

## Bone Density Report Generation Module

The Bone Density Reporting Module is available for the PenRad Mammography Information System and allows facilities to generate, with simple taps to the screen complete narrative reports in mailable/faxable formats and complementary patients letters.

Two primary screens, first screen (main), accommodates the selection of patient risk factors and clinical data, recommendations, overall change and impression, recall interval and selection of optional patient letter. This screen also facilitates selection and review of individual current and prior scan information.

Second primary screen captures scan information such as BMD, T&Z scores, machine type and body region scanned. Automatic calculation of BMD risk level, value and percentage change from prior scans is performed.

Additional support screens display prior narrative reports and selection of prior scans for comparison.

### Typical Operation:

Technologist selects patient via the patient list or HIS/RIS work list. Then selects exam type as bone density, specifies exam date and the patient study is directly sent to input scan data or added to the reading schedule for deferred scan data input.

When a study is selected, the Main Bone Density screen appears allowing the capture of data for new scan and comparisons scans, along with the selection of risk factors and clinical data by the technologist. As various data is collected during the study, the exam can be suspended multiple times to facilitate various facility workflow patterns.

When the radiologist selects a suspended study to approve, then the final recommendations, overall change and impression, recall interval and patient BMD letter (if applicable) are selected. For items not featured in each of the selection windows, user can tap the add text button and select or add new items for future use.

Bone Density										12/18/2001 13:39:42																													
Alice M. Anderson DOB: 6/6/1968 AGE: 33 F PID: 223234309 SSN: 223234309 CHT: ACCT:																																							
<b>Risk Factors</b> Add Text Caucasian race Asian race Advanced age Early or surgical menopause Long term use of corticosteroids Maternal history of osteoporosis Low height/weight ratio Prolonged bed rest History of previous fracture High alcohol consumption Diet low in calcium Cigarette smoking Diet high in protein/phosphates High caffeine consumption			<b>Clinical Data</b> Add Text Post menopausal Perimenopausal Estrogen deficient Clinical risk for osteoporosis Follow up to previous study FU after initiating bone preserving meds			<b>BMD Change</b> n/a Not Significant Decrease Increase			<b>Recall Interval</b> No Recall Msg 6 months 1 year 2 year																														
<b>Recommendations</b> Add Text Estrogen replacement therapy Weight bearing exercises Calcium & vitamin D supplements Recheck of BMD in 1-2 years Pt consult w/primary care provider Further BMD testing Post Menopausal BMD test			<b>Impression</b> Cannot be assessed Normal BMD > -1 Low Osteopenia BMD -1 to -2.5 High Osteoporosis BMD < -2.5 Severe Osteoporosis BMD < -2.5			<b>Patient Letter</b> No Letter Bone Normal Limits Bone High Risk Bone Low Risk																																	
Date: 12/18/2001 12:51 ? Now																																							
Radiologist: Anderson, Christine A - PenRad Clinic, Plymouth, MN																																							
<table border="1"> <thead> <tr> <th>New</th> <th>Date</th> <th>SI</th> <th>Region</th> <th>BMD</th> <th>T</th> <th>Z</th> <th>%Ref</th> <th>%Age</th> <th>Risk</th> <th>Machine</th> <th>Tech</th> <th>Rad</th> <th>Rpt</th> </tr> </thead> <tbody> <tr> <td>Edit</td> <td>12/18/01</td> <td>A</td> <td>L1-L4 Region</td> <td>O -1.032</td> <td>2.34</td> <td>3.02</td> <td>12.0</td> <td>17.0</td> <td>low</td> <td>Lunar</td> <td>daa</td> <td>caa</td> <td>Y</td> </tr> </tbody> </table>												New	Date	SI	Region	BMD	T	Z	%Ref	%Age	Risk	Machine	Tech	Rad	Rpt	Edit	12/18/01	A	L1-L4 Region	O -1.032	2.34	3.02	12.0	17.0	low	Lunar	daa	caa	Y
New	Date	SI	Region	BMD	T	Z	%Ref	%Age	Risk	Machine	Tech	Rad	Rpt																										
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Selected Comparisons: Add 1 7/8/00 R Hand 2.300 0.20 0.30 22.0 2.4 normal Alara N																																							
Remove Preview Approve Approve & Print Suspend Add Text Coding Cancel Help																																							

