

>> Welcome.

My name is Dr. Sara White and I'm here to talk with you about ergonomics for spay-neuter veterinarians.

I'm a spay-neuter vet and I also like to do research on spay-neuter practice and spay-neuter vets.

I became interested in spay-neuter ergonomics when I heard friends and colleagues talking about going to work, injured or in pain, and decided to do some research about it.

Is there even a problem?

Is ergonomics and pain something we need to spend time thinking about in spay-neuter veterinarians?

In short, yes.

A lot of spay-neuter vets experience discomfort that they attribute to their work.

In my survey of spay-neuter vets and pain,

I found that 99 percent of the vets

in this survey had

experienced some musculoskeletal discomfort in the past month.

Ninety-eight percent had body pain and

just over three-quarters had hand or wrist pain.

This sounds really alarming,

but other surveys of veterinarians in a variety of practice areas has shown nearly as high prevalence of discomfort.

There's a lot of variability in the severity of discomfort that people experience and the number of body regions that were uncomfortable.

Some veterinarians have worked full time for many years in spay-neuter with relatively little discomfort and others are uncomfortable with a much lighter workload.

This slide is showing the body regions where spay-neuter veterinarians most commonly experience discomfort.

As you can see, the low back, neck, and shoulders are the most likely to be uncomfortable.

Low back pain is common in humans and so the high proportion of vets reporting low back pain in the past month is actually in line with other surveys of people.

However, the rate of neck, shoulder, and upper back pain is about 40 percent higher than what's reported in other surveys of veterinarians.

The only surveys where I've seen these high rates

of neck pain are in humans surgeons,
this slide is showing the areas
of the hands and wrists where
spay-neuter veterinarians most
commonly experienced discomfort.

The right thumb and wrists are
the most commonly painful areas.

This was true of the lefties that answered,
as well as the right-handed vets.

One big question in this research was,
what are the workplace factors
that contribute to pain?

The top predictors of pain were the hours per week in
surgery and the number of
years working in the field of spay-neuter.

The least important factors were the number of
surgeries per day and the speed of surgery.

However, these workplace factors only
explained a small amount of the pain score.

Most of the differences would have to be
explained by individual variability,
genetics, activities outside of work,
and other factors that we may not even think about.

Many studies in many fields
have shown that people who have
higher job stress or
lower job satisfaction

experienced more work-related pain.

In this study, nearly every measure of discomfort increase as people

had higher stress and lower satisfaction.

We can't say from this survey that this is a direct cause and effect process,

although other studies have suggested that it can be.

It may be best to think about pain, stress, and low job satisfaction

as a cycle that feeds on itself.

As you're trying to solve

ergonomics problems in your workplace,

take the time to consider that working on

psychosocial issues may actually

improve people's physical comfort as well.

Now, onto physical ergonomics

and how to set up the surgical workspace.

I want to start by encouraging

you to take photos or videos in

order to evaluate your surgical ergonomics

and body posture.

It's hard to pay attention to

your body posture

while you're in the middle of surgery.

Even if you're trying to pay

attention to postures and positions,

you may not be able to know or evaluate

your posture without a view from the outside.

By taking video, you can

later watch yourself and find problems

that you can then make a special point of

changing during your next surgery.

The technology is so accessible now,

a smartphone or a digital camera is all you need.

You can prop a phone on a box of gloves,

tape it to an IV pole,

tape it to a surgical light,

or use a tripod.

In the picture here, I had set up

video of myself from above and behind

because I was having shoulder and

upper back pain after surgery days and

this helped me figure out when I was

tensing up so I could work on that.

The physical environment

includes things like the height of

your surgery table and how you

position the patient and objects in your space.

These factors influence the way you use your body

and changing them doesn't have to

be difficult or expensive.

In this first example,

the surgery table is too

high so that the surgeon has to raise

her shoulders and abduct
her elbows in order to reach the patient.

This puts strain on the upper body,
especially in the neck and shoulders.

In the second picture,
if the surgery table is too low,
then the surgeon has to lean
forward in order to reach the patient.

This could place strain on the neck,
upper back, lower back,
and perhaps also the shoulders.

When the surgery table is adjusted comfortably,
the surgeon can stand
with a relaxed upper body posture.

In general, the easiest table height for
a relaxed posture is one in which the hands
fall about 5-10 centimeters
or 2-4 inches below the elbows.

