Scoliosis clinic

Paediatric Orthopaedic Team
Department of Orthopaedics and Traumatology
Prince of Wales Hospital

Commonest types of Scoliosis

- **Idiopathic**
  - **infantile (0 to 3 years)**
  - **juvenile (3 to 9 years)**
  - ***adolescent (10 years to adulthood)***
- **Congenital**
- **Neuromuscular**
- **Others- syndrome related: nonstructural, structural**

Clinical Assessment

- **Aims**

  Rule out underlying pathology

  Assess risk of progression

  - **Severity**
  - **Skeletal maturity**

History

- Symptoms
  - deformity, cosmetic effect
  - Age of onset, progression
  - pain
  - neurologic symptoms
- Rule out underlying pathology
  - family history
- Prognosticating factors
  - age
  - menstrual history
  - growth pattern

Physical Examination

- General
  - weight and height
  - dysmorphic features
  - skin pigmentation
  - ligamentous laxity
- Secondary sexual characteristics
  - axillary hair
  - Tanner staging (only when radiological finding in doubt)
- CNS
  - complete CNS examination especially:-
    - abdominal reflex
    - Babinski
    - Romberg
    - finger-nose testing

Physical Examination

- **Back**
  - ***look***
    - **asymmetry**
      - **neckline, shoulder, rib cage, iliac crest**
    - **trunk shift**
      - **plumb line from C7 to gluteal cleft**
    - **deformity of spine**
      - **note the 3-D torsional deformity**

Physical Examination

- ***Feel***
  - feel any muscle spasm
- ***Forward bending***
  - this is the single most important test every doctor should master

Forward Bending Test

- Stand in front or behind the patient
- Instruct patient to stand straight with feet together pointing forward
- Ask her to bend forward as much as possible
- Identify asymmetry of the rib cage

Physical Examination

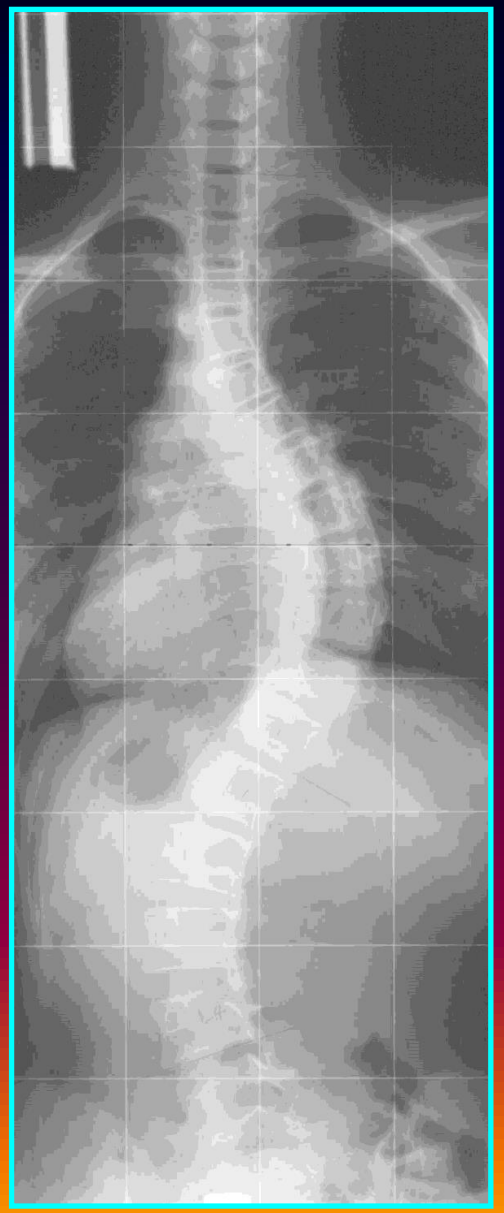
- ***Move***
  - **assess mobility of spine**

- ***supine position***
  - **assess any leg length discrepancy**

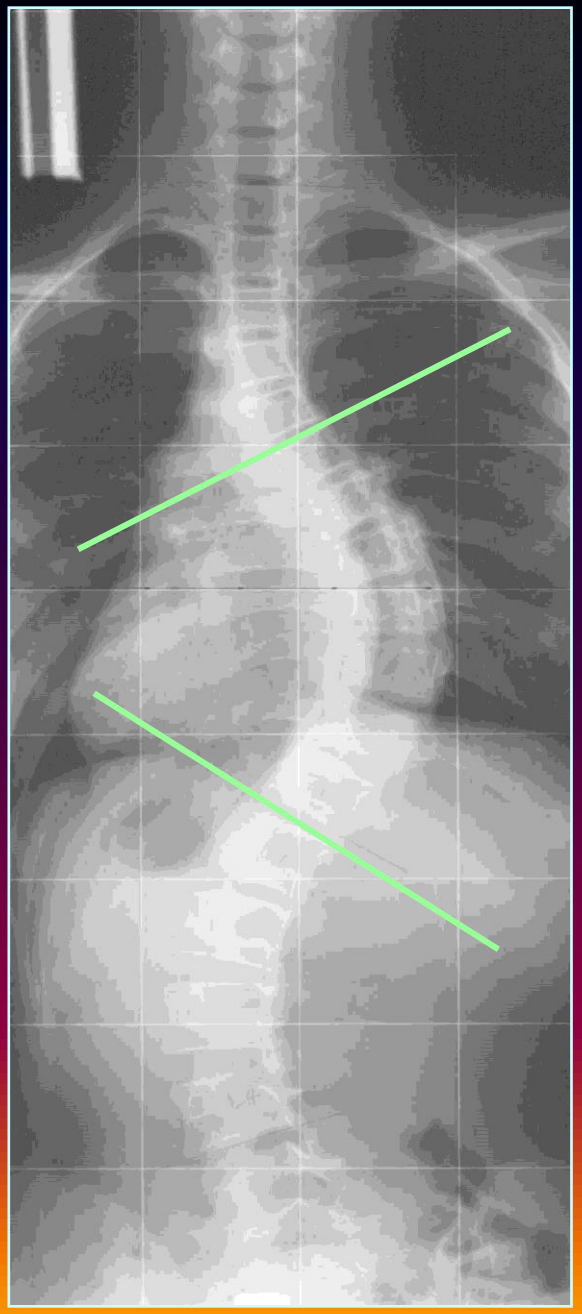
Investigation

- Scoliosis x-ray
- MRI
- CT scan
- Misc: Blood Test, EMG

- one should note:-
  - view (PA or lateral)
  - age of patient
  - date of the x-ray
  - any anomalies (bony and non-bony)
  - curve
    - Site and Direction (S)
    - Location and level (L)
    - Apical vertebra (A)
    - Cobb's angle (C)
  - skeletal maturity
    - Risser’s sign
    - ring apophysis

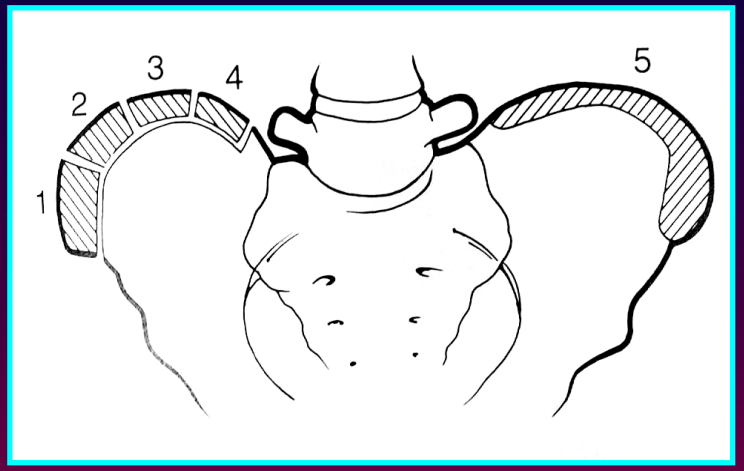


Cobb's angle =



Skeletal Maturity

- **Risser's sign**
  - **ossification of apophysis of iliac crest**
  - **stage 0 means no ossification seen**



  - **stage 1,2,3,4 corresponds to the number of quadrants ossification is present along the iliac crest. Stage 5 means the apophysis is fused with the iliac bone**

