Improvement of Reading Room Environment in Teleradiology Services: Prevention of Physical and Mental Disability by Interpretation

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IRIMOTOMEDICAL

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Background

- Computer-based reading and interpretation tasks are associated with many stresses that can lead to disorders
- Improving the reading room environment can help alleviate these stresses and provide for a comfortable reading atmosphere for radiologists

Purpose/Aim

-Prevent physical and mental stress associated with interpretation work

-Improve reading and interpretation efficiency

-Improve QOL of radiologists

Working Safely with Video Display Terminals

U.S. Department of Labor Occupational Safety and Health Administration

OSHA 3092 1997 (Revised)

Detrimental Effects

- Visual Problems
- Fatigue and Musculoskeletal Problems
- Radiation

Interventions

- Lighting
- Work Station Design
- VDT Design
- Work Practices Job Organization

Physical and mental disabilities caused by reading and interpretation work

Visual system dysfunction
- -Computer vision syndrome

Musculoskeletal disorder
- -Repetitive strain injuries

Mental disability
- -Technostress
- -Depression

Others
- -Organic dysfunction
- -Metabolic syndrome

Computer vision syndrome

Eyestrain

- sores, aches, irritation, blurred/double vision
- Dry eye syndrome
- Headache

Etiology

Visual capability

- un-corrected, unsuitably corrected

Video display

- character, contrast, color

Work place lighting

- brightness, glare

Air-conditioning

- low humidity

Heavy workload

Interventions

Visual capability

- viewing distance: VDT > hard copy

Video Display

- size, suitable character, color, black/white

Lighting

- Window screen, partition
- Task-ambient illumination
  - Indirect up-lighting system
  - Controllable illumination
  - Hand lighting

