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The Effects of Spondylolisthesis on the Human Body

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Glossary

Introduction to Spondylolisthesis

Spondylolisthesis is a rare and unknown disorder to many. The anatomical perplexity beneath its diagnosis is extensive yet crucial to truly understanding this unique anomaly. As a condition that is too often undistinguished and unexplained to countless, it warrants and demands undisputed attention. Therefore, this condition will be personally explored for all that it entails.

Spondylolisthesis is often used interchangeably with a variant term referred to as spondylolysis. Although there is similarity in the enunciation of these words, they are distinct in their own meanings. There is, nonetheless, an affiliation between the two. "Spondylolysis is most commonly observed in the lumbar spine, particularly L5, and is associated with spondylolisthesis, or anterior 'slippage' of a vertebra in relation to an adjacent vertebra" (Conklin et al., 2012). Spondylolysis signifies a condition in which the pars interarticularis or small bony arch in the backside of the spine between the facet joints contains a defect. The affected pars interarticularis is frequently broken or separated, thereby facilitating further slippage of the vertebrae in the case of spondylolisthesis, which takes place in the front side of the spine. This further clarifies and confirms the distinction between these two phrases due to the notion that spondylolysis exists posteriorly while spondylolisthesis transpires anteriorly. Regardless, spondylolysis has been found to be the main cause behind a majority of spondylolisthesis diagnoses.

There are, however, several additional causes of spondylolisthesis. These elements include but are not limited to a congenital facet defect resulting in dysplastic spondylolisthesis, degeneration of the facet joints and vertebral discs ensuing degenerative spondylolisthesis, fractures or injuries to the neural arch leading to traumatic spondylolisthesis, and bone diseases bringing about pathogenic spondylolisthesis. Another significant source of spondylolisthesis can be derived from a specific case of isthmic spondylolisthesis "which includes lytic or stress fractures, an elongated

but intact pars or an acute fracture of the pars" (Hyde, 2007). Since the pars interarticularis is influenced, isthmic spondylolisthesis is derived from spondylolysis. Therefore, this kind of spondylolisthesis is of pertinent importance in relation to the incidence of both spondylolysis and spondylolisthesis in individuals.

> "Of interest is the increased incidence in young athletes, especially those involved in sports requiring repetitive flexion/extension and/or hyperextension (e.g., gymnastics, weight lifting, diving, and rowing), found with defects of the pars interarticularis. Harvey et al. reported an incidence of spondylolysis in the general population ranging from 4 to 8 % that increased to 23–63 % in those engaging in certain sporting activities. Ninety-five percent of the defects in their series were found at L5"
> (Conklin et al., 2012).

Strenuous activities such as dancing, softball, and wrestling have also been found to be associated with spondylolysis. Studies also show that "spondylolysis is believed to progress to spondylolisthesis in approximately 70 % of cases" (Conklin et al., 2012).

Once spondylolisthesis is discovered and diagnosed, it is then evaluated on a grading scale based on the severity of the case. To determine the level of severity, several components are taken into consideration including an x-ray exemplifying the degree of the slip, the slip angle, the sacral inclination, the chronicity of the slip, and the pelvic incidence (Conklin et al., 2012). After reviewing this series of data, an additional factor is considered before announcing the final end-grade diagnosis. This last component entails the percentage of slippage of one vertebra relative to the adjacent caudal vertebra that has been affected as a result of the spondylolisthesis. The slippage typically occurs between the fifth lumbar vertebra (L5) and the first sacral vertebra (S1), but in rarer circumstances between the fourth lumbar vertebra (L4) and the fifth lumbar vertebra (L5). After this extensive examination, the case will be labeled as one of five grades. "Grade I is translation up to

25 %; grade II, 26– 50 %; grade III, 51–75 %; grade IV, 76–100 %; and grade V, >100 % (spondyloptosis). Translations of >50 % are generally considered unstable" (Conklin et al., 2012). If the slippage percent is confirmed to be less than thirty percent, research shows that progression is unlikely, whereas in the cases of those high-risk or unstable spondylolisthesis of >50 %, in instances of grades III or higher, progression is promising and very likely. If progression is meant to occur, it will be the most pronounced during the adolescent growth spurt period. This is yet another reason why children, young adults, and young athletes are notably more prone to substantial spondylolisthesis injury in comparison to the older age groups.

Spondylolisthesis can be benign or asymptomatic in all age-groups or it can be illustrated through a variety of symptoms. "It tends to manifest as aching axial low back pain, exacerbated by hyperextension and relieved by rest. It represents the most common identifiable cause of back pain in children and is common in adolescent athletes with acute low back pain. Radicular symptoms and postural spinal deformity are more common in high grade spondylolisthesis" (Conklin et al., 2012). This back pain can also radiate into the lower extremities of the human body causing sharp continuous or intermittent pain. All age groups encounter this excruciating lower back pain, in addition to hamstring contracture or tightness which can cause gait disturbance in the representations of crouching, a short-stride length, and an incomplete leg swing phase. "When an adult with low-grade isthmic spondylolisthesis seeks medical attention, pain is the chief complaint as well, usually in the lower limbs" (Conklin et al., 2012). The pain is derived from nerve endings in the lower lumbar section of the back tunneling throughout the physical gap of the spondylolisthesis impaired and separated pars interarticularis. With arduous movement or exhaustive standing, the vertebral disc located between the two affected vertebrae can wear out causing extreme compression of these nerve endings. This agonizing and consuming lower back

and extremity pain can affect one's daily life and requires remedial and immediate action by means of conservative measures or surgical procedures.

Treatment Modalities for Spondylolisthesis

There is an array of treatment options offered for an individual diagnosed with spondylolisthesis. The most optimal treatment method for a person with this disorder is dependent on the severity of their condition. If surgery can be delayed, non-operative conservative measures such as rest, physical therapy, regular exercise, and medication regimens are often utilized as a first-line therapy for this uncommon yet complex diagnosis.