Current practice

Refer to the bracing treatment reference

Risser 2-3 Within 1 yr after menarche	1.6% physio	22% physio	brace	If >45° surgery	surgery
Risser 4-5	Physio	Physio	Physio	Physio	surgery

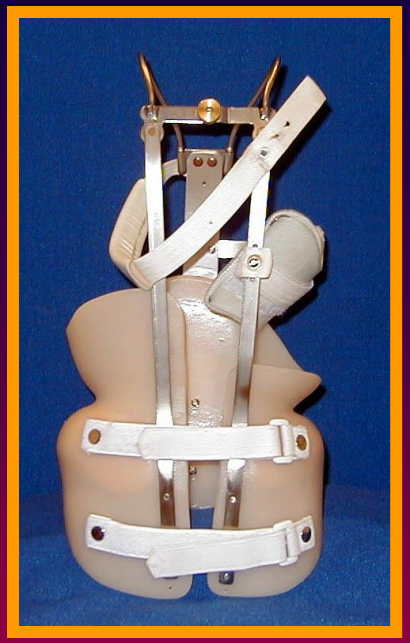
General treatment

- Physiotherapy
  - Stretching
  - Muscle training
  - Postural
- Scoliosis advice
  - Exercise
  - Avoid heavy objects
- Pregnancy alert with xray

Bracing : History

Milwaukee brace

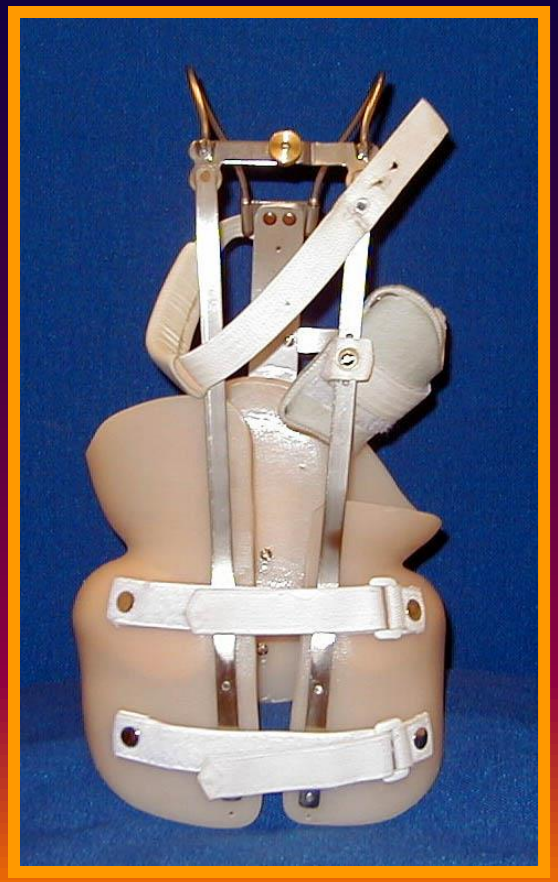
- 1946
  - Blount and Schmidt
  - For poliomyelitis after spinal fusion
- 1958
  - Applied to non-operative treatment for scoliosis

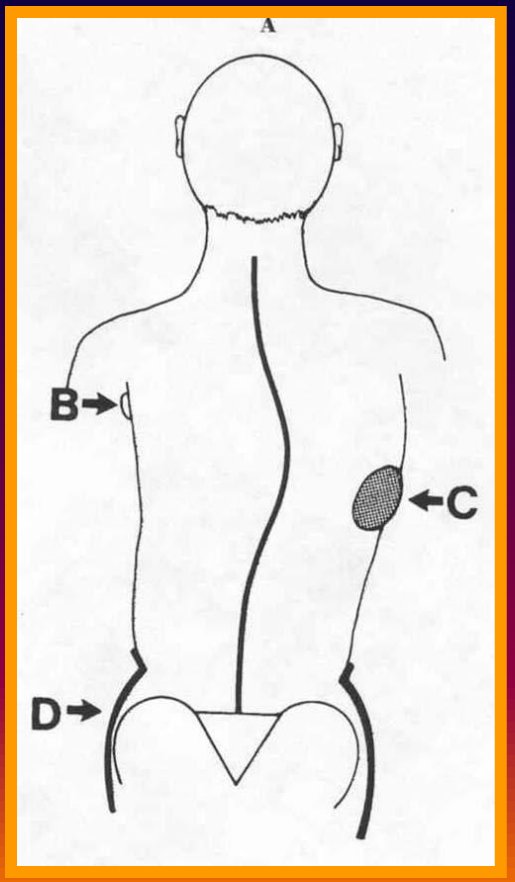


Biomechanics

- Milwaukee brace
  - CTLSO
  - initial concept of mandibular and occipital distraction discarded
  - 3 point control

Biomechanics

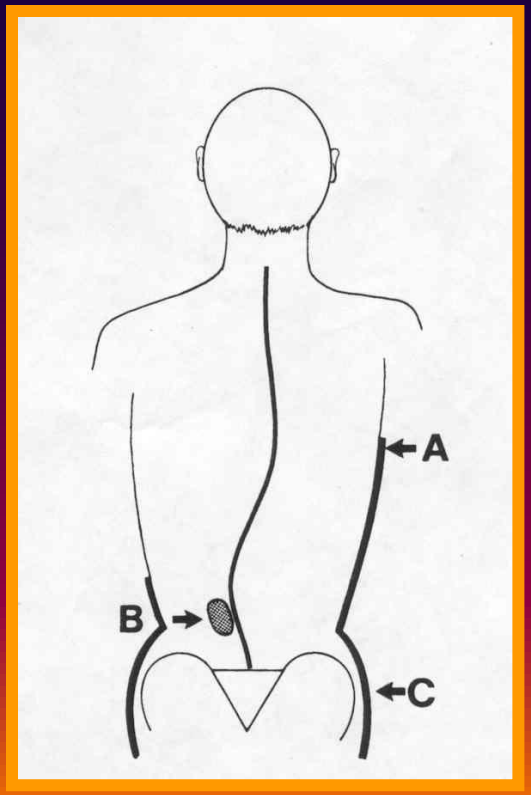




Biomechanics

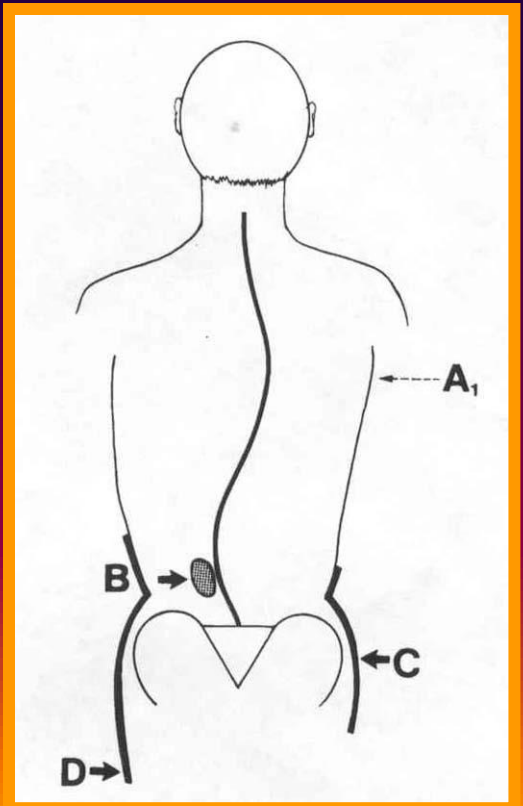
- Underarm brace
  - TLSO
    - Boston
      - introduced in 1971 by JE Hall and ME Miller

