

SCOPE



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Pittsburgh, PA

DETERMINE YOUR ERGONOMICS QUOTIENT FOR GREATER PROFITABILITY

A good way to gain a better understanding of anything is to simply test yourself. Therefore, we present an opportunity to look at specific ergonomic issues relevant to good overall call center design and see how you score. The answers are provided on the rest of the brochure. Please don't be distracted by the technical jargon in the quiz. After all, knowledge is power. In fact, we suggest quizzing your architect/space planner to see how knowledgeable they are concerning these issues so important to the performance of your call center.

1. A footrest is a good way of supporting people whose feet can't reach the floor.

Freestanding footrests are commonly recommended (ANSI/OSHA) to provide foot support for smaller people who must work at a keyboard on a fixed-height desk that is too high for them. Typically, the seat is raised to align the worker's upper limbs with the keyboard, and a footrest is provided to support the feet, which would otherwise be dangling above the floor.

True or False?

2. An "ergonomic" work chair is the best way to ensure good back support.

There is a widely held belief that an ergonomic chair with lots of adjustments ensures healthy sitting postures.

True or False?

3. Keyboards should be placed at elbow height with the forearms parallel to the floor to achieve a straight wrist posture.

Most ergonomic guides and supporting illustrations emphasize aligning the keyboard height (the keyboard's home row, to be exact) with the seated elbow height (the body protuberance called the lateral epicondyle). At the same time, they emphasize keeping the forearms parallel to the floor. This supposedly establishes a straight wrist posture while keying.

True or False?

4. The best sitting posture for office work is an upright torso with a 90-degree hip angle.

Upright sitting postures are commonly recommended for office work. Many ergonomic guidebooks, templates, software models, and standards (ANSI) depict anatomical figures with the landmarks of the ear, shoulder, and hip aligned vertically, and the hip angle at a perfect 90 degrees. Many health and safety managers describe this posture to workers as being ideal for computer work.

True or False?

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5. The best place to position the mouse or pointing device is to the immediate right or left of the keyboard.

According to the few experts closely studying the mouse and mousing postures, placements of the mouse to the immediate right or left of the keyboard (based on the dominant hand) is recommended.

True or False?

6. The best place for the VDT monitor is at or slightly below the worker's upright seated eye height.

Many ergonomic guides and standards suggest that the active viewing areas of the screen should be placed at, or slightly below, eye height. Many practitioners use anthropometric measurements for eye height that are taken with a worker sitting upright to determine exactly how high to position the monitor.

True or False?

7. An adjustable keyboard tray is the most cost-effective way to ensure good working postures.

Because of their relatively low cost and ease of retrofit, keyboard trays tend to be used as a panacea to correct most posture problems in the office.

True or False?

8. The seat-height range recommended by ANSI (16 to 20.5 inches) is based on fitting 95 percent of American men and women.

ANSI/HFS VDT 100-1988 provides voluntary guidelines for size and specification of computer hardware and associated furniture and seating. The guidelines are developed using the science of anthropometry (the study of human body dimensions based on landmarks for measurement such as joints and creases). ANSI's criteria for the guidelines are based on fitting the 5th-percentile female through the 95th-percentile male. In effect, this should accommodate 95 percent of all Americans, excluding only the outer fringes of the population — the 5 percent who are very small women and the 5 percent who are very large men. Most people assume that furniture and seating designed to fit a certain percentile of a population will actually do so for all body dimensions. In truth, it is nearly impossible to meet every combination of variability among even average-sized people.

True or False?

ANSWERS

1. False. Footrests can do the job, but they should be used only as last resort.

A footrest does provide foot contact, which helps to reduce pressures on the backs of the legs and reduces loads on the spine for those whose feet don't reach the floor. However, the footrest simply doesn't work most of the time. Here's why:

- People need to use different leg positions for comfort and to avoid leg swelling. People also need to vary body postures to avoid concentrated forces on the spine and pressures on soft tissue. For workers whose feet don't reach the floor, footrests severely limit posture changes.
- Most people need to move around their workstation. This requires leg movement. When we reach forward, our legs and feet need to move front to back. When we move sideways or swivel to get out of our chair, our legs



and feet need to move side to side. For workers whose feet don't reach the floor, footrests don't provide a large enough base of support for these basic seated movements.