Although clinical trials have yet to establish a standardized non-operative treatment protocol for spondylolisthesis, "according to Vibert et al. most physicians begin with a 1 to 2 day period of rest followed by a short course of anti-inflammatory medications for any diagnosis involving lower back pain" (Hunter & Kalichman, 2008). In the case that the symptoms are not treated properly and persevere after one to two weeks, a referral to physical therapy is then provided. During these physical therapy sessions, bicycling is an exercise that is promoted and encouraged by the physical therapists for its lack of wear and tear effects on the human body. "Stationary bicycling is an excellent exercise because it promotes spine flexion, deconstriction of the thecal sac, and allows for more exercise before the development of neurogenic claudication (cramping pain) is present" (Hunter & Kalichman, 2008). Other aerobic exercises such as running, swimming, walking, and working out on the elliptical can be conducted but offer a much greater risk for damage or breakdown to the spine. Additional physical rehabilitation techniques that are applied to spondylolisthesis patients for the purpose of reduced pain, restoration of motion and function, and strengthening and stabilization of the spinal column, include bracing and more importantly core abdominal exercises.

> "O'Sullivan et al. found that individuals with chronic lower back pain and a radiological diagnosis of spondylolysis or spondylolisthesis who underwent a 10-week specific exercise treatment program involving the specific training of the deep abdominal muscles, with co-activation of the lumbar multifidus proximal to the pars defects showed a statistically significant reduction in pain intensity and functional disability levels, which was maintained at 30-month follow-up" (O'Sullivan, 2000; Hunter & Kalichman, 2008).

With a spondylolisthesis diagnosis kept in mind, physical therapists understand that exercises that avoid aggravating the injuries and symptoms are far more beneficial in the improvement of these individuals' outcomes.

However, if the short course of anti-inflammatory medications is effective, then physical therapy can often be avoided altogether. A common regimen that spondylolisthesis patients are placed on involves acetaminophen and/or a selection of NSAIDs. "For pain inadequately controlled with acetaminophen or NSAIDs, opioids and muscle relaxants are commonly prescribed for diagnoses with lower back pain even though they have not been shown to be more effective than acetaminophen and NSAIDs in well-controlled studies" (Hunter & Kalichman, 2008). If these medications are still not sufficient, a series of epidural steroid injections (ESI) can be administered. "ESI involves delivery of a corticosteroid preparation, such as methylprednisolone, around the stenotic cauda equina and nerve roots in order to relieve lower back pain, lower extremity pain related to radiculopathy and neurogenic claudication" (Hunter & Kalichman, 2008). The pain relief from these medications can be substantial to spondylolisthesis patients. With less agony hindering their abilities, spondylolisthesis individuals can greatly enhance their overall functioning.

Although back and lower extremity pain may be alleviated as a result of these more conservative non-operative measures, a comprehensive two-year study has also been done to

conclude whether or not the overall cost of these treatments is relative to their realistic effectiveness. This study examines the medical management of lumbar spondylolisthesis, stenosis, and herniation patients who have decided on nonsurgical treatment rather than operative procedures in a multidisciplinary spinal research center. “The mean 2-year total cost (direct plus indirect) of medical management found was $6606 for spondylolisthesis, $7747 for stenosis, and $7097 for herniation” (Godil et al., 2014). These costly procedures however did not equate to high levels of effectiveness. Rather, they only compensated for temporary short-lived pain relief. “From both the societal and payer perspective, continued medical management of patients with these lumbar pathologies in whom 6 weeks of conservative therapy failed was of minimal value given its lack of health utility and effectiveness and its health care costs” (Godil et al., 2014). In this two-year study, the costs of these non-operative methods seemed unworthy and valueless, in comparison to other case studies that have shown opposing positive long-term relief and effects. This case study does however exemplify the significance of considering more definitive and cost-effective surgical procedures when all other conservative treatment options have failed.

The most-widely used surgical procedure for spondylolisthesis is referred to as spinal fusion. This type of fusion can be implemented using a posterior approach with either posterolateral fusion (PLF) or posterolateral interbody fusion (PLIF or TLIF), or an anterior approach with interbody fusion (ALIF). The conclusion on which type of fusion is best for each patient is based on their individual complaints and the causation of their symptoms. Regardless of the approach, a recent study done by the Healthcare Cost and Utilization Project Nationwide Inpatient Sample database showed that “from 1998 to 2008, the annual number of spinal fusion discharges in the United States increased from 174,223 to 413,171, which corresponds to 64.5 and 135.5 cases per 100,000 people, respectively. The therapeutic approach to spinal stenosis and spondylolisthesis has also shifted

toward more complicated procedures such as this, although the reasons for this trend are unclear " (Auerbach et al., 2014). The increased application of spinal fusion for spondylolisthesis patients has proved to be advantageous. "Spinal fusion surgery for a degenerative spondylolisthesis is generally quite successful, with upwards of 90% of patients improving their function and enjoying a substantial decrease in their pain" (Ulrich, 2011). The effectiveness of this surgical procedure results from the two affected vertebrae being fused together so there is no longer any space or motion between them. Through this intricate process, a solid mass of bone is created and re-stabilization of the spinal column is once more achieved. In preparation for this procedure, the patient is anesthetized before an incision is inflicted. Once an incision has been made, the tissues are gently placed aside to create an accessible pathway to the spine. Any bone or vertebral growths causing decompression of the nerves may then be removed before extracting the bone graft supply that will relocated to the spine. Bone graft is often supplied by the own patient's pelvic bone or by a well-known bone bank (Highsmith, 2017). The purpose behind utilizing a bone graft is for additional spinal support. Hardware such as rods, screws, etc. are then used to steady the spinal column for the insertion of the selected bone graft. In the following weeks to come, new bony tissue will grow and connect to the spine, indicating the completion of a permanent spinal fusion.

