

「攜手童行e世界」家長講座

'Smart Net Surfing with Kids' Parent Seminar



教育局
Education Bureau

家庭與學校合作事宜委員會
Committee on Home-School Co-operation

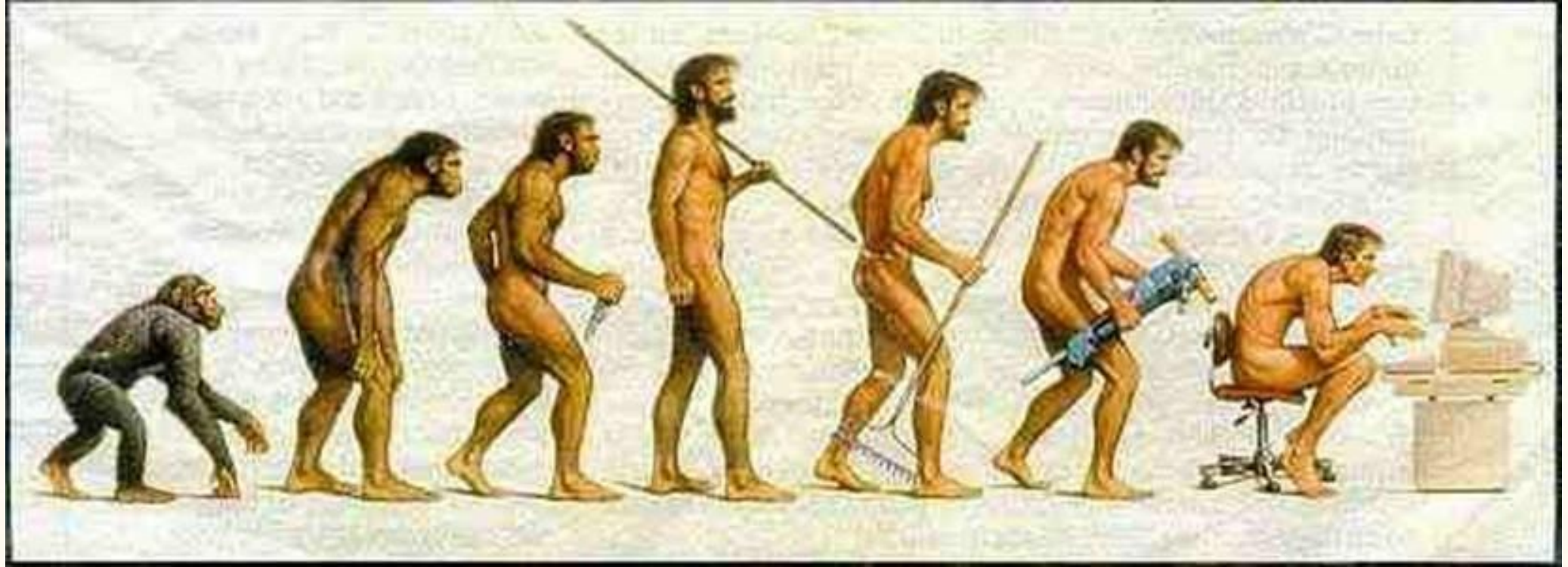
SMART Device SMART Care SMART Students

Kenneth LEUNG

Senior Physiotherapist, Kowloon Hospital

MSc, BSc, Dip (OSH), CDMP







Computerized / Electronic Life Style

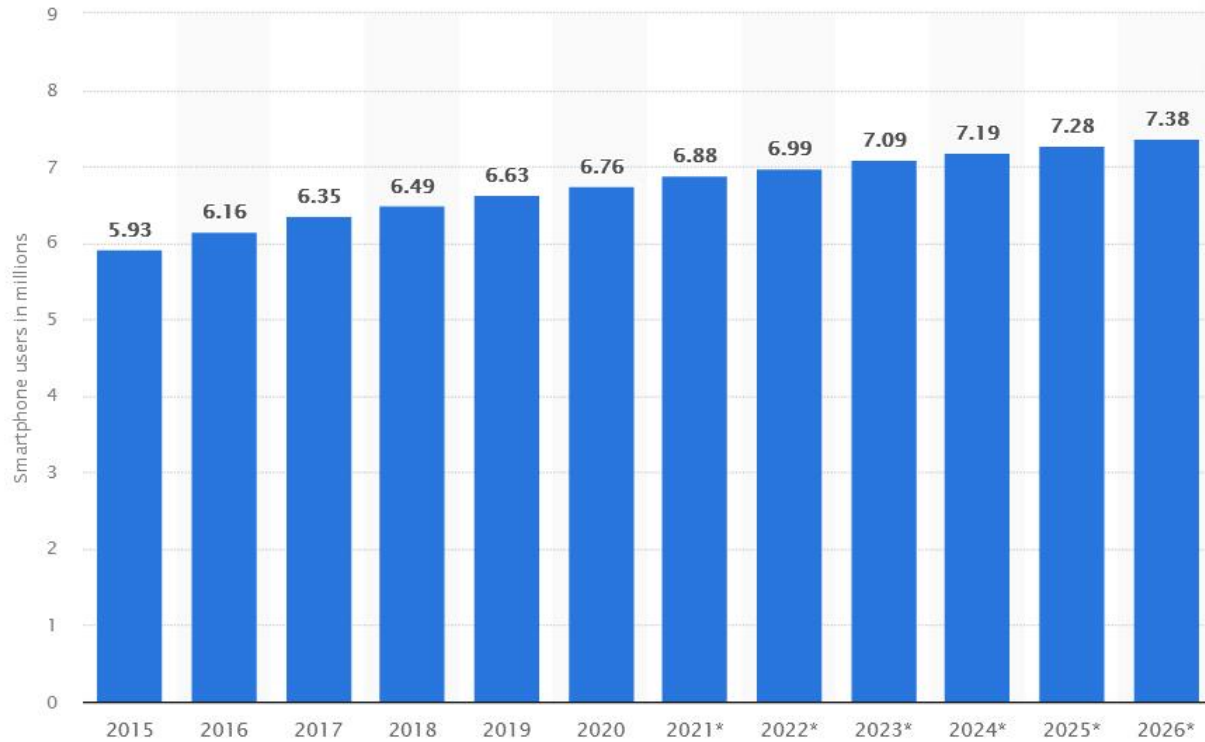
- Global changes in lifestyle due to IT Development
- e-mail, e-payment, e-classroom, e-meeting, games, App.....
- Everyone must have a hand held device in their hand
- Electronic devices are part of our life / essential to our life

