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Editorial

Dual-energy X-ray Absorptiometry Quality Matters

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Errors in radiologic tests occur *(1–3)*. However, there is a clinical perception among osteoporosis specialists that errors in dual-energy X-ray absorptiometry (DXA) performance and reporting are extremely common *(4,5)* and recent evidence reinforces this belief *(6–8)*. These errors are not inconsequential, and they have the potential to cause inappropriate clinical management *(9)*, potentially affecting up to 40% of patients in 1 report *(7)*. Possible reasons for such a high error rate include a decline in DXA reimbursement *(10)*, the belief that DXA can be automated with results requiring no human oversight, and failure of the field to convey the seriousness of fragility fracture *(11)*. Additionally, lowered reimbursement has devalued DXA to a point where facilities have either elected to discontinue services or restrict resources such that training and continuing education may not occur. Another potential contributing factor is that bone densitometry is not recognized as a subspecialty among medical professionals (physicians or technologists), a concept reinforced by the lack of mandatory training by state and local officials. Recognizing the need for high-quality DXA in osteoporosis care, the International Society for Clinical Densitometry (ISCD) recently shifted the focus of their bone densitometry education course to stress quality in bone densitometry.

DXA data, being a quantitative test, are clinically similar to laboratory data and should be managed by regulatory authorities and payors in a similar fashion. Laboratory testing requires trained technologists, documentation of properly functioning equipment, measurement performance following standard operating procedures, and oversight by appropriately trained laboratorians. Similarly, DXA technologists must proficiently acquire and analyze data, document the densitometer is functioning appropriately and providing stable data over time *(12)*. This includes determining facility bone mineral density (BMD) precision and least significant change (LSC) *(13,14)*. Without LSC information, an instrument can only provide data useful in diagnostic classification and fracture risk prediction, but not monitor change. Although it has been suggested by some that monitoring BMD is not necessary *(15)*, motivating patients to start and continue medications in this setting is challenging at best; in our experience, high-quality DXA testing facilitates patient acceptance and adherence to therapy.

Incorrectly performed laboratory or DXA testing can lead to misdiagnosis, which consequently may cause inappropriate referrals, unnecessary medical testing, and inappropriate medication exposure, all of which are irresponsible expenditures of limited health care resources. Moreover, an incorrect DXA could cause clinicians to overlook a serious condition that leads to a preventable fracture; the care and cost of which may far exceed that of preventative approaches. As such, like clinical laboratories, DXA practices must meet quality standards. This should require technologists and interpreters to demonstrate proficiency related to positioning, acquisition, analysis, and reporting, including documenting precision and reporting of LSC on all follow-up examinations. These proficiencies can be demonstrated by achieving and maintaining certification and accreditation from the ISCD (iscd.org). Regulatory authorities should demand, and consumers expect, no less; DXA services should not be paid for when such standards are not met.

It is logical that training in DXA performance improves quality; to date, little evidence exists demonstrating this to be true. Historically, efforts to enhance DXA quality have consisted of guidelines and instructional pieces aimed at helping readers identify errors and offering approaches to corrective action *(13,16–19)* Most recently, the ISCD published a best practices document providing a structured approach to high-quality DXA scan production and reporting *(14)*. Although all these resources offer guidance, none demonstrate that any specific intervention can successfully improve DXA quality. One could argue that it is self-evident that training or education improves performance; however, recent trends in continuing medical education call for evidence documenting practice change.

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Generating this evidence is a challenging task fraught with study design flaws and bias *(20)*.

In this article, Sritara et al took a large step forward demonstrating that education or training improves DXA quality that is sustained over time. Importantly, in their study design, they developed methodology to address one of the challenges in evaluating DXA testing, i.e., when is an error an error. For example, it is recommended that spine scans be acquired in a manner where patients are positioned to have a straight lumbar spine that is centered in the scan field to ensure adequate soft tissue sampling. From a practical standpoint, it is recognized that small positioning variations likely do not impact test results; however, no acceptable thresholds have been defined, confounding the definition and reproducible identification of an error. Here, the authors develop a grading system to define when to accept adequate positioning rather than requiring perfection, making this a more real-world assessment. The method they employ is arguably arbitrary, but their attempt should be applauded. Additionally, their design allows quantitative and qualitative documentation that their training intervention improved positioning and sustained this higher level of production over time. This work documents that training and ongoing education is an appropriate and effective approach in efforts to improve DXA quality.

The Sritara investigation is hopefully the start of more studies to evaluate how our field might improve DXA quality and ultimately patient care. As noted, it only addresses a portion of the technical aspect of the problem, as reporting issues were beyond the scope of the protocol, but it offers a road map of how others might design trials to fairly evaluate interventions implemented to improve DXA testing and reporting. It is essential that we succeed in improving DXA quality; our patients deserve no less: DXA Quality Matters!

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