



Medical Coverage Policy

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Bone Mineral Density Measurement

Table of Contents

Overview 2
 Coverage Policy 2
 Coding Information 2
 General Background..... 2
 Health Equity Considerations..... 7
 References..... 8
 Revision Details 10

Related Coverage Resources

[Preventive Care Services](#)

INSTRUCTIONS FOR USE

The following Coverage Policy applies to health benefit plans administered by Cigna Companies. Certain Cigna Companies and/or lines of business only provide utilization review services to clients and do not make coverage determinations. References to standard benefit plan language and coverage determinations do not apply to those clients. Coverage Policies are intended to provide guidance in interpreting certain standard benefit plans administered by Cigna Companies. Please note, the terms of a customer’s particular benefit plan document [Group Service Agreement, Evidence of Coverage, Certificate of Coverage, Summary Plan Description (SPD) or similar plan document] may differ significantly from the standard benefit plans upon which these Coverage Policies are based. For example, a customer’s benefit plan document may contain a specific exclusion related to a topic addressed in a Coverage Policy. In the event of a conflict, a customer’s benefit plan document always supersedes the information in the Coverage Policies. In the absence of a controlling federal or state coverage mandate, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of 1) the terms of the applicable benefit plan document in effect on the date of service; 2) any applicable laws/regulations; 3) any relevant collateral source materials including Coverage Policies and; 4) the specific facts of the particular situation. Each coverage request should be reviewed on its own merits. Medical directors are expected to exercise clinical judgment where appropriate and have discretion in making individual coverage determinations. Where coverage for care or services does not depend on specific circumstances, reimbursement will only be provided if a requested service(s) is submitted in accordance with the relevant criteria outlined in the applicable Coverage Policy, including covered diagnosis and/or procedure code(s). Reimbursement is not allowed for services when billed for conditions or diagnoses that are not covered under this Coverage Policy (see "Coding Information" below). When billing, providers must use the most appropriate codes as of the effective date of the submission. Claims submitted for services that are not accompanied by covered code(s) under the applicable Coverage Policy will be denied as not covered. Coverage Policies relate exclusively to the administration of health

benefit plans. Coverage Policies are not recommendations for treatment and should never be used as treatment guidelines. In certain markets, delegated vendor guidelines may be used to support medical necessity and other coverage determinations.

Overview

This Coverage Policy addresses the assessment of bone density, vertebral fracture, bone strength, or fracture risk using AI software analysis on pre-existing CT scans.

For Osteoporosis Screening information, see Cigna's Administrative Policy on Preventive Care Services (A004).

Coverage Policy

Assessment of bone density, vertebral fracture, bone strength, or fracture risk using EITHER of the following methods is not covered or reimbursable for ANY indication:

- **Artificial intelligence to analyze existing CT scans (i.e., CPT® 0691T)**
- **Finite element analysis on an existing CT scan (i.e., CPT® 0743T)**

Coding Information

Notes:

1. This list of codes may not be all-inclusive since the American Medical Association (AMA) and Centers for Medicare & Medicaid Services (CMS) code updates may occur more frequently than policy updates.
2. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

Not Covered or Reimbursable when used to report artificial intelligence analysis of existing CT scans or finite element analysis performed on an existing CT scan for the assessment of bone density, vertebral fracture, bone strength or fracture risk for any indication:

CPT®* Codes	Description
0691T	Automated analysis of an existing computed tomography study for vertebral fracture(s), including assessment of bone density when performed, data preparation, interpretation, and report
0743T	Bone strength and fracture risk using finite element analysis of functional data and bone-mineral density (BMD), with concurrent vertebral fracture assessment, utilizing data from a computed tomography scan, retrieval and transmission of the scan data, measurement of bone strength and BMD and classification of any vertebral fractures, with overall fracture risk assessment, interpretation and report

***Current Procedural Terminology (CPT®) ©2025 American Medical Association: Chicago, IL.**

General Background

A bone mineral density (BMD) test measures calcium and other minerals in bone. Bones containing more minerals are denser, so they tend to be stronger and less likely to break. Bones can become less dense from aging or from certain medical conditions. When too much bone is lost, osteoporosis can develop. Osteoporosis causes bones to become weak and brittle, which increases the risk of fractures. Bone mineral density testing can identify and diagnose osteoporosis, measure the risk of fractures, and monitor the effectiveness of osteoporosis treatment. There are several methods of measuring BMD. The gold standard test for measuring BMD is dual-energy x-ray absorptiometry (DXA). DXA is the tool recommended by the U.S. Preventive Services Task Force for screening (Nicholson et al., 2025). It is the modality of choice for screening or initial imaging of low bone mineral density (Yu et al., 2022).