Computerized / Electronic Life Style

- In 2013, a local research indicated that more than half of Hong Kong citizen presented with “nomophobia”.
- According to figures from the Office of the Communications Authority, the number of persons using mobile devices to access the Internet has risen from 3 million ten years ago to nearly 16 million this year. From the above data, it reflected that smart phones have been integrated into everyone's lives.
- These smart devices do bring convenience to the public, but at the same time they are also one of the causes of various musculoskeletal symptoms.

Number of smartphone users in Hong Kong from 2015 to 2020 with a forecast until 2026

(in millions)



- ★
- 🔔
- ⚙️
- 🔗
- 🔍
- 🖨️

DOWNLOAD

PDF + XLS + PNG + PPT +

SOURCE

- Show sources information
- Show publisher information

Release date

July 2021

Region

Hong Kong

Survey time period

2015 to 2020

Special properties

Individuals of any age who own at least one smartphone and use the smartphone(s) at least once per month.

Supplementary notes

* Forecast.

[Additional Information](#)

© Statista 2021 [Show source](#)

Computerized / Electronic Life Style

- Studies have pointed out that about two-thirds of the population have experienced neck pain in their lives. Recently, it has been found that the problem of neck pain has a younger trend.
- In worse scenario, neck pain, upper limb pain, weakness, or paralysis could occur.
- According to clinical examination, this type of pain is closely related to the long-term neck flexion position and repeated use of mobile electronic products in the upper limbs.

Computerized / Electronic Life Style

- Research reported that smartphone users are more likely to have neck pain and muscle fatigue. Using a smartphone in a bad posture for a long time will cause the neck to bending forward, making the neck muscle load five times higher than normal.
- Studies have also shown that long-term poor postures and repeated operation of the screen could also cause shoulder, elbow, wrist and finger pain or other related musculoskeletal symptoms.

Relationship of Use of Mobile Device to Musculoskeletal Symptoms

Body part being involved:

- **Neck Pain**
- **Shoulder**
- **Elbow**
- **Wrist**
- **Fingers**
- **Upper Back**
- **Lower back**

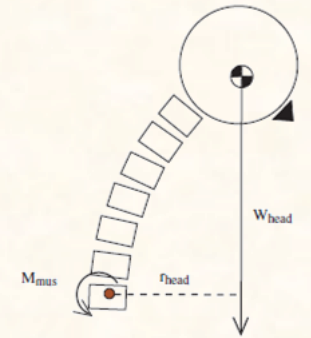
Author	Study Design	Subjects	Type of Device investigated	MSK symptoms				
Gustafsson et. al, 2017	Longitudinal population-based cohort study	Aged 20-24 Baseline: 7092 5 years: 2724	Texting on mobile phone		Baseline		5 years	
					M	F	M	F
				Neck	23%	46%	30%	50%
				Shoulder	22%	30%	25%	32%
				Hand/fingers	8%	11%	10%	16%
Woo et. al, 2016	Cross sectional Self report Questionnaire	Aged 18-25 503 Students (M=299; F=204)	Mobile phones Game Consoles Computers		M	F		
				Neck	72.3%	73.6%		
				Shoulder	72.3%	84.3%		
				Upper back	37.7%	39.7%		
				Elbow	21.5%	15.7%		
				Wrist/hand	42.3%	44.6%		
				Low back	37.7%	41.3%		
Yang et. al, 2017	Cross sectional Self report Questionnaire	Aged 16-20 Junior College Students (M=182; F=120)	Smart phones		M	F		
				Neck	53%	51%		
				Shoulder	51%	39%		
				Upper back	20%	32%		
				Elbow	10%	18%		
				Wrist/hand	16%	17%		
				Low back	38%	37%		
Kim & Kim 2015	Cross sectional Self report Questionnaire	292 Female University students mean age 21.42	Smartphones	Neck	55.8%			
				Shoulder	54.8%			
				Hands	19.2%			
				Wrists	27.1%			
				Fingers	19.9%			
				Lower back	29.8%			

Risk Factors for Using Mobile / Computer Devices

- Posture
- Time spent
- Tasks frequently performed
- Human device interaction techniques

Posture

- Cervical spine has a normal physiological curvature.
- Prolonged use of electronic devices makes head bowing forward and causes back, neck, upper back and shoulder muscles tightness. The physiological curvature of the cervical spine becomes straight and the center of gravity of the head is tilted forward. Neck and back muscles becomes more tighten and form a vicious circle.
- The gravitational moment of the head increases during the neck flexion posture, which is 3-5 times that of the normal posture.
- For long, it reduces the range of motion of the neck.
- In severe cases, it may cause various musculoskeletal problem like intervertebral disc herniation, nerve root irritationetc.
- The worst cases may require surgery.

