

## Practice in Motion: Part II - 6 Components of Posture

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**Disclaimer:** Participants must always be aware of the hazards of using limited knowledge in integrating new techniques or procedures into their practice. Only sound evidence-based dentistry should be used in patient therapy.

### Introduction

This continuing education course is designed to educate dental professionals about the 6 components of posture and how to recognize structurally stable positions when providing care. Various movement strategies, stretches and exercises are presented that can assist with minimizing strain to pain sensitive tissues. This course builds on Part I. In addition, the science behind sitting and elements of a good supportive seat are discussed.

Please note this is Part II of a two-part series. [Practice in Motion: Part I](#) will educate dental professionals about efficient sitting positions and movements that assist with minimizing occupational pain and/or injury.

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## Conflict of Interest Disclosure Statement

- Jacquelyn Dylla reports no conflicts of interest associated with this course.
- Jane Forrest has done consulting work for P&G.

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## Overview

The focus of this course is to educate dental professionals about the 6 components of posture and various movement strategies, stretches and exercises that can assist with minimizing strain to pain sensitive tissues. This course builds on Practice in Motion - Part I. In addition, the science behind sitting and elements of a good supportive seat are discussed.

## Learning Objectives

**Upon completion of this course, the dental professional should be able to:**

- Identify fitness strategies that support good posture and body mechanics.
- Perform stretches and strengthening routines that can protect against fatigue, common aches and occupational injury.
- Discuss strategies for transitioning to new habits.

## The Six Components of Posture

The anatomy of the spine, combined with the pathological associations of structurally unstable postures beg the question of how should one sit to attain a structurally stable alignment, move in safe ranges and patterns, and still be able to provide sound dental care.

The six components of posture in video format intend to provide grounds to recognize structurally stable positioning, the boundaries that define safe working conditions that minimize stress to pain-sensitive tissue, and movement strategies that will enhance visualization during compromised positioning.

We acknowledge the impossibility to work within this framework 100% of the time. But knowing how to align yourself and move in safe ranges and patterns of motion should provide basic framework to return to when practice necessitates moving outside the recommended protective ranges and positions. Please review the 6 short video clips on stable and protective positioning and movement strategies (beginning with Video 1, Component 1 Base of Support through Video 6, Component 6 Head & Neck).

## The Six Components of Posture Videos

Dental professionals who lack the understanding of proper body mechanics do not have the knowledge to actively participate in protecting themselves from musculoskeletal disorders. While many accept discomfort as part of the profession, early intervention upon realization of symptoms may assist with preventing serious or permanent injury.

**Table 1. 6 Components of Posture.**

1. Base of Support
2. The Pelvis
3. The Lumbar Spine
4. Trunk
5. Shoulders
6. Head and Neck



**Video 1.** Component 1 - Base of Support.  
[Click on image to view video online.](#)



**Video 2.** Component 2 - The Pelvis.  
[Click on image to view video online.](#)



**Video 3.** Component 3 - The Lumbar Spine.  
[Click on image to view video online.](#)



**Video 4.** Component 4 - Trunk.  
[Click on image to view video online.](#)



**Video 5.** Component 5 - Shoulders.  
[Click on image to view video online.](#)



**Video 6.** Component 6 - Head and Neck.  
[Click on image to view video online.](#)

Dental professionals at risk for musculoskeletal disorders may experience the following symptoms:

1. Fatigue, or stiffness in joints
2. Reduced range of motion (ROM) in the back, neck, or shoulders
3. Pain in the back, neck, forearms, wrists/hands
4. Numbness or burning in the legs, arms, or hands
5. Muscle cramping
6. Loss of strength

Although these symptoms may not necessarily lead to a musculoskeletal disorder, it is important to recognize them and seek intervention if they persist. Acknowledging that fatigue in any position, whether correct or incorrect, is a precursor to discomfort that can lead to symptoms that may cause pain/injury is important. When fatigued, clinicians should alter their position, move to another quadrant, or take a short break. Awareness of proper body mechanics is key to making informed decisions about sitting and moving to minimize pain and injury.