Vertebral fracture is the most common osteoporotic fracture and indicates a high risk for future fractures. The gold standard for initial VFA is the use of spinal radiographs. Images are taken from AP and lateral views of the thoracic and lumbar spine. VFA using DXA is an alternative approach for the identification of vertebral fracture. Vertebral fracture assessment is a tool available on modern DXA instruments and has proven ability to detect vertebral fractures, the majority of which occur without a fall and without the signs and symptoms of an acute fracture. DXA-VFA has several distinct advantages including lower cost, lower radiation exposure, less obliquity, and greater convenience for patients given it can be performed at the same time as BMD measurements. Conventional spinal radiographs in comparison to DXA-VFA images have been widely researched. Studies establish the validity and reproducibility of VFA. There is good agreement between DXA-VFA and spinal radiographs for presence of vertebral fracture.

QCT is an alternative test that can be used for bone mineral density screening. It is considered "a secondary tool to DXA" (Yu et al., 2022). Its use is specific to clinical scenarios when DXA is less accurate, including very tall or very small individuals, obesity, or severe degenerative spine disease (Yu et al., 2022).

Automated analysis of an existing computed tomography (CT) scan using artificial intelligence (AI) technology (such as specialized analysis software/algorithms/advanced engineering computation) is proposed for the identification (computer-aided detection/diagnosis [CAD]) of vertebral fracture, as well as assessment of bone strength and fracture risk using finite element analysis. The algorithms/software programs are continually evolving. Finite element analysis (FEA) utilizes bone biomechanical properties, geometry, and loading conditions to assess bone strength and overall fracture risk. Biomechanical computed tomography analysis (BCT) is a test comprised of a finite element analysis of bone strength using as input a clinical resolution CT scan. It also includes CT-based measurements of BMD and DXA-equivalent hip BMD T-scores. The finite element analysis component of BCT represents a "virtual stress test" that provides a functional noninvasive assessment of the breaking strength of the patient's hip (proximal femur) or spine (vertebral body) (Keaveny et al., 2020). More research is needed to demonstrate how AI technology can improve upon patient outcomes. Available evidence in literature focuses primarily on the ability of these tests to detect fracture or determine bone density. More studies are needed to determine if the opportunistic use of these tests is advantageous compared to traditional DXA or spinal radiographs. Further, the current literature often focuses on detection in already at-risk populations. Additional research on the generalizability of these results is needed. Professional societies have yet to recommend this technology as an alternative to gold standard tests.

Literature Review

Although studies demonstrate proof-of-concept of the ability of AI-algorithms to detect incidental fracture or assess bone density on existing CT scans, there is a paucity of evidence demonstrating impact of these assessments on patient-specific long-term health outcomes (Lin, et al., 2024; Kolanu, et al., 2020; Dagan, et al., 2020; Allaire, et al., 2019; Adams, et al., 2018). This is an

emerging field with potential to impact opportunistic fracture and osteoporosis identification, but more research is needed to develop standardized protocols and assess long-term impacts.

Guo et al. (2025) conducted a retrospective cross-sectional study on the abdominal CT results of 625 elderly individuals (including a total of 702 CT scans). The researchers utilized a bone density AI model to predict bone mass density measurements and to predict a diagnosis of osteoporosis on the previously obtained imaging. Excluded were images from individuals who had systemic diseases affecting bone metabolism or had a history of taking medications affecting bone metabolism. The results of the algorithm were compared against previously obtained QCT bone mass density measurement. Outcomes of interest included the utility of AI-derived bone mass density measurement for osteoporosis classification and validation of the diagnostic equivalence of AI-based bone mass density against QCT reference standards. The AI system predicted diagnoses of osteoporosis for 358 individuals, reduced bone mass for 197 individuals, and normal bone density for 70 individuals. The AUC of the AI system in diagnosis osteoporosis was 0.822 (95% CI: 0.787–0.867, $p < 0.001$), with an accuracy of 0.9456, the sensitivity is 0.9601, and the specificity is 0.9270. The AI algorithm and the QCT results did not align in 45 individuals. A limitation of this study was the retrospective nature of the information. The authors conclude that this technology has potential for future use.

