome, Phy-Non-LCP = physiatrists who are not involved in life care planning, N/A= none.

Frequency of SCs for C5-C6 SCI (Scenario 1)

Following the same two physician groups and all the same criteria for Scenarios 1 and 2 regarding the likelihood of 13 SCs occurring with two males, one with a C5-C6 SCI and the other with a T6 SCI, a second set of questions were asked regarding the frequency of SC occurrence over an individual's lifetime which require hospitalization (except for the pressure ulcer wound care only question). Unlike the first two scenarios where the rating scale was based on five low/high incidence percentage choices (e.g., 1%-25%), this time participants chose from a numerical drop-down menu ranging from "0-25+" occurrences over one's lifetime. Overall in this scenario, 30 Phy-LCPs and 49 Phy-Non-LCPs participated in estimating frequency of SCs in the C5-C6 tetraplegia scenario, and 29 Phy-LCPs and 47 Phy-Non-LCPs participated in the T6 paraplegia frequency scenario. Between both groups, the vast majority of respondents clustered in opinions between the 0-5 range, then at 10, and finally at 25+ frequency of SCs. Most, but not all of the remaining frequency columns had zero endorsements.

In reviewing the highlights most and least endorsed frequency of SCs among the 30 Phy-LCPs in the C5-C6 tetraplegia scenario, the highest was approximately 27% who did not believe this hypothetical person with tetraplegia would require hospitalization for pressure ulcers over his lifetime. The second most frequently cited endorsement was 23% who opined this individual would experience two hospitalizations for pressure ulcers over his lifetime, and overall cumulatively, 73% endorsed between 0 to 3 pressure ulcer hospitalizations over a lifetime. In responding to pressure ulcers not requiring hospitalization but rather wound care at home, a higher percentage believed this would occur. Specifically, 27% opined 10 episodes of wound care, 20% endorsed five episodes, and 16.6% endorsed more than 25 episodes of pressure ulcers requiring wound care over this individual's lifetime.

Concerning pneumonia/atelectasis, the highest endorsement was 30% of five episodes requiring hospitalization among Phy-LCPs, followed by 16.6% for 10 episodes. Relatedly concerning respiratory dysfunction, the most frequently endorsed was 25+ episodes at 23% or seven of the group followed by 16.6% who believed the male with tetraplegia would experience five hospitalizations for respiratory problems.

The two most highly endorsed SCs were neuropathic pain where 33% or 10 Phy-LCPs perceived 25+ hospitalizations to treat this pain, and 46.6% endorsed 25+

occurrences of urinary tract infection over this individual's lifetime. Separately, over 43% of the group opined this hypothetical individual with tetraplegia would be hospitalized for repetitive motion injury/overuse syndrome, while an additional 16.6% believed one occurrence would be probable. One set of scores that cannot be reconciled, however, is that while 14.7% of the Phy-LCPs indicated that there was no likelihood of pressure sores occurring over the lifetime of this individual with tetraplegia, 26.6% of them (approximately four more participants) indicated zero frequency of occurrence. These numbers of course should match up. Tables 8 and 9 show descriptive differences between both groups of physiatrists.

When rating the C5-C6 cases, the Phy-Non-LCP group ($n = 49$) opinions overall tended to be more conservative in number of occurrences. Although this was not so for pressure ulcers involving hospitalization where three (6%) believed this individual would not require any hospitalizations, the largest majority (47%) opined one hospitalization for pressure ulcers would occur over his lifetime. Second to this opinion among this group were five Phy-Non-LCP respondents (10.2%), who indicated two episodes would occur. In considering pressure ulcers requiring *home wound care but no hospitalization*, 12 Phy-Non-LCPs endorsed three episodes (24.4%), followed by eight (16.3%), and five Phy-Non-LCPs or 10.2% each endorsing four, 10, and 25+ episodes of pressure ulcers respectively involving home wound care.