Table 2 summarizes the protective positions and ranges for each of the six body regions discussed in the videos and can be used as a decision-making guide for posture and positioning.<sup>1</sup> Constructed upon the foundational principles underlying alignment, the parameters set in the table aim to minimize load and stress to pain sensitive tissues when sitting. Sitting properly is not intended to be a static event, but fluid movement in the most energy efficient ranges and patterns. In turn, the conservation of energy will minimize fatigue, and in the long run, pain and/or pathology.

### Prescribing Fitness

With an understanding of a stable sitting posture and safe movement patterns, proper attention must be paid to attaining and/or maintaining proper tissue lengths through stretching and mobilization. This section devotes attention to fitness topics crucial to the health of the dental professional. These include the benefits of stretching, stretching guidelines, several muscular stretches, one nerve glide, and one joint mobilization technique.

**Table 2. Summary of Protective Positions and Ranges.**

Acceptable Position	Body Region
	<b>Base of Support (BOS)</b>
Feet Flat on floor Wide BOS	Position of Feet
	<b>Hips</b>
Hips level on stool	Side to Side
	<b>Lumbar Spine</b>
Tailbone up (Lordosis present)	Front to Back
	<b>Trunk</b>
≤ 20° in each plane	Front to Back
≤ 20° in each plane	Side to Side
≤ 20° in each plane	Rotation
	<b>Head/Neck</b>
Ear in line with AC joint	Front to Back
≤ 20° in each plane	Side to Side
≤ 20° in each plane	Rotation
	<b>Shoulders</b>
Not slumped forward, ≤ 20° flexion	Front to Back
Level with trunk and NOT elevated. Abduction ≤ 20°	Side to Side

### Why Should I Stretch?

The purpose of stretching is multi-factorial offering numerous benefits. First, stretching elongates a muscle to allow more freedom of movement of the joint that the muscle crosses, therefore reducing excessive or imbalanced muscle forces that can cause dysfunction. Second, stretching improves flexibility, and for the elderly, this may reduce the risk of falls. Next, stretching increases range of motion (ROM), circulation and blood flow, and improves posture, balance and coordination. Also, stretching promotes relaxation and reduces stress. Other benefits of stretching include reducing muscle spasm, which in return can reduce pain. As well, it can assist with muscle recovery after exercise and with reducing delayed-onset muscle soreness. Finally, stretching can balance muscle groups that are unbalanced due to poor posture,



or from performance of repetitive activities. Table 3 summarizes these benefits.<sup>2,12</sup>

For dental clinicians, the areas that may be vulnerable to tightness or imbalances include the neck, chest/shoulders, wrists/hands/fingers, hips, and the low back. Therefore, it is important for the clinician to adopt a stretching regime targeting specific regions that potentially can trigger pain, spasm, and imbalance. If these or other symptoms currently hinder your practice, then start immediately to manage the symptoms before they intensify. General guidelines will maximize the effectiveness and safety of your stretching routine. Table 4 offers several strategies to apply to your routine.<sup>13,14</sup> Use the guidelines in Table 4 when considering the activities presented in the next section.

The following stretches, nerve glide, and joint mobilization offer the dental professional a specific means to combat occupational pain of musculoskeletal origin. Apply the guidelines in Table 4 whenever possible.

**Table 3. Summary of the Top 10 Benefits of Stretching.**

1. Increases ROM and Flexibility
2. Decrease Falls
3. Increases Circulation and Blood Flow
4. Improve Posture
5. Improves Balance and Coordination
6. Promotes Relaxation
7. Reduces Stress
8. Decreases Muscle Spasms
9. Decreases Muscle Soreness
10. Balances Muscle Groups

**Table 4. Stretching Guidelines.**

1. **Warm-up** prior to stretching for activity preparation. Blood flow to the muscles enhances the ease of stretching. An adequate warm-up should increase the body's core temperature. Breaking a sweat often signifies warm-up.
2. **Hold for 30 seconds.** For tighter muscles, hold each stretch for 60 seconds. Execute each stretch 1-3 times.
3. **Don't bounce.** Ballistic or bouncing stretches may tear or injure tissue consequently forming scar tissue. Scarring intensifies tightness and hampers flexibility.
4. **Slow static stretching** of muscle offers greater safety than bouncing.
5. **Avoid painful stretching.** Stretch until you feel a slight pulling, but not pain.
6. **Stay relaxed.** Breathe deeply and avoid holding your breath while stretching. Exhale as you move into the stretch.
7. **Stretch daily.** Perform some stretches multiple times per day to alleviate tension from static positioning.