This means that the table height
will need to be adjusted between large,
deep body patients, and small patients in
order to keep the surgeon's upper body
in this relaxed position.

Of course, I know that not everyone has
access to tables that adjust adequately,
but this doesn't have to mean that you're
condemned to upper body strain.

Low tech solutions like steps, tools or platforms, bed risers, blocks, and other boosters can help get you and your patient to a comfortable height.

Another positioning issue that comes up sometimes is that a tiny patient is placed in the middle of the surgery table so that the surgeon has to reach a long way to the patient or bend forward.

A lot of reaching and bending can put strain on the upper and lower back and shoulders.

If you have a surgery table that you can lean your body against that you work, you may find that it's comfortable to work with the patient in this position.

However, if your table moves when you lean on it, then you may be straining yourself to reach like this.

If you do find yourself bending and reaching forward to reach a patient in the middle of the surgery table, consider just positioning the patient closer to you.

When we talk about positioning, also remember to look at the other objects in the surgery space.

Are there objects that the surgeon has to work to avoid or has to work to reach?

The surgeon in this picture is having to lift her arm and elbow way up to avoid the instrument tray.

It's great having the instruments nearby and an easy reach.

But this tray would work a lot better if it was lower or further away, or even if the instruments were on the table between the patient's back legs, most spay-neuter vet stand for surgery.

This is what we were taught during school and many of us don't think about sitting unless we have to because of injury or for comfort during pregnancy.

But research with human surgeons showed that they were less fatigued if they either sat for surgery or alternated between sitting and standing.

So if you haven't tried sitting during surgery, and maybe something to consider, at least some of the time to increase comfort during surgery.

Sitting for surgery is pretty straightforward when it comes to a small patient.

It's possible to use a standard stool or chair and get close enough to the patient to

remain in a comfortable posture.

However, it can be more challenging to stay in a comfortable position when doing surgery on a large deep body patient, a surgeon sitting on a standard stool or chair may have to raise her shoulders and elbows to clear the patient's body.

In this scenario, it's not possible to lower the table or raise the surgeon's height because the surgeon's legs are already in contact with the underside of the table.

But there is another solution for this.

Using alternatives like a saddle-shaped seat or a sit-stand stool can help by allowing the surgeon to remain close to the patient while achieving a better relative height.

Here, are some pictures of some dental students using a standard chair versus a saddle-shaped chair.

The type of seating really shapes the way these students use their whole bodies.

Okay, onto some other aspects of the physical environment.

Research shows that floor mats can decrease lower limb fatigue and discomfort.

They sometimes get credit for helping relieve back pain.

But that isn't supported by the research.

The perfect mat will be one that's

not too hard and not too soft.

The best mat will be a matter of personal preference.

You want something that's cleanable and non-slip.

Try out a variety of mats wherever you get

the chance to see what feels best to you.

Also, look online to ask for

free sample mat or one-month's trial

from the companies that sell them to hospitals

or offices so that you can try them out.

As with floor mats,

there's no perfect surgery shoe.

But in general, wearing shoes with

cushioned soles while in surgery will be the

most comfortable even if

you're already standing on a floor mat.

Some studies of industrial workers

found that people who wear different shoes on

different days were less likely to have

plantar fasciitis than those

wearing the same shoes every day.

Christian and athletic shoes or

rubber clogs can be a good choice.

Now let's move on to talking about surgery itself.

Spay-neuter surgery involves a combination

of repetitive movements that can at times

require force or may be performed

with awkward positioning of the hands and wrists.

Each of these factors alone is

only moderately associated with pain.

But put together, there's

a strong association with hand and wrist pain.

In any high-volume workplace,

there will be repetition.

Fortunately, many of the

high-volume surgery techniques

that we learned can reduce some of the repetition.

For example, pedicle ties mean fewer suture knots.

Shorter incisions mean fewer sutures

placed and fewer knots tied.

Efficient technique in general

means less wasted motion.

Sustained, awkward,

or tiring positions can lead to discomfort.

The pinch grip used for thumb forceps is

a common example of an awkward tiring grip.

Some spay-neuter vets minimize the use of

thumb forceps during closure. This reduces

the trauma to the skin edges and also reduces strain

from the pinch grip so it can be a win-win situation.