Three of the most highly endorsed tetraplegia SCs requiring hospitalization among Phy-Non-LCPs were urinary tract infections where 18 (36.7%) opined 25+ episodes of UTI, 13 (26.5%) believed 25+ episodes of autonomic dysreflexia would occur, and 11 (22.4%) endorsed 25+ episodes of neuropathic pain requiring hospitalization would occur. Other noteworthy, random, but highly endorsed SCs were 40.8% indicating one episode of syringomyelia (while an additional 22.4% indicated no episodes), 34.6% indicating 10 episodes of repetitive motion injury or overuse syndrome requiring hospitalization, 32.7% indicating one episode of deep vein thrombosis, and 28.6% indicating hospitalization for one episode of cardiovascular disease. Conversely, the three least endorsed frequency estimations of future SCs were pneumonia/atelectasis, respiratory dysfunction, and osteoporosis/bone fracture, where none of the Phy-Non-LCPs indicated the case of tetraplegia could avoid some degree of these complications.

Table 8

Frequency of Secondary Complications for Individuals with C5-C6 SCI: Phy-LCP Responses (Scenario 1)

SC	Phy-LCP							
	0	1	2	3	4	5	10	25+
SB-S	26.6%	13.3%	23.3%	10.0%	N/A	6.6%	6.6%	3.3%
SB-H	3.3%	3.3%	6.6%	10.0%	3.3%	20.0%	26.6%	16.6%
PNA	3.3%	6.6%	3.3%	3.3%	6.6%	30.0%	16.6%	6.6%
HO	13.3%	23.3%	13.3%	16.6%	N/A	13.3%	3.3%	N/A
AD	3.3%	6.6%	3.3%	10.0%	N/A	23.3%	13.3%	20.0%
DVT	10%	23.3%	20.0%	6.6%	3.3%	13.3%	6.6%	N/A
CVD	3.3%	16.6%	10.0%	3.3%	N/A	13.3%	13.3%	16.6%
SMI	43.3%	16.6%	10.0%	6.6%	10.0%	6.6%	3.3%	N/A
NP	6.6%	16.6%	6.6%	N/A	N/A	10.0%	10.0%	33.3%
RD	3.3%	13.3%	N/A	N/A	6.6%	16.6%	6.6%	23.3%
UTI	N/A	N/A	N/A	N/A	N/A	6.6%	6.6%	46.6%
OP/F	13.3%	13.3%	16.6%	1.0%	10.0%	13.3%	N/A	10.0%
RMI	13.3%	10.0%	3.3%	16.6%	N/A	10.0%	13.3%	13.3%

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome. Phy-LCP = physiatrist life care planners N/A= none.

Table 9

Frequency of Secondary Complications for Individuals with C5-C6 SCI: Phy-Non-LCP Responses (Scenario 1)

SC	Phy-Non-LCP							
	0	1	2	3	4	5	10	25+
SB-S	6.1%	46.9%	14.2%	6.1%	4.1%	10.2%	6.1%	N/A
SB-H	2.0%	6.1%	8.1%	24.4%	10.2%	16.3%	10.2%	10.2%
PNA	N/A	8.1%	18.3%	14.2%	8.1%	10.2%	10.2%	8.1%
HO	12.2%	32.7%	20.4%	10.2%	2.0%	10.2%	4.1%	2.0%
AD	4.1%	8.1%	4.1%	6.1%	6.1%	10.2%	12.2%	26.5%
DVT	6.1%	32.7%	18.3%	10.2%	8.1%	8.1%	6.1%	N/A
CVD	10.2%	28.6%	10.2%	8.1%	N/A	10.2%	10.2%	10.2%
SMI	22.4%	40.8%	6.1%	10.2%	N/A	4.1%	2.0%	4.1%
NP	8.1%	18.3%	6.1%	N/A	2.0%	4.1%	12.2%	22.4%
RD	N/A	14.3%	6.1%	8.1%	8.1%	2.0%	14.2%	10.2%
UTI	2.0%	4.1%	N/A	N/A	4.1%	8.1%	8.1%	36.7%
OP/F	N/A	28.6%	16.3%	10.2%	4.1%	16.3%	2.0%	8.1%
RMI	12.2%	8.1%	16.3%	4.1%	4.1%	14.3%	34.6%	6.1%

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome, Phy-Non-LCP = physiatrists who are not involved in life care planning, N/A= none.