Mathew et al. (2025) reported results of a retrospective study evaluating Nanox.AI HealthOST software's ability to identify missed incidental vertebral compression fractures. The study included 590 individuals over 50 who underwent outpatient CT Chest or CT Abdomen and Pelvis imaging over a one-year period. Excluded were CT scans which lacked clinical indications and CTs with indications related to assessment for vertebral body fracture. The study looked at two vertebral body height reduction thresholds: mild ($> 20\%$) and moderate ($> 25\%$). As a comparator, expert radiologists reviewed the original CT scans. The study reported that AI identified 88% and 92% of fractures missed by radiologists at the 20% and 25% thresholds, respectively. The authors stated limitations to the technology, writing "a key technical limitation of the AI software is its reliance on intravertebral evaluation, where vertebral height loss is assessed within the same vertebra rather than comparing it to adjacent vertebrae (intervertebral evaluation). This can lead to discrepancies in fracture grading and overcalls, particularly in cases of physiological wedging. While scans with partial vertebral visualization may contain clinically significant findings, HealthOST requires at least four contiguous vertebrae for accurate segmentation. As a result, scans with fewer vertebrae cannot be reliably processed and are excluded, which we acknowledge as a limitation of the current software version". The authors conclude that this technology "demonstrates potential as an effective screening tool" for the identification of overlooked vertebral compression fractures.

Petraikin et al. (2025) conducted a retrospective cohort study of 1,888 individuals greater than 50 years of age who underwent CT Chest imaging in June of 2021 at one of 7 different participating centers. A morphometric AI algorithm for vertebral compression and density was applied to the previously obtained CT scans to evaluate its performance in opportunistic osteoporosis screening. The findings of the algorithm were then verified by radiologist report. The study showed that the algorithm was able to detect vertebral compression defects in 336 individuals (17.8%) with 105 having vertebral fracture. Low bone mass density values were detected in 501 individuals (26.5%). A noted limitation to the use of chest CT for opportunistic screening is that the field of view does not include vertebrae with the greatest mechanical load. The authors also stated limitations to the study itself, including the need for further investigation considering age group sizes and using lumbar imaging. The authors conclude that the algorithm could be a useful tool for identification of high-risk individuals.

Spangeus et al. (2025) reported results of a retrospective cross-sectional study of 101 individuals previously enrolled in a study on falls who had undergone CT of the thorax or abdomen. A total of 246 scans were reviewed. Images were included if performed within 6 months before or after a

fall event. An AI algorithm was used to review the previously obtained images for vertebral fractures. This information was compared to the review of the images by two independent radiologists. The primary outcomes were the measurement of sensitivity and specificity of AI detection of vertebral fractures. The study found AI demonstrated high accuracy (0.93), sensitivity (0.86), and specificity (0.99) in detecting moderate to severe VFs. Sensitivity was lower at individual vertebral analysis (0.71), but with similar levels of accuracy (0.96) and specificity (0.99). Some of the limitations of this study were the inclusion of multiple scans from the same individual and that the cohort was already high risk for fracture. The authors concluded that the algorithm was effective in identifying fractures. Further, they stated, "The full impact of AI in vertebral fracture detection on the treatment and outcome of osteoporosis patients has not been demonstrated yet due to lack of prospective studies" and that additional research should focus on how these algorithms could be integrated into practice in the future.

Wu et al. (2025) performed a retrospective cross-sectional study of 553 men and women who underwent chest CT and DXA within 1 day using an AI algorithm to predict osteoporosis from thoracic spine vertebrae. Included were images obtained over a three-year period. Excluded were diagnoses of oncologic, hematologic, known metabolic bone, or chronic kidney diseases. The results of the AI predictions were compared against DXA. The primary outcome of interest was whether thoracic spine vertebrae were a reliable source for the determination for the prediction of osteoporosis. The results demonstrated that the diagnostic efficacy of the T10-T12 vertebra was superior to that of T7-T9 vertebra. The retrospective, single-center nature of this study is the primary limitation. The authors noted that future prospective, multi-center studies should be performed, but that their study demonstrated the ability of chest CT to be used for opportunistic screening.

Lin et al. (2024) reported results of a retrospective study of 91 men with metastatic hormone-sensitive prostate cancer (mHSPC) on androgen deprivation therapy (ADT) who received CT abdomen/pelvis or PET/CT within 48 weeks before ADT initiation and during follow-up.

- Lin et al. noted that biomechanical computed tomography (BCT) is an image-based analysis technique that can be applied to CT scans obtained through routine management of mHSPC patients to assess BMD and bone strength, without need for DXA. BCT analyzes previously obtained imaging and can be applied to CT scans that were performed at any point in the past.
- The authors analyzed correlations with concurrent DXAs performed within 90 days before or after a baseline or follow-up CT scan. The authors reported that BCT-assessed BMD T-score calculated using scans performed in routine clinical management of this population was strongly correlated with DXA-measured femoral-neck BMD T-score. The authors concluded that BCT of routinely collected CT scans may offer an accurate and convenient means to screen for fracture risk among patients with mHSPC.