Air-conditioning

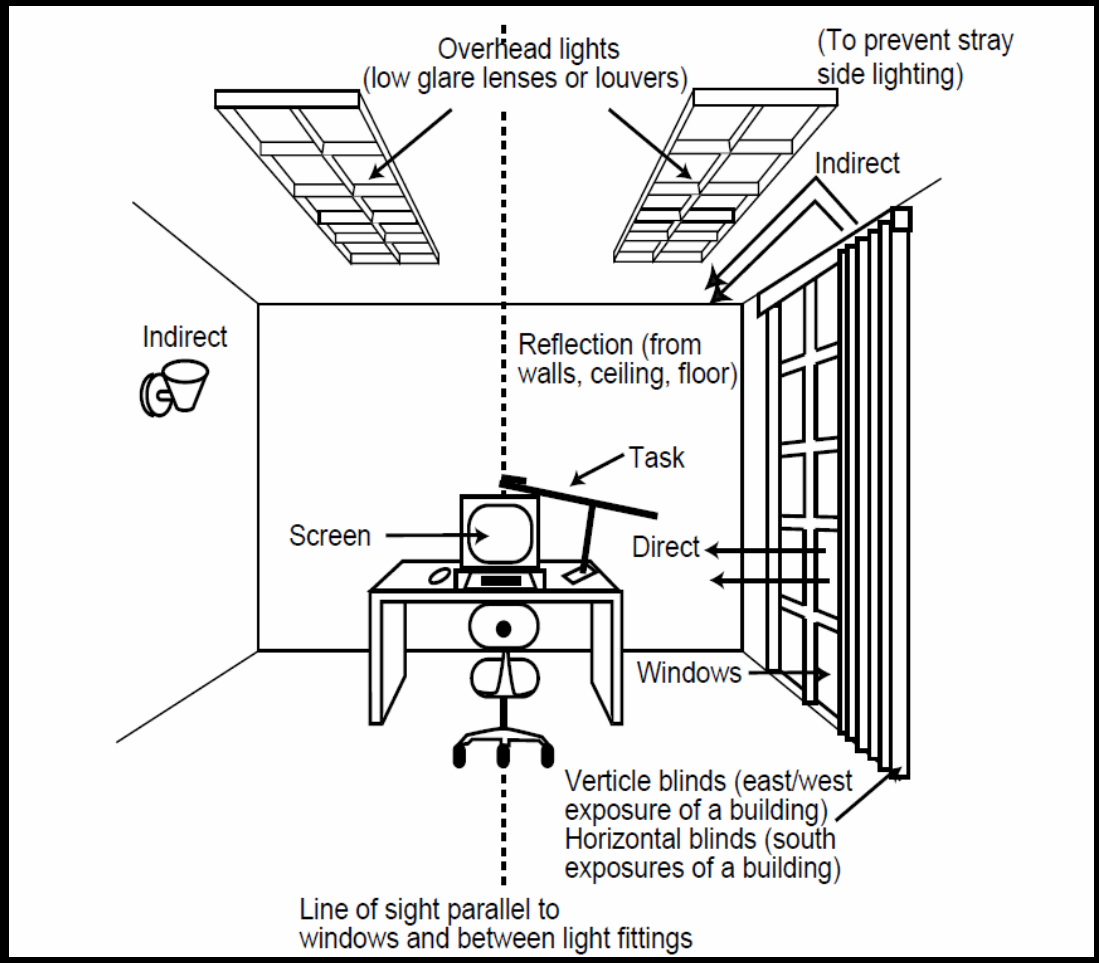
- humidifier, fresh air intake

Workload

- length, pace, breaks

Position of light source relative to VDT

OSHA 3092 1997



Task-ambient illumination

Window screen

Partition

Indirect up-lighting system

Controllable illumination

Hand lighting

Musculoskeletal disorders

Repetitive strain injuries

- back, neck, shoulder discomfort, painful/stiff neck or shoulder

Etiology

Seating

- fixed, awkward, inadequate posture and arm position
  → biomechanical stress

Repetition

- high rate of keystrokes

Heavy workload

Interventions

Seat · desk

- **chair: backrest, arm rests, chair base**
- **foot rest, ergonomic chair**

Keyboard

- **height, configuration, transcriber, speech**
- **recognition**

Display

- **size, height, adjustability, flexible monitor stand**

Breaks

- **sofa (recliner, massage), refreshment**

Exercise

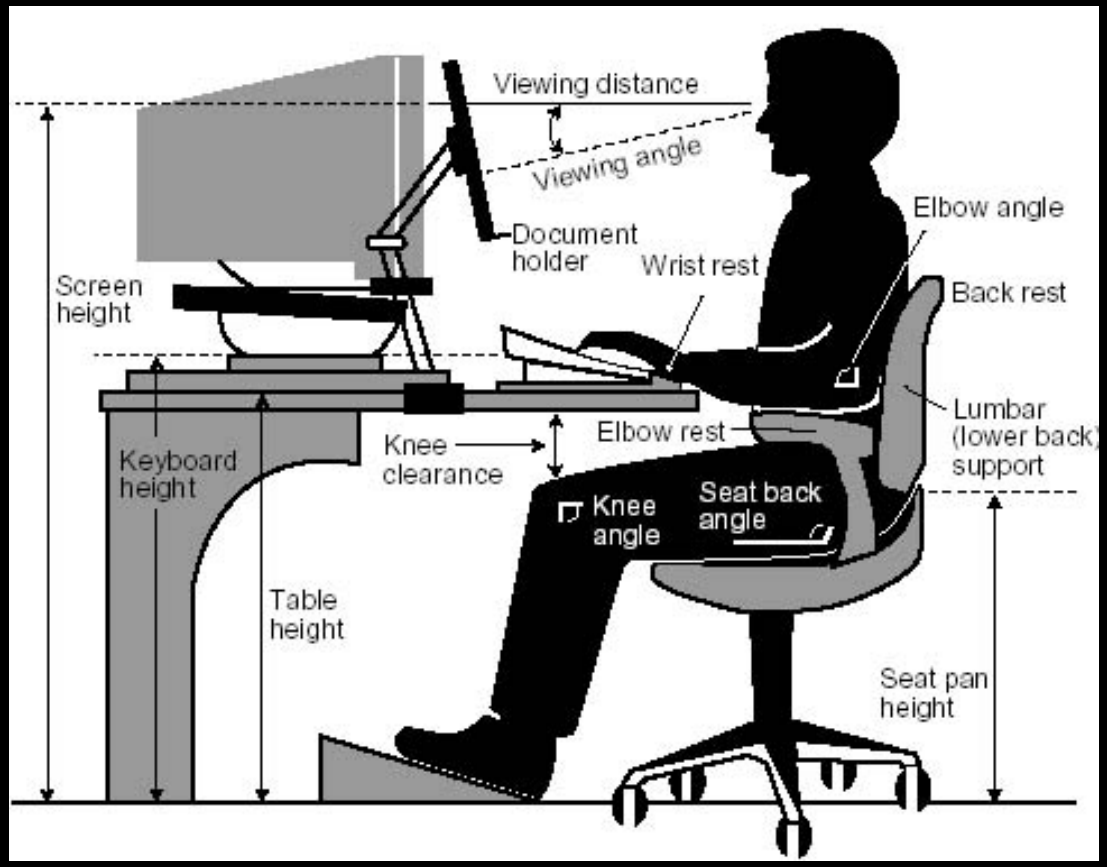
- **usable, effective, safe**

Work control

- **length, pace**

Proper user position and support

OSHA 3092 1997



Chair/Desk/Workstation

Chair height: 0.23 of body height or the “popliteal” height

Stable chair: 5 star bases
The entire sole of the foot can rest on the floor or foot rest