Descriptive Statistics Regarding Frequency of SCs for T6 SCI (Scenario 2)

Once again, a trend was noted between both physiatrist groups overall endorsing far fewer SCs for the hypothetical male with paraplegia than for the male with tetraplegia. These opinions are consistent with those generally reported by the NSCISC (2013). In most instances, the majority of both groups endorsed up to five occurrences, with added spikes at the 10 and 25+ frequency counts of specific SCs.

Among Phy-LCPs, 29 participated in this part of the survey and 47 Phy-Non-LCPs responded to each of the 13 SCs frequency categories. Among Phy-LCPs endorsing the frequency of SCs, highest consistent opinions were either zero or one occurrence. The pinnacle of these was 55% indicating no syringomyelia occurrences. Almost 38% similarly reported no hospitalization episodes for autonomic dysreflexia. Twenty-seven Phy-LCPs each opined this individual would also require no hospitalization for pressure ulcers or pneumonia, and 24% ($n = 7$) respondents reported the same for heterotrophic ossification and respiratory dysfunction.

Among the highest frequency occurrences for Phy-LCPs, 48.2% endorsed 25+ episodes of urinary tract infection requiring hospitalization. Other 25+ occurrence frequency endorsements for this group included 27.5% opining repetitive motion injury, 24% for neuropathic pain, and 20.7% believed 25+ hospitalizations for cardiovascular disease would occur over one's lifetime. Nine (31%) Phy-LCPs agreed that an individual with a T6 level of injury would experience one hospitalization for heterotrophic ossification and respiratory dysfunction. Additionally, eight (27.6%) endorsed one episode of osteoporosis/bone fracture and 24% opined one episode of pneumonia/atelectasis over one's lifetime.

Among the 47 Phy-Non-LCPs for the T6 injury and frequency of SCs involving hospitalization, the top six indicating zero hospitalizations over the 20% margin of agreement were: 38% indicating no episodes of autonomic dysreflexia, 34% regarding no episodes of syringomyelia, 32% no episodes of respiratory dysfunction, 23.4% reporting no episodes of heterotrophic ossification, and 21.2% opining no hospitalization for pneumonia/atelectasis. Pressure ulcers requiring no anticipated future hospitalization also scored with 19% agreement.

The next largest cluster among Phy-Non-LCPs involved the frequency of hospitalization for the following SCs: 42.5% opined one hospitalization would be needed for pressure ulcer, 40.4% for heterotrophic ossification, roughly 32% each for deep vein thrombosis and syringomyelia, 27.6% each for pneumonia/atelectasis, cardiovascular disease and osteoporosis/bone fracture, and 23.4% for autonomic dysreflexia. All other SCs fell below the 20% frequency endorsement level. It also appears Phy-Non-LCPs highly clustered around two SC occurrences requiring hospitalization over one's lifetime. The highest was osteoporosis/bone fracture at 23.4%, deep vein thrombosis at 21.3%, pressure ulcers requiring hospitalization at 19.1%, and eight participants each or 17% endorsing pressure ulcers requiring wound care and pneumonia/atelectasis. Conversely, at the high end of agreement among Phy-Non-LCPs (and similar to Phy-LCPs but not as highly endorsed), 34% opined 25+ urinary tract infections involving hospitalization. Also endorsing 25+ SCs were 19% for neuropathic pain, 17% for repetitive motion injury or overuse syndrome, and 10.6% each for cardiovascular disease and pressure ulcers requiring wound care. See tables 10 and 11 for more specific breakdown details.

Table 10

Frequency of Secondary Complications for Individuals with T6 SCI: Phy-LCP Responses (Scenario 2)