Page et al. (2023) performed a retrospective cross-sectional study of 550 previously obtained CT scans of the chest or abdomen and pelvis of men and women in a five-year range to test the sensitivity and specificity of a vertebral compression fracture algorithm. The findings of the algorithm were compared against a board-certified neuroradiologist reading of the CT. The results demonstrated sensitivity and specificity of the algorithm in diagnosing any VCF were 0.66 (95% CI 0.59–0.72) and 0.90 (95% CI 0.88–0.92), respectively, and for diagnosing moderate/severe VCF were 0.78 (95% CI 0.70–0.85) and 0.87 (95% CI 0.85–0.89), respectively. The authors noted a positive finding with the VCF algorithm was associated with 6.88 increased odds of having a VCF, relative to not having a VCF (95% CI 5.32–8.44) and 5.98 increased odds of having a moderate/severe VCF relative to not having such a fracture (95% CI 4.87–7.10). A limitation of this study was its retrospective nature. Additionally, the algorithm was unable to provide determination on almost 10% of the images. The authors suggest that the algorithm could be used as an additional tool to help support diagnosis of osteoporosis.

Keaveny et al. (2022) reported results of a retrospective observational cohort study of 469 individuals followed for a period of 5 years. The study sought to determine whether a biomechanical CT could predict individuals' risk for vertebral fracture or reoperation. Included were adults with any type of primary thoracic or lumbar fusion between 2005 and 2018 with preoperative CT scans of the surgical level. The outcomes of interest were reoperation for any reason or a newly documented vertebral fracture up to 5 years after surgery. The results reported were as follows:

- Median follow-up time was 44.4 months. 11.1% had a reoperation (median time 14.5 months), and 7.7% had a vertebral fracture (median time 2.0 months). Overall, 25.8% of individuals tested positive for osteoporosis. Compared to individuals without osteoporosis, those testing positive were at almost five-fold higher risk for vertebral fracture (adjusted hazard ratio 4.7, 95% confidence interval = 2.2–9.7; $p < .0001$ Kaplan-Meier survival). Of those positive-testing individuals, those who tested positive concurrently for low values of both bone strength and bone mineral density (12.6% of individuals overall) were at almost four-fold higher risk for reoperation.
- Results showed that individuals who were high-risk for fracture tested positive for fragile bone strength and/or osteoporosis. However, for reoperation, only those individuals who concurrently tested positive for both fragile bone strength and osteoporosis were at significantly higher risk. Those testing positively for either fragile bone strength or osteoporosis, but not both, were at increased risk of vertebral fracture.

Limitations of this study included its retrospective nature, exclusion of potential data due to incomplete available CT data, and the lack of distinction of reasons for reoperation. The authors suggested that BCT could be used to help identify individuals who would benefit from interventions to prevent complications after surgical instrumentation.

Adams et al. (2018) conducted a retrospective case-cohort study (FOCUS) of 3938 patients who received an abdominal or pelvic CT scan during routine clinical care and received a DXA scan within 3 years of the CT. Adams et al. stated that methods now exist for analyzing previously taken clinical CT scans to measure a DXA-equivalent BMD at the hip and a finite element analysis-derived femoral strength. Adams et al. assessed the efficacy of this 'biomechanical CT' (BCT) approach for identifying patients at high risk of incidental hip fracture in a large clinical setting.

- In women, BCT had a sensitivity and specificity for detecting hip osteoporosis of 0.56 (95% CI, 0.51 to 0.60) and 0.77 (95% CI, 0.72 to 0.81), respectively, while DXA had a sensitivity of 0.52 (95% CI, 0.47 to 0.56) and specificity of 0.77 (95% CI, 0.73 to 0.81). In men, BCT had a sensitivity of detecting hip osteoporosis of 0.45 (95% CI, 0.39 to 0.52) and a specificity of 0.82 (95% CI, 0.76 to 0.87) compared to 0.43 (95% CI, 0.37 to 0.50) and 0.83 (95% CI, 0.77 to 0.88), respectively, for DXA. The authors concluded that BCT is at least as effective as DXA in identifying patients who are at high risk of hip fracture.