## Stretches

### Levator Stretch

**Target:** Levator scapulae and upper trapezius muscles

For stretching the left side, place both arms behind the back and hold the left wrist with the right hand. Slightly tuck your chin, and then tilt your head to the right. Do not let your left shoulder elevate.

As an option, use your arm to gently pull your head into a lateral tilt. To individualize the stretch for your specific tightness, move your head slightly forward or back to optimize the stretch.

Hold for 30 seconds. Repeat on the other side.



### Doorway Stretch

**Target:** Pectoralis major muscle; clavicular and sternal portions

**Position A:** Stand in a doorway and place your arms along the frame. Keep the elbows at shoulder height. Attempt to step through until a stretch is felt in the chest.



**Position B:** Repeat position 1, except place the elbows higher than the shoulders. Hold each stretch for 30 seconds and perform 2x.



### Nerve Gliding

**Glide:** Self Median Nerve Glide

**Target:** Median nerve

Place your hand at shoulder height against the wall with the palm flat, fingers spread, and the elbow straight. Next, rotate your arm so the elbow crease faces the ceiling. Finally, slowly rotate your entire body away from your arm to achieve a gentle stretch. Hold 10-15 seconds. Perform 3x with each arm.



### Thoracic Mobilization

**Mobilization:** Tennis Balls with Arm Circles

**Target:** Stiff or sore costotransverse joints in the thoracic spine (mid-back)

Lie face up with knees bent on the floor with 2 taped tennis balls placed in a stiff or sore

segment of the thoracic spine. Use a pillow under the head for support. Raise both arms up to the ceiling and circumscribe circles in either the clockwise or counterclockwise direction. Larger circles will provide greater intensity. Scoot up or down to move the balls to another segment. The balls can be used in the lumbar or thoracic spine, but NEVER on the cervical spine. Perform for 5+ minutes. This mobilization is most therapeutic at the end of the day.



### Exercises (with videos)

Finally, **strength training** to support new positioning and movement is essential. While perfect posture and strength are not the “magic bullets” that eliminate all possibility of pain or pathology, they may reduce the dental professional’s vulnerability. Knowledge of what muscles to target when training for postural support and injury prevention is important. Strengthening the wrong muscles may prove counterproductive. For example, many spend time working-out the chest. For the dental professional, this may prove detrimental and further exacerbate pre-existing symptoms in the neck and/or shoulder region. When strengthening the core, the abdominal muscles should be targeted. However, focusing only on the rectus abdominis muscle (the six pack most of us are missing) may not prove significantly beneficial if the goal is lumbar or core stabilization. And, with certain pathologies, sit-ups may cause more harm than good.

The exercises put forward target the necessary muscles dental professionals must strengthen if they are to sit in a structurally stable alignment with minimal fatigue. The pertinent regions of the body include the upper and mid-back, shoulders, low back, hips, and thighs. As well, the exercises target areas of the body vulnerable to pain and injury, especially for

professionals who sit most of the day. If followed precisely as instructed, they should not cause pain other than muscle soreness. If you experience pain, stop and consult your physician. As well, if you already have pathology, consult your physical therapist or physician before starting any new exercise routine.

These exercises are progressive utilizing various positions. The easiest exercises are described first in the lunge and plank progressions, with the difficulty increasing with each successive exercise.

### “I Don’t Knows”

#### Exercise: “I Don’t Knows”

**Targeted Muscles:** Infraspinatus, teres minor, rhomboids, middle trapezius

This exercise can be performed with or without the exercise band or sports-cord. Start with your shoulders down and back, arms at your side, elbows bent 90 degrees, and your palms up. Make sure your elbows are slightly behind your trunk. Next, externally rotate your arms while keeping your elbows at your side. Maintain the interscapular muscle activation (shoulders down and back) during the entire exercise. Perform 20-30 repetitions every hour. This will assist with offloading neck stress while strengthening the upper back and shoulders.