Phy-LCP								
SC	0	1	2	3	4	5	10	25+
SB-S	27.5%	20.6%	6.8%	10.3%	6.8%	6.8%	6.8%	3.4%
SB-H	6.8%	6.8%	10.3%	13.7%	13.7%	13.7%	6.8%	17.2%
PNA	27.5%	24.1%	N/A	10.3%	10.3%	10.3%	6.8%	N/A
HO	24.1%	31.0%	10.3%	6.8%	N/A	3.4%	10.3%	N/A
AD	37.9%	6.8%	13.7%	3.4%	13.7%	6.8%	13.7%	3.4%
DVT	20.6%	20.6%	24.1%	6.8%	N/A	10.3%	3.4%	N/A
CVD	10.3%	13.7%	17.2%	N/A	N/A	6.8%	13.7%	20.6%
SMI	55.1%	17.2%	6.8%	N/A	3.4%	13.7%	N/A	N/A
NP	13.7%	17.2%	3.4%	6.8%	6.8%	10.3%	6.8%	24.1%
RD	24.1%	31.0%	10.3%	10.3%	N/A	10.3%	6.8%	6.8%
UTI	N/A	3.4%	N/A	N/A	3.4%	10.3%	17.2%	48.2%
OP/F	10.3%	27.5%	10.3%	17.2%	3.4%	3.4%	6.8%	10.3%
RMI	3.4%	6.8%	6.8%	6.8%	3.4%	6.8%	13.7%	27.5%

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome, Phy-LCP = physiatrist life care planners, N/A= none.

Table 11

Frequency of Secondary Complications for Individuals with T6 SCI: Phy-Non-LCP Responses (Scenario 2)

Phy-Non-LCP								
SC	0	1	2	3	4	5	10	25+
SB-S	19.1%	42.5%	19.1%	N/A	N/A	6.3%	6.3%	N/A
SB-H	N/A	17.0%	17.0%	17.0%	6.3%	10.6%	6.3%	10.6%
PNA	21.2%	27.6%	17.0%	10.6%	2.1%	10.6%	8.5%	N/A
HO	23.4%	40.4%	10.6%	4.2%	4.2%	12.7%	4.2%	N/A
AD	38.2%	23.4%	12.7%	4.2%	2.1%	2.1%	6.3%	4.2%
DVT	10.6%	31.9%	21.2%	6.3%	8.5%	8.5%	12.7%	N/A
CVD	10.6%	27.6%	10.6%	6.3%	2.1%	10.6%	6.3%	10.6%
SMI	34.0%	31.9%	10.6%	12.7%	N/A	6.3%	N/A	4.2%
NP	10.6%	19.1%	8.5%	8.5%	6.3%	4.2%	14.8%	19.1%
RD	31.9%	17.0%	14.8%	4.2%	4.2%	8.5%	10.6%	2.1%
UTI	2.1%	6.3%	4.2%	6.3%	2.1%	2.1%	17.0%	34.0%
OP/F	4.2%	27.6%	23.4%	6.3%	4.2%	12.7%	10.6%	2.1%
RMI	10.6%	4.2%	12.7%	4.2%	2.1%	10.6%	14.8%	17.0%

Note. Md = Mode; SB-S = skin breakdown requiring surgery, SB-HWC = skin breakdown requiring home wound care, PNA = pneumonia (atelectasis, and/or aspiration), HO = heterotopic ossification, AD = autonomic dysreflexia, DVT = deep vein thrombosis, CVD = cardiovascular disease, SMI = syringomyelia, NP = neuropathic pain, RD = respiratory dysfunction, UTI = urinary tract infections, OP/F = osteoporosis/bone fractures, RMI = repetitive motion injury/overuse syndrome, Phy-Non-LCP = physiatrists who are not involved in life care planning, N/A= none.

Likelihood of Secondary Complications with and Without Preventative Measures

Finally, we asked, “Are ratings pertaining to the likelihood of SCs if preventative measures are taken/not taken a function of physiatrist demographics?” For this analysis, the two outcome measures were asking physiatrists to rate how likely secondary complications are to occur if preventative measures ARE taken, and if preventative measures ARE NOT taken. There were five ordinal scale response types noted earlier including 0%, 1%-25%, 26%-50%, 51%-75%, and 76%-100%. Generalized ordered logistic regression using the gologit2 program in STATA was utilized, and all explanatory variables (i.e., certification, whether ever worked at a SCI model system, Phy-LCP or Phy-Non-LCP, and knowledge of SCs) were within the

parallel lines assumption. A Bonferroni corrected alpha level of .025 (.05/2) was used to determine model significance for each item.