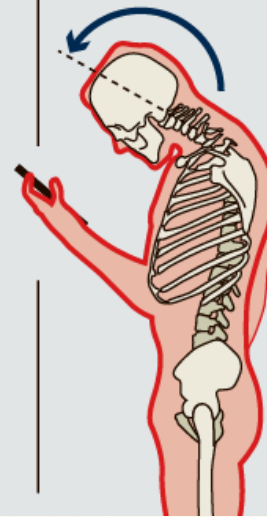
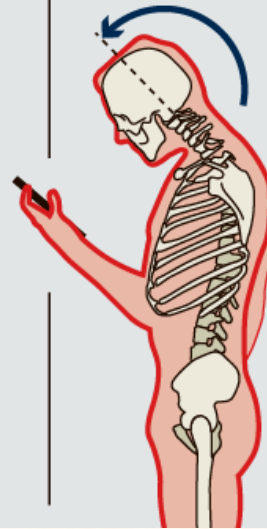
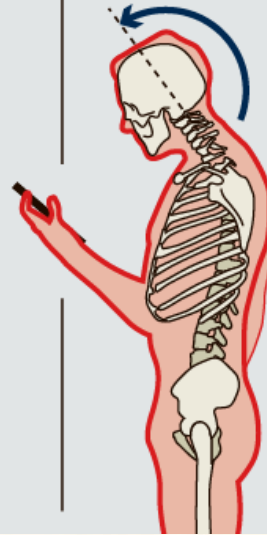
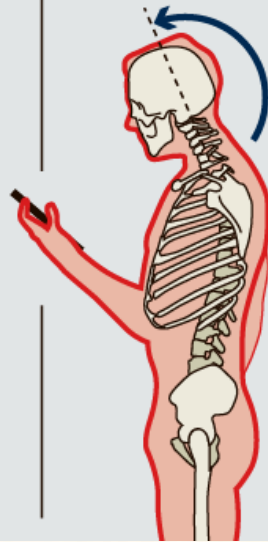
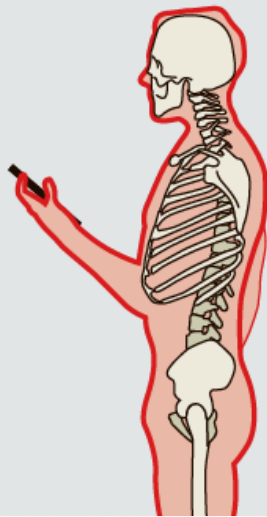


Posture

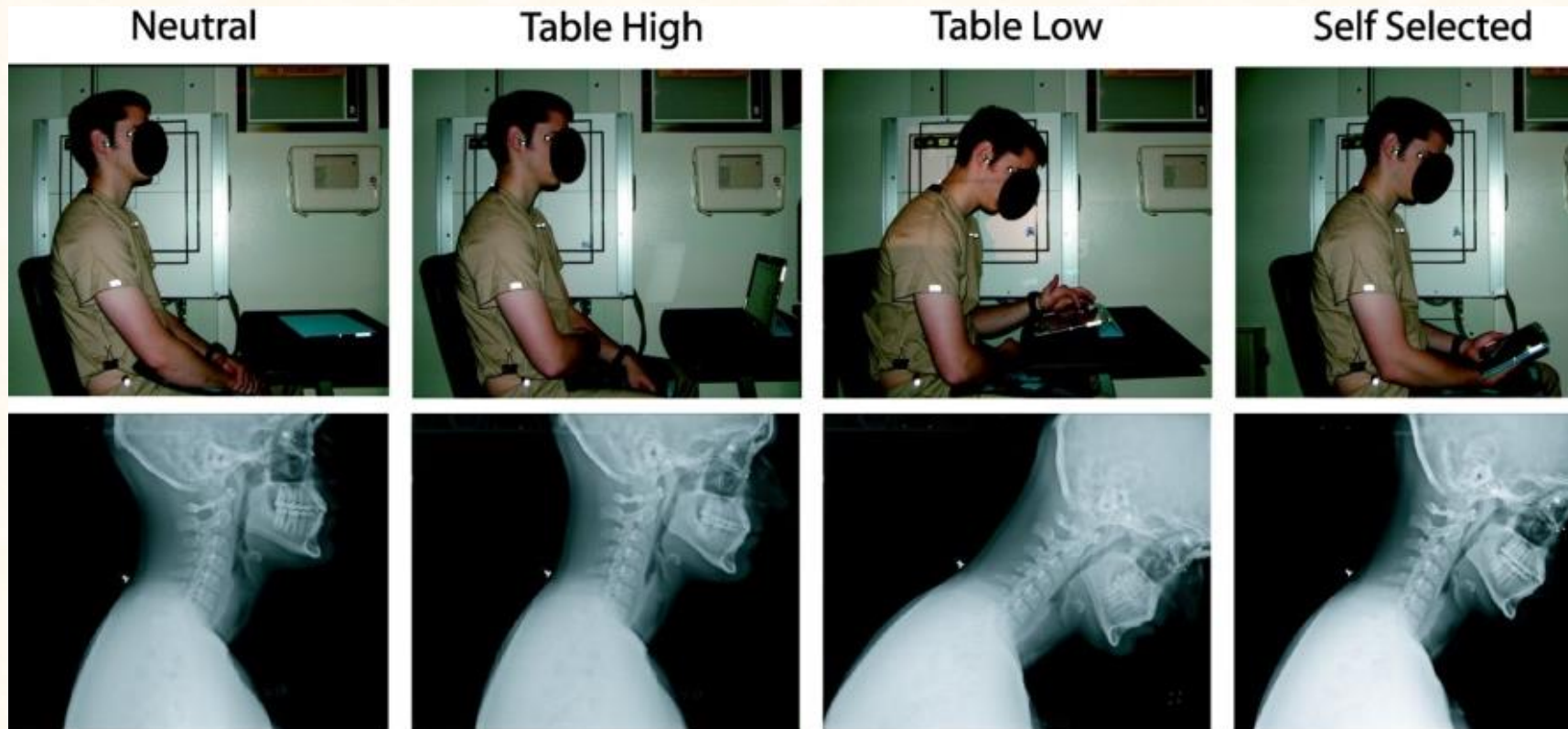
How texting could damage your spine

Forces on the neck increase the more we tilt our heads, causing spine curvature

Force on neck	10-12lb	27lb	40lb	49lb	60lb
Neck tilt	0 degrees	15 degrees	30 degrees	45 degrees	60 degrees