**Video 7.** Exercise - “I Don’t Knows.”

[Click on image to view video online.](#)

## Lunges (Standing, Walking, Star)

### Exercise: Lunges (Standing Lunges, Walking Lunges, Star Lunges)

**Targeted Muscles:** Hips and thighs

Success of this exercise depends not on what the front leg does, but what the back leg does. Start by standing with your feet shoulder width apart and the stomach drawn in. Next, take a step forward with your left leg and drive the right leg straight down toward the floor. This will assist with maintaining an alignment whereby the left knee is in-line with the left ankle. Keeping the knee in-line with the ankle will minimize shearing forces in the knee and subsequently assist with decreasing the incidence of anterior knee pain. Avoid the knee progressing forward of the ankle in the forward leg. After lunging forward, you may return to the starting position and execute this maneuver starting with the right leg. As an option, instead of returning to the starting position, continue performing the lunge with each step progressing forward; walking lunges or perform them in multiple planes; star lunges. Perform either standing, walking, or star lunges or walking lunges for 3-5 minutes.

## ½ Planks

### Exercise: ½ Planks

**Targeted Muscles:** Abdominals (transverse abdominis and obliques), lower and mid back, and shoulders

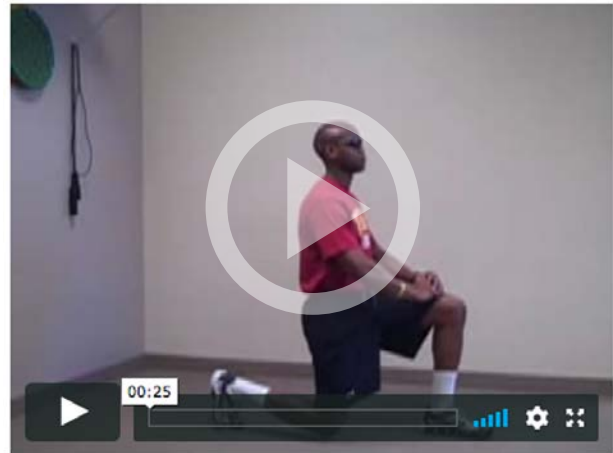
**½ Forward Plank:** Balance on the elbows and knees so that the shoulders are over the elbows, and your hips are in front of your knees. Draw your stomach in, tighten your buttock muscles, and push up through your shoulders. Do not let your back sag toward the floor. Hold this position for 10-15 seconds and perform 10 repetitions.

**Goal:** 10 repetitions holding each for 30 seconds.

## ½ Side Plank

### Exercise: ½ Side Plank

The balance points are the elbows and knees. Keep your shoulders over your elbows, draw



**Video 8.** Exercise - Standing Lunges.  
[Click on image to view video online.](#)



**Video 9.** Exercise - Walking Lunges.  
[Click on image to view video online.](#)



**Video 10.** Exercise - Star Lunges.  
[Click on image to view video online.](#)





**Video 11.** Exercise - ½ Forward Plank.  
[Click on image to view video online.](#)



**Video 13.** Exercise - Full Forward Plank.  
[Click on image to view video online.](#)



**Video 12.** Exercise - ½ Side Plank.  
[Click on image to view video online.](#)



**Video 14.** Exercise - Full Side Plank.  
[Click on image to view video online.](#)

your stomach in, tighten your buttock muscles, and raise your hips. Hold for 10-15 seconds and perform 10 repetitions.

**Goal:** 10 repetitions holding each for 30 seconds.

### Full Planks

#### Exercise: Full Planks

**Targeted Muscles:** Abdominals (transverse abdominis and obliques), lower and mid back, and shoulders.

**Full Forward Planks:** The balance points are the elbows and toes. Draw your stomach in, tighten your buttock muscles, push up through your shoulders, and raise your body off the

floor between your elbows and toes. Do not let your back sag toward the floor. Hold for 10 seconds and perform 10 repetitions.