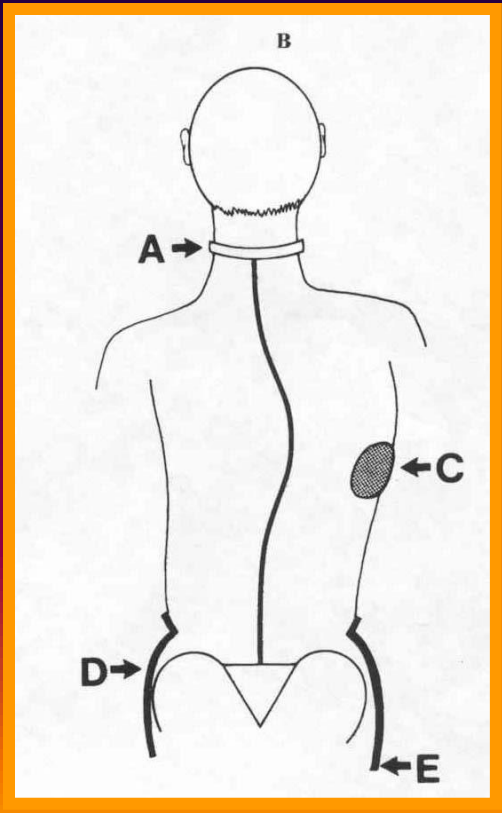
Biomechanics

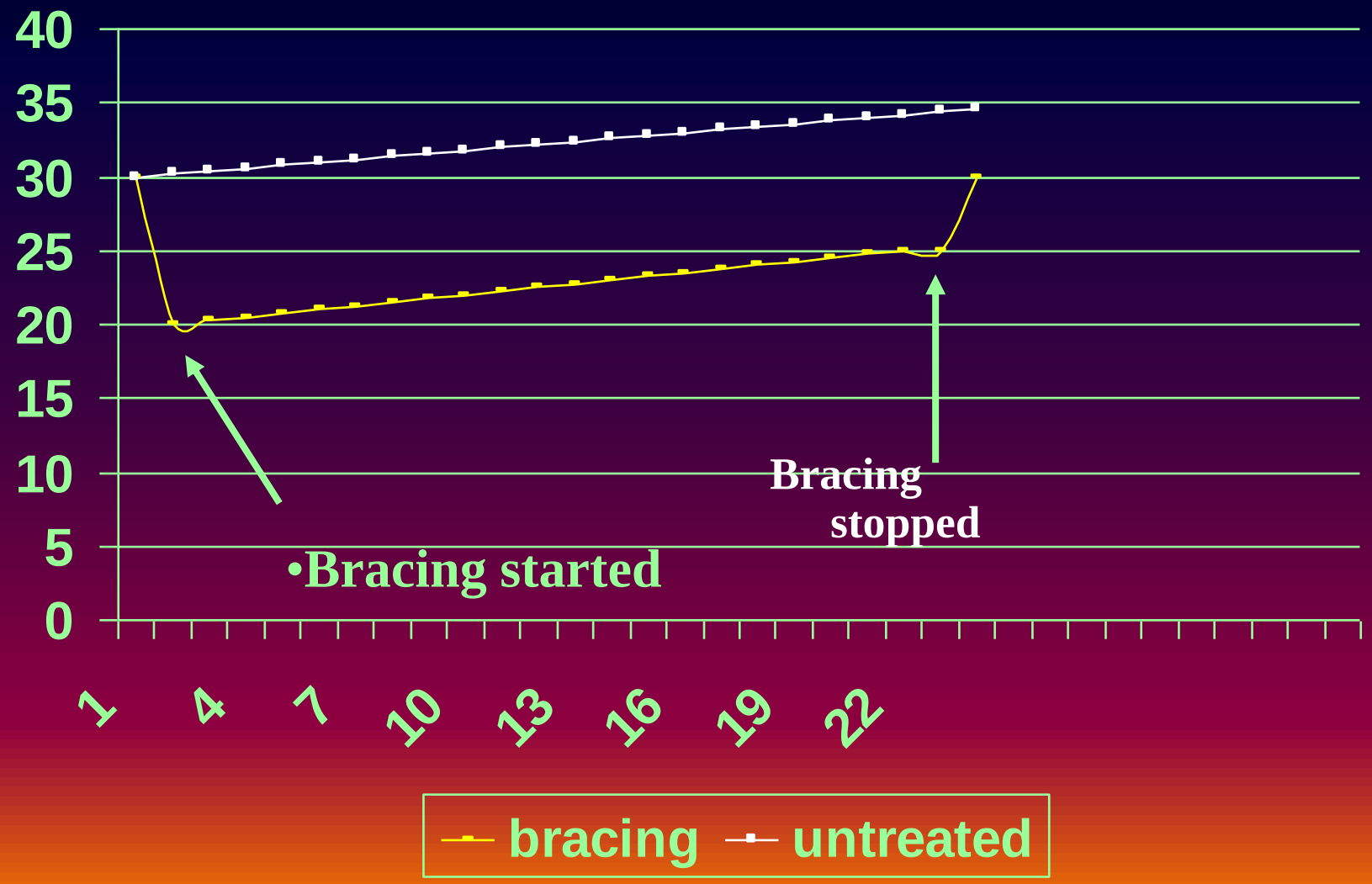


Biomechanics

- Righting reflex






40
35
30
25
20
15
10
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1
4
7
10
13
16
19
22
•Bracing started
Bracing
stopped
bracing
untreated

Problems

- Can not correct 3-D deformities
- May worsen thoracic hypokyphosis
- Muscle wasting
- Stiffness
- Pressure sore
- Allergy
- Psychology, self-esteem
- Esophagitis from increase intra-abdominal pressure
- Poor compliance

Current practice

Refer to the bracing treatment reference

R… m… C… pr…					
Risser 2-3 Within 1 yr after menarche	1.6% physio	22% physio	brace	If >45° surgery	surgery
Risser 4-5	Physio	Physio	Physio	Physio	surgery

Bracing

- Not necessary if
  - Risser > = 4 and commonly 24 months post-menarche, closure of ring apophysis of vertebra, distal radius and ulnarepiphysis

  OR

  - if Cobb's > 5o degrees rigid curves
    - In such case, need to consider surgical treatment
      - **Discuss with senior**

Bracing Weaning

- Start weaning when
  - Risser >= 4 and
  - Distal ulnar & radius epiphyseal closure
  - Ring apophysis has closed
  - No growth for 18 months
- Stages
  - First stage
    - On time 7:00am to 10:00pm for 4 months
  - Second stage
    - On time 7:00am to 5:00pm for another 4 months
  - Then stop

New cases

- Prove that it is structural scoliosis
  - Rule out
    - Leg length discrepancy
    - Pain induced scoliosis
    - Hysteria
- Look for unusual pathology & signs
  - Neuromuscular
  - Congenital
  - Others eg syndromic, tumor, infection

New cases

- Assess severity and maturity
  - Cobbs
  - Risser, menarche, growth, secondary sexual characteristics

New cases

- Explanation to parents
  - Pamphlets
- Treatment
  - Physiotherapy
  - Scoliosis advice
    - Swimming
    - Avoid carrying heavy objects
  - Pregnancy alert with xray

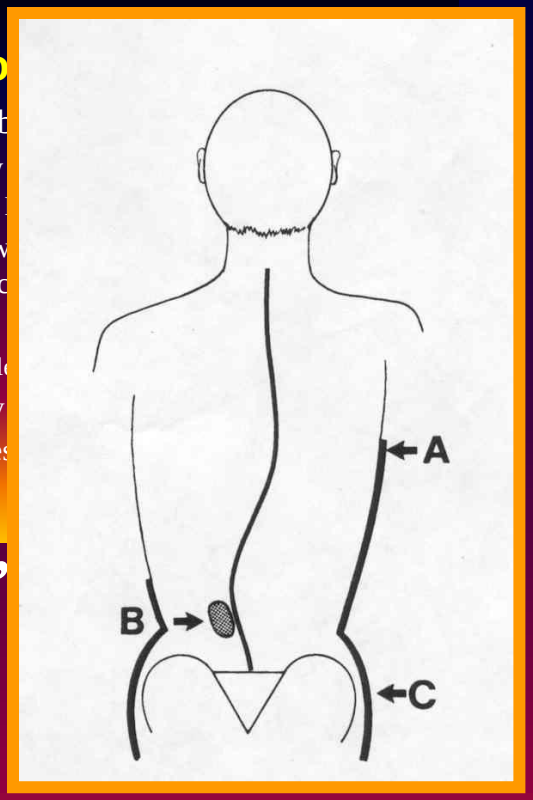
New cases

- Bracing
  - Inform P&O
  - Emphasize 23 hours per day
  - Will stop at skeletal maturity
- Surgery
  - Inform senior
  - Book MRI within 3 months
    - **Ask patient to come to clinic (Wed AM) if that can not be done**
  - Admit 1 day before date of MRI for pre-op workup
  - Issue letter from CMS to patient

