

le measurement methodology is challenging. The best way involves using a three dimensional method to be able to measure all parameters (Fig.4). But a three dimensional methodology relies on equipment that is not clinically accessible and the Japanese clinical group has not been able to determine how to implement a three dimensional system. To address these challenges, this presentation will describe the effectiveness of measurement according to the ISO using one camera method and other simple tool (Kemmu:Development of posture measurement instrument and its clinical application).

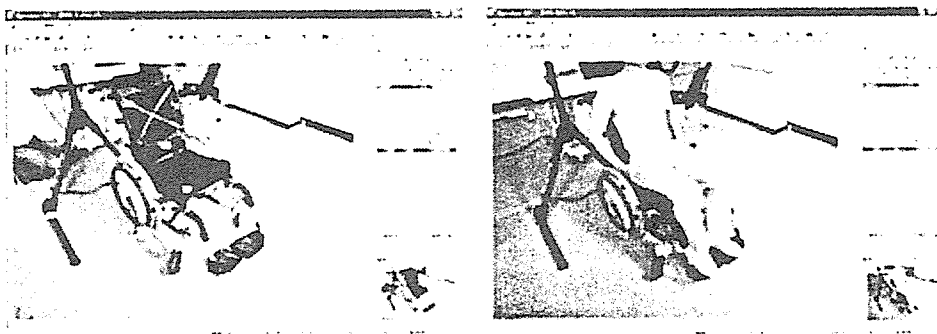


Figure 4 The three-dimensional measurement method uses two cameras and software to process the images

Table1 Parameter and the Measurement methods

	Measures parameter	Ruler	One camera method	Instrument	Three dimensional methods
Support surfaces	Coordinate location	Impossible	impossible	impossible	possible
	Absolute and relative angles	Impossible	possible	Partly possible	possible

A seated person	Linear	Possible	impossible	impossible	possible
Person	Absolute and relative angles	Impossible	possible	Partly possible	possible

We will demonstrate absolute and relative angles of support surfaces and absolute angle of a seated person using one camera method.

5. Simple measurement methods (Table 2)

As mentioned above, there are several challenging measurement issues related to the seated person, including difficulties calculating joint centers and measuring absolute and relative body angles effectively. To address these difficulties, the Japanese clinical group has selected anatomical points to be able to measure directly near calculation joint centers including use of the mastoid instead of the calculated upper neck joint and a mid point between C7 and upper sternal notch (Figures 5 and 6). Also, We will measure the angle of the sagittal pelvic line using ASIS and PSIS excluding a hip joint center. Additionally, we have developed some simple measurement methods to measure absolute relative angles of support surfaces and absolute angle of a seated person combining one camera method.

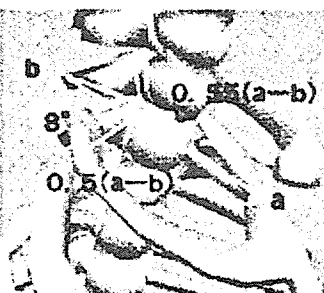
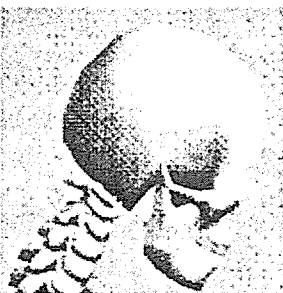
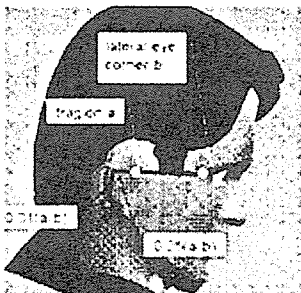


Figure 5 Upper neck point

Figure 6 Lower neck

k point

(Calculated and mastoid)

(Calculated and mid po

int)

Table 2 Simple measurement according to the ISO16840-1

Seated body

Segment line term	Landmarks defining the segment line	axis	starting angle
Sagittal pelvic line	line perpendicular to the ASIS- PSIS line	z	0
Frontal pelvic line	line perpendicular to the line passing through the right ASIS and left ASIS, passing through the ASIS midpoint	z	0
Transverse pelvic line	line perpendicular to the line passing through the right and left ASIS's at the midpoint of this line	y	0
Sagittal upper trunk line	lower neck point and the iliac crest point 1: lower neck point: a mid point between C7 and the upper sternal notch	z	0
Frontal trunk line	line passing through the upper sternal notch and the ASIS midpoint	z	0
Transverse trunk/shoulder	line perpendicular to the line passing through the right and left acromion points	y	0

line			
Sagittal abdominal line (Annex)	line passing through the lower sternal notch and the ASIS midpoint	z	0
Frontal abdominal line (Annex)	line passing through the lower sternal notch and the ASIS midpoint	z	0
Sagittal sternum line (Annex)	line passing through the upper and lower sternal notch points	z	0
Frontal sternum line	line passing through the upper sternal notch and the lower sternal notch	z	0
Sagittal neck line (Frontal neck line)	line passing through the lateral upper and lower neck points 1: upper neck point: a mid point between lower points of left and right mastoid portions 2: lower neck point: a mid point between C7 and upper sternal notch	z	0
Frontal neck line	line passing through the suprasternale and the base of the nose	z	0
Sagittal head line	line perpendicular to the line passing through the trignon and eye corner	z	0
Frontal head line	line perpendicular to the line passing between the right and left eye corners	z	0