Posture

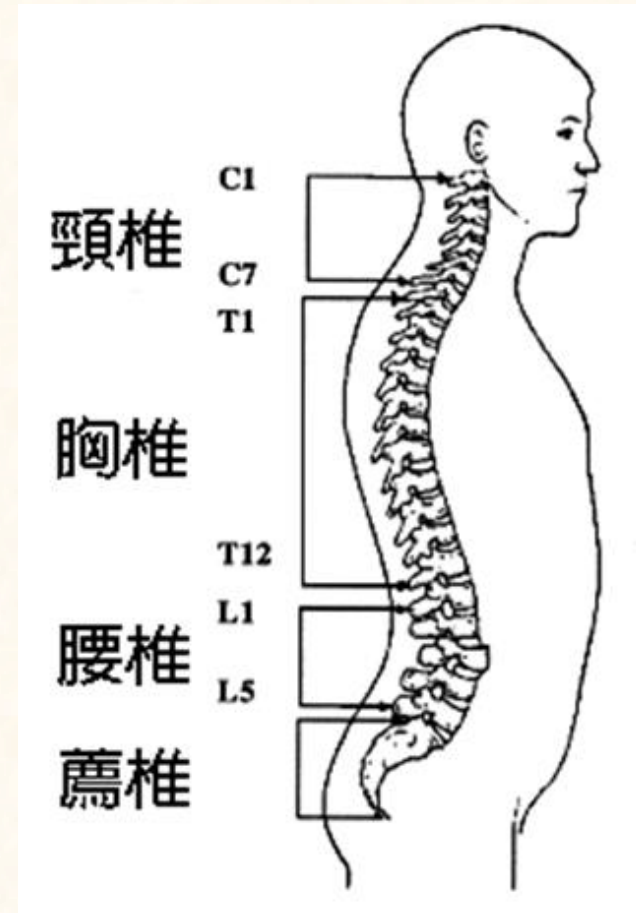


Posture

What is a “good posture”?

Side view

- S shape
- Provides a desirable platform to postural muscle to work

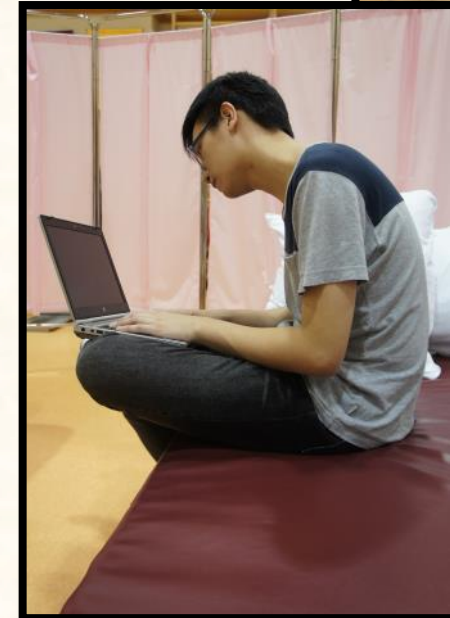


Posture

Poor Posture

- Support the cheek by one hand -> easily induce pressure on the neck and back muscles
- Sit on sofa / bed
 1. prolonged neck flexion
 2. poor back support
 3. excessive knee and prolong bending

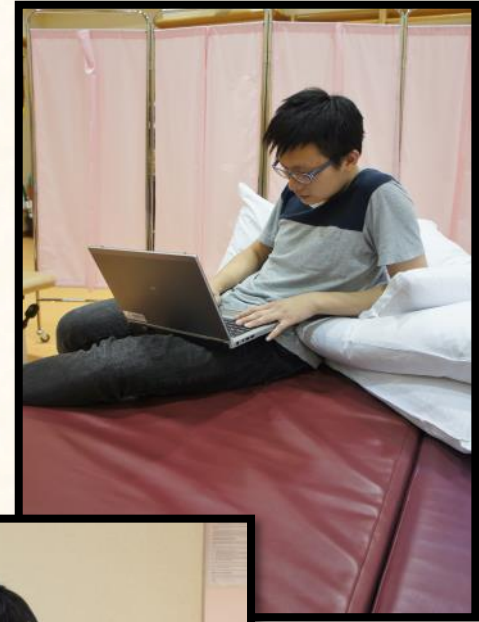
Causes neck back muscle fatigue and reduce circulation to lower limb



Posture

Poor Posture

- Recline / lean against on bed
 - Poor back and upper limb support
 - Excessive neck flexion
 - Muscle easily fatigue
 - Lead to muscle imbalance
- Use multiple devices at the same time
 - Odd posture
 - Neck, back and upper limb not in good bio-mechanics
 - Poor attention



Posture

Poor Posture

- Lean against one side on sitting / Use one hand to hold and use the mobile device
 - Poor back and upper limb support
 - Excessive neck flexion
 - Excessive stress and repeat strain to wrist and thumb
 - Lead to muscle imbalance
- Use mobile device without Upper limb support
 - Poor upper limb support
 - Excessive neck flexion
 - Excessive stress and repeat strain to wrist and thumb



Posture

Relationship between shoulder pain and posture

- Poor posture is closely related to muscle imbalance and tenderness points



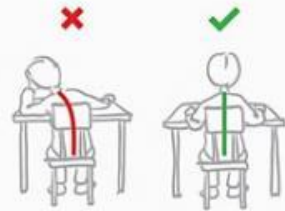
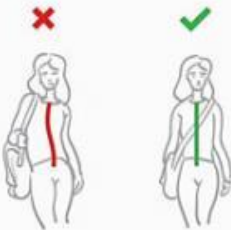
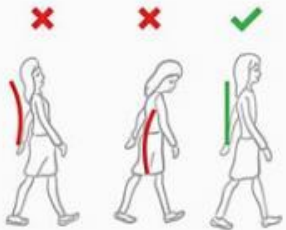
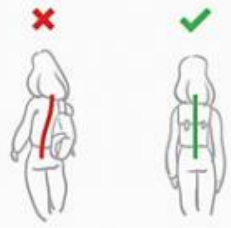
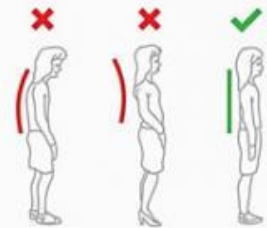
Posture

