

Bone Density Accreditation

Brian Lentle MD

Osteoporosis Clinic, Women's Health Centre, Vancouver
Emeritus Professor, University of British Columbia

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Conflicts:

- Past chair, CAR Accreditation Committee
- Board member, International Society of Clinical Densitometry (ISCD)
- Faculty member, ISCD Densitometry Course
- Chair, Facility Accreditation Quality Team, OAR
- OAR application reviewer

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Why accreditation?:

- Trend
 - ACR certification in colonoscopy
 - Mammography (ACR/CAR)
 - ISCD certification/ accreditation
- DXA requires knowledge of osteoporosis
- Quantitative

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Definitions:

- **Certification:** Defines individual physician competence
 - International Society of Clinical Densitometry (ISCD)
- **Accreditation:** Defines acceptable standards of practice in a service (hospitals, IHFs)
 - CAR – lapsed, undergoing renewal
 - Ontario Association of Radiologists
 - ISCD (beta testing)

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Accreditation - needs assessment:

- Case examples
- The literature
- Ontario experience

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Referral: Successive examinations of the proximal femur: The radiologist had chosen to report change in the femoral neck and described the 67% increase in mineralization as a good treatment response.



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Note:

Limitations:

- Usual to compare change in respect of the total proximal femur as the sample size is larger.
- The magnitude of the change is excessive and should have served as a "red flag".
- The change is limited to the femoral neck suggesting a local abnormality.
- The image reveals a focal increase in density in the femoral neck in 2006. At the referral centre it was possible to establish by CT that the patient had a developing stress fracture at this site.

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Mean annual increases in BMD - Pivotal trials of PMO therapy:

	Mean annual % increase in BMD			
	Spine	Range	Femur	Range
Bisphosphonates:				
-Alendronate	3	1 - 4	2	0.5 - 3
-Etidronate	1.5	1 - 2	0.5	0.3 - 1.5
-Risedronate	3	1 - 4	2	0.5 - 3.0
Calcitonin	2 - 3	?	?	?
Strontium ranelate **	0.6	?	?	?
Raloxifene	2.5	?	0.8	?
Teriparatide	5	3 - 8	3	2 - 5
Vitamin D, calcium	?	?	1	0.0 - 2

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A discrepancy between QCT and DXA: This 57-year old woman presented for specialist care as a lumbar spine QCT examination had revealed a T-score of -3.9 but the DXA T-score was -1.4. In the meantime she sold her mountain bike and lived in fear of a fracture?

Fig 8



T = -3.9

T = -1.4

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Well-intentioned but bad advice:

- The data base used for QCT is quite different from that used in DXA.
- QCT examines cancellous bone in the lumbar spine which might be seen as highly desirable except that the WHO classification of osteoporosis is derived from DXA which is used to measure a mixture of cortical and cancellous bone.

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Needs assessment: the literature (1):

- DXA: "[w]ide scope for misuse and abuse"
- "[U]rgent need for high standards of accuracy and precision and an understanding thereof"
 - Utian WH. Bone mineral density testing: storm clouds rising. Menopause management (journal of NAMS), 2009

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The literature (2):

- DXA: [Family physicians] “would appreciate a meaningful report from a radiologist”
- Radiologists providing no added value
 - Jaglal SB et al. How are family physicians managing osteoporosis. *Canad Fam Phys* 2003; 49: 462 - 468

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BMD accreditation in North America:

- Initial CAR programme (?1997 - lapsed)
 - No pedagogical component
- ISCD (pilot project in testing)
 - Parallel certification programme
- OAR (2007)
 - Physicist involvement
 - Limited one-off pedagogical programmes but now flirting with ISCD certification (revenue +)
- CAR (launch imminent)
 - Pedagogy ? limited to process
 - ? Flirting with ISCD certification (revenue +)

Duplicate effort?

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Canadian Association of Radiologists:

- Recognition of the “problem”
- Hiatus between first and second iterations
- Protocol developed
- “Standard” published for comment
- Pedagogy?
- Cost: \$420 (315); portability \$26.25

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Ontario Association of Radiologists:

- Recognized that an issue existed
- Met with Osteoporosis Canada
- Jointly secured ministry (Ontario) funding
- Initiated a BMD accreditation programme in 2007
- Pedagogy re BMD and process
- FAQT comprised of MD, physicist, RTs
- Cost \$400 per unit (3 year validity)

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DXA in Ontario:

- 320 plus DXA units in the Province
- \$40 300 000 in DXA billings, 2006/7

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The substance of accreditation:

- Answers problems, eg FRAXtm
- Examines:
 - Education and credentialling
 - SOPs
 - QC/QA protocols and data, Shewhart charting
 - [Physicist visit]
 - Precision determination (physicist input)
 - [10] new examinations and reports
 - [10] repeat examinations and reports
 - Physician communications

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OAR data:

- N = 41
- Process educational not adversarial
- Term 3-years
- Results - accreditation status:
 - Exemplary - 7 (17%)
 - Approved - 20 (49%)
 - 1-year conditional approval - 13 (32%)
 - Rejected - 1 (2%)
- Repeats - 2

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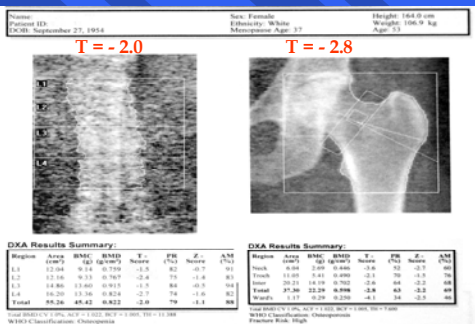
OAR "practice improvement" suggestions by centre:

- Physician
 - Education (20)
 - Application of risk model / use on Rx (33)
 - Reports: inconsistencies / transcription errors (15)
 - Ignoring weight change (17)
 - Significance of change or sign ignored (22)
 - Using Ward's (7)
 - "Osteopenia" (23)
- Technologist*
 - Positioning errors (30)
 - Incorrect ROIs (11)
 - "Dress" artifacts (15)
 - F-U positioning errors (9)
 - Mapping errors (8)
 - Pannus (panniculus) retraction (2)
- Protocol
 - QC/QA
 - SOPs not specific
 - Failure to apply LSC
 - Shewhart plots
 - Service follow-up

*Technologist education relevant only in the context of physician education

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Discrepancy between the T-scores in the spine and proximal femur:



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Obesity:

DXA Results Summary:

Region	Area (cm ²)	BMC (g)	BMD (g/cm ³)	T-Score	FR (%)	Z-Score	AM (%)
L1	12.04	9.14	0.759	-1.5	82	-0.7	91
L2	12.16	9.33	0.767	-2.4	75	-1.4	83
L3	14.86	13.60	0.915	-1.5	84	-0.5	94
L4	16.20	13.36	0.824	-2.7	74	-1.6	82
Total	55.26	45.42	0.822	-2.0	79	-1.1	88

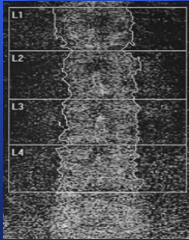
Total BMD CV 1.0%, ACF = 1.022, BCF = 1.005, TH = 11.388
 WHO Classification: Osteopenia
 Fracture Risk: Increased



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Serial examinations:

2004:04:23
 Weight 132 kg
 BMD 0.868g.cm⁻²
 (T = -1.6)

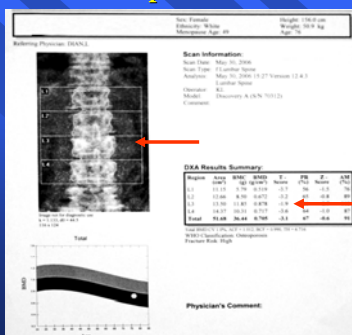


2006:12:14
 Weight 77 kg
 BMD 0.915g.cm⁻²
 (T = -1.2)




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Osteoporosis?



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Diagnosis:



- L3 has a T -score more than 1.0 different from adjacent segments
- The superior end plate is deformed. The lateral spine examination indicates that the patient has fractured L3.

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To be or not to BMD accreditation?

- "Turf"
- Credibility
- Potential for scandal
- THE "QUALITY" MOVEMENT
- LEADERSHIP
- ACCOUNTABILITY

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Oversight (1):

- "In follow-up examination #1 the LSC is quoted in absolute values but the actual change as a percentage. There is no attempt to indicate if the change is or is not significant so that the physician is, at best, left to use his or her calculator and decide. Totally perplexing if not irresponsible."

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Oversight (2):

- “The images poor. Their chief use in DXA is for QA but no comment is ever made about the limitations of the examinations. For example, if the T-scores of adjacent vertebrae differ by more than one unit (1.0 T) it is recommended that consideration be given to eliminating the offending segment(s) from the analysis as there is likely to be excessive artifact. Better images would allow some intelligent assessment of the nature and importance of the artifact(s). The one attempt to deal with artifact (follow-up NN) does so incorrectly. Best practice would be to eliminate L3 and L4 and re-analyze the series; this would alter the diagnostic category from “low bone mass” to “osteoporosis” - a change that should be communicated to the physician of record.”

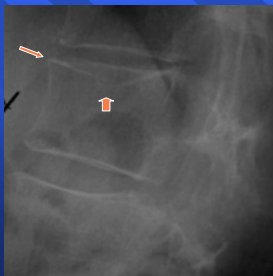
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Sanctions:

- CAR mark I
 - None: ? 5 sites
- CAR mark II
 - ?
- ISCD
 - Remuneration tied to certification
 - ?
- OAR
 - Accredited sites listed on OC and OAR web-site
 - “Political” imperative - 40 sites plus 40 in the pipeline

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Grade 1 anterior wedge and crush (superior end plate) fracture:



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Radiological fracture recognition (1):

- Review of chest radiographs on 934 women aged >60 years, admitted to hospital
- On review 132 had 1 or more spinal fractures
- Of these: 65 (49%) were reported
- 23 (17%) were noted in the medical record
- 25 (19%) were treated
- Gehlbach SH et al. Osteoporosis Int 2000;11:577 - 582

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Radiological fracture recognition (2):

- In a Canadian study of emergency room radiography the following were the chief findings in relation to the thoracic spine:
- Mean age of the population was 75 years,
- 47% were women, and 46% were admitted to the hospital.
- According to the reference radiologist, prevalence of moderate to severe vertebral fractures was 22%.
- Simple agreement was about 88% among reviewers; kappa values were moderate (0.56-0.58).
- Only 55% (12/22) of the vertebral fractures identified were mentioned in the radiology reports.

Kim N, Rowe BH, Raymond G, Jan H, Colman J, Jackson SA et al. Underreporting of vertebral fractures on routine chest radiography. Am J Roentgenol. 2004;182:297 - 300.

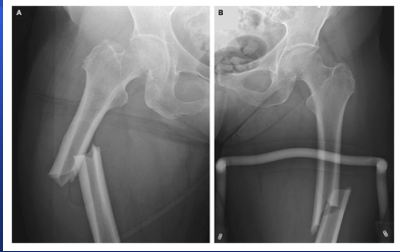
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Transverse sub-trochanteric fractures and bisphosphonates?



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Transverse sub-trochanteric fractures and bisphosphonates?



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The US Surgeon General: Bone Health and Osteoporosis, 2004

- "Much of what we know from research about bone health is not always applied in practice."

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