**Goal:** 10 repetitions holding each for 30 seconds.

### Full Side Plank

#### Exercise: Full Side Plank

The balance points are the elbows and ankles. Draw your stomach in, tighten your buttock muscles, and raise your hips off the floor. With the arm not supporting your body weight, extend it toward the ceiling for balance. Hold for 10 seconds and repeat on the other side. Perform 10 repetitions on each side.

**Goal:** 10 repetitions on each side holding each for 30 seconds.

Incorporate any or all these stretching/strengthening and stabilization exercises into your daily routine. These exercises are offered as a sampling of the many and progressive strengthening exercises available. They are not offered as treatment for an existing problem and we encourage you to discuss your specific problem with a health care professional.

### Science Behind Sitting

History has shown that transitioning from a standing to a sitting position has traded one set of physical aches and pains for another, with many careers ending far too early from severe low back pain and other musculoskeletal disorders. To minimize the detrimental effects of static sitting we must turn to the science underlying both the principles of sitting and the surfaces on which we sit.

### Science Behind Sitting: Disc Pressures, Lumbar Lordosis, and Ischial Contact Pressure

As discussed in Practice in Motion: Part I, disc pressures in sitting far exceed those in standing.<sup>15</sup> An increase in the spinal load from sitting causes an increase in disc pressure, reduces the disc heights and decreases the lumbar lordosis, contributing to pain and disc degeneration.<sup>16,17</sup> The decreased lumbar lordosis associated with sitting as compared to standing<sup>16,18</sup> has been associated with low back pain<sup>18,19</sup> and degenerative disc disease at the L5 S1 segment.<sup>20</sup>

Increasing the lumbar lordosis can be accomplished in three ways. First, clinicians can actively rotate their pelvis forward by raising the tailbone up. Second, a lumbar support that supports them into a lordotic curve, like that in standing, will work. Finally, tilting the angle of the seat downward will rotate the pelvis forward and create more lordosis in the lumbar spine.

### Elements of a Seating System

The discussion that follows will lead you on a course that should shed light on seating systems and their four major components: the base, seat, backrest and arm support.

### The Base

The base of the chair should always utilize a 5-point system (Figure 1). The five legs on a chair will provide two main essentials: ease of movement and stability.

The 5-point system allows you to move in varied angles and patterns around your patient's chair with proficiency and without the possibility of destabilizing your sitting surface, which can occur with a 4-point system. The focus must be on your treatment and not on your chair. Most, if not all, employ this concept.

### The Seat

Seats come in varied sizes and shapes (Figures 2 and 3). Five key issues surrounding seats include **pressure reduction, shape, length, height and tilt.**

**Pressure reduction:** First, let's address ischial pressure reduction. Decreasing the pressure under the ischial tuberosities can be accomplished in two ways. First, a pliable surface, such as a Swiss ball, or other forgiving surfaces can be used. Applying a concept from physics, if there is no net movement of our body down into the seat, then the hard surface we sit on will direct an equal and opposite force upon us. So, if we direct a 100kg force into the firm seat, the seat will direct that 100kg force back at us. This force can be transmitted immediately up the spine resulting in an increased spinal load during sitting. In standing, the opposing force is directed up through our legs before being transmitted to the spine. Thus, there are lower disc pressures with standing; however, if the surface significantly deforms from our force



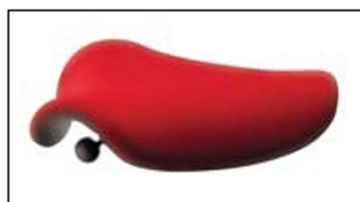
**Figure 1.** The five-point “star” base.



**Figure 2.** Flat-type seats.



**Figure 3.** Saddle-type seats.



**Figure 4.** Declining Seat.

directed down into it, as with sitting on a Swiss ball, our force is greater than the force pushing back up at us and the spinal load is less.

Second, an articulating surface that tilts the back part of the seat down while keeping the front part of the seat level and combines an aggressive backrest to support a lordosis akin to an angle in standing is recommended.<sup>21</sup> Today, an articulating seat has not been designed beyond the laboratory, so one should look for a seat that not only slopes down in the front, decreasing the pressure to the distal thighs, but also slopes down in the back to reduce the ischial pressure as well. If the back part of the seat slopes downward, there must be a corresponding aggressive back support to facilitate lumbar lordosis.