Correct and incorrect student behaviours causing postural defects

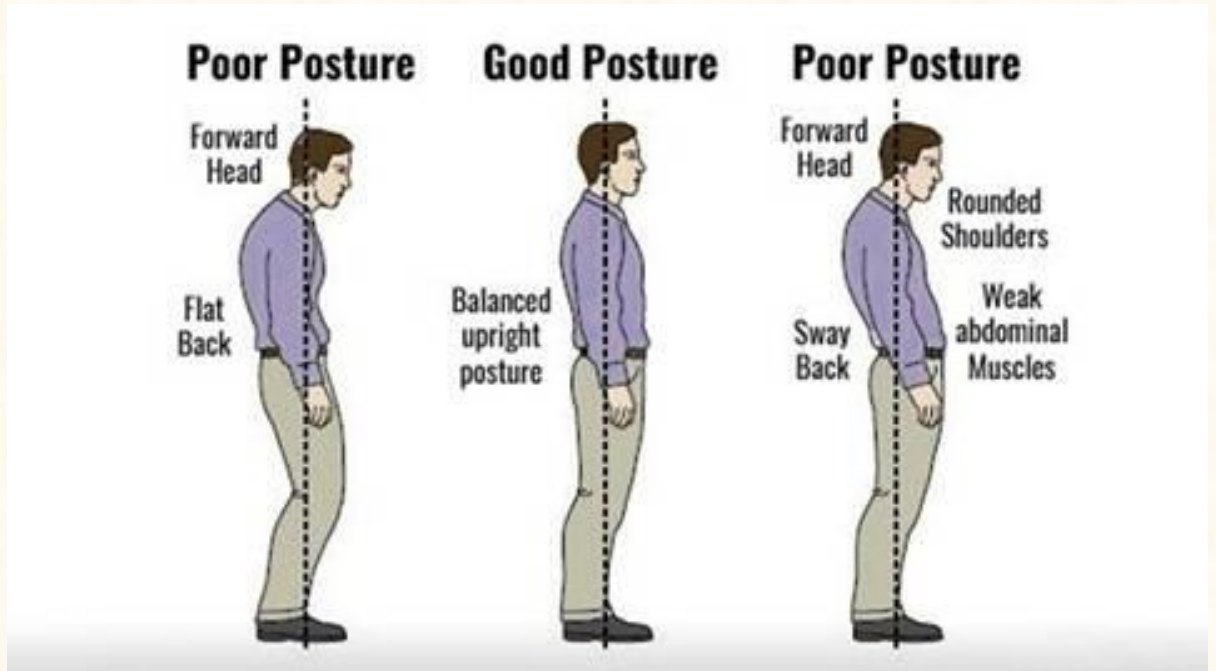
Body posture while resting and moving

Way of carrying backpack or school bag

Way of sitting in school benches



Source: NIK



Time spent

- Significant associations found between
 - **Time spent** gaming and pain at middle of thumb
 - Internet browsing & base of thumb
 - Total time spent and pain on left & right shoulder, and neck
- One study also found that prolonged use of smartphones can induce **changes in cervical posture and proprioception**



Time spent

Effect of smartphone usage time on posture and respiratory function (Jung et al., 2016)

- For those who used smartphones > 4 hrs
 - Increased in degree of forward head posture
 - Increased degree of rounded shoulder
 - Declined Peak Expiratory flow
- Round shoulder is strongly associated with forward neck posture
- Neck MSK disorder is related to thoracic kyphosis and round shoulder posture
- Other researches showed that kyphotic posture caused by using smartphone for a long time can also impair respiratory function

Time spent

- Prolonged use of the mouse and keyboard daily could cause repetitive stress injuries.
- People who engaged with computer or mobile device for a long time obviously do not get any meaningful exercise, so computer addiction can indirectly lead to poor overall physical condition and even obesity.

Time spent

- Most of the studies found inconsistent evidence, only measuring the total daily duration on mobile devices / computers but not the duration of time
- It is still advisable that
 - For using mobile phone, take a short break every 30 minutes
 - For using computer, take a short break every 60 minutes
- Provide sufficient rest time for neck, shoulder and hand muscles
- Proper relaxation exercise could help
 - The related tendons and joints will not be under pressure or overwork for a long time

Tasks frequently performed

An ergonomic study of thumb movements on smartphone touch screen (Xiong & Muraki, 2014)

- Investigate the relationships between thumb muscle activity and thumb operating tasks on a smartphone touch screen with one-hand posture

Conclusion:

The use of small buttons should be minimized, which may make the thumb less fatigued, so as to reduce the activity-related needs and musculoskeletal symptoms of the thumb

Research shows that 60% of IT professionals who spend more than 8 hours on a computer every day may suffer from RSI (neck, shoulder, forearm, thumb, upper back, hands, wrists, fingers, and arms) symptoms at some point.

Human device interaction techniques

Texting style and screen size influence upper extremity and trapezius muscle activity and cervical posture while texting

- Greater muscle activities over wrist muscles was noted with the one-hand typing style
- 60% of participants placed the 9.5” device on their laps during texting
 - Increased neck flexion while texting as screen size increases
- Trends for increased finger flexor, wrist extensors and trapezius muscle activity
- Texting on larger screen size may impart greater demand and postural stress on musculoskeletal tissue than using a smaller device