- Workers who use footrests tend to sit at the front edge of their chairs in order to use their legs if their job requires movement. As a result, they get no back support from the chair.

Lesson Learned

Whenever possible, lower the chair so that the worker's feet are in contact with the floor and adjust the rest of the work-station accordingly. If the only alternative is a footrest, use a large one. Only use footrests for people whose feet do reach the floor, as a tool to support varied leg postures.

2. False. The chair itself doesn't control sitting postures.

A good ergonomic work chair can be an important factor in achieving good back support by properly fitting the worker. However, the chair itself isn't what controls workers' seated postures or the amount of back support they get. Consider this:

- A person's torso is drawn forward, regardless of the attributes of the chair, when frequently used items on the desktop (mouse, paperwork, writing materials) are too far away to reach easily or when objects that must be viewed (reference material, keyboard) are too low.
- Work surfaces that are too high or too low cause workers to sit forward without back support from the chair.

Lesson Learned

To ensure good back support, start by arranging frequently used desktop equipment close in to the body. Often the work surface configuration (corner, U or body pocket designs) can reduce the need to sit forward by providing more space close in to the body. Try raising or angling up any writing or reading materials to reduce the need to bend forward. Then you can focus on ergonomic chair features to optimize back support.

3. False. There is no evidence that using a keyboard at elbow height while keeping the forearms in a horizontal position produces desirable postures

Adjusting the keyboard height to the elbow height is a good benchmark because when the keyboard platform is too high, people have to raise their shoulders to type. However, keyboard/elbow-height alignment does not have a strong bearing on the wrist posture itself. Here's why:

- A number of studies have confirmed that the neutral, straight position of the wrists is not ensured by having an elbow-height keyboard and horizontal forearms.
- The neutral or least stressful position of the elbow joint is open, which affects the angle of the forearms. In many cases, the forearms are inclined upward or downward.

Extreme deviation in wrist position may occur if the keyboard is adjusted to accommodate an upright seated posture but is used in a forward or reclined posture.

Lesson Learned

Don't get hung up on elbow heights and prescribed arm postures. Concentrate on adjusting the keyboard height and angle to match the angle of the forearms (in the worker's normal working posture) to achieve straight wrist postures.

4. False. There is no “best” sitting posture.

There is no single best sitting posture — and if there were, it certainly wouldn't be upright. Here's why:

- When sitting upright, a worker may use the backrest to keep the back stable, but the back is not actually being supported. All the weight is supported by the person's spine and pelvis.
- For almost everyone, a 90-degree hip angle when sitting means a flat lumbar spine. Consequently, the discs experience 25 percent more pressure than when the hip angle is open.
- An upright posture is front-heavy. As a result, the lower back muscles have to work 25 percent harder to hold the torso upright than when reclining.
- Many people cannot actually hold a 90-degree hip posture due to limited hip flexion or their spinal curvature.
- Many tasks that involve writing, reading, paperwork, or reaching must be performed in more forward-biased postures. Conversely, when tasks strictly involve keying and mousing, workers show a strong preference for recline-biased postures.

Lesson Learned

The worker's seated posture is dependent on many personal, physiological and task factors. No single posture can be considered “best.” Ideally, workers should have a full range of postural options, forward through reclined, and periodic changes in seated posture should be encouraged.

“The upright posture is wishful thinking, VDT operators instinctively do the right thing when they recline and ignore the recommended upright trunk posture.”

5. True. That is, true for most people and most tasks. But are you aware that:

The few experts closely studying the postural effects of mousing all recommend positioning the mouse as close in the centerline of the body as possible. When the mouse must be used in conjunction with the keyboard, they recommend putting it to the immediate right or left. However, they also concede that this might not be ideal for some people and some task. Here's why:

- The average-sized keyboard is about as wide as the elbow breadth of the largest male. Consequently, most people operate the mouse in an out-



bound position (away from the centerline of the body), which can be stressful on the shoulder.