Follow up cases

- Patient without brace
  - Check notes for treatment plan or special instructions
  - Assess any new symptoms
    - Eg pain, lower limb neurology
  - Examine if new symptoms developed e.g. tenderness or progression –check ATR
  - Interpret xray
  - Confirm right levels measured
  - Assess maturity

ollow up cases



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- **tio**
- **nosi**
- **ess**
- **ical curve correction**
- cation for change of treatment
- **Weaning off brace**
- **Surgical treatment**

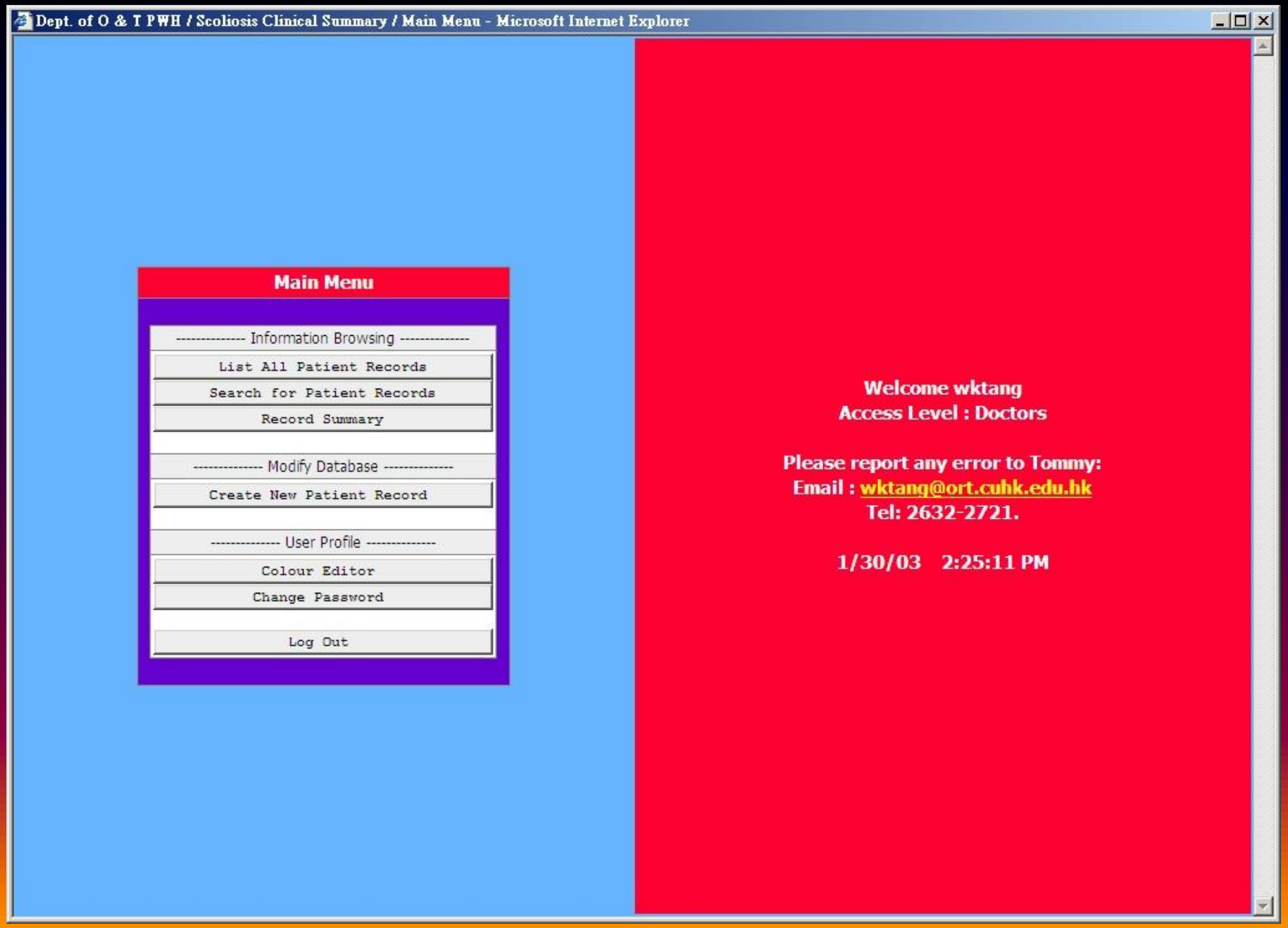
Follow up cases

- Patient with brace
  - On going problems
    - **Compliance**
    - **Complication of bracing eg allergy, pressure, hypokyphosis**
    - **Brace fitness**
  - Check indication for change of treatment
    - **Weaning off brace**
    - **Surgical treatment**

Follow up cases

- Referral criteria for
  - **Transferring patients to step-down clinic or**
  - **Discharge patient from pwh scoliosis clinic**
- **When patient has unsatisfactory response to bracing, consider criteria for transferring patient to “Special Brace Clinic”**

Computerized Scoliosis Clinic


Dept. of O & T PWH / Scoliosis Clinical Summary / Main Menu - Microsoft Internet Explorer
Main Menu
---------- Information Browsing ----------
List All Patient Records
Search for Patient Records
Record Summary
---------- Modify Database ----------
Create New Patient Record
---------- User Profile ----------
Colour Editor
Change Password
Log Out
Welcome wktang
Access Level : Doctors
Please report any error to Tommy:
Email : wktang@ort.cuhk.edu.hk
Tel: 2632-2721.
1/30/03 2:25:11 PM

Dept. of O & T PWH / Scoliosis Clinical Summary / Search - Microsoft Internet Explorer

Search INFO / HELP

Rows/Page: 18

Sort By: ○ Name ◉ SCN ○ HKID

Order: ◉ A - Z ○ Z - A

Name :

SCN :

HKID :

King's:

Search Clear

ListAll Main Menu

Search Result (Sorted by SCN)