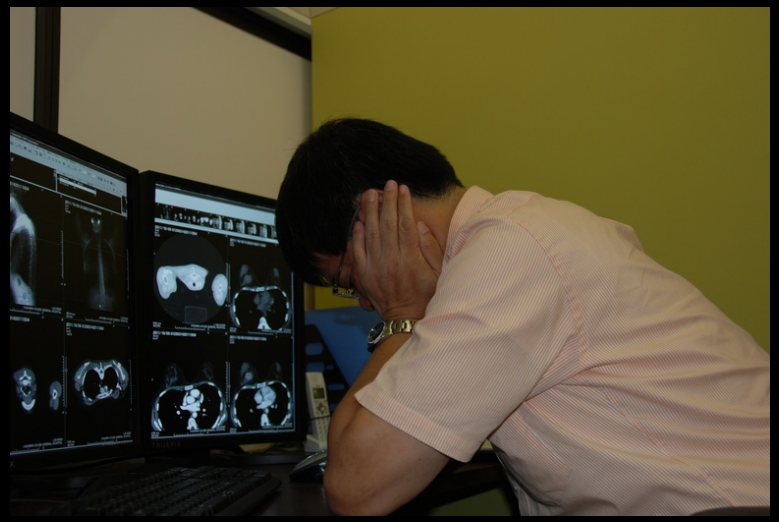
Lumber support

Viewing angle: -10 ° to -30 °

Viewing distance: >40cm

Elbow angle: 90 °

Mental disability



Technostress
Depression
Insomnia
Burnout and dissatisfaction
Malpractice stress syndrome