- Very small features who use the mouse next to a standard keyboard can be reaching to positions that are half again their body width to the side (8 inches) and half again their forearm length to the front (6 inches). This results in arm extension or, more often, sitting forward in the chair.
- Pointing tasks, like CAD work on digital pads that involves large arc motions of the arms, require holding the entire arm extended when using the mouse to the side of the keyboard.

Lesson Learned

Keep an eye on smaller workers who find it difficult to use the mouse in this prescribed position. Often the best bet is to use a mouse tray that can be brought in to the forward side of the keyboard. Or, look for a keyboard with a detachable numeric keypad that allows you to move the mouse closer in to the centerline of the body.

For tasks that involve large arm motions, look for good forearm support. This can be provided by a work surface configuration that surrounds the torso and provides a lot of mouse activation area close in to the worker's side.

6. False. There's just too much variability in individual viewing requirements and working postures to specify a "best" height.

For many people, the best monitor height is quite low. It is well documented that the visual system works best when the eyes look downward because the eyes focus with less strain and are less likely to become dry and irritated.

For others, the best monitor height is above the eyes. This is especially true for people in deep recline postures who find it easy to look upward.

Individual variations in neck and spinal curvature (kyphotic upper back) affect the viewing posture. Even while sitting upright, some people look downward. To be able to balance their heads, they must vary their sitting posture, which in turn affects their eye height.

Eye wear (bifocals/trifocals) can limit the range of a worker's view angle and preferred monitor height.

Lighting and glare conditions can further limit viewing angles and monitor heights.

Lesson Learned

Don't get hung up on monitor heights, especially as they pertain to body landmarks. The eye height and viewing angle can vary significantly in different working postures and under different viewing conditions. Let workers determine the best monitor height based on what they find most comfortable.

To help workers assume correct postures, watch for awkward head/neck positions and adjust the monitor height and angle accordingly.

7. False. for most workers who do more than just keying.

Adjustable keyboard trays are often an effective and economical means of providing height and angle adjustments to ensure relaxed and neutral wrist and upper-limb postures. However, in many job situations, they will actually compromise back and shoulder postures. Here's why:

— Adjustable trays that only hold keyboards move the worker farther away from other tools that are often essential to carrying out their jobs, such as the mouse, paperwork and writing materials. This often results in excessive forward leaning or reaching, which can be stressful on the back and shoulders.

Lesson Learned

The most cost-effective step to ensure good working postures is to arrange frequently used tools close to the worker. If adjustment of the keyboard platform is necessary to correct upper-limb postures, make sure you examine alternatives that will also let you move commonly used tools close to the body, particularly the mouse.

8. False. This range accounts for only about two-thirds of women, though it does fit 98 percent of men.

The requirements of ANSI/HFS VDT 100-1988 are generally based on what will fit the 5th-percentile female through the 95th-percentile male. However, they don't come close on the critical seat-height dimension, particularly for females. To wit:

- On the low end, 16 inches is higher than the back-of-knee height for 35 percent of women and 1 percent of men.
- On the high end, 20½ inches is lower than the back-of-knee height for 1 percent of men. The explanation ANSI provides for this discrepancy is that seat height is a function of the chair and workstation system, which they say includes a foot support. In other words, smaller people must rely on a footrest rather than the floor for support.

Many designers and manufacturers attempt to create products that meet the anthropometric requirements of this large population segment. However, many “average” people have one or more individual dimensions that fall outside the 5th-to-95th range for that dimension.

Lesson Learned

Chairs that can be adjusted lower than 16 inches are good! Ideally, a seat-height range from 14½ inches to 21 inches would fit most of the American population. Since no single chair meets that range, several differently scaled chairs are your best bet.

Don't assume that a product will fit everyone equally well — even if it is designed to fit most people or includes a lot of adjustments. Listen to the squeaky wheels who might be experiencing discomfort due to a product feature that doesn't fit properly. In addition, furniture should be designed for a wider range than just the 5th to 95th percentiles.



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