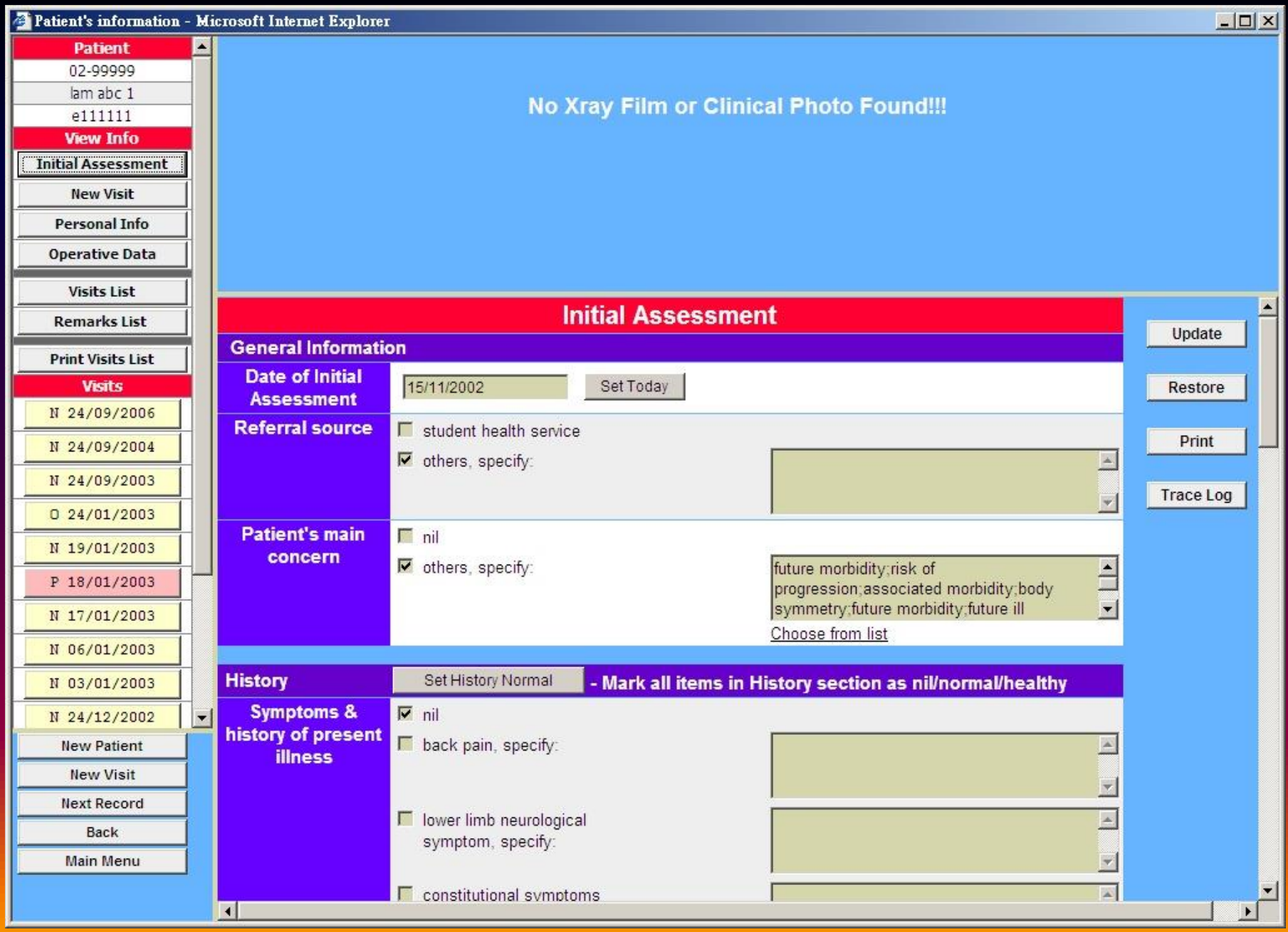
Name	SCN <	HKID	
CHEN TSZ SAN	00-10001	Z652988(8)	Detail
FUNG LOK YIN	00-10002	Z946093(5)	Detail
LEUNG KA MAN	00-10003	Z747085(2)	Detail
TAM YICK SEE	00-10004	Z791544(7)	Detail
FUNG WAI YAN	00-10005	Z681715(8)	Detail
TSANG WAI KWAN	00-10006	Z001230(1)	Detail
TAM SUET FAN	00-10007	P748819(3)	Detail
LUN HUI CHING	00-10008	Z844439(1)	Detail
DISKIN LAURA	00-10009	UH331852(5)	Detail
CHEUNG LOK MAN	00-10010	Z925341(7)	Detail
YU KA YAN	00-10011	Z886739(A)	Detail
LAU SIU FONG	00-10012	Z744895(4)	Detail
KWONG MEI YING	00-10013	Z789563(2)	Detail
NG TING YAN	00-10014	Z847867(9)	Detail
WU YIN TING	00-10015	Z606755(8)	Detail
NG NGAR SZE ALICE	00-10016	Z623539(6)	Detail
WONG ALEXANDER	00-10017	Z087544(A)	Detail
HO PO LAI	00-10018	Z640021(4)	Detail
(Result: 1-18 / 6000)			Page 1
Restart			Next Page

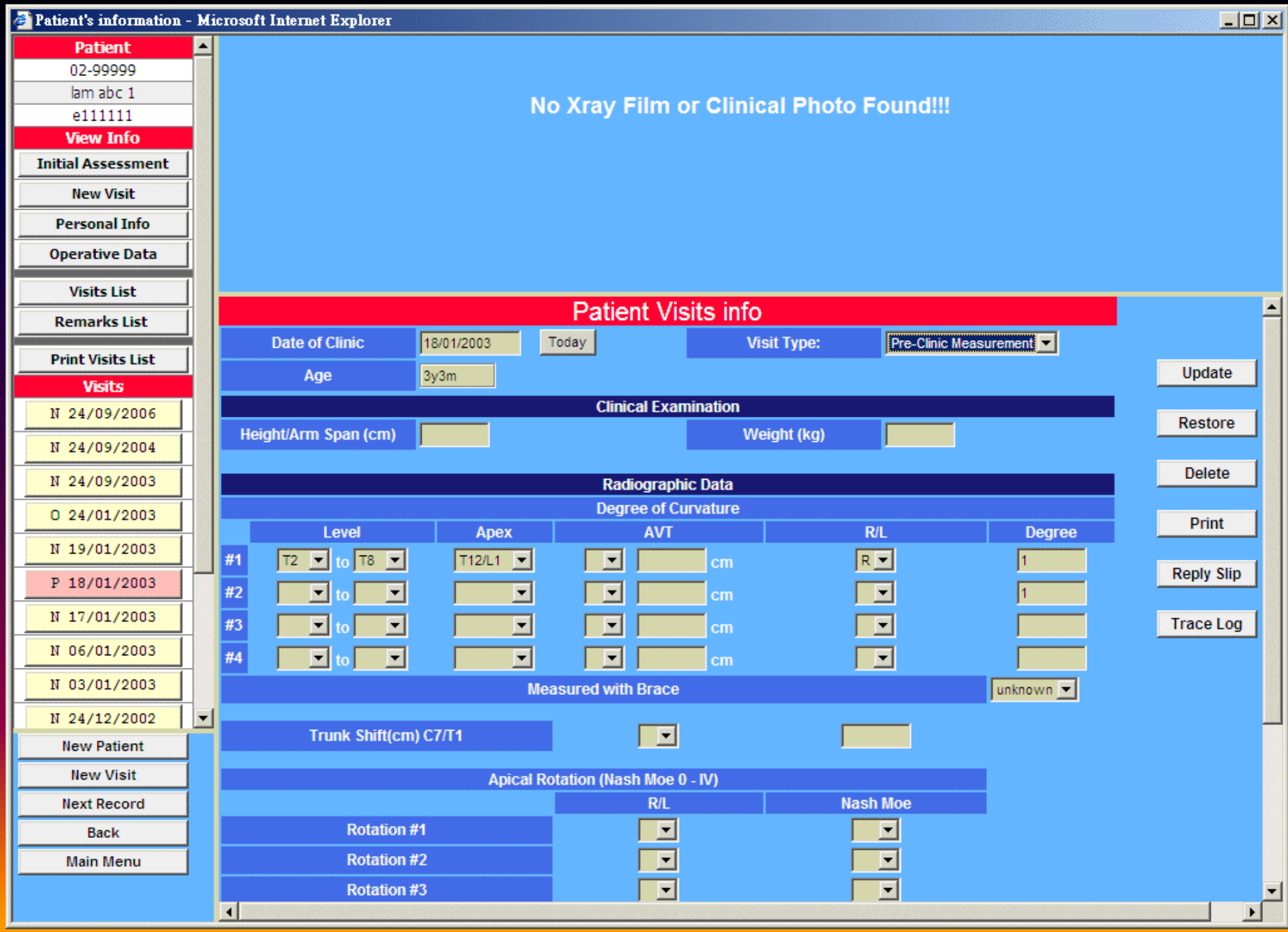
Dept. of O & T PWH / Scoliosis Clincial Summary / SCN 02-99999 - Microsoft Internet Explorer

Speical Remarks Summary - lam abc 1 (SCN 02-99999)

Visit No.	Date	Doctor	Special Remarks
1	24/09/2002	tplam	PATIENT IS WORRIED ABOUT SCOLIOSIS, NEED MORE EXPLANATION NEXT VISIT
2	25/09/2002	tplam	-
3	15/11/2002	tplam	patient compliance poor
4	18/11/2002	tplam	book mri spine
5	10/12/2002	tplam	-
6	24/12/2002	tplam	? LLD, CHECK SCANNOGRAM AND REASSESS NEXT VISIT TO SEE WHETHER SHOE RAISE IS NEEDED OR NOT
7	03/01/2003	tplam	-
8	06/01/2003	tplam	-
9	17/01/2003	tplam	sfSVdzf
10	18/01/2003	tplam	-
11	19/01/2003	tplam	cone view on L1 need tofsfsgfszg
12	24/01/2003	tplam	-
13	24/09/2003	tplam	NO LLD, HENCE NO SHOE RAISE IS NEEDED, PATIENT HAS BACK PAIN, WILL CHECK CT AND REVIEW REPORT NEXT VISIT
14	24/09/2004	tplam	NEED FURTHER OBSERVATION
15	24/09/2006	tplam	-