Both analyses met the parallel line assumptions for all explanatory variables. The model predicting the likelihood of secondary complications if preventative measures are taken was not significant ($p = .424$). In contrast, the model predicting the likelihood of secondary complications without preventative measures reached statistical significance at the adjusted alpha level ($p = .021$). Knowledge of SCs related to SCI was a significant positive predictor ($p < .01$). Thus, higher levels of knowledge were associated with higher reported likelihoods of secondary complications without preventative measures.

Table 12

Proportional Odds Model for Likelihood of Secondary Complications with and without Preventative Measures

Variable	SC with preventative measures	SC without preventative measures
<i>Model coefficients b (se(b))</i>		
Certified	-.064 (.441)	-.284 (.538)
Employed SCI	.467 (.391)	.380 (.498)
Knowledge	.193 (.209)	.752** (.264)
Group: Phy-LCP or Phy-Non-LCP	.292 (.401)	-.079 (.545)
<i>Model Summary</i>		
LR χ^2 (df = 4)	3.87	11.56
p	.424	.021*
Pseudo R ²	.015	.078
Wald test of PL p	.211	.997
N	105	106

Note. SC = secondary complications. Certified coded 0 = non-certified and 1 = certified. Employed SCI coded 1 = No, 2 = Yes. Knowledge coded 1-5 (1 = poor, 5 = excellent). Group coded 1 = Phy-Non-LCP, 2 = Phy-LCP. Outcome measures coded 1-5 (1 = 0%, 5 = 76-100%). Adjusted alpha for model significance = .05/2 = .025.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

This is the first study that has investigated the opinions of physiatrists involved in life care planning and physiatrists not involved in life care planning in ascertaining the likelihood and frequency of SCs arising among people with SCI. Although physiatrists in both groups sometimes had diverse opinions regarding these complications, there were also many instances where group responses were similar.

For the first scenario question that looked at the probability of SCs in a C5-C6 injury regarding a low to high possibility versus probability of occurrence of SCs, Phy-LCPs endorsed four SCs with a 51% or higher probability of occurring: urinary tract infections (82.4% agreed), repetitive motion injury or overuse syndrome (61.8%), respiratory dysfunction (55.9%), and neuropathic pain (52.9%). For the Phy-Non-LCP group, three SCs met the probability level, albeit at a lower rate of endorsement: urinary tract infections (60.4% agreed), osteoporosis/bone fracture and neuropathic pain scored at 51% probability. Both groups were in agreement in the probability of urinary tract infections and neuropathic pain occurring for an individual with tetraplegia. All other secondary complications for the Phy-Non-LCPs fell below the threshold of a probability of occurrence.

In the second scenario of similar low to high dichotomous response possibility versus probability percentage occurrence of these complications for an individual with a T6 SCI, both groups overall agreed that there would be fewer complications. Indeed, both groups opined that none of the 13 SCs had a 51% or higher probability of occurring. The highest percentage for Phy-LCPs was 37.5% agreement of urinary tract infections, followed by 34.4% for repetitive motion injury or overuse syndrome. Of interest, six Phy-LCPs had no endorsements of 51% or higher probability. These included pressure ulcer requiring hospitalization, pneumonia/atelectasis, heterotrophic ossification, autonomic dysreflexia, deep vein thrombosis and syringomyelia.

The Phy-Non-LCPs' opinions for the probability of SCs for a T6 injury was consistent with Phy-LCPs' in that none of the 13 SCs had a 51% or greater probability of occurring. The highest ratings related to urinary tract infection were at 30.8% agreement, and repetitive motion injury or overuse syndrome at 30.2%. The Phy-Non-LCPs group identified seven SCs with no probability of occurring: six of these were the same SCs identified by the Phy-LCP group plus respiratory dysfunction.

Regarding the second scenario addressing the frequency of SCs requiring hospitalization, there was a wide range of opinions for the C5-C6 and T6 injury scenario. Since respondents could choose between 0-25+ responses, there was no clear consensus on any single SC. Tetraplegia once again did have higher frequencies of SCs requiring hospitalization than did the male with paraplegia. The NSCISC (2013) data does overall support statistics in that people with tetraplegia often succumb to a greater number of

SCs with relatively earlier mortality rates as well. The other somewhat general but inconsistent trend were Phy-Non-LCPs who endorsed fewer SC frequencies than Phy-LCPs (in most, but not all cases).