Ergonomic advice

Key principle

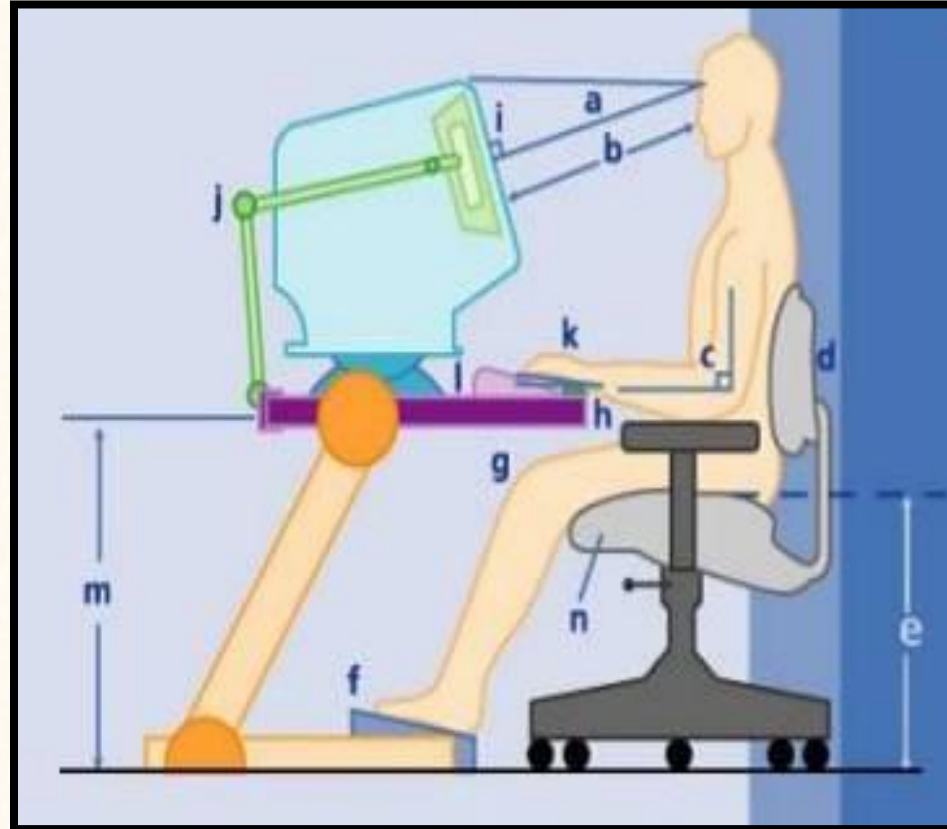
- Sufficient support for forearms (e.g. leaning on armrests, thighs or tables)
- Sitting posture
 - Don't bend your head forward excessively
 - Sufficient support on the back
 - Sitting upright
- Use assistive device if needed

Ergonomic advice

Design of computer workstation

Key elements

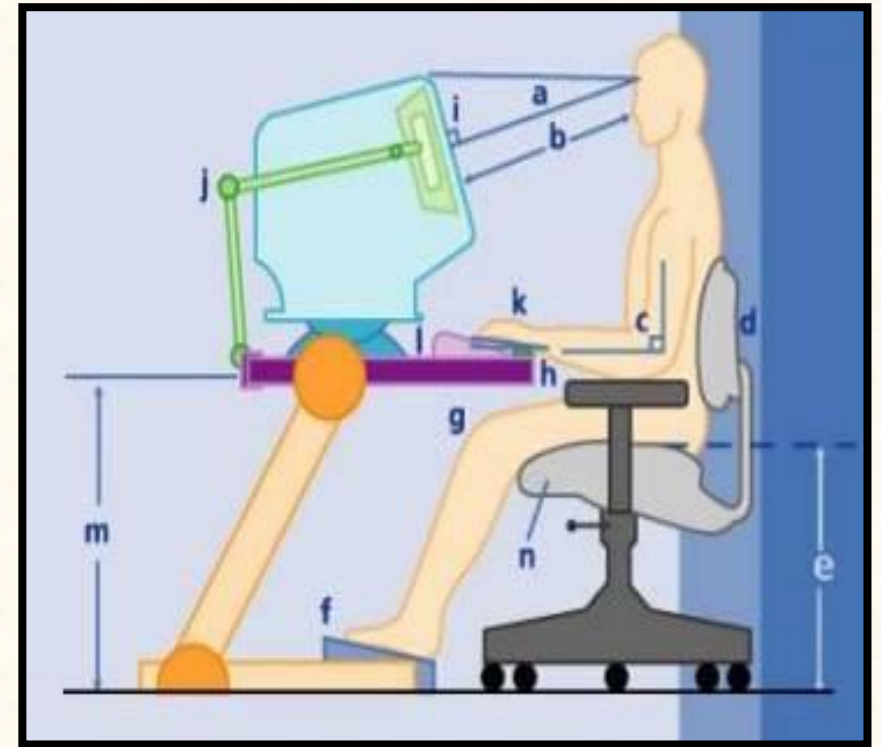
- Display screen
- Keyboard
- Work desk
- Chair



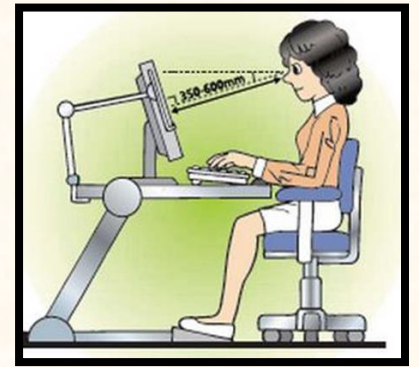
Ergonomic advice

Design of computer workstation

- (a) Comfortable viewing angle, about 15° - 20°
- (b) Comfortable viewing distance, about 350-600 mm
- (c) Forearm and arm are approximately at right angles and well supported
- (d) Adjustable chair back
- (e) Adjustable seat height
- (f) If necessary, use stable pedals
- (g) There is enough space for lower limbs to stretch



Ergonomic advice



Display Screen

- The display screen should have a clear, distinct and stable image
- The displayed font must be of proper size and there must be enough space between the lines
- The brightness and contrast of the image should be adjusted
- Can steer and adjust the inclination to avoid excessive neck extension or flexion
- The placement position should maintain a comfortable viewing distance from the operator (about 350 to 600 mm)
- The top line of words should be at or slightly below eye level

Ergonomic advice



Keyboard

- Should be thin and adjustable inclination
- Can be separated from the display screen so that the operator can take a comfortable working posture
- The surface of the keyboard should not reflect light and a neutral and soft color should be used
- The fonts and symbols on the keys should be clear and easy to identify
- There should be enough space in front of the keyboard to support both hands
- The proper position of the keyboard should be such that the forearm and the arm are approximately at right angles during operation
- The inclination of the keyboard should be adjusted to a moderate input angle
- An overly tilted keyboard can cause excessive wrist flexion
- Wrists should be slightly inclined during operation