Close this window


Patient's information - Microsoft Internet Explorer
Patient
02-99999
lam abc 1
e111111
View Info
Initial Assessment
New Visit
Personal Info
Operative Data
Visits List
Remarks List
Print Visits List
Visits
N 24/09/2006
N 24/09/2004
N 24/09/2003
O 24/01/2003
N 19/01/2003
P 18/01/2003
N 17/01/2003
N 06/01/2003
N 03/01/2003
N 24/12/2002
New Patient
New Visit
Next Record
Back
Main Menu
No Xray Film or Clinical Photo Found!!!
Initial Assessment
General Information
Date of Initial Assessment
15/11/2002
Set Today
Referral source
student health service
others, specify:
Patient's main concern
nil
others, specify:
future morbidity;risk of progression;associated morbidity;body symmetry;future morbidity;future ill
Choose from list
History
Set History Normal
- Mark all items in History section as nil/normal/healthy
Symptoms & history of present illness
nil
back pain, specify:
lower limb neurological symptom, specify:
constitutional symptoms
Update
Restore
Print
Trace Log


Patient's information - Microsoft Internet Explorer
Patient
02-99999
lam abc 1
e111111
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New Visit
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Print Visits List
Visits
N 24/09/2006
N 24/09/2004
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O 24/01/2003
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P 18/01/2003
N 17/01/2003
N 06/01/2003
N 03/01/2003
N 24/12/2002
New Patient
New Visit
Next Record
Back
Main Menu
No Xray Film or Clinical Photo Found!!!
Patient Visits info
Date of Clinic
18/01/2003
Today
Visit Type:
Pre-Clinic Measurement
Age
3y3m
Clinical Examination
Height/Arm Span (cm)
Weight (kg)
Radiographic Data
Degree of Curvature
Level
Apex
AVT
R/L
Degree
#1
T2
to
T8
T12/L1
cm
R
1
#2
cm
1
#3
cm
#4
cm
Measured with Brace
unknown
Trunk Shift(cm) C7/T1
Apical Rotation (Nash Moe 0 - IV)
R/L
Nash Moe
Rotation #1
Rotation #2
Rotation #3
Update
Restore
Delete
Print
Reply Slip
Trace Log


Patient's information - Microsoft Internet Explorer
Patient
02-99999
lam abc 1
e111111
View Info
Initial Assessment
New Visit
Personal Info
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Visits List
Remarks List
Print Visits List
Visits
N 24/09/2006
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P 18/01/2003
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N 06/01/2003
N 03/01/2003
N 24/12/2002
New Patient
New Visit
Next Record
Back
Main Menu
No Xray Film or Clinical Photo Found!!!
Patient Visits info
Date of Clinic
18/01/2003
Today
Visit Type:
Normal
Age
3y3m
Update
Restore
Delete
Print
Reply Slip
Trace Log
Clinical Examination
Height/Arm Span (cm)
Weight (kg)
Menarche
N/A (Male)
Joint Hyperlaxity
/ 5
Abdominal Reflex
(e: equivocal)
a:
b:
c:
d:
Fill All +
Fill All -
Trunk Shift (cm) C7/T1
Rotation
(Scoliometer) (cm)
1
2
3
4
Shoulder Asymmetry (cm)
Breast
Tanner's staging
Pubic Hair
Tanner's Staging
Axillary Hair
nil
scanty
abundant
Radiographic Data
Degree of Curvature
Level
Apex
AVT
R/L
Degree
#1
T2
to
T8
T12/L1
cm
R
1
#2
to
cm
1

Patient's information - Microsoft Internet Explorer

Patient

02-99999

lam abc 1

e111111

View Info

Initial Assessment

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Visits

N 24/09/2006

N 24/09/2004

N 24/09/2003

O 24/01/2003

N 19/01/2003

P 18/01/2003

N 17/01/2003

N 06/01/2003

N 03/01/2003

N 24/12/2002

New Patient

New Visit

Next Record

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Main Menu

No Xray Film or Clinical Photo Found!!!

Radiographic Data

Degree of Curvature

	Level		Apex	AVT		R/L	Degree
#1	T2	to T8	T12/L1		cm	R	1
#2		to			cm		1
#3		to			cm		
#4		to			cm		

Measured with Brace: unknown

Trunk Shift(cm) C7/T1

Apical Rotation (Nash Moe 0 - IV)