Spinal fusion provides a long-term solution to an individual facing the hardships of spondylolisthesis. Whether spinal fusion surgery or conservative measures are needed, is contingent on the specific needs of a patient with this condition. Every individual varies with their own ailment, but it is common for least invasive treatments to be practiced before more invasive surgical procedures. Regardless of which treatment option is chosen, spondylolisthesis patients are fortunate enough to have a wide range of treatment modalities offered for their rare and uncommon diagnosis.

January 28th, 2017: Personal Reflection on the Micheli Center

The Micheli Center which specializes in sports and injury prevention helped to enlighten me on the importance of strengthening one's body. The highly respected athletic trainer who I was able to shadow, allowed me to participate in a three-hour long consultation with a female athlete complaining of bilateral anterior knee pain and lower back pain related to strenuous modern-style dancing. The five foot seven inch fifteen-year-old had grown nine inches in the last two years, causing her bone growth rate to exceed her muscle growth rate.

We began the appointment by obtaining a wide variety of measurements utilizing tools referred to as goniometers, inclinometers, dynamometers, and sensory testing equipment. These instruments provided a baseline set of data describing the strength of her underlying muscles. We then relocated from the consultation room to the facility's advanced gymnasium. Athlete M.H. proceeded to conduct a series of FMS or functional movement system exercises. These exercises consisted of standing on a simulation mat that recorded the pressure points most used by her feet during complex balancing positions. The athletic trainer also prompted M.H. to run on a cutting-edge treadmill that processed and interpreted the positioning of her back and legs while she ran. The results of this thorough and intricate physical examination showed that M.H. completed the assigned exercises with extreme convex curvature of her lower back with exaggeration on the lower thoracic and lumber vertebrae. The results also demonstrated a lack of alignment between M.H.'s legs and shoulders, causing her to compensate by dropping her hips and extending her chest forward.

With these findings kept in mind, the athletic trainer met with M.H.'s physician to collaborate on effective treatment and strengthening modalities. With this interdisciplinary teamwork, they decided on a referral to physical therapy for the athlete's knee pain and a sequence

of physical training sessions at the Micheli Center to strengthen her core to prevent lower back injuries.

Institutions such as the Micheli Center, are crucial to young athletes. As a former three season athlete who participated in volleyball, basketball, and softball, I too faced physicality hardships. Unfortunately for me, I failed to take the appropriate preventative measures to avoid such injuries. I managed to cause sufficient trauma and damage to a vital joint in my back as a direct result, leading to my regrettable spondylolisthesis diagnosis. If I had taken the same precautionary actions as athlete M.H. has, then I may have strengthened my lower back enough to avert such harm.

Although M.H. is currently at high risk for severe back injuries such as spondylolisthesis, with this new guidance and direction she will hopefully be fortunate enough to escape such diagnoses and disorders. Facilities such as this one truly make a difference in teaching the importance of maintaining bodily strength to young athletes.

February 18th, 2017: Personal Reflection on Post-Operative Spinal Fusion

The orthopedic unit of ten northwest at the Boston Children's Hospital encounters and treats an array of post-operative pediatric patients. Staff nurse, Michael Felber, has been a member of this unit's interdisciplinary team for over fifteen years and has become knowledgeable about the post-operative needs of spinal fusion patients. Since spinal fusion represents one of the surgical procedures offered to an individual diagnosed with spondylolisthesis, his familiarity with the various patient outcomes following this type of surgery proved to be insightful.

Michael explained that spinal fusions have evolved and advanced immensely over the last decade. When he began his nursing career, the post-operative recovery period for this surgery equated to about five days, whereas today these patients can be released after a mere three days with

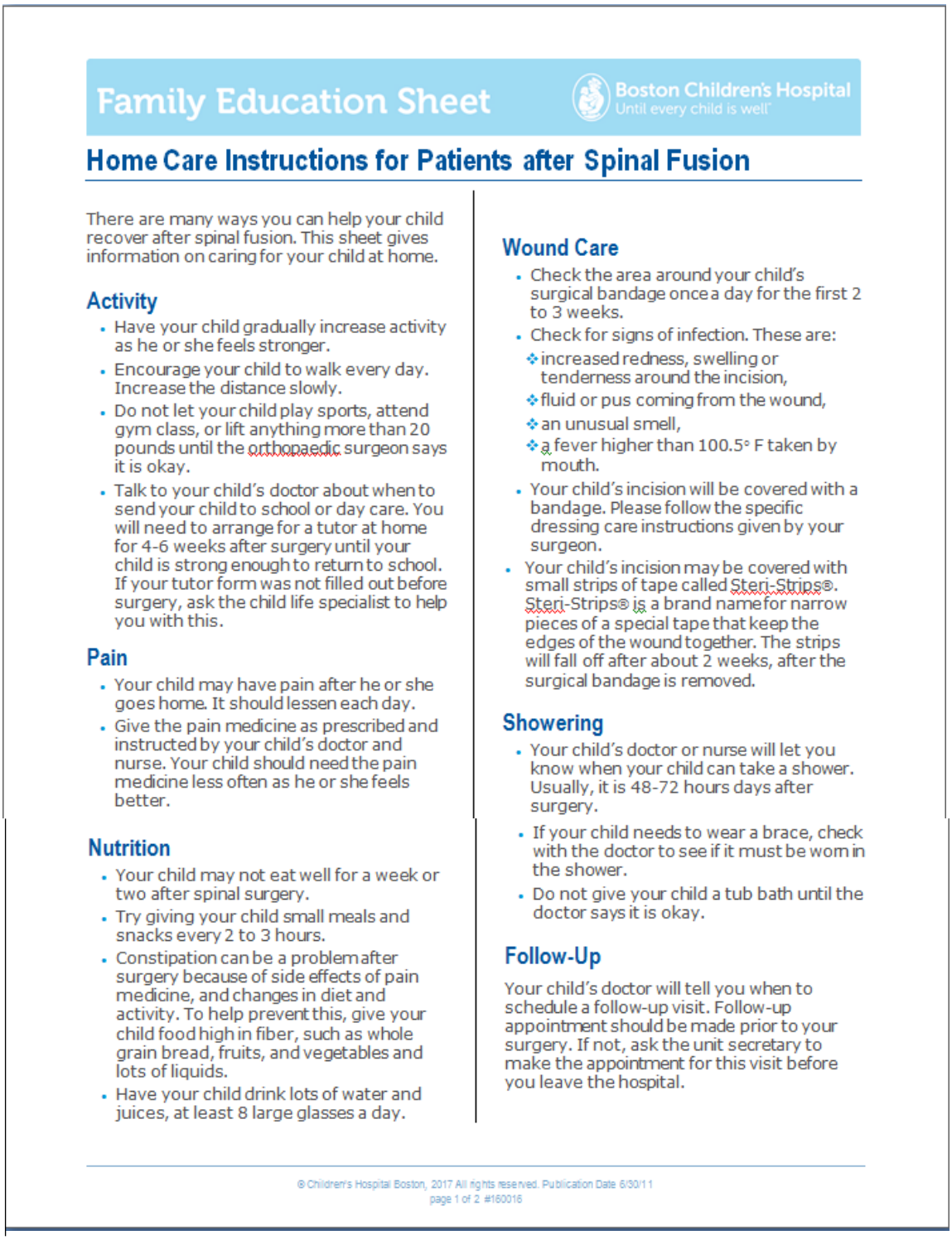
the exception of any unexpected complications. In the past, spinal fusion patients were also immediately placed in the intensive care unit (ICU) with the impression that these patients were too unstable for an alternate unit's supervision. With new findings and research, this misconception however no longer exists. Spinal fusion patients are instead transferred to orthopedic units such as ten northwest following their operative procedures. The health care providers receiving these patients are now equipped with specialized training that ensures patient safety during the critical timeframe involving the first twelve hours following surgery. In previous years, spinal fusion patients were also placed on intravenous (IV) and patient-controlled analgesia (PCA) pain medications for three days or longer and kept in bed. Whereas today, providers are implementing early ambulation and PO (by mouth) pain medications sooner in the recovery period. Michael emphasized that these alterations in post-operative spinal fusion care have both enhanced the patients' quality of stay and improved patient outcomes.