Other awkward or extreme postures are

rarely necessary in spay-neuter surgery,

but they may be something that you're

using without really realizing it.

This is a great reason to get
video of yourself doing surgery.

Surgeons may adopt hand or
wrist positions with a large amount
of wrist flexion or extension.

These positions are okay as long as they're
comfortable and not sustained or
repeated for a lot of time.

If they become uncomfortable or if the surgeon is
spending a lot of time in extreme
or awkward positions,
then it's time to think of other ways to
perform the same surgical tasks.

This slide shows some arm positions during
suturing that are near
the extremes of their ranges of motion.

Again, there's nothing wrong with having
positions that are at the end of the range in
motion but if they become uncomfortable or
inefficient or they're sustained or repeated often,
then the surgeon will need to try to find
alternative positions to achieve the same tasks.

There are a lot of different ways that
spay-neuter vets hold their needle holders.

Some spay-neuter vets swear by using the palm grasp,
whereas others have never used it.

It turns out that the amount of muscle use and the range of motion is so variable between different vets that I can't really make generalizations about muscle strain between the different grasps.

This is another case where photos and videos are helpful.

If the motions of surgery and grasping instruments are uncomfortable, then that may be a cue for the surgeon to consider learning at different grasp style and seeing if the changes in grasp take strain off the uncomfortable body areas.

In addition to repetitive motion and awkward position, forceful motions are the other contributor to hand and wrist pain.

The most common times when a spay-neuter vet has to use force is during suturing and not tying and during castration of large male dogs.

Choosing a suture size that's bigger than what you need for a given surgery means that on every throw of every knot, you'll be applying more pounds of force than necessary to your ligaments and muscles.

Over the course of a surgery day,
that's hundreds of times that
you're applying that extra force.

In addition to being good surgical practice
to select appropriate suture size,
it's also good ergonomic practice.

That the big dog-neuter,
the spay-neuter veterinarian,
can be using a combination of force and
awkward posture to exteriorize the testicle.

As you can see in the illustration,
the surgeon has to have
a firm grasp and maybe pulling
with a substantial amount
of ulnar deviation so that
the wrist is counted towards the pinky finger.

This can be challenging for people with
discomfort anywhere in the upper quarter
of their body,
from hand, wrist, and elbow to shoulder,
neck, and upper back.

Some alternatives that decrease
this strain could include open castration,
sharply dissecting the fibrous attachments around
the vaginal tunic
and between the tunic and sub-q tissue.
Using hemostat to clamp the cord just

proximal to the testis once the spermatic cord is exposed to provide a more favorable grip for applying traction rather than grasping the testis itself.

There are also times when surgical technique can change your whole body posture.

In this illustration, the vet is doing a continuous sub-q closure from left to right.

In order to position the needle, she's twisted around, leaning over, and has a raised elbow.

Here's me doing the same thing.

It wasn't until I took a video that I realized how awkward this is and how easy this solution could be.

Just by doing the same closure from right to left as a right-handed surgeon, this surgeon can avoid all the twisting and leaning.

The moral is if you're doing something really awkward,

there's probably another solution that's a lot smoother and easier.

Another awkward moment here, same cat as in the last picture.

I have my surgery pack on my left, but I'm reaching with my right hand.

If I plan to head in positioning my instruments at the beginning of

this surgery or I learn

to use my left hand more effectively,

I could avoid these awkward moments.

I just want to say a little

about instruments and needles.

It should not take a lot of force to open and

close the ratchets on needle holders.

If you're using stiff instruments

over the course of the day,

that can add up to a lot of extra force.

In order to reduce the force

required by instruments and needle holders,

make sure that you're using

good protocols for cleaning and processing.

Get scissors and needle holder sharpened and get

[inaudible 00:15:01] replaced when they get dull or smooth.

Discard needles once their dull.

It takes extra force to use

a dull needle and extra tissue trauma

for the patient.

If you have the chance to make purchasing decisions,

choose instruments that don't require

a lot of force to open and close.

Now I want to talk about posture and movement

during the surgery day and how

they affect your pain and fatigue level.

Surgeons sometimes adopt awkward postures,

leaning over, head bent,
arms out, face inches away from the patient.

This may be because of the way
their surgery room is set up or because of
habit or unawareness of posture or all of the above.

Maybe these are brief positions during surgery.

