

DXA scans- Quality Standards checklist

V1.0 2023

Introduction

DXA scans, in the UK, are regulated under IR(ME)R and as such are subject to 'justification' and 'optimisation' as part of these regulations. Accurate and reliable DXA measurements rely wholly on *quality acquisition* and *analysis* by operators with training and expertise in the technique. Both of these elements are integral parts of 'optimisation' under IR(ME)R.

DXA measurements can be highly error prone and for centres to be confident their measurements are reliable; precision errors must be reduced as far as is practical. Precision error may be reduced by:

- Scans only being performed by a small team of well trained and skilled operators
- Robust protocols and standard operating procedures
- Routine evaluation, audit and review cycles of clinical practice embedded as culture

These standards were developed from the ROS National Training Scheme for Bone Densitometry lecture course, examination and portfolio marking scheme, and informed by manufacturer specific scan acquisition and analysis criteria.

Point and Purpose

This checklist sets out the expected standards for optimal DXA scan positioning and analysis of the lumbar spine and proximal femur for the two main manufacturers equipment in use in the UK.

It is designed for DXA teams to be able to:

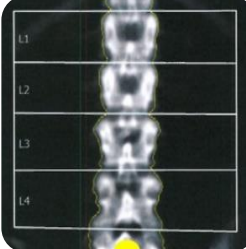
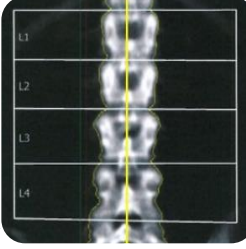

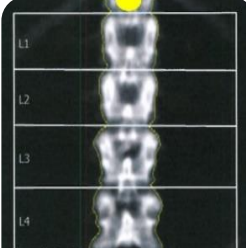
- Support precision error reduction and promote reliability of measurements
- Write and develop local standard operating procedures for scan acquisition and analysis
- Measure performance against the standards and integrate with quality improvement programmes
- Support delivery of quality improvements in DXA scanning technique
- Use in conjunction with the ROS DXA scan technique audit tool

So that:

Precision error is minimised, and clinical decisions are made for individual patients based on the most reliable scan measurements and data.

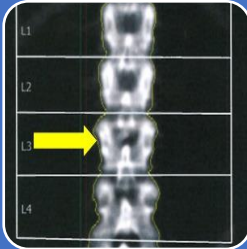
The standards

Positioning- the lumbar spine scan

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- 1) The spine scan starts in the body of L5*
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- 2) The spine is straight/vertical in the field of view
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- 3) The spine is central in the field of view
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- 4) The spine scan ends in the body of T12*

*For GE Lunar scanners this determines the soft tissue values and is non-negotiable. For Hologic scanners, best practice is to only include L5-T12 as part of optimisation under IR(ME)R. If a scout scan is performed to verify L5 then the acquisition scan should be repositioned to start in the body of L5 and not include sacrum

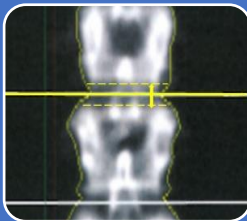
Analysis- the lumbar spine scan



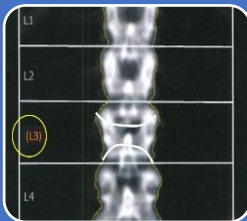
1) Bone mapping and edge detection accurately reflects bone*



2) Vertebral levels are accurately identified and labelled



3) Intervertebral markers are equidistant and parallel to vertebral endplates inferiorly and superiorly



4) Vertebral fractures, sclerotic and degenerative changes are excluded and artifacts managed appropriately**

*For GE Lunar scanners: use point typing to complete the edge detection only where missing mapped bone is greater than the default 'brush' size in the point typing mode.

**Vertebrae are excluded where 1) There is a focal abnormality regardless of the impact on BMD 2) The result differed by >1SD T-score from adjacent vertebrae AND a visual abnormality to inform which vertebrae to exclude 3) There is an artifact overlying the vertebrae. For artifacts overlying soft tissue: GE Lunar scanners- point type as artifact, Hologic scanners- exclude the vertebral level.

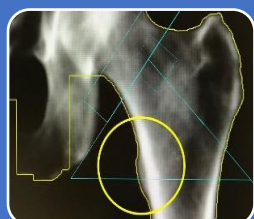
Positioning- the proximal femur scan



1) The femur is projected vertically in the field of view



2) The scan ends with the acetabulum fully visualised appropriate to manufacturer*



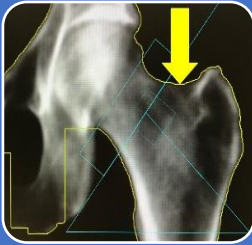
3) Little or no lesser trochanter is visible



4) The scan starts below the ischium appropriate to manufacturer

*GE lunar scanners- 2-3 sweeps & Hologic scanners minimum of 5cm superior to acetabulum and inferior to ischium

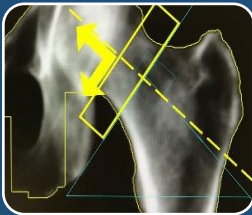
Analysis- the proximal femur scan



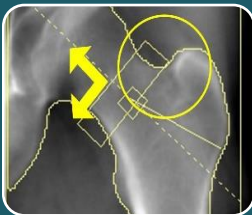
1) Bone mapping and edge detection accurately reflects bone*



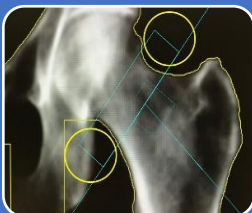
2) The mid femoral line evenly bisects the femoral head



3) **GE LUNAR**: the femoral neck box is 90° to the mid femoral line



3) **HOLOGIC**: the femoral neck box is 90° to the mid femoral line *and* is moved to be adjacent to the medial portion of the greater trochanter



4) There is no bone projected in the femoral neck box *except* for femoral neck**

*GE lunar scanners- this is essential for correct auto placement of the femoral neck box and must be corrected through point typing

This can be adjusted through: GE scanners- by point typing the inferior ischium as 'neutral' or *shortening* the long axis of the neck of femur box. This box **MUST NOT be narrowed (short axis). HOLOGIC scanners as excluding bone through 'sinking islands'