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**BONE DENSITY EVALUATION:** 1/15/2002

**CLINICAL DATA:** Post menopausal. Maternal history of osteoporosis.

**RISK FACTORS:** Patient currently on Thyroid treatment and calcium. Personal History of osteoporosis and arthritis.

**COMPARISON:**  
 1/22/2001 Right femur neck using a Norland unit from PenRad Clinic with reported high fracture risk, BMD of 0.635g/cm<sup>2</sup> and T-score of -3.17.  
 1/22/2001 AP L2-L4 region of spine using a Norland unit from PenRad Clinic with reported medium fracture risk, BMD of 0.806g/cm<sup>2</sup> and T-score of -2.02.

**FINDINGS:**  
 Bone density evaluation was performed 1/15/2002 on the AP L2-L4 region of spine using a Norland unit. The BMD average for the exam is 0.805 g/cm<sup>2</sup>. The T-score is -2.22. Since the previous similar exam of 1/22/2001, there has been no change in bone density. This matches the World Health Organization's criteria for osteopenia and places the patient at a medium risk for fracture.  
 An additional bone density evaluation was performed 1/15/2002 on the right femur neck using a Norland unit. The BMD average for the exam is 0.590 g/cm<sup>2</sup>. The T-score is -3.54. Since the previous similar exam of 1/22/2001, there has been a -0.045 or -7.1% change in the BMD value which represents no significant interval change in bone density. This matches the World Health Organization's criteria for osteoporosis and places the patient at a high risk for fracture.

**IMPRESSION: SEVERE OSTEOPOROSIS**  
 Patient is at extremely high risk for fracture. Compared to BMD of prior exam, there has been a decrease in bone density. Recheck of BMD in 1-2 years is recommended.

James E. Edwards MD  


penradrpt2/2002 16:15:58

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Each scanned region associated with the current study is displayed in the upper spreadsheet along with a summary of items specified for quick reference. A new scan study is added by tapping the new button and items associated with scanned region are selected. Current scans are stored for future comparisons.

Lower spreadsheet displays a quick reference of specified comparisons scans for current study. To specify or add comparison scans, user taps the add button and select scans from list, or, adds new prior scan data if necessary.

**Typical Operation Continued:**

The Bone Density Scan screen (below) facilitates data capture for an individual scan for new/current or prior scans. Values are referenced in the report for BMD, T, Z and standardize T-Score, % bone density young and age reference are entered by tapping on individual column to create the full score value. Extended decimal places are optional, as well as input for each score type. Exam scan date, imager/location, scan unit type, body side and region are also entered by a simple tap and are referenced in the narrative report.

The BMD risk is automatically computed from the T-Score. BMD change is automatically calculated and inserts into the narrative report reflecting the differences of value and % change from the most current comparison scan, from alike scan region and machine type from the available non-zero score. The numerical values are calculated from the BMD score first, if not, then the STD T-Score, if not, then the T-Score. If same region is scanned and dissimilar machines, then the universal STD T-Score is used. BMD change and risk can be manually overridden.

The Bone Scanned List screen (right) lists a summary of previous recorded BMD scans, allows selection of BMD exams for comparison for a new study, and facilitates access to add/delete/view previous BMD scans. Access is granted from the add comparison button on Bone Density Main screen or from the Patient Maintenance/Prior Exams screen via the bone density button.

Date	SI	Region	BMD	T	Z	%Ref	%Age	Risk	Machine	Tech	Rad	Rpt
7/6/00	R	Hand	2.300	0.20	0.30	22.0	2.4	normal	Alara			N
12/18/01	A	L1-L4 Region Of Spin	-1.032	2.34	3.02	12.0	17.0	low	Lunar	daa	caa	Y

The Bone Density Module is a value added sample of the PenRad commitment to provide our users with the most comprehensive Mammography Information System available.

Other value added PenRad modules include QA/QC module for processors and imaging machines, integrated appointment and schedule module, HIPPA compliance and custom bi-directional HL7 interfaces. PenRad continues to provide “more” than just a mammography reporting and tracking system. The best is even better.

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