Transverse head line	line perpendicular to the line connecting the right and left Tragus at the midpoint of this line	z	0
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PSDs

	planes and reference lines	axis	starting angle
Back	Sagittal	z	0
	Frontal	z	0
	Transverse	y	0
Seat	Sagittal	z	90
	Frontal	y	0
	Transverse	y	0

6. Some tools for measurement

We have some ideas about measuring some anatomical landmarks hidden by the body and PSD. The hidden points can be measured using tools that extend the point outward so that it is not hidden. (see Figure 7). Also, we use a Martin measurement tool to measure the angle between ASIS and PSIS. The end point of a Martin measurement tool is on PSIS and the middle edge point is on ASIS (Figure 9). The lever shows the angle between ASIS and PSIS. The figure shows the measurement method measuring angle between ASIS and PSIS. Finally, the hidden and soft surface of PSDs can be measured by a cube box (Figure 10).

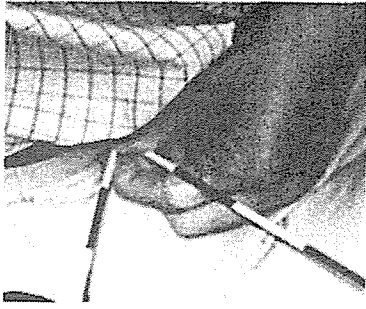


Figure 7 indicated bars

Figure

8 Martin tool and measurement

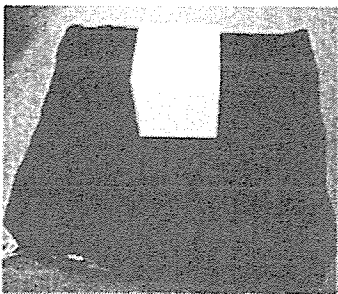


Figure 9 Box to referred a support surface

7. Results

Deformation of pelvic and spine in PSDs has three dimensional position changes so we will have challenges how we analysis these data We show you simplify methods to describe the posture and PSDs. We all get together to advance forward the progress of the wheelchair seating science.

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E. 研究発表

1. 論文発表 なし

2. 学会発表

1) Hirose H, Kenmoku T, Crane B: Measurements of Positions of Sitting Posture and Posture Support Devices According To ISO 16840-1. 24th International Seating Symposium. Orlando, U. S. A. , 2007/3/8. Syllabus, 2007, p. 65-67.

2) 続木良江, 廣瀬秀行: 車いすの変更により、褥瘡が変化した場合 第2回日本シーティング・シンポジウム. 東京都北区, 2006/10/1. NPOシーティング・コンサルタント協会抄録集. 2006. p. 34-35.

3) 鈴木聖貴, 廣瀬秀行, 見木太郎, 清宮清美, 井上悦男, 森田智之, 古賀 洋: ISO姿勢計測における各身体支持部の位置関係の表現方法について. 第2回日本シーティング・シンポジウム. 東京都北区. 2006/10/1. NPOシーティング・コンサルタント協会抄録集. 2006. 38-39.

4) 古賀 洋, 森田智之, 廣瀬秀行, 見木太郎, 清宮清美, 井上悦男, 鈴木聖貴: ISOに基づいた座位保持装置計測の問題点. 第2回日本シーティング・シンポジウム. 東京都北区. 2006/10/1. NPOシーティング・コンサルタント協会抄録集. 2006. 40-41.

5) 森田智之, 鈴木聖貴, 廣瀬秀行, 見木太郎, 清宮清美, 井上悦男, 古賀 洋: 人体及び座位保持装置各部の角度の表現方法について. 第2回日本シーティング・シンポジウム. 東京都北区. 2006/10/1. NPOシーティング・コンサルタント協会抄録集. 2006. 42-43.

6) 清宮清美, 鈴木聖貴, 廣瀬秀行, 見木太郎, 井上悦男, 森田智之, 古賀 洋: ISO姿勢計測の臨床応用. 第2回日本シーティング・シンポジウム. 東京都北区. 2006/10/1. NPOシーティング・コンサルタント協会抄録集. 2006. 44-45.

F. 知的財産権の出願・登録状況

なし

書籍刊行物 なし

雑誌刊行物 なし