The medications that are essential to the recovery period following this type of procedure include gabapentin for neuropathic pain, morphine for "breakthrough pain," acetaminophen also for pain, valium as needed for muscle spasms, toradol for reduced swelling/pain, and stool softeners. Sugarless gum is often used to alleviate stomach pain as well. I was able to witness the administration of these medications while overseeing seventeen-year-old S.F.'s care following his recent (less than twenty-four hour) spinal fusion surgery. S.F. received spinal fusion not for spondylolisthesis but for his diagnosis of severe scoliosis. The post-operative care measures that must be conducted for spinal fusion patients however, are the same regardless of surgery rationales or indications. Therefore, Michael elaborated on techniques and approaches that can be utilized when caring for any individual recuperating from spinal fusion surgery.

The first technique involved stressing the importance of proper repositioning of the patient. Michael explained that log rolling is often used in place of any and all twisting methods when handling a patient in the post-operative state. He also disclosed that a Boston overlap brace or B.O.B. brace can be enforced for spinal fusion individuals who experience hardships with longer periods of mobility during the recovery phase. Frequently however, only those at high risk for injuries and/or falls are given these special braces. The majority of cases do not require such measures. In addition, strict neurological assessments need to be completed on post-operative spinal fusion patients to ensure that no adverse effects or complications have occurred related to surgery. Incentive spirometry is another technique often employed in these patients as well to prevent pneumonia. Further day-by-day directions for post-operative spinal fusion care can be found on the educational sheet provided by Boston Children's Hospital resources in Figure 1 below.

Unit ten northwest admits and treats about three to four post-operative spinal fusion patients each week, providing safe and effective care. This patient population increases significantly during summer and school vacations as this is typically an elective surgery. Although this can be an overwhelming surgery and post-operative recovery period for both the patient and family, spinal fusion care methods have progressed tremendously. Post-operative spinal fusion treatment has thrived in proficiency during the last decade and exemplifies great promise for the next.

Figure 1: Home Care Instructions for Patients after Spinal Fusion – English Version (The Boston Children's Hospital, 2011).



Family Education Sheet

Boston Children's Hospital
Until every child is well™

Home Care Instructions for Patients after Spinal Fusion

There are many ways you can help your child recover after spinal fusion. This sheet gives information on caring for your child at home.

Activity

- Have your child gradually increase activity as he or she feels stronger.
- Encourage your child to walk every day. Increase the distance slowly.
- Do not let your child play sports, attend gym class, or lift anything more than 20 pounds until the orthopaedic surgeon says it is okay.
- Talk to your child's doctor about when to send your child to school or day care. You will need to arrange for a tutor at home for 4-6 weeks after surgery until your child is strong enough to return to school. If your tutor form was not filled out before surgery, ask the child life specialist to help you with this.

Pain

- Your child may have pain after he or she goes home. It should lessen each day.
- Give the pain medicine as prescribed and instructed by your child's doctor and nurse. Your child should need the pain medicine less often as he or she feels better.

Nutrition

- Your child may not eat well for a week or two after spinal surgery.
- Try giving your child small meals and snacks every 2 to 3 hours.
- Constipation can be a problem after surgery because of side effects of pain medicine, and changes in diet and activity. To help prevent this, give your child food high in fiber, such as whole grain bread, fruits, and vegetables and lots of liquids.
- Have your child drink lots of water and juices, at least 8 large glasses a day.

Wound Care

- Check the area around your child's surgical bandage once a day for the first 2 to 3 weeks.
- Check for signs of infection. These are:
  - increased redness, swelling or tenderness around the incision,
  - fluid or pus coming from the wound,
  - an unusual smell,
  - a fever higher than 100.5° F taken by mouth.
- Your child's incision will be covered with a bandage. Please follow the specific dressing care instructions given by your surgeon.
- Your child's incision may be covered with small strips of tape called Steri-Strips®. Steri-Strips® is a brand name for narrow pieces of a special tape that keep the edges of the wound together. The strips will fall off after about 2 weeks, after the surgical bandage is removed.