We now know from science that reducing the pressure under the ischial tuberosities reduces strain on the back, and that femoral abduction and external rotation allows the pelvis to more

easily attain a position whereby the contact pressure under the ischial tuberosities is reduced (i.e., an anteriorly rotated pelvis).

**Shape:** The next issue related to seats is **shape**. The flat, scooped or pan seat tends to increase the pressure under the ischial tuberosities, unless the seat is declined in the back and/or leg regions offloading the ischial tuberosities or thighs respectively (Figure 4). In addition, flat seats require one to expend more effort in assuming the tail-bone up position. Often the thighs are cradled, placing them in a more adducted and internally rotated position, whereas, the biomechanics of the straddle-sitting position give rise to structural stability.

Look for a seat that allows the thighs to abduct and externally rotate, making anterior pelvic rotation easier and further stabilizing your pelvis. Assuming a wide base of support also promotes femoral external rotation, and the abduction will keep you balanced when you move around your patient's chair. Some saddle-type seats can accomplish these goals, but be careful. Some manufactures use the term "saddle" to describe a seat that tilts, but in reality, it is flat and inhibits your thighs from automatically abducting and externally rotating.

**Length:** Length of the sitting surface also should be considered. The length should always allow for at least two to four inches of space between the end of the seat and the back of the knee. A longer seat length may compromise circulation and cause excess pressure to the tissue.

**Seat Height:** Seat height must be adjustable. At the very lowest, the seat should be adjusted so the hips and knees are equal in height, i.e., parallel to the floor. Ideally, the hips should be slightly higher than the knees, creating a trunk-to-thigh angle greater than 90° (135° is ideal). This degree of angle allows the pelvis to rotate forward with greater ease and thus create the essential lumbar curve.

**Tilt:** Tilt is the next popular feature in the seat. Science has demonstrated that we lose some of our lumbar curve when we sit as compared to standing,<sup>21</sup> and the tilt feature can facilitate a greater lordosis than a flat seat. Look for a chair

that allows a forward tilt of at least 15-25°, as this can be the difference in the lumbar curve in sitting as compared to standing.<sup>21</sup> Also, tilting the seat to promote a 135° trunk-to-thigh angle will reduce the pressure in the lumbar spine by decreasing the contact area under the ischial tuberosities.<sup>16</sup>

### The Backrest

Just as the shapes of seats differ, so do the shapes and types of backrests (Figure 5). The back support of the chair is key in assisting with creating a lumbar curve comparable to that in standing. The adjustability must be robust enough to meet and/or improve your own lumbar lordosis after assuming the “tail-bone up”<sup>22</sup> posture. It should aggressively support the lumbar spine and not cradle or wrap around your trunk. The backrest height should not compromise the spine’s natural curves, but only support the middle to lower lumbar region. Many backrests on today’s chairs offer too much width and height, which can compromise spinal positioning and movement. Therefore, the adjustability should include an up and down and a front-to-back modification.

### Arm Supports

Clinical simulation suggests a benefit in using dental stools that incorporate static arm supports.<sup>23</sup> Surface EMG studies<sup>24,25</sup> examined the effects of forearm support on muscle activity in the shoulder and forearm during horizontal movements and subject comfort. Study results indicated that forearm supports do improve subject comfort and reduce muscle activity in the shoulder and forearm regions which can reduce fatigue, pain and possibly pathology. However, the ability of the manufacturers to deliver these components both functionally and effectively varies with design. Some designs offer only a forearm “rest” that has the potential to allow the forearm or elbow to slip off, while others offer a forearm support that cradles the forearm, eliminating the possibility of slippage. Other variations in forearm rests or supports include those that are fixed on both sides. Alternatively, one side is fixed and the other spring-loaded. This design provides stability for one arm and supported



**Figure 5.** Back Rests.

mobility for the other. Also, a telescoping feature may be offered that allows the support to move with your arms as you reach. Again, science supports this option, but effectiveness relies on selecting the appropriate design matching your needs.

