



## Work Safety

Ergonomics in Obstetrics and Gynecology  
Preventing Injury in OBGYN Ultrasound Practice

Presented by  
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## Disclosures

Joan P. Baker, MSR, RDMS, RDCS

Relevant Financial Relationships:

- Sound Ergonomics, LLC Kenmore, WA
- Retired Professor, Bellevue College
- Retired Program Chair, Seattle University

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Carolyn Coffin, MPH, RDMS, RDCS, RVT

Relevant Financial Relationships:

- Program Chair, Seattle University
- Sound Ergonomics, LLC, Kenmore WA

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## Learning Objectives

After completing this presentation, the learner will be able to:

1. Discuss the causes of musculoskeletal disorders in sonography
2. Identify injury-producing work postures
3. Describe work posture and work environment changes that would help minimize occupational injury risk

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## Lecture Outline

- Work-Related Musculoskeletal Disorders (WRMSDs)
- Risk Factors
- Solutions
  - Industry Standards for the Prevention of WRMSDs

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## Brief Overview

Take the time to do it right!

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## Historical Perspective

- Anecdotal evidence of WRMSD in sonography was established in the late 1970's
- 1985 was when the first published statement about "sonographer's shoulder" appeared
- Incidence:
  - In 1995 incidence was 81% in USA
  - In 2008 incidence was 91% in USA
  - In 2009 incidence was 83% in vascular sonographers

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## What Causes MSDs?

According to OSHA, this condition for any occupation is caused by:

- repetitive motions
- forceful or awkward movements
- duration of pressure
- overuse
- poor posture/improper positioning
- excessive force and strain
- vibrations

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## Factors Associated With MSDs

- Risk of injury depends upon:
  - Duration of exposure
    - number of years in the profession
  - Frequency of exposure
    - number of studies performed
  - Intensity of exposure
  - Combinations of risk factors

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## Tasks That Cause Symptoms

- Repetitive movements
  - lack of exam variety as seen in high-risk obstetrics (OB)
  - follicle studies
  - gynecologic (GYN) endovaginal studies
- Awkward movements
  - bedside exams
  - pushing the equipment
  - setting up the patient room

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## Injury-Producing Postures Forceful or Awkward Movements



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## What is the maximum time you maintain one body position while scanning?

### Duration of pressure

- |                                       |   |
|---------------------------------------|---|
| • Under 10 minutes                    | 30% limited study                                     |
| • 10-15 minutes                       | -31.4% TV only  |
| • 15-30 minutes                       | -29.1% OB   |
| • Over 30 minutes-<br>echocardiograms | -9.5% fetal exams<br>•high risk, multiples, anomalies |

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## Poor Posture Improper Positioning

- Twisting of neck/trunk
  - poor postural alignment
  - scanning behind the midline
  - unsupported arm



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## Factors Contributing to MSDs in Sonography

- Physical factors
  - age
  - gender
  - height and weight
  - hand dominance
  - systemic illnesses
  - physical fitness
  - years in profession



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## Summary of Factors Contributing to MSDs

- Workplace
  - number of scans per month
  - scan time
  - Transducer/ system design
  - chair/stool position
  - exam table position
  - pushing system

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## Staging of MSD Symptoms

- Stage 1: aching, fatigue that subside with overnight rest; work performance not affected
- Stage 2: aching, fatigue that do not subside with overnight rest; symptoms occur earlier in the day; may affect job performance
- Stage 3: aching, fatigue, weakness result in reduced performance in work and leisure activities; symptoms disturb sleep and may last for months or years

Browne CD, Nolan BN, Faithfull D. Occupational repetition strain injuries: guidelines for diagnosis and management. Med J Aust 1984; March 17:329-336

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## Conditions

- carpal tunnel
- tennis elbow (lateral epicondylitis)
- golfer's elbow (medial epicondylitis)
- DeQuervain's
- tenosynovitis
- trigger finger
- bursitis (shoulder)
- nonspecific pain or symptoms in back and neck that don't follow a pattern
- thoracic outlet

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## Results of Survey

- Static positioning:
  - All students have prolonged static positioning as they try to perfect their images.
- What activities aggravate the pain?
  - applying pressure
  - shoulder abduction
  - twisting neck and trunk
  - bedside studies
  - gripping the transducer

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## Summary of Survey

- The incidence of scanning in pain has increased from 81% to 90% according to the data collected in 2008 by Sound Ergonomics using an ARDMS and SDMS database.
- Areas most affected
  - shoulder
  - neck



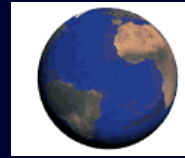
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SDMS, CSDMS, BCUS, HCBT survey results

## Global Perspective

### Hospitals and clinics

- USA = 90%
- Canada = 87%
- Italy = 80%
- UK = 89%
- Australia = 95%
- New Zealand = 93%



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## Risk Factor: Abduction



Perinatologist performing a scan using incorrect posture

- 60 minutes at 30 degrees
- 20 minutes at 60 degrees
- 10 minutes at 90 degrees

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## Risk Factor: Abduction



- Abduction of the scanning arm

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- Solution
  - Lower the table
  - Elevate your chair
  - Reduce angle of abduction to 30 degrees or less
  - Stand up
  - Patient touching your hip

## Relax your shoulder



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## Endovaginal Scanning



Notice the angle of the wrist and shoulder.



A better way to do an endovaginal scan is with the scanning arm supported and the patient using stirrups.

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## Risk Factor: Reaching Endurance Time

- 30 minutes for 30-cm reach
- 20 minutes for 40-cm reach
- 7 minutes for 50 -m reach



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## Risk Factor: Reaching



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## Risk Factor: Reaching

- Correctly position the equipment with respect to the table and patient.
- Need enough leg room to bring the console close.
- Need controls to be to the left of mid console for right handed scanning and vice versa.
- Don't keep the arm extended over the knobs or freeze button.



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## Risk Factor: Twisting & Bending of the Neck

- Keep your neck in the neutral position
  - Any neck extension is a risk for injury
  - Caused by exam chair being too low and monitor height too high
- Neck flexion should be no more than 20 degrees.



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## Risk Factor: Neck Twisting



- Solution
  - Position the monitor in such a way as to reduce the turn on your head.
  - Do not share the monitor with the patient.

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## Risk Factor: Twisting of the Trunk



Scanning arm behind midline



- Solution
  - weight evenly on both feet when standing
  - sit up straight with good postural alignment
  - Use abdominal muscles to support trunk

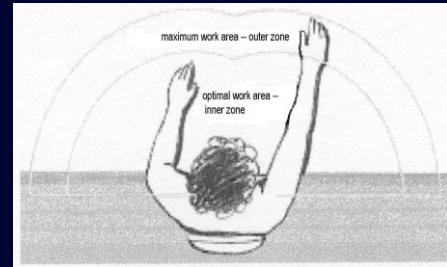
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## Obesity

- **Patients:** main reason for worker's need to use excessive force & strain
- **Workers:** obesity reduces physical capacity to do work

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## Work in an Optimal Zone



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## Good Postural Alignment



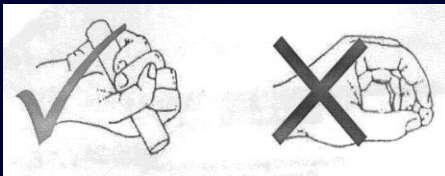
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## Correct Position When Standing



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## Power Grip Versus Pinch Grip



Hold the transducer with a power grip whenever possible.

Try to avoid a pinch grip.

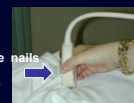
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## Risk Factor: Grip

- Gripping transducer too tightly

### Solution

- Use textured fingers gloves.
- Use gloves that fit and are not too big.
- Lighten your grip.



Gloves

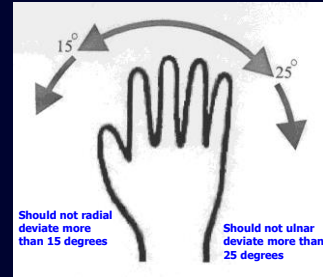
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### Risk Factor: Grip



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### Risk Factor: Wrist Deviation



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### Risk Factor: Wrist Deviation



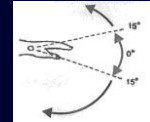
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### Risk Factor: Wrist Flexion/Extension

Tendency to both hyperflex and extend wrist when doing OB ultrasound exams



Ulnar deviation



Hyper-extension



Hyperflexion  
gaucher 2nd  
Scan 0

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### Anatomy of the Wrist



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### Risk Factor: Wrist Torque



cable brace

- **Solution**
  - Systems should have flexible light weight cables.
  - Use a cable brace to support the cable.

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## Risk Factor: Summary Wrist

- Uncomfortable arm positions
  - Hyperextension or flexion of hand and wrist.
  - Note the white knuckles, an indication of a tight grip.



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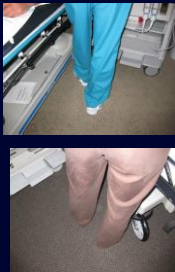
## Risk Factors: Foot Position

- Solution
  - Place feet firmly on the ground or on the system.
  - Support your body from your abdominal muscles.



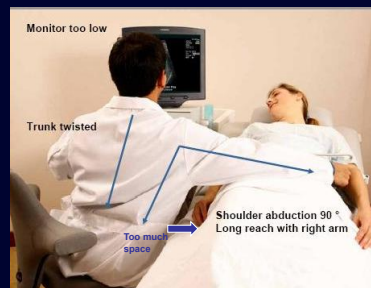
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## Risk Factor: Good Feet!



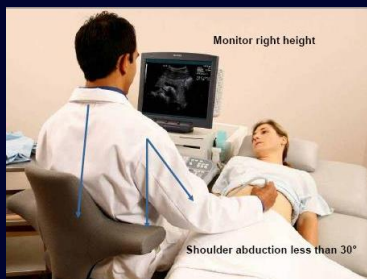
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## Incorrect Position



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## Correct Position



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## Workstations With Ergonomic Features



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## Ultrasound Equipment Control Panel

- Adjust so keyboard is at or just below elbow level.
  - May need to adjust chair.
- Utilize presets to minimize keystrokes.
- Avoid resting your hand on control panel when not annotating.



Photo courtesy of Philips Medical Systems



Photo courtesy of GE

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## Keyboard and Monitor

- height adjustable
- capable of rotating
- frequently used keys easily accessible
  - minimize abduction
- monitor independent of key board
- space underneath for sonographer's knees
  - reduce reaching
- no sharing with patient!



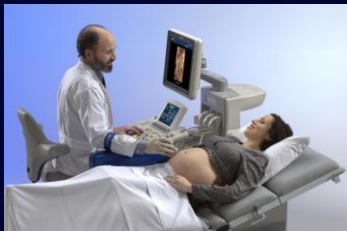
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## How to Set Up the Ergonomic Work Station



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## Setting Up Your Workstation



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## Employee Responsibility

- Postural alignment
  - no more than 30 degrees arm abduction
  - use abdominal muscles for support
  - Maintain normal spinal curvature
  - even distribution of weight
  - head level or slightly flexed
  - knees lower than hips when seated



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## Conclusions

- Ultrasound is important.
- It is more important than surgery.
- At least 50% of a resident's time should be spent in ultrasound.
- This being the case, the length of your career depends on you avoiding injury from scanning.

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## Summary

- Injury rates are high in sonography
  - Know the risk factors and minimize or avoid them as much possible.
- Risk factors are
  - eye strain
  - twisting of trunk and neck
  - reaching
  - abduction of scanning arm
  - grip and wrist deviation
  - hyperextension and flexion of the wrist

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# Thank You!



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