Ergonomic advice

Keyboard Wrist Pad / Mouse Pad

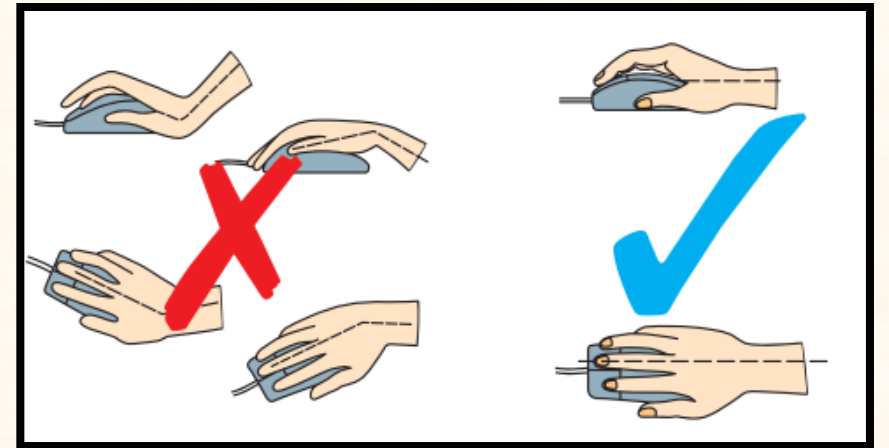
- Provide support for long time keyboard operation
- Keep wrists straight / slightly inclined
- Reduce the risk of repetitive strain injury
- Wrists should only be placed on the wrist pad during work pauses for a short rest
- When using the keyboard to input data, the wrist should not be close on the wrist pad
- The correct way is to move the whole hand to type data



Ergonomic advice

Mouse

- Operate with touch buttons
- Place it at about elbow height Avoid overextending your forearms
- Be careful to keep your wrists straight during operation
- Avoid flexing your wrists forward or on both sides



Ergonomic advice

File rack / holder

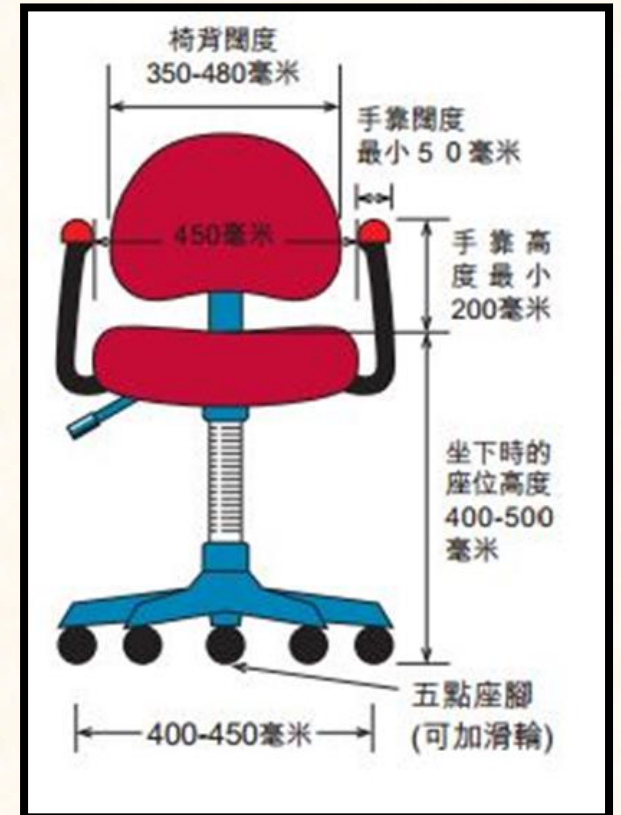
- To enter data by reading the document stable
- Adjustable height, distance and angle
- The document shelf can be placed on both sides of the screen to keep the document and the screen roughly on the same plane
- Avoid bad neck posture and movements



Ergonomic advice

Chair

- The height of the seat should be adjustable (between 400 and 500 mm from the ground)
- The height and inclination of the seat back could be adjusted to provide sufficient support for the back
- If there is a hand rest, its height can be adjusted and the position should not hinder the operation of the keyboard
- Seat cushion: breathable high-density latex, moderate hardness, and the seat surface is slightly concave
- Round or edge vortex at the front of the seat
- The bottom of the seat should be stable (should have five-point seat feet), and set wheels for movement



Ergonomic advice

Footrest

- If the seat is too high and the operator's legs cannot be placed on the ground, a stable footrest should be provided to support the lower limbs stable
- With non-slip surface Adjustable height and angle



Ergonomic advice

Working posture

- Sit upright
- Avoid twisting, sitting sideways
- Make good use of the backrest to support the load of the back
- Do not keep the same posture for a long time (may cause muscle strain)
- Should change posture regularly or make a slight change, such as doing other work or toilet / tea break



Ergonomic advice

For notebook computer user

- Small design of keyboard and pointing device, user needs to work with unnatural hand postures for a long time
- Fingers and hands are prone to fatigue if use a notebook computer for a long time
- Detachable keyboard and mouse as input tools
- Connect to desktop display screen