Also of interest is how Phy-LCPs responded to the types of costs often included within a life care plan (Table 3). Specifically, Phy-LCPs were almost split down the middle on when to include such costs. Over half (56.7%) believed costs for SCs should be included even if they were only possible or likely to occur less than 51% of the time. Similarly, over 62% disagreed with using empirical statistics that deal with the probable prevalence of certain SCs, and over 45% also disagreed about including SC costs if a physician deems a SC as probable to occur. Indeed, over 45% disagreed on the notion to include SC costs if deemed probable by empirical statistics and a physician. As such, for about half of Phy-LCPs, it appears they perceived that their education, training, and experience, enabled them when/when not to include possible or probable SC costs into the life care plan. This is particularly interesting as the standards of practice for life care planners address the need to work with treating physicians and utilize the empirical literature. Another explanation, however, is medical practitioners typically see patients due to having some medical complication. Therefore, some/many of the responses obtained may be skewed as a result of observing and treating pathologies rather than seeing healthy patients free of complications.

Implications for Life Care Planners

The practical implications for Phy-Non-LCPs are of interest. First, when working on cases involving SCI, life care planners should be knowledgeable of SCs, the empirical literature on the probability of occurrence, and should inquire of treating physiatrists the likelihood and potential frequency of any of these complications occurring over an individual's lifetime. Life care planners can be more assured of their opinions when supported by empirical statistics and a treating physician's confirmation towards the probability of SCs arising.

Second, as discussed earlier and reported by Krause (1996, 2013), LCPs must be cognizant of each individual case's premorbid health conditions as well as the type and severity of SCI. As noted here by both groups of physiatrists and supported within the literature (Krause), certain premorbid conditions or circumstances can increase or decrease the chances of sustaining secondary complications. For example, empirical literature supports the finding that people with a SCI who are obese, are smokers, have diabetes, and have complete tetraplegia, are at greater risk for one or more pressure ulcer occurrences within their lifetime (Byrne & Salzberg, 1996; Garber, Rintala, Hart, & Fuhrer, 2000).

Third, LCPs can use the results of this study to initiate a conversation with treating physiatrists about being comfortable predicting a probability prognosis of certain secondary complications occurring among people with SCI.

For example, despite the between group differences, there was some consensus about urinary tract infections occurring for people with tetraplegia and paraplegia. The same may be true to a lesser extent for neuropathic pain and repetitive motion injury or overuse syndrome depending on type of disability. Also, reviewing a patient's previous history with the injury and prevalence of such SCs can also strengthen the inclusion of costs. A history of urinary tract infections or pressure ulcers is generally a positive indicator for future occurrences (Sezer, Akkus, & Ugurlu, 2015).

Fourth, when Phy-Non-LCPs are on the defense side of the plaintiff Phy-LCP, they can look for and argue instances where costs are included within a life care plan without support; specifically, when opinions are not supported by either the empirical literature or the consensus of Phy-Non-LCPs' opinions found within this study. Instances where Phy-LCPs do not consult with treating specialists or cite supporting empirical statistics and otherwise rely solely on their background could be rightfully challenged for lack of empirically supported foundation. Since any qualified life care planner must abide by a standard of life care planning certainty or probability of occurrence, it behooves us all to refrain from what otherwise may be considered as speculative SC opinions that are possible, but not probable.

Overall, this study surveyed the opinions of physiatrists regarding two hypothetical males with tetraplegia and paraplegia in relation to experiencing one of 12 different types of SCs. There was some consensus as to the possibility versus probability of occurrence between both groups of physicians; however, there were also some differences between and within groups. About half of the life care planning physiatrists reported their opinions to include SC costs were not from the empirical literature or a physician, while the other half did utilize either/both resources. Additionally, physicians overall believed there would be negative implications of SCs if preventative measures are not taken.