Etiology

Heavy work load

Narrow working space

Less communication

Stress associated with potential malpractice suits

Interventions

Control work load

Increase satisfaction

Communication

Space of reading desk, Partition

Coloring reading room

Reading assistant

Breaks, Refreshments

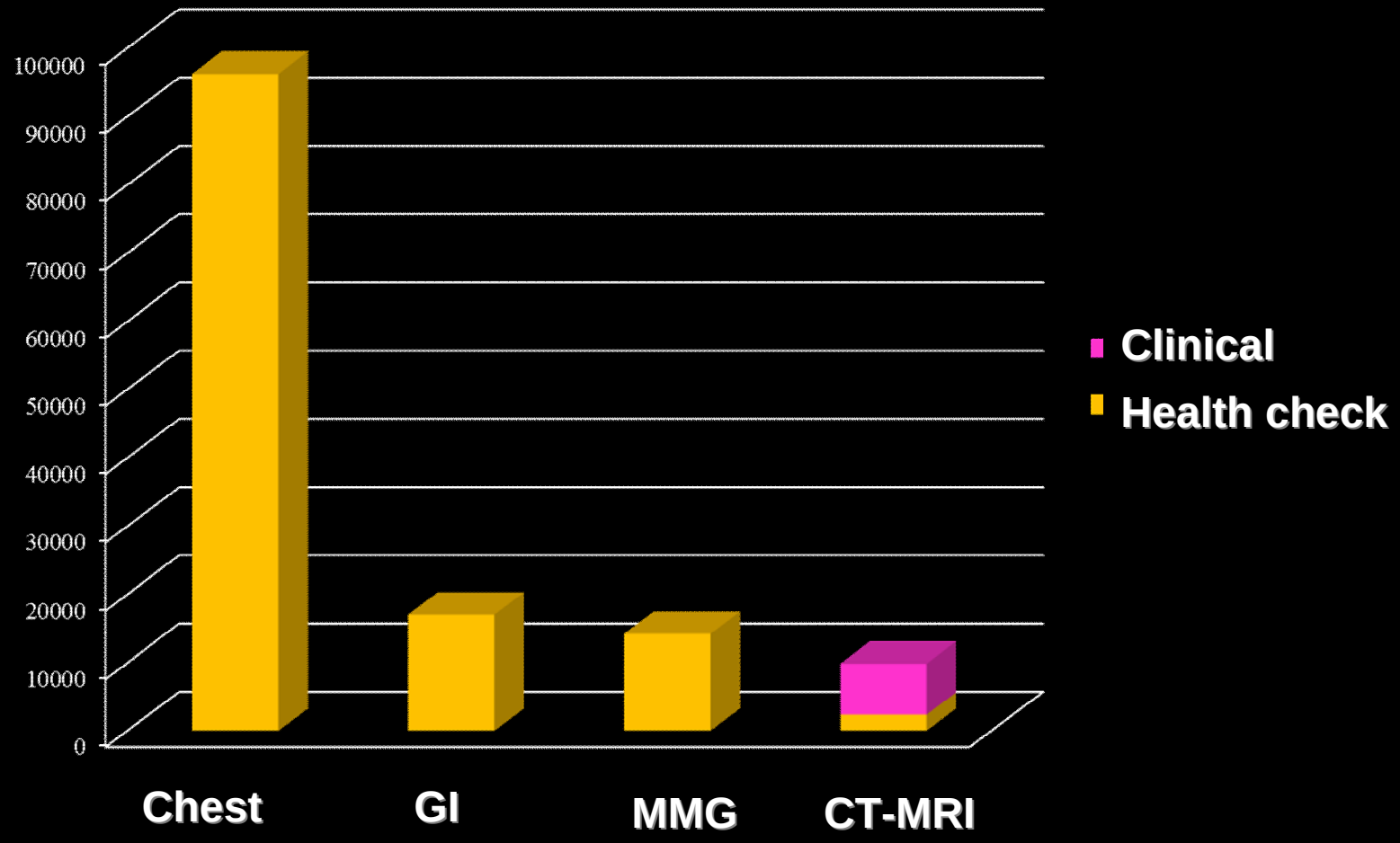
IRIMOTOMEDICAL

Teleradiology service managed by independent radiologists (established in 2001)

Tokyo Main Office ,　2 branch offices

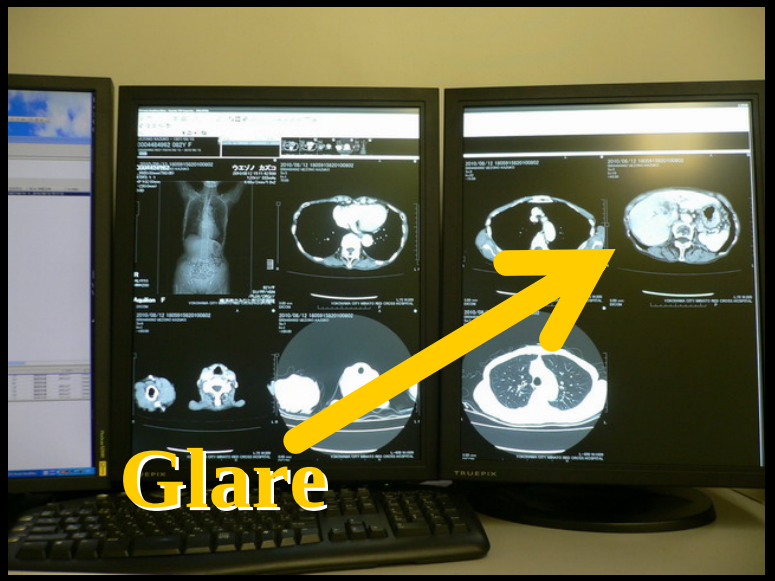
Full time radiologists: 2
Part-time radiologists:　8
Assistants:　3
System engineer:　1
Accounting manager: 1

Reading Cases (2010)



Health check-up: 129939 cases
Clinical: 7500 cases
Total: 137439 cases

Reading room at Tokyo office (Dec 2009)



Vertical blinds: sunlight enters

Ceiling illumination: glare

Increase in radiologists: lack of space to accommodate all radiologists

Improvements to reading room needed!

