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Gordon Answers 20 Tough Questions

Gordon's Clinical Observations: The plea for "evidence-based' answers to every clinical question is seen routinely. There are state-of-the-art conclusive answers to many clinical questions. But how many times in a clinical day is there not an evidence-based answer to a question? In such situations, observational clinical evidence accumulated by practitioners is appropriate as stated by the person who popularized the phrase evidence-based medicine—David L. Sackett MD, a Canadian/American physician. *CR staff has accumulated many dental topics with apparently inadequate evidence-based answers and made suggestions for your consideration on these topics.*

CR clinicians and science staff accumulated 70 topics on which there were no finite answers and are controversial. At the risk of developing additional controversy, they have provided suggestions for you on the **potential current answers to these questions**.

1. Is cone beam radiology necessary?

YES! Surveys of dentists using cone beam radiology find this technology is mandatory for implant placement, removal of impactions or difficult extractions, diagnosis, and endodontic treatment. **It is time to get access to cone beam or buy one for your practice because some clinical procedures are now considered to require cone beam images to be accepted "standard of care"!** As an added benefit, most cone beams come with excellent 2D panoramic images. According to a recent CR survey, the most popular brands are Dentsply Sirona, Planmeca, Carestream, Vatech, and Kavo/DEXIS. (See also article on cone beam below.)

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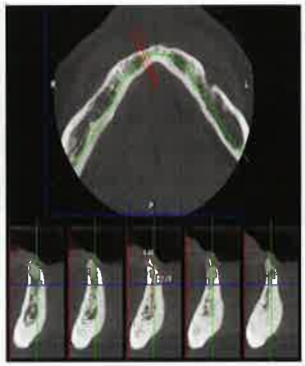
The Increasing Value of Cone Beam in General Practice

Gordon's Clinical Observations: Cone beam radiography has certainly proven itself to users over the 20 plus years it has been available, and dentists are pleased with the advantages it provides their practices. 30–40% of general practitioners have this concept in their office. What is holding back greater acceptance? Is it cost, space required, or adequacy of current radiographic devices? *This article prepared by CR scientists and clinicians candidly states the reasons cone beam is standard of care for several clinical procedures, evaluates two devices, and promotes the use of the concept.*



CBCT image showing cross-sectional views of the mandible as part of planning for an implant-supported prosthesis. Red lines in the upper image are the five "slices" shown below.

Cone beam computed tomography (CBCT) provides both two- and three-dimensional radiographic image data with the ability to view cross sections on any plane. This ability to visualize anatomical structure from any angle significantly improves diagnosis, treatment planning, safety, and success of involved procedures. CBCT was quickly incorporated by oral maxillofacial surgeons and endodontists where it is now the standard of care. Today, general practitioners make up the greatest growth segment as they expand their treatment repertoire to include more implants, endo, and extractions.

The following report includes data on current use, information on two premium systems, and clinical tips.

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The Increasing Value of Cone Beam in General Practice (Continued from page 1)

Current CBCT Use

CBCTs are now experiencing the greatest growth among general practitioners and are expected to become ubiquitous throughout dentistry. A survey of 910 clinicians indicated the following:

- Use by **general practitioners** is about 34%.
- Most are **new users** with 84% less than 6 years.
- **Satisfaction is high:** 92% rated it excellent or good; 76% indicated it was an essential diagnostic aid; and 93% indicated that they would buy it again.
- **Main uses** are implants, endo, surgical guides, impactions, and exams.

Example 2D extraoral bitewing (Vatech Green X)

Performance of Two Current Systems

Two full-featured systems are currently undergoing long-term evaluation in CR's on-site clinic. The following chart shows key features and initial performance characteristics. Numerous additional brands and models are available.

Brand (Company)	Approx. Cost	Fields of View (diameter × height cm)	Patient Head Restraint	Alignment Guides	Exposure Controls	2D Modes	Artifact Reduction	Low Dose Mode	Preliminary Alignment Image	Implant Tools	Ease of Use	Image Quality	Initial Overall Rating
Green X (Vatech) 	$100,000	Endo 5 × 5 8 × 5 8 × 8 12 × 9 16 × 11 18 × 15	Chin rest, bite stick, temple side clamps	Projected laser lines	On computer software, tabs and sequential buttons, easy	Pan, extraoral bitewing, others	Yes, Very Good	Yes, "Green" mode	Yes	Yes	Excellent–Good	Excellent	Excellent
Viso G7 (Planmeca) 	$125,000	5 × 5 10 × 10 10 × 14 16 × 16 20 × 26	Chin rest, bite stick, back of head clamp	Live image with virtual lines	On consule touch-screen, touch and drag, intuitive and easy	Pan, extraoral bitewing, others	Yes, Very Good (adjustable)	Yes, "Ultra Low Dose" mode	Yes	Yes	Excellent–Good	Excellent–Good	Excellent–Good

Summary of evaluation:

- **Both systems** evaluated are capable of producing a wide range of diagnostic images with viewing options and tools for basic and advanced treatment planning.
- **Green X** exhibits excellent image quality noted by clinicians, along with good control of metal artifacts. Exposure settings are made at the computer. Software has excellent tools and is fairly intuitive with a short learning curve. Additional Vatech CBCT models are available with a range of features, fields of view, and prices.
- **Viso G7** exhibits good to excellent image quality. Intuitive touchscreen console at unit is used for both patient positioning and exposure settings. Software has excellent tools and is fairly intuitive with a short learning curve. Additional Planmeca CBCT models are available with a range of features, fields of view, and prices.

Clinical Tips

- **Affording CBCT:** Users indicated that CBCT pays for itself fairly quickly. Patients should be billed a fair price for radiographs. Panoramic and other 2D imaging can be used and billed routinely while 3D CT imaging is only for more involved cases. The survey indicated that 67% of clinicians are only occasionally billing for imaging with their CBCT.
- **Reducing x-ray exposure:** Low-dose modes reduced patient exposure and still resulted in diagnostic images, although image quality was slightly affected with more graininess. Artifacts (beam hardening) were also reduced. X-ray exposure varies greatly with field of view and resolution setting. A typical CBCT image of full dentition is around 57 µSv, compared to 4 µSv for a single digital intraoral bitewing, 11 µSv for a digital pan, and 2000 µSv for a typical medical CT image (fan beam). Diagnostic image value should always be weighed against exposure risk.
- **Selecting a CBCT:** Entry-level models with small to medium fields of view cost less and are usually adequate for general practices. Verify that third molars can be imaged for extractions. Analyze and compare units by arranging demos or visiting colleagues, show rooms, or trade shows.
- **Field of view:** Use the smallest field adequate for the procedure as you are liable for the interpretation of all areas of the image. This also reduces radiation exposure for the patient.
- **Resolution:** Resolution varies with field of view and settings. Higher resolution (smaller voxels) provides greater clarity but requires longer processing times. In general, the lower resolution of 3D images makes them poorly suited for caries detection and other subtle diagnostics.

CR CONCLUSIONS: Cone beam computed tomography provides conventional 2D extraoral imaging and improved 3D visualization of anatomical structures to aid diagnosis and treatment planning with a wide range of software tools. It is generally considered to be the standard of care for implants, endo, impactions, and other involved procedures. The increased use has now shifted toward general practitioners, who show a high level of satisfaction. Impediments continue to be high cost and the time and complexity of integrating new technology to facilitate new treatments. Both cone beam units currently being evaluated by CR made diagnostic images