	R/L	Nash Moe
Rotation #1		
Rotation #2		
Rotation #3		
Rotation #4		

Risser's Sign

Sagittal Plane	Cobb's Angle	Degree
Thoracic Kyphosis		
Lumbar Lordosis		

Update

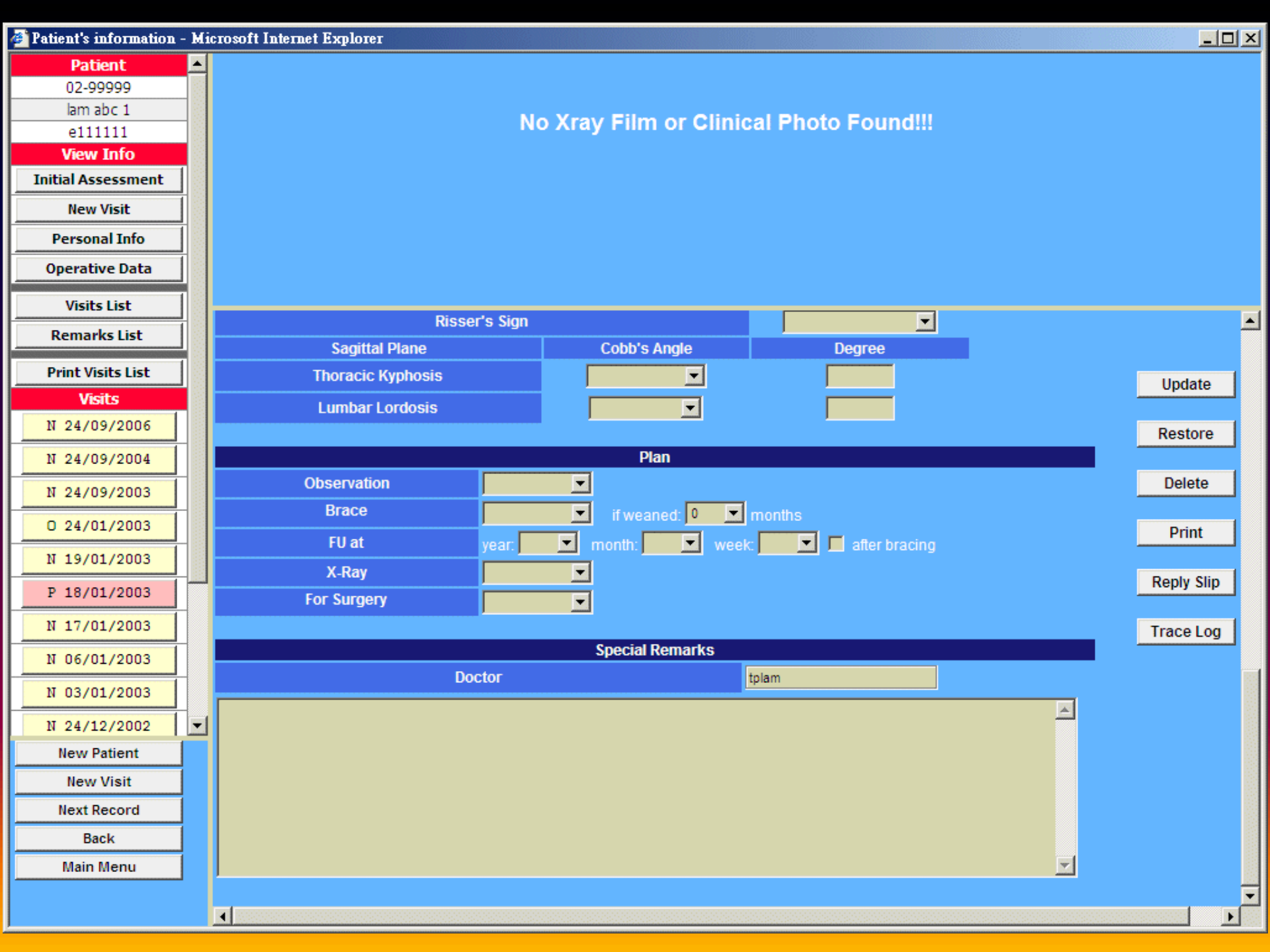
Restore

Delete

Print

Reply Slip

Trace Log


Patient's information - Microsoft Internet Explorer
Patient
02-99999
lam abc 1
e111111
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Visits List
Remarks List
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Visits
N 24/09/2006
N 24/09/2004
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N 24/12/2002
New Patient
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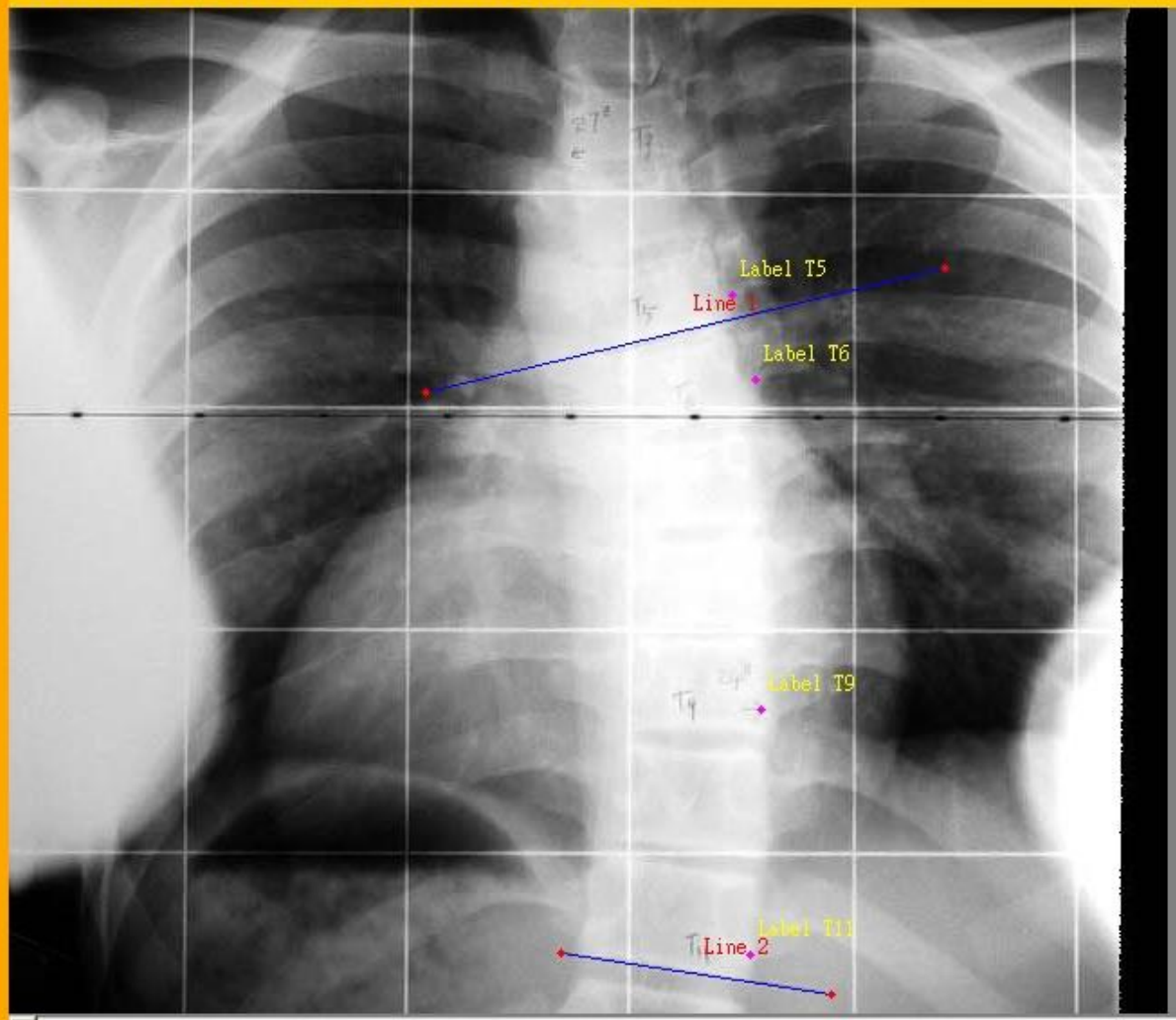
Main Menu
No Xray Film or Clinical Photo Found!!!
Risser's Sign
Sagittal Plane
Cobb's Angle
Degree
Thoracic Kyphosis
Lumbar Lordosis
Plan
Observation
Brace
if weaned: 0 months
FU at
year: month: week: after bracing
X-Ray
For Surgery
Special Remarks
Doctor
tplam
Update
Restore
Delete
Print
Reply Slip
Trace Log

Java Image Viewer Applet ["/XImage/00/sc0010001/sc0010001_20000608AP_N_01.jpg"] - Microsoft Internet Explorer

Add lines | Measure angle | Move points | Remove lines | Add labels: T10 | Remove labels

Zoom 100% 100% -10% +10% Calibrate grid Show message

Angle between Line 1 and Line 2 is 22.19 / 157.81 (degree)



X = 689, Y = 670

Patient's information - Microsoft Internet Explorer

Patient

00-10002
FUNG LOK YIN
Z946093(5)

View Info

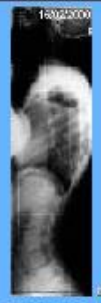
- Initial Assessment
- New Visit
- Personal Info
- Operative Data
- Visits List
- Remarks List
- Print Visits List