Renovating the reading room

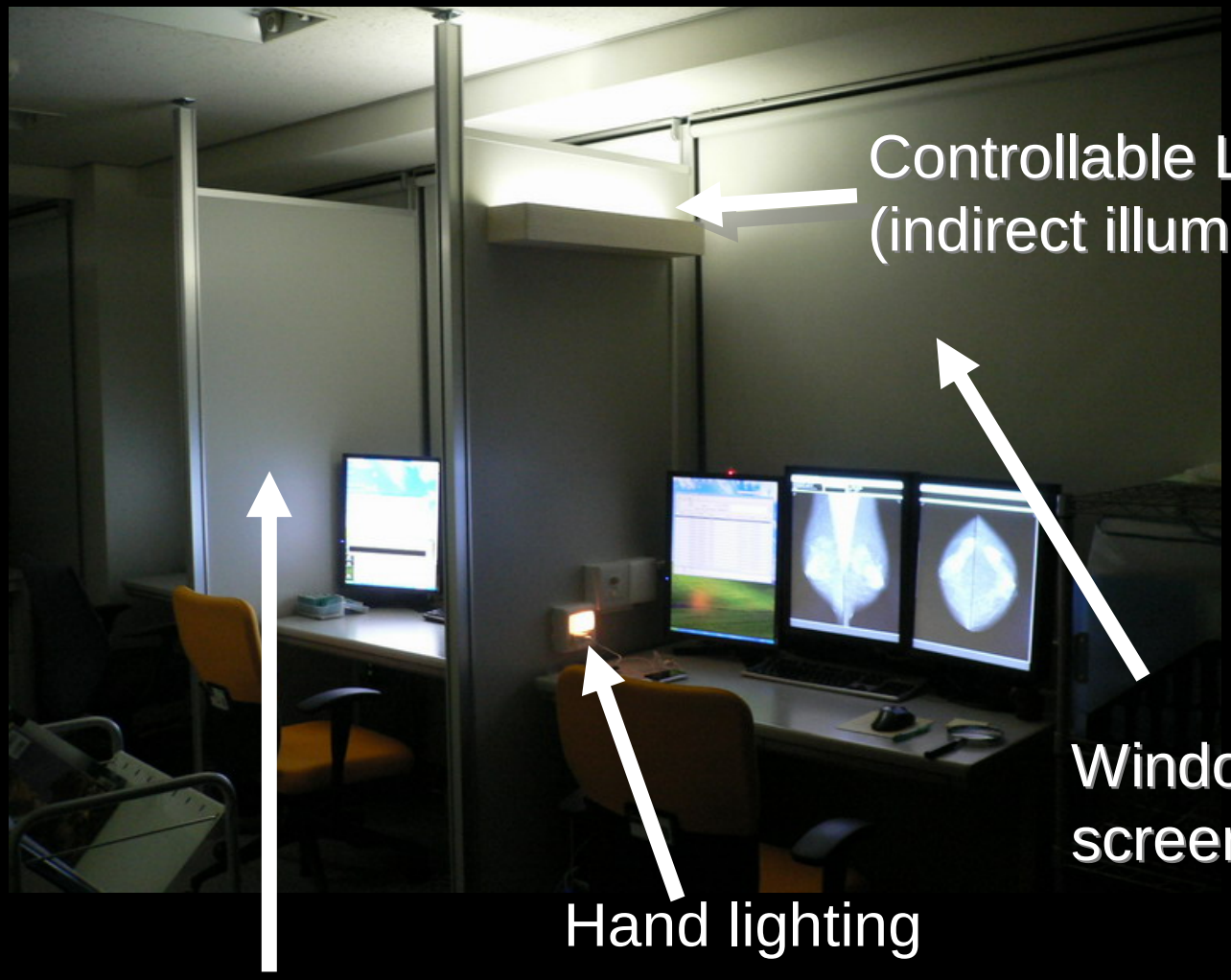
Dec 2009

Window blind screen
Task-ambient lighting
Partitions

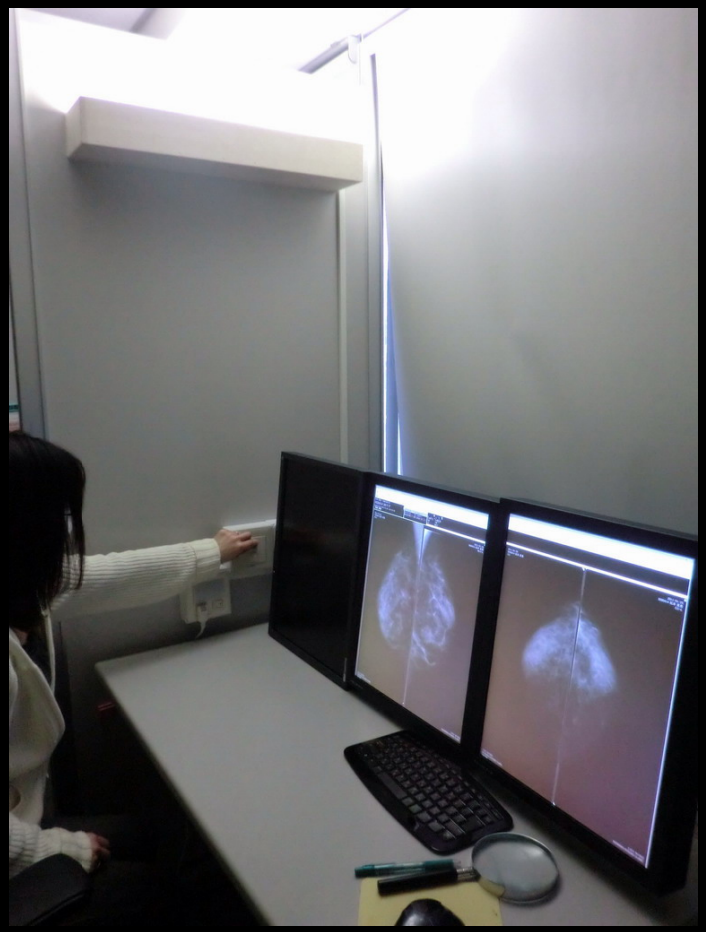
May 2011

More space/workstation
Color coordination
Ergonomic chairs
Original reading desk
Fresh air intake