Showering

- Your child's doctor or nurse will let you know when your child can take a shower. Usually, it is 48-72 hours days after surgery.
- If your child needs to wear a brace, check with the doctor to see if it must be worn in the shower.
- Do not give your child a tub bath until the doctor says it is okay.

Follow-Up

Your child's doctor will tell you when to schedule a follow-up visit. Follow-up appointment should be made prior to your surgery. If not, ask the unit secretary to make the appointment for this visit before you leave the hospital.

Family Education Sheet •

Home Care Instructions for Patients after Spinal Fusion

When to Call the Doctor

Call if your child

- has numbness or tingling in the arms or legs that doesn't stop if you change position,
- has nausea and vomiting that lasts more than 24 hours,
- becomes constipated,
- has a fever above 100.5° F taken by mouth,
- shows signs of a wound infection (See Wound Care above), or
- has pain that gets worse or is not helped by the pain medicine.

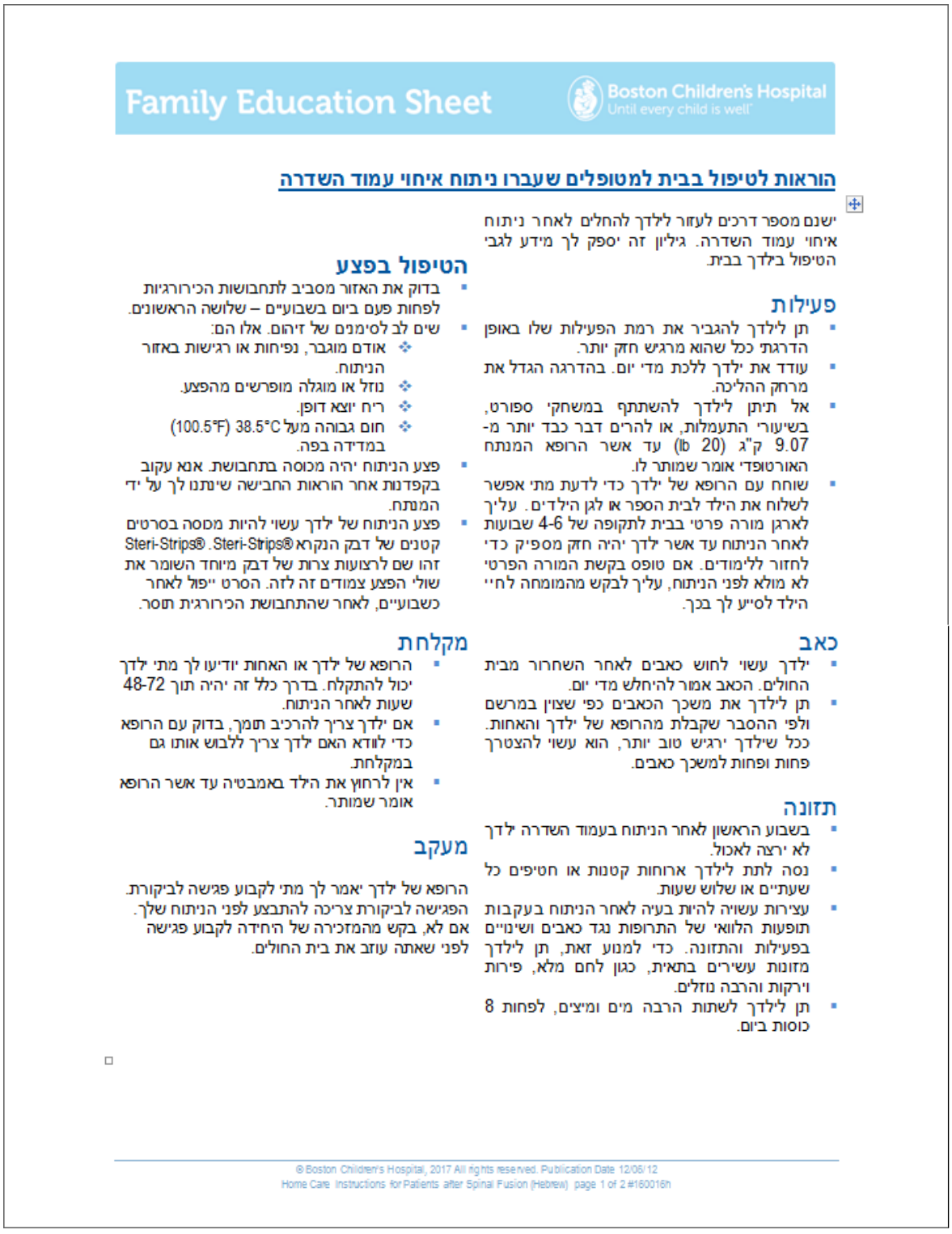
Call with any questions or concerns.

Contact Us

- Between 8:30 a.m. and 5 p.m., Monday through Friday, call the Orthopaedic Clinic at (617) 355-6021. Ask to speak to the triage nurse.
- After 5 p.m. on weekdays and on weekends and holidays, call the hospital page operator at (617) 355-6369. Ask to speak with the orthopaedic resident on call.

A ***Spanish*** version of this education sheet is available from your provider.

Figure 2: Home Care Instructions for Patients after Spinal Fusion – Hebrew Version (The Boston Children's Hospital, 2012).



Family Education Sheet

Boston Children's Hospital
Until every child is well

הוראות לטיפול בבית למטופלים שעברו ניתוח איחוי עמוד השדרה

ישנם מספר דרכים לעזור לילדך להחלים לאחר ניתוח איחוי עמוד השדרה. גיליון זה יספק לך מידע לגבי הטיפול בילדך בבית.