Professional Societies/Organizations

The American College of Radiology Appropriate Use Criteria® (2022) provided the society's recommendations for the most appropriate radiological studies for screening and diagnosis of osteoporosis. DXA is noted in all clinical scenarios as usually appropriate imaging. DXA VFA was noted as usually appropriate follow-up imaging in some scenarios. QCT was noted as a usually appropriate imaging modality for males and females greater than or equal to 50 years of age with suspected osteoporosis and advanced degenerative changes of the spine with or without scoliosis or other conditions that may spuriously elevated BMD. The recommendations did not list the use of algorithmic assessment of previously obtained imaging as an option for imaging in any of the clinical variants addressed. The authors note, "several studies have assessed using conventional CT scans for measurement of bone density by establishing threshold Hounsfield unit levels that

are diagnostic for osteopenia and osteoporosis, but this concept remains an opportunistic use of CT and not a screening tool” (Yu et al., 2022).

The BHOFF Clinician’s Guide to Prevention and Treatment of Osteoporosis (LeBoff, et al., 2022) stated vertebral fracture imaging (x-ray or DXA vertebral fracture assessment) should be performed in high-risk individuals to detect subclinical vertebral fractures. Recently performed MRI or CT imaging studies done for other purposes can and should also be evaluated for presence of vertebral fractures or evidence of vertebral deformity.

The International Society for Clinical Densitometry (2023) noted that opportunistic CT to screen patients with low BMD or low bone strength of the spine or proximal femur is possible only if validated machine-specific cutoff values and scanner stability have been established. Finite element analysis (FEA) is discussed in the section on QCT and pQCT.

The USPSTF Screening for Osteoporosis to Prevent Fractures Recommendation Statement only addresses DXA. It does not address CT, MRI, or finite element analysis (Nicholson et al., 2025).

The Bone Health & Osteoporosis Foundation (BHOFF) (previously known as National Osteoporosis Foundation) published the Clinician’s Guide to Prevention and Treatment of Osteoporosis (LeBoff, et al., 2022). It states DXA measurement of hip and lumbar spine is the preferred method for establishing and/or confirming a diagnosis of osteoporosis, predicting future fracture risk, and monitoring patients. LeBoff et al. addresses serial BMD measurement under the section on monitoring treatment response, and notes the following:

- Central DXA assessment of the total hip, femoral neck, or lumbar spine is the “gold standard” for serial assessment of BMD.
- DXA is currently the preferred approach for monitoring treatment response.

The United States Preventive Services Task Force (USPSTF) Screening for Osteoporosis to Prevent Fractures Recommendation Statement states the most used bone measurement test to screen for osteoporosis is DXA at a central site (e.g., total hip, femoral neck, or lumbar spine). Centrally measured DXA correlates with bone strength and clinical fracture outcomes and uses low doses of radiation. Fracture risk at a specific site is best predicted if bone density is measured at that site. The USPSTF found adequate evidence that centrally measured DXA BMD can accurately predict osteoporotic fractures in women (Nicholson, et al., 2025).

The BHOFF Clinician’s Guide to Prevention and Treatment of Osteoporosis (LeBoff, et al., 2022) states that vertebral fracture imaging (X-ray or DXA vertebral fracture assessment) should be performed in high-risk individuals to detect subclinical vertebral fractures.

The American Association of Clinical Endocrinologists (AACE) and American College of Endocrinology (ACE) Clinical Practice Guidelines for the Diagnosis and Treatment of Postmenopausal Osteoporosis (Camacho, et. al., 2020) noted that lateral spine imaging with standard radiography or VFA with DXA is indicated in certain high-risk individuals (for example, in the elderly, those on glucocorticoid therapy, those with height loss).

The International Society for Clinical Densitometry (2023) states lateral spine imaging with standard radiography or densitometric VFA is indicated for VFA in certain high-risk individuals (for example, in the elderly, those on glucocorticoid therapy, those with height loss).

Health Equity Considerations

Health equity is the highest level of health for all people; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which people are born, grow, live, work, and age.

Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include safe housing, transportation, and neighborhoods; racism, discrimination and violence; education, job opportunities and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

Opportunistic AI-based osteoporosis screening proposes to reduce inequities by expanding access to populations for whom screening may be underutilized (e.g., those with barriers to transportation, language and health literacy barriers, etc.). More research is needed to ensure equitable use, requiring intentional research efforts to diversify data, calibrate models appropriately, and validate tools broadly.

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Revision Details

Type of Revision	Summary of Changes	Date
Annual Review	<ul style="list-style-type: none"> • Revised policy statements for CPT® 0691T and CPT® 0743T. 	4/15/2026
Annual Review	<ul style="list-style-type: none"> • Revised policy statements for CPT® 0691T and 0743T. • Removed policy statements for all other CPT® codes. 	4/15/2025
Annual Review	<ul style="list-style-type: none"> • Added policy statement for ultrasound-based radiofrequency echographic multi-spectrometry (REMS) (CPT® 0815T) • Revised policy statement for bone mineral density measurement testing. 	4/15/2024

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