Task-ambient lighting

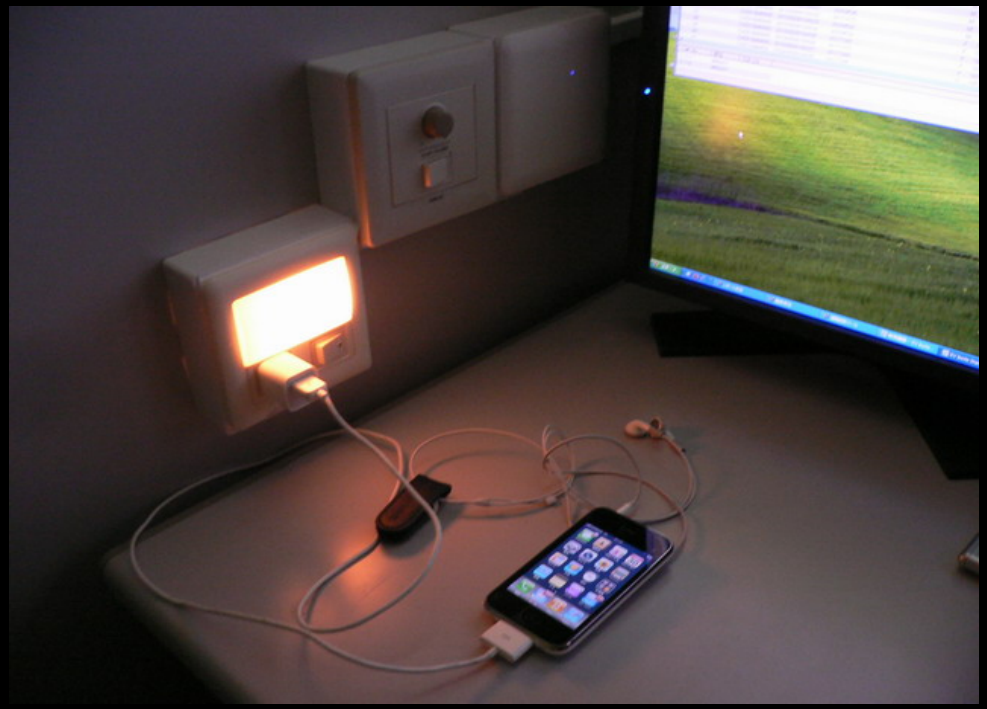


Suitable lighting control



- Controllable LED indirect illumination
- Hand controllers

Hand lighting



Power receptacle

Ergonomic chair and footrest

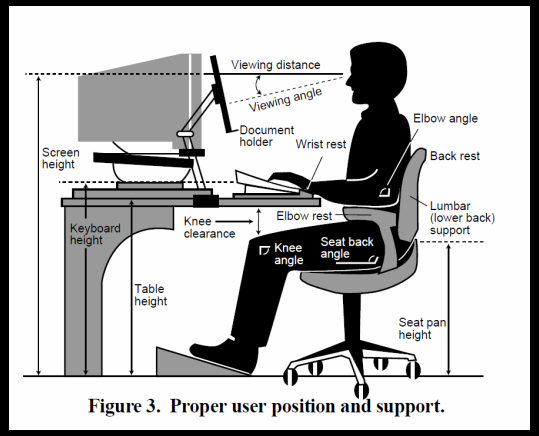
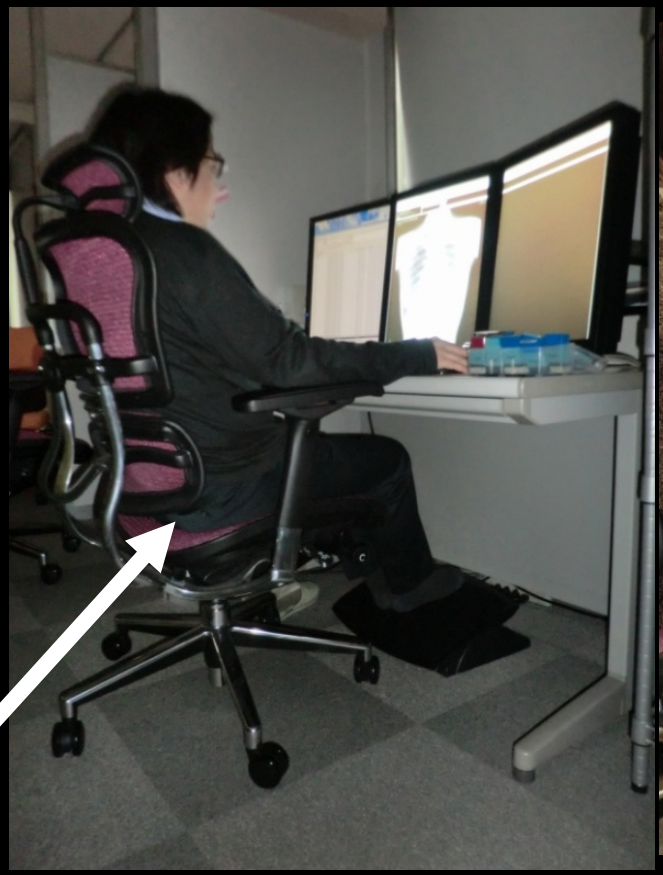


Figure 3. Proper user position and support.

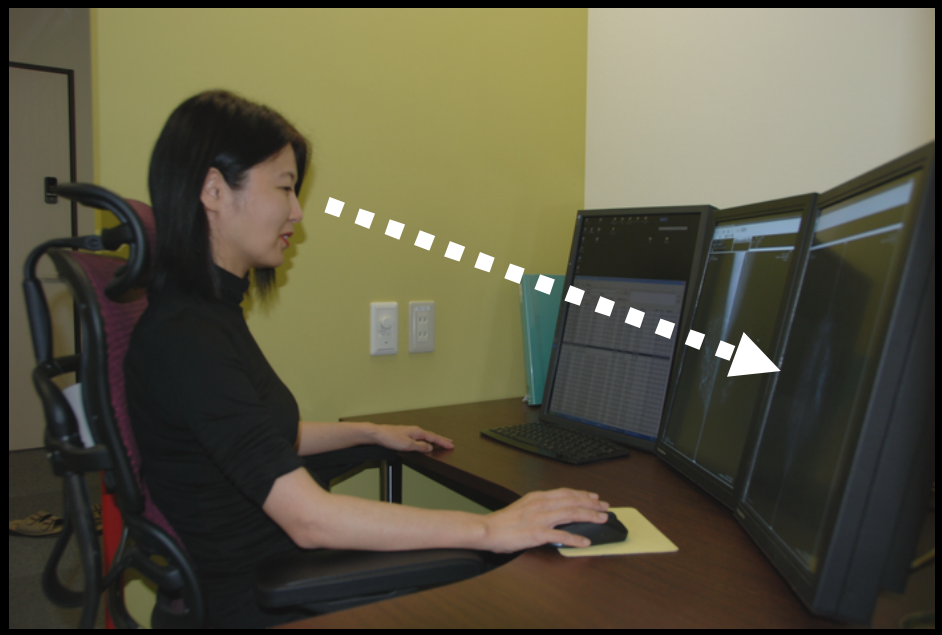


Adjustable

Armrest at desktop level

Flexible monitor stand

Adjustable height and angle



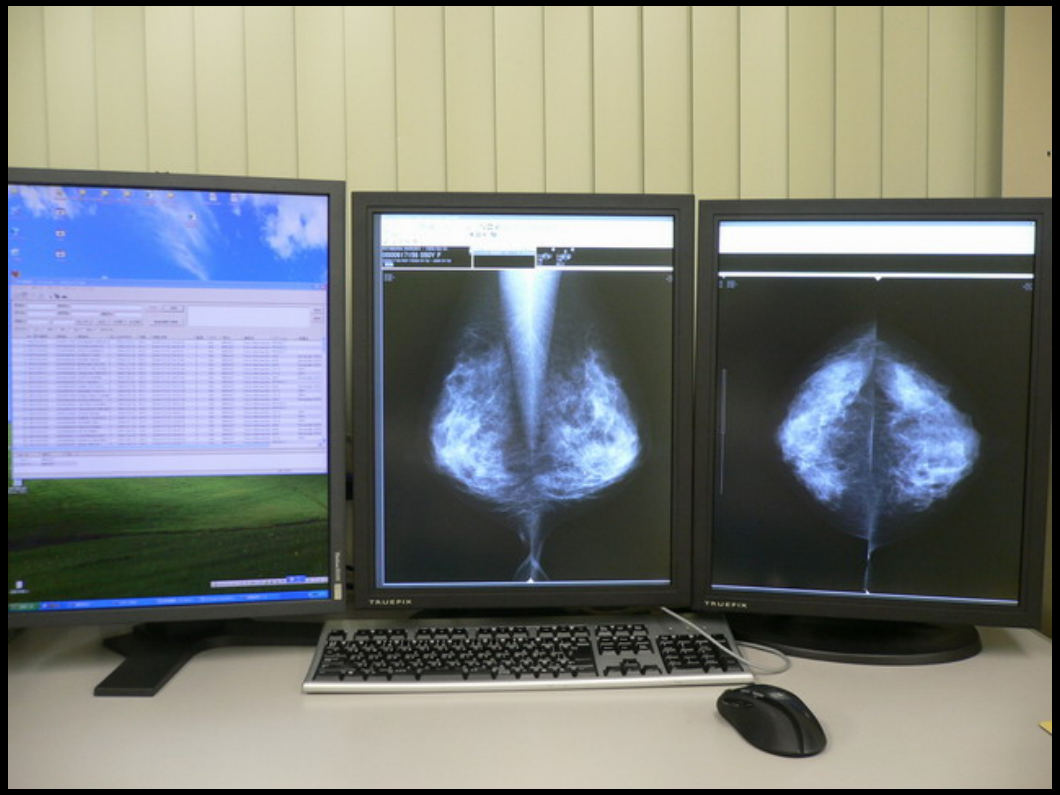
Downward viewing

Multifunctional mouse

Keyboard functions assigned to multifunctional mouse

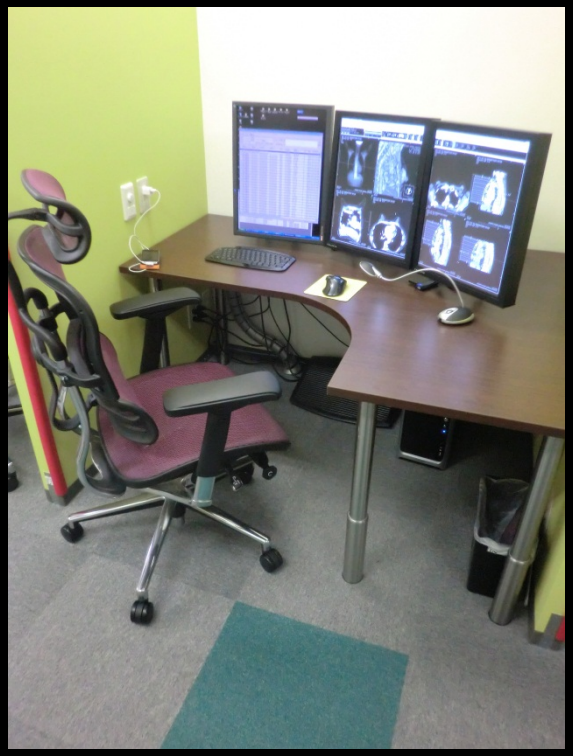
Speech recognition

Workstation customization



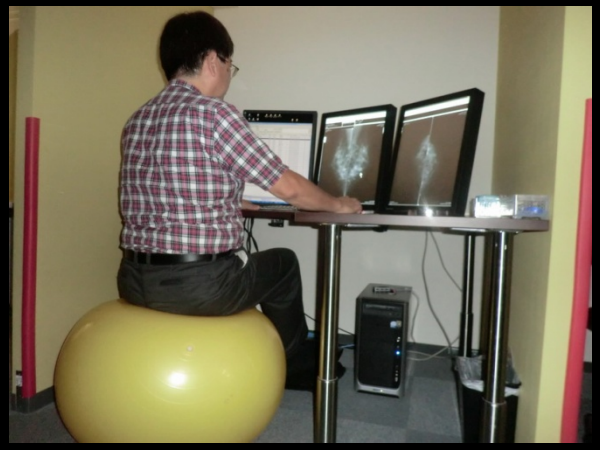
- Indispensable tool for radiologists
- Design and customize based on personal preference

Color coordinated reading booth



Ensure privacy, but allow for communication

Exercise and relaxation



Balance ball

Chair yoga

Rest area

Reading assistants

Assistants handle miscellaneous tasks

Refreshments as appropriate to relieve fatigue

Conclusions

Capital investment and personnel expenses are needed to develop a comfortable working environment.

Such investments are important for teleradiology service centers with heavy and varied workloads.

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