פעילות

- תן לילדך להגביר את רמת הפעילות שלו באופן הדרגתי ככל שהוא מרגיש חזק יותר.
- עודד את ילדך ללכת מדי יום. בהדרגה הגדל את מרחק ההליכה.
- אל תיתן לילדך להשתתף במשחקי ספורט, בשיעורי התעמלות, או להרים דבר כבד יותר מ-9.07 ק"ג (20 lb) עד אשר הרופא המנתח האורטופדי אומר שמותר לו.
- שוחח עם הרופא של ילדך כדי לדעת מתי אפשר לשלוח את הילד לבית הספר או לגן הילדים. עליך לארגן מורה פרטי בבית לתקופה של 4-6 שבועות לאחר הניתוח עד אשר ילדך יהיה חזק מספיק כדי לחזור ללימודים. אם טופס בקשת המורה הפרטי לא מולא לפני הניתוח, עליך לבקש מהמומחה לחיי הילד לסייע לך בכך.

כאב

- ילדך עשוי לחוש כאבים לאחר השחרור מבית החולים. הכאב אמור להיחלש מדי יום.
- תן לילדך את משכך הכאבים כפי שצוין במרשם ולפי ההסבר שקבלת מהרופא של ילדך והאחות. ככל שילדך ירגיש טוב יותר, הוא עשוי להצטרך פחות ופחות למשכך כאבים.

תזונה

- בשבוע הראשון לאחר הניתוח בעמוד השדרה ילדך לא ירצה לאכול.
- נסה לתת לילדך ארוחות קטנות או חטיפים כל שעתיים או שלוש שעות.
- עצירות עשויה להיות בעיה לאחר הניתוח בעקבות תופעות הלוואי של התרופות נגד כאבים ושינויים בפעילות והתזונה. כדי למנוע זאת, תן לילדך מזונות עשירים בתאית, כגון לחם מלא, פירות וירקות והרבה נוזלים.
- תן לילדך לשתות הרבה מים ומיצים, לפחות 8 כוסות ביום.

הטיפול בפצע

- בדוק את האזור מסביב לתחבושות הכירורגיות לפחות פעם ביום בשבועיים – שלושה הראשונים.
- שים לב לסימנים של זיהום. אלו הם:
  - אודם מוגבר, נפיחות או רגישות באזור הניתוח.
  - נוזל או מוגלה מופרשים מהפצע.
  - ריח יוצא דופן.
  - חום גבוהה מעל 38.5°C (100.5°F) במדידה בפה.
- פצע הניתוח יהיה מכוסה בתחבושת. אנא עקוב בקפדנות אחר הוראות החבישה שינתנו לך על ידי המנתח.
- פצע הניתוח של ילדך עשוי להיות מכוסה בסרטים קטנים של דבק הנקרא Steri-Strips®. Steri-Strips® זהו שם לרצועות צרות של דבק מיוחד השומר את שולי הפצע צמודים זה לזה. הסרט ייפול לאחר כשבועיים, לאחר שהתחבושת הכירורגית תוסר.

מקלחת

- הרופא של ילדך או האחות יודיעו לך מתי ילדך יכול להתקלח. בדרך כלל זה יהיה תוך 48-72 שעות לאחר הניתוח.
- אם ילדך צריך להרכיב תמך, בדוק עם הרופא כדי לוודא האם ילדך צריך ללבוש אותו גם במקלחת.
- אין לרחוץ את הילד באמבטיה עד אשר הרופא אומר שמותר.

מעקב

הרופא של ילדך יאמר לך מתי לקבוע פגישה לביקורת. הפגישה לביקורת צריכה להתבצע לפני הניתוח שלך. אם לא, בקש מהמזכירה של היחידה לקבוע פגישה לפני שאתה עוזב את בית החולים.

הנחיות למשפחה

הוראות לטיפול בבית למטופלים שעברו איחוי עמוד השדרה

מתי לפנות לרופא

עליך לפנות לרופא כאשר:

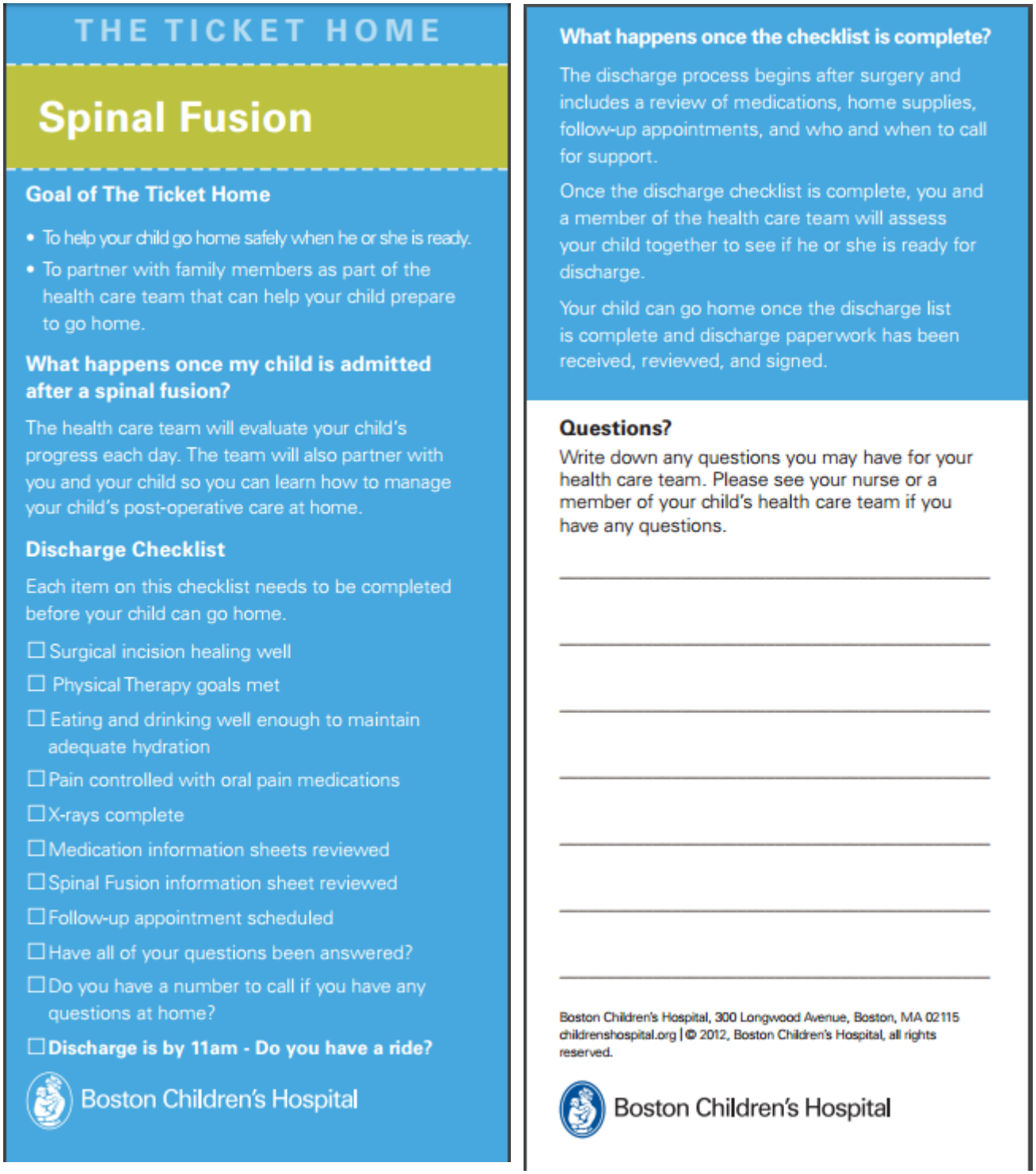
- ילדך מרגיש חוסר תחושה או דקירות קלות בידיים או ברגליים ותחושה זו לא חולפת אם משנים את התנוחה.
- יש בחילות והקאות שנמשכות יותר מ-24 שעות.
- יש לו עצירות
- יש לו חום מעל 38.5°C (100.5°F) כפי שהו נמדד בפה.
- מראה סימנים של זיהום בפצע (ראה למעלה: הטיפול בפצע), או
- יש לו כאב שהולך ומחמיר או שאינו משוכך עם המשכך כאבים.

צור קשר עם כל שאלה או ספק.

צור עמנו קשר

- בין השעות 8:30 -17:00 בין הימים ב'-ו'. התקשר למרפאה האורטופדית בטלפון: (617) 355-6021. בקש לדבר עם אחות טריאז'.
- לאחר השעה 17:00 בימי חול, בסופי השבוע ובחגים, התקשר לשירות המענה בטלפון (617) 355-6369. בקש לשוחח עם הרופא האורטופד המתלמד הנמצא בתורנות.

Figure 3: The Ticket Home (The Boston Children's Hospital, 2012).



THE TICKET HOME

Spinal Fusion

Goal of The Ticket Home

- To help your child go home safely when he or she is ready.
- To partner with family members as part of the health care team that can help your child prepare to go home.

What happens once my child is admitted after a spinal fusion?

The health care team will evaluate your child's progress each day. The team will also partner with you and your child so you can learn how to manage your child's post-operative care at home.

Discharge Checklist

Each item on this checklist needs to be completed before your child can go home.

- ☐ Surgical incision healing well
- ☐ Physical Therapy goals met
- ☐ Eating and drinking well enough to maintain adequate hydration
- ☐ Pain controlled with oral pain medications
- ☐ X-rays complete
- ☐ Medication information sheets reviewed
- ☐ Spinal Fusion information sheet reviewed
- ☐ Follow-up appointment scheduled
- ☐ Have all of your questions been answered?
- ☐ Do you have a number to call if you have any questions at home?
- ☐ **Discharge is by 11am - Do you have a ride?**

Boston Children's Hospital

What happens once the checklist is complete?

The discharge process begins after surgery and includes a review of medications, home supplies, follow-up appointments, and who and when to call for support.

Once the discharge checklist is complete, you and a member of the health care team will assess your child together to see if he or she is ready for discharge.

Your child can go home once the discharge list is complete and discharge paperwork has been received, reviewed, and signed.

Questions?

Write down any questions you may have for your health care team. Please see your nurse or a member of your child's health care team if you have any questions.

Boston Children's Hospital

My Own Personal Experience with Spondylolisthesis

The school bell struck 1:43 pm on a cloudy Thursday afternoon in May of 2011 signifying the end of yet another ordinary high school day, or so I thought. I sorted through my locker for the textbooks and folders I would need for that night's homework and headed off to the locker room following my typical after school routine. As I passed through the corridor, I found myself questioning what today's practice regimen would be. Would it be fielding? I really hoped so, but knowing my luck it would most definitely be batting practice which I had been dodging. Usually when my eye was on the ball and my head was in the game, I had no trouble up at bat, but lately I had felt physically uncomfortable at the plate. My stance had been off and my body seemed to do everything but cooperate. Pushing those thoughts aside, I reached for the handle to the women's locker room door, hoping that those thoughts would not become today's reality.

Familiar sounds and smells flooded my ears and nose as I entered the room. There were cleat spikes tapping on the floor following my teammates' movements, warm up music echoing throughout the room into the changing areas, and the smell of sweaty often unwashed practice jerseys on the backs of every single one of my teammates. I was no different. I headed to my locker and proceeded to get changed. As I finished filling my water bottle at the locker room fountain, I felt a hand press along my back. My best friend and the catcher of the team, Kallie, had come up behind me. As I turned around to greet her, the rest of my teammates joined us. We began to talk about our homework assignments and our desire or more so lack of desire to have a long practice on such a crummy day. As we began to continue the conversation outside of the locker room and towards the field, I found myself searching for buckets of balls, which would mean the worst thing ever in my eyes on this day…batting practice.

With no buckets of balls in sight and a flood of immediate relief, I began to breathe easier and enjoy the company of my teammates. We approached our coach, Mr. Baker, gradually breaking out of conversation and into silence, focusing our attention on his directions. It was then that my angst began once again. “So today we are going to work on our team’s batting. I forgot to grab the buckets of balls from the field’s shed earlier, so I’m looking for two volunteers to go grab them while the rest of you begin on five warm up laps around the field.” As hands rose up in the air to volunteer for a break from the dreaded warm up laps, I was too distracted to even care. Whatever new excitement that I had formed for the day’s practice immediately vanished once more.

As we began to rotate through players for a turn at bat, I was in no rush to volunteer. As a sophomore on the varsity team, I did not want to let my coach down by complaining about a sore body so I failed to confide in him about my fear of batting. With every second that I spent fielding a teammate’s ball, another second passed bringing me closer to my turn at bat. Eventually, despite hoping that time would run out, my turn approached and I headed towards the plate prompting myself with thoughts that maybe today would be a better outcome. I placed my helmet on my head, buckled the strap, put my batting gloves on, grabbed my favorite bat, and planted my feet on the right side of the plate. As the team pitcher threw the first ball, I tightened my grip and swung the bat for what felt like an eternity.

Heat rushed to my lower back as the bat made contact with the ball, sending it to the shortstop player. I grimaced but took my stance once more for the next pitch. This time, I hit the ball with more power towards center field but at an expense that I would forever be paying for. I felt a sharp intense and unbearable pain as I twisted my back to finish my swing, and found myself completely collapsed on the ground in mere seconds. My legs had given out and my back was on fire.

My coach and teammates immediately rushed towards me with bags of ice and words of comfort. I felt a wave of embarrassment pass over me and as I tried to stand up to avoid the attention, tears rushed down my cheeks and I found my way to the ground once more.

Minutes later, the school's physical trainer carried me off the field to his athletic room where all the injured athletes were found. Up until then, I had only ever walked by the room to visit friends who had encountered injuries, but I had never been among the injured. The physical trainer called my house phone and proceeded to inform my mom of the situation. Thirty minutes later, the frantic woman asking directions to the trainer's room, otherwise known as my mother, had arrived.

The next day, with the advice of the physical trainer, we proceeded to the doctor's office for an x-ray of my back. It was then that I was told by an older gentlemen with silver-lined hair that I had developed a disorder known as spondylolisthesis, most likely due to a stress fracture from repetitive strenuous activity such as softball. In that moment, I honestly had no clue what the heck "spondy-lo-lis-thesis" was. It was not until he continued on that a new sense of worry and concern crossed my mind.

According to the physician, I was a grade two in severity and a great candidate for future spinal corrective surgeries due to my age and current health status. He urged me to complete core exercises that would help to lessen the pressure of my upper body weight on the affected vertebrae. He informed me that these methods could help to prevent the need for surgery.

To this day, I still cringe at the thought of batting practice. I can still recall the twisting motion my back made and the fall that followed it with such detail. Reminders of the treacherous incident will always live on with every instance of pain that I now feel in my back during long periods of sitting in my college classes and during my eight hour nursing clinicals at various hospitals. That softball season will live to haunt me. I wish I could go back and tell myself to speak

up and confide in my coach about the condition I was in. I wish I could go back and tell the old me not to push my body too hard. The truth is, I learned that even with your eye on the ball and your head in the game, none of that matters if your body is not willing to play.

Closing Statement

Through my own personal research, I was able to acquire an abundance of fundamental knowledge and insight in regards to my own personal diagnosis of spondylolisthesis. The expectations that resulted from this project greatly exceeded those that were held during its commencement. I was not only able to conduct online research but was also to observe and study real-life situational research in some of the most renowned medical facilities in New England.

By investigating various medical databases, I have become further educated on some small but vital details that an individual with spondylolisthesis should know. According to findings, once diagnosed with a certain grade or severity of this condition, the rapid progression in grades is often not apparent or common. Therefore, as a twenty-one-year-old female classified as a grade two out of five in terms of severity, the likelihood of my spinal disorder worsening is low. That does not however suggest that progression will not occur. Therefore, the field studies I conducted helped me to determine the remedial measures I must take in the case that it should or does in fact progress.

The Boston Children's Micheli Center emphasized a theme of injury prevention. Since I had already received the injury, I was able to share my trauma story with some of the young athletes who visited the institution to help motivate them to take care of their own bodies. The physical trainers also provided strengthening-focused exercises to fortify and support their high athletic demands. Although, such measures could not be taken to prevent the already developed fracture of my pars interarticularis and the sequential vertebrae slippage of my spine, I could use such methods

to strengthen my core to delay or inhibit any further symptoms or progression of the spondylolisthesis itself.

The orthopedic unit I observed at The Boston Children's Hospital also aided me in my exploration but in a much different way. It helped me to envision the surgical procedures and post-operative measures that may be needed in the future. If my current core exercises and non-conservative methods that I utilize now do not help to prevent the worsening of my graded spondylolisthesis, then I would consider proceeding with a personal spinal fusion surgery. After hearing a firsthand account of another individual's experience with the surgery and observing the post-operative treatment modalities provided by the nurses and staff, I feel a high sense of reassurance and confidence in the procedure itself. My personal database research also suggested high efficiency and positive outcomes related to pain management of the vertebrae in relation to the diagnosis of spondylolisthesis.

Overall, this project truly gave me a greater understanding of the odds that I currently face with this spinal disorder and the various treatment options that are offered. It provided me with an abundance of answers that will prove to be crucial in my future health decisions and actions. This project does not only hold extreme significance in regards to my own identity but will also prove to be significant for all of the other individuals I encounter with spondylolisthesis and similar spinal disorders during my future nursing career. I now feel equipped with the knowledge and information to spread awareness amongst those who face the same discouraging health hardships.

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