But if these postures are
sustained through the surgery day,
surgeons who use postures like this are
likely to experience some pain as a result.

In small animal surgery,
we can achieve a fairly neutral posture
except for our neck position.

A neutral neck position would involve flexion
of less than 10 degrees but for a surgeon,
it's often 20 or 30 degrees.

In this picture, I have
a neck angle approaching 40 degrees.

It may not be possible to avoid
extreme neck flexion in this work and
the most important thing
will be getting out of this posture
between surgeries to allow
the muscles to release and stretch.

Other surgical postures to look for can be
twisted or asymmetrical postures.

If a surgeon maintains

an asymmetrical or twisted posture,
that can lead to uneven muscle use and strain,
and discomfort at the end of the day.

However, varying position during
the surgery day is a good thing.

If this surgeon balances her twist in
one direction over time
with a twist in the other direction,
then she may not experience strain from the posture.

In this case, she might be more comfortable
with a footstool to rest foot on them.

This is another important takeaway for the day.

Move during the surgery day. Between surgeries,
take a few seconds to change your position.

Roll your neck and shoulders,
stretch, walk a few steps.

Taking a 20-second break
every 20 minutes can
increase your comfort and decrease fatigue
after a day of surgery and it can sustain
your surgical performance and
accuracy better through the surgery day.

We're fortunate in spay-neuter surgery that we have
short enough surgery times that we can use
the end of each surgery as a cue to move a little.

We aren't doing hours-long surgeries where we
would need to set an alarm to remind us to move.

Take a moment when you switch from one surgery to the next to break the muscular tension that you're holding during surgery.

We don't necessarily think of or talk about spay-neuter surgery as an activity that requires physical fitness or work hardening, but it does.

As you do this work, you're ligaments adapt.

If you give them the recovery time they need between use.

Gradual increases in work hours, rather than starting off with a full-time schedule may be more likely to lead to well-adapted ligaments rather than injury and strain.

Also, physical activity outside of work is important to reducing physical discomfort while at work.

There are not specific activities or exercise that research says are best, and it will likely vary between individuals.

The key is simply being active and moving.

Now, I briefly want to touch on ergonomics elsewhere in the clinic.

Ergonomic risks in small animal surgery workplace include lifting and carrying animals and supplies,

prolonged standing or prolonged sitting,
including during vehicle driving,
handling and restraining animals,
repetitive manual tasks such as drawing up drugs,
injections, clipping and prepping,
computer use, and phone use.

During patient restraint, the person
holding may have to get down on the floor
or lean over the table and
they have to hold tight against wiggling.

The animal may twist or evade
and can cause your fingers,
wrists, or arms to twist.

Of course, there's always
the possibility of bites and scratches.

In this case, the plan should be to learn
appropriate restraint techniques and use
equipment or protection when necessary.

Lifting and carrying are
another big risk in small animal work.

In order to decrease this risk,
try modifying the following.

The weight of the load.

For example, by breaking up
a large package into smaller items.

The distance of your hands from your lower back.

The height of the lift,

meaning, from the floor or from above me height.

Can you minimize how high you need to lift?

Minimize twisting and side bending.

Try to avoid working in a restricted space.

Try to get a good grip or modify an irregular, bulky, floppy, unpredictable load.

For example, placing a sedated dog on a stretcher.

Maintain good work flooring conditions.

Finally, work on communications and coordination when lifting as a team.

Other perioperative ergonomic risks include repetitive manual tasks such as drawing up drugs, injections, and clipping and prepping.

These tasks may require a combination of repetitive movements that can at times require force or may be performed with awkward positioning of the hands and wrists.

Alone each of these factors is only moderately associated with pain in the hand and wrist, but as you've heard before, when combined, the association with hand and wrist pain is strong.

An example of combined force plus repetition can be using heavy clippers throughout the day to shave patients.

A one-pound difference may not seem like much until you

have to prep 30 plus animals

five days a week with them.

This is even worse if you're doing it,
doing so with an awkward risk position.

The takeaway message is that force
or awkward position can be okay as

long as they're not repeated but

for repeated actions or tasks,

it pays to minimize force

and minimize awkward positions.

We've reached the end.

This image shows sources of

the pictures in this presentation that aren't mine.

If you want to review this

information or learn more about

ergonomics in veterinary medicine, visit ergovet.com.

Thank you for listening.