Ergonomic advice

Recommendations for Touch Screen Mobile Electronic Devices



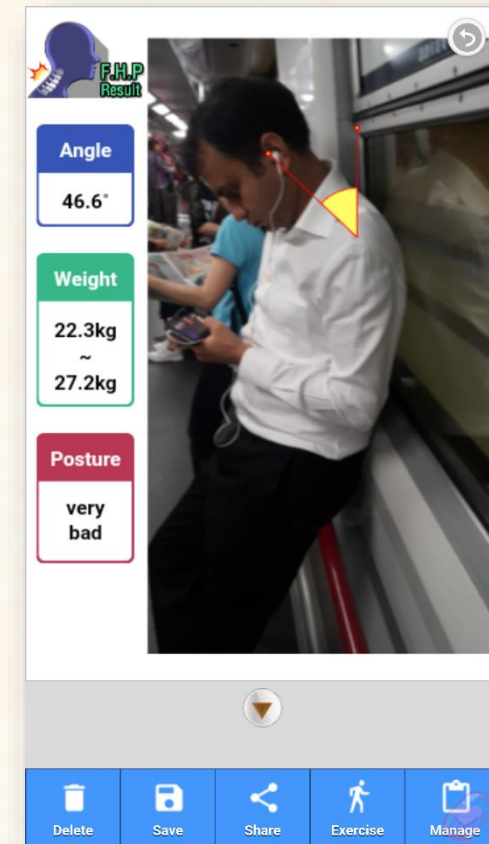
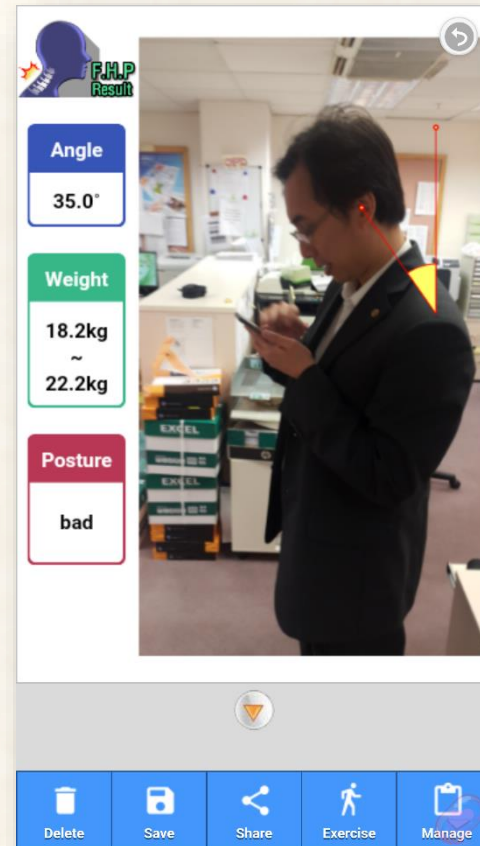
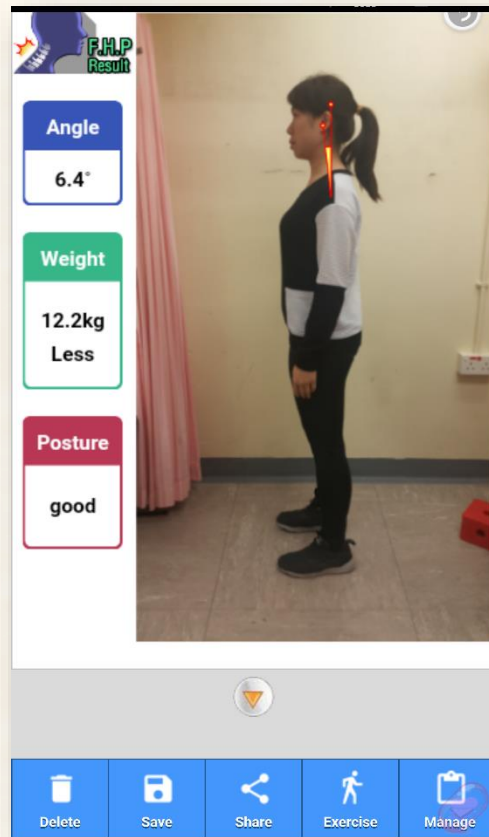
Ergonomic advice

Recommendations for Touch Screen Mobile Electronic Devices

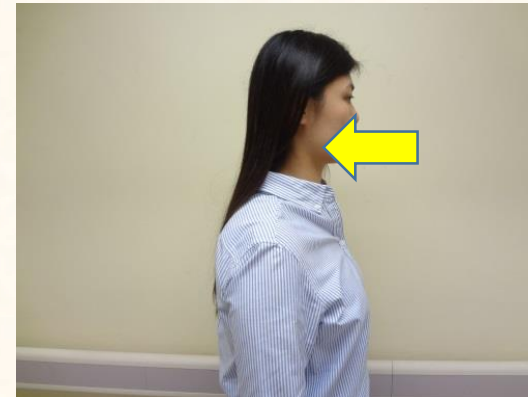
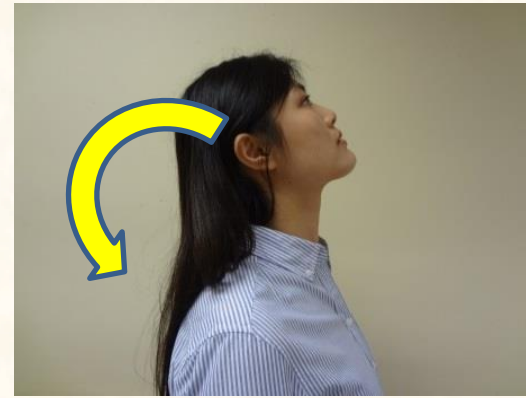
- Pen and Keyboard



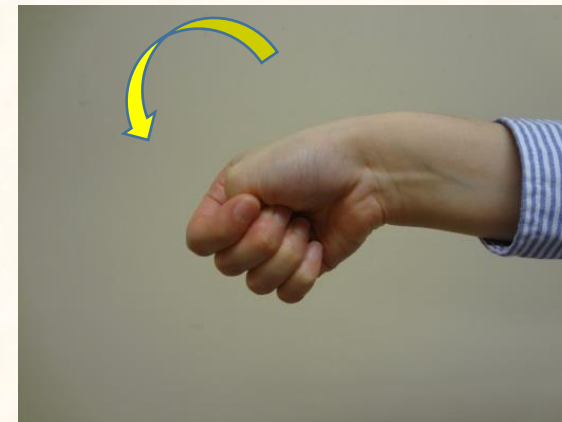
Posture App



Exercises



Exercises



Exercises

- Regular exercises could improve muscle strength, flexibility and blood circulation
- If exercise causes pain, do not force it to continue
- All exercises should be done in a pain free mode
- Muscles should have slightly tightness feeling when doing stretching type exercise
- If you have any query or feel unwell, please consult a doctor or physiotherapist

Be Smart & Be Healthy

- Adequate rest and sleep can relieve pain and discomfort and promote recovery
- Change positions frequently, do not stay in a position that makes you painful
- At work, take breaks and exercise
- Warm water bag can help to reduce muscles pain and enhance circulation