Visits

- N 07/08/2002
- N 09/01/2002
- N 18/07/2001
- N 31/01/2001
- N 16/08/2000
- N 26/04/2000
- N 23/02/2000

- New Patient
- New Visit
- Next Record
- Back
- Main Menu


16/02/2000 AP 1


16/02/2000 LA 1


14/04/2000 AP 1


12/08/2000 AP 1


23/01/2001 AP 1

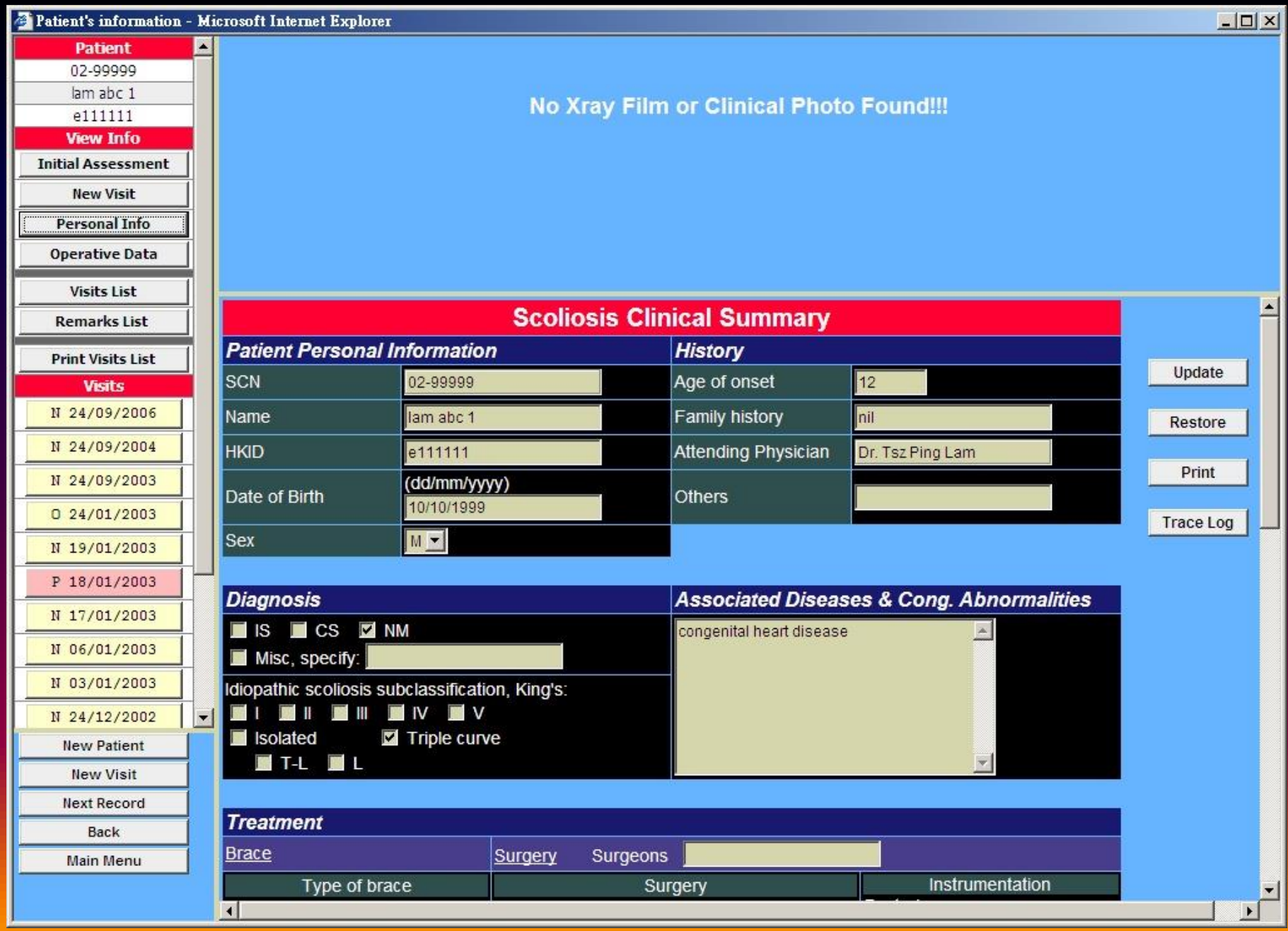

12/07/2001 AP 1

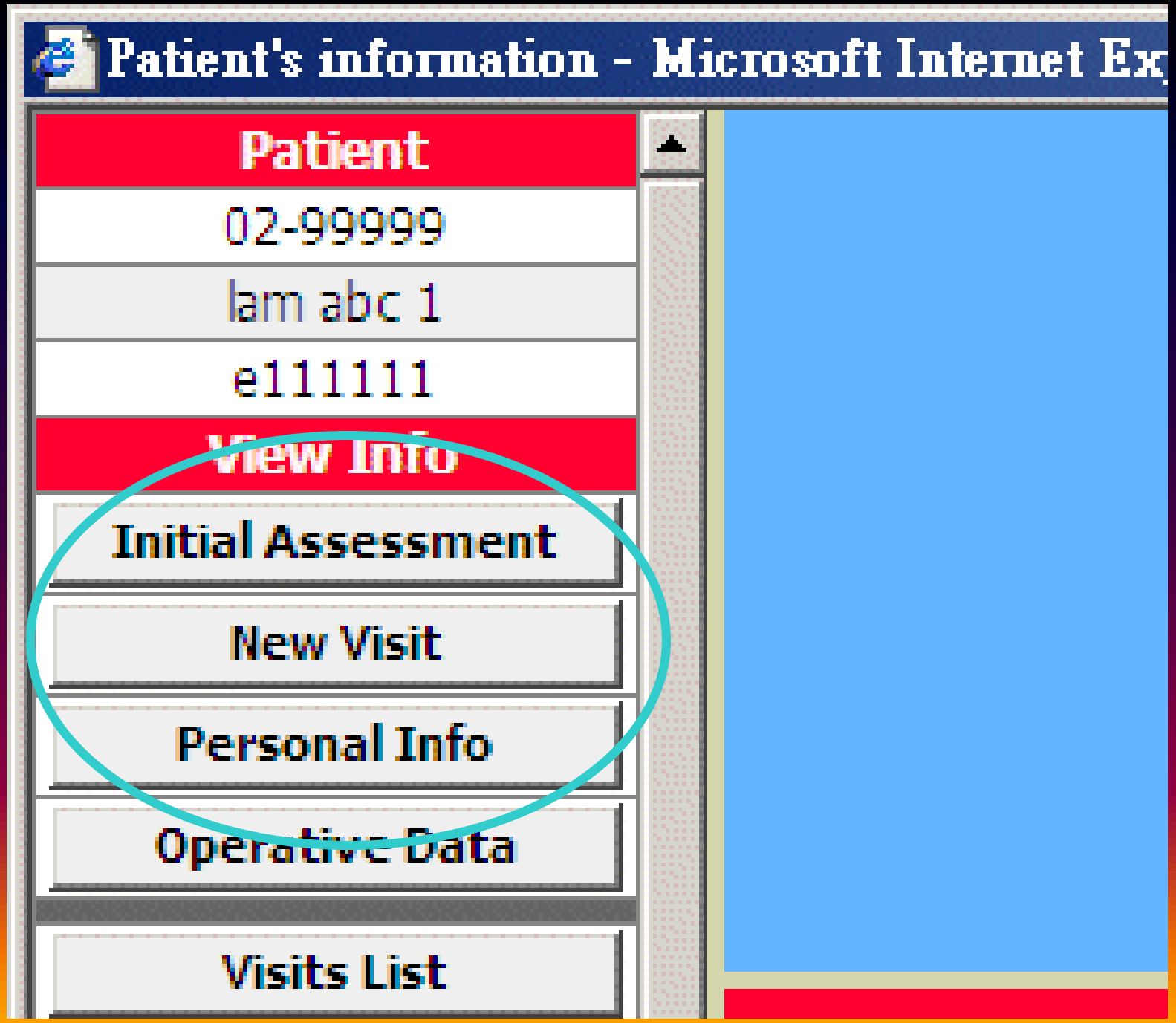

03/01/2002 XX 1


30/07/2002 XX 1

Visit No.	1	2	3	4	5	6
Date of Clinic	23/02/2000	26/04/2000	16/08/2000	31/01/2001	18/07/2001	09/01/20
Age	12y0m	12y2m	12y6m	12y11m	13y5m	13y11m
Special Remarks		Yes	Yes	Yes	Yes	Yes
Height/Arm Span(cm)			145.1	145.4	147.3	148.6
Weight(kg)			31.2	33	34.7	35.4
Menarche(year)						
Menarche(month)						
Risser's Sign			0	0	0	4
Curve Level #1			T1 - T7	T1 - T7	T1 - T7	T1 - T7
Curve Level #2			T8 - L1	T8 - L1	T8 - L1	T8 - L1
Curve Level #3	-	-	-	-	-	-
Curve Level #4	-	-	-	-	-	-
Measured with Brace	Unknown	Unknown	Yes	Yes	Yes	Yes
Curve Degree #1	22	12	16	18	16	14
Curve Degree #2	36	20	24	32	20	24
Curve Degree #3						
Curve Degree #4						
Height/Arm Span(cm)	141		145.1	145.4	147.3	148.6
Weight(kg)	28.8		31.2	33	34.7	35.4
Visit Type	Normal	Normal	Normal	Normal	Normal	Normal
Menarche(year)						

ISOLATED THORACO-LUMBAR CURVE
IMPROVE ON BRACE (20 HRS/DAY)
MENARCHE 22/3/00
SCREENING THE YOUNGER SISTER AGE 10
NO OBVIOUS SCOLIOSIS
SCOLIOMETER -> 0


Patient's information - Microsoft Internet Explorer
Patient
02-99999
lam abc 1
e111111
View Info
Initial Assessment
New Visit
Personal Info
Operative Data
Visits List
Remarks List
Print Visits List
Visits
N 24/09/2006
N 24/09/2004
N 24/09/2003
O 24/01/2003
N 19/01/2003
P 18/01/2003
N 17/01/2003
N 06/01/2003
N 03/01/2003
N 24/12/2002
New Patient
New Visit
Next Record
Back
Main Menu
No Xray Film or Clinical Photo Found!!!
Scoliosis Clinical Summary
Patient Personal Information
SCN 02-99999
Name lam abc 1
HKID e111111
Date of Birth (dd/mm/yyyy) 10/10/1999
Sex M
History
Age of onset 12
Family history nil
Attending Physician Dr. Tsz Ping Lam
Others
Update
Restore
Print
Trace Log
Diagnosis
IS CS NM
Misc, specify:
Idiopathic scoliosis subclassification, King's:
I II III IV V
Isolated Triple curve
T-L L
Associated Diseases & Cong. Abnormalities
congenital heart disease
Treatment
Brace
Surgery Surgeons
Type of brace
Surgery
Instrumentation


Patient's information - Microsoft Internet Ex
Patient
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New Visit
Personal Info
Operative Data
Visits List

- Xray preview clinic
  - Cobbs measured and entered into computer
- Formal patient visit
  - MO is responsible for
    - clinical assessment
    - Enter rest of computer datas

Follow up cases

- Patient without brace
  - Assess any new symptoms
    - Eg pain, lower limb neurology
  - Examine for any new evidence of underlying pathology
    - Eg tenderness
  - Interpret xray
    - Make sure no abnormality from follow up xray
  - Assess maturity
  - Determine necessity of changing current treatment

Thank you