Limitations of the Study

There are several noteworthy limitations in the present study the need to be considered. First, these are the opinions of approximately 123 practicing physiatrists and, therefore, generalizability to all such practitioners cannot be made. Second, although over 1,000 physiatrists were solicited to participate, a proportionally small sample size (12.3%) responded and completed the surveys; however, a vast majority of physiatrists replied to the email requesting participation and indicated they did not work with SCI patients and, therefore, reluctant to participate in the study. Finally, we understand there is a number of confounding variables regarding SCI demographics that include gender differences, race/ethnicity differences, disability severity, weight, substance use, premorbid medical conditions, etc. that must be considered when contemplating the inclusion of SC costs and the incidence rate of SCs. For this reason, we

chose two otherwise healthy males in their mid-20s in our hypothetical scenarios for participants to provide their professional opinions. This is not representative of the numerous people with SCI who do not fit these characteristics. Future research could expand upon different hypothetically injured individuals with SCI, or alternatively consider other disabilities such as traumatic brain injury and cerebral palsy, among others.

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Continuing Education Credit Questions

Name: _____

Phone Number: _____

Questions are based on the article, A Comparison of Physiatrist Life Care Planners versus Non-Life Care Planner Physiatrists' Professional Opinions Regarding Secondary Complications of Spinal Cord Injuries, beginning on page 3, Volume 14, Number 1.

1. What are three levels of risk factors for secondary complications noted by Krause (1996)?
 - a. Biological, psychological, and environmental factors
 - b. Societal, economical, and spiritual factors
 - c. Eating habits, intellectual ability, and family size
 - d. Level of education, financial income, and ethnicity
2. When testifying in court, experts now have to be able to demonstrate a generally agreed-upon methodology accepted by their peers. Which lawsuit is responsible for this more stringent litmus test of expert opinions?
 - a. *Daubert v. Merrill Dow Pharmaceuticals*
 - b. *Michelin Tires v. Pharma*
 - c. *Kuhmo Tires v. Daubert*
 - d. *Linker v. Discount Tires*
3. How would you define the term "preventative measures" as stated in this publication?
 - a. Being compliant with regular physician visits, recommended treatment, and following rehabilitation plan recommendations.
 - b. Visiting the Emergency Room when needed.
 - c. Visiting your primary care physician twice per year.
 - d. Not attending any doctors visit at all.
4. The term "physiatry" is described as a practitioner who specializes in what specific area?
 - a. Physical medicine and rehabilitation
 - b. Psychological disorders
 - c. Epidemiology
 - d. Immunology
5. Considering the overall results of this study, which type of hypothetical SCI case scenario was perceived by physiatrists as likely succumbing to more secondary complications over his lifetime?
 - a. Brown's cord syndrome
 - b. Paraplegia
 - c. Tetraplegia
 - d. Hemiparesis
6. The neurological aspect of spinal cord injuries is measured by what instrument?
 - a. ASIA Impairment Scale
 - b. Global Assessment of Functioning Scale
 - c. Glasgow Coma Scale
 - d. NSCISC Impairment Scale
7. Which of the following was not a secondary complication discussed throughout this publication?
 - a. Deep vein thrombosis
 - b. Urinary tract infection
 - c. Tethered spinal cord
 - d. Respiratory dysfunction
8. Of all the secondary complications observed in this study, which is the most frequently reported in prevalence studies?
 - a. Cardiovascular disease
 - b. Neuropathic pain
 - c. Syringomyelia
 - d. Urinary tract infection
9. Physiatrists who responded to the likelihood of secondary complications regarding the individual with a C5-C6 SCI were more likely to endorse which of the three top complications as a probability of occurring?
 - a. Pneumonia, respiratory dysfunction and autonomic dysreflexia
 - b. Cardiovascular disease, urinary tract infection, and deep vein thrombosis
 - c. Osteoporosis, neuropathic pain, and urinary tract infection
 - d. Neuropathic pain, syringomyelia, and repetitive motion injury
10. For the hypothetical individual with a T6 SCI, non-life care planning physiatrists endorsed how many secondary complications would occur over this individual's lifetime within a 51% or greater probability?
 - a. 2
 - b. 5
 - c. 7
 - d. 0

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