### Summary

Videos of the six components of posture are presented to allow the learner to recognize structurally stable positioning, the boundaries that define safe working conditions, and movement strategies that will enhance visualization during compromised positioning. Examples of stretches and strengthening exercises that target postural support and injury prevention for dental professionals also are incorporated as are stretching guidelines. All videos are available and can be viewed as often as needed.

Another component of the course reviewed the science behind sitting and the elements that should be considered when selecting a chair. No one chair will meet the needs of all individuals, and no one chair exhibits all the ideal characteristics that support structural stability. It is not the intent to promote a specific chair, but provide guidance based on science when making your selection. Keep these concepts in mind when putting your *practice in motion*.



## Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: [www.dentalcare.com/en-us/professional-education/ce-courses/ce554/start-test](http://www.dentalcare.com/en-us/professional-education/ce-courses/ce554/start-test)

- 1. To establish a structurally stable sitting posture, what should you do first:**
  - a. Tail-bone up
  - b. Establish a wide base of support
  - c. Shoulders down and back
  - d. Hinge from the hips to lean forward
- 2. A strategy in sitting for leaning forward to get closer to an object without bending at the low back is called what?**
  - a. Hip hinging
  - b. Hip flexion
  - c. Lumbar shifting
  - d. Lumbar lordosis with thoracic stabilization
  - e. None of the above.
- 3. What controls the lumbar spine?**
  - a. Base of support
  - b. Pelvis
  - c. Backrest on the chair
  - d. Thoracic spine position
  - e. Cervical spine position
- 4. When looking down, the best technique to use is what?**
  - a. Spine compression test
  - b. Full cervical flexion
  - c. Capital hinging
  - d. Capital flexion
- 5. When describing a forward head position, the ear is forward of what structure?**
  - a. Hip joint
  - b. Humerus
  - c. AC joint
  - d. C7 vertebrae
- 6. How many degrees of freedom can you move in each plane and still be in a protective position?**
  - a. 5
  - b. 10
  - c. 15
  - d. 20
  - e. 30
- 7. Improvement in posture, a decrease in muscle tension and spasms, improved circulation and blood flow, and an increase in ROM are all benefits of:**
  - a. Sitting
  - b. Stretching
  - c. Prolonged standing with a wide base of support and the use of hip hinging.
  - d. Test taking
  - e. Structurally stable sitting posture.

8. **What muscles are targeted in the exercise “I don’t know?”**
- a. Pectoralis major and minor
  - b. Infraspinatus, teres minor, rhomboids, middle trapezius
  - c. Deltoids and lower trapezius
  - d. Transverse abdominis
  - e. Rectus abdominis
9. **To minimize shearing forces in the knee when performing the lunge, it is important to keep the knee in line with the ankle.**
- a. True
  - b. False
10. **“Balancing on your elbows and toes” describes what exercise?**
- a. “I don’t know”
  - b. Full side planks
  - c. Doorway stretch
  - d. Half forward planks
  - e. Full forward planks
11. **Transitioning from a standing to a sitting position has eliminated low back pain and other musculoskeletal disorders.**
- a. True
  - b. False
12. **When selecting an operator’s chair, it should have the following:**
- a. A 3-point base, trunk support, and a pan type seat.
  - b. A 3-point base, lumbar support, and a saddle type seat.
  - c. A 5-point star base, lumbar support, a mechanism to create forward tilt.
  - d. A 5-point star base, trunk support, a saddle type seat.
  - e. None of the above.
13. **The following strategies can assist in reducing ischial pressure:**
- a. Use of a pliable/forgiving seating surface
  - b. Tilting the back part of the seat down while keeping the front level
  - c. Using an aggressive backrest to support a lordosis
  - d. A and C
  - e. A, B and C
14. **A seat should be adjusted so the hips and knees are equal in height or the knees should be slightly higher than the hips.**
- a. True
  - b. False
15. **Which of the following backrest features does not support the lumbar curve?**
- a. Being adjustable
  - b. Cradling the trunk
  - c. Moving up and down
  - d. Moving front-to-back
  - e. None of the above, they all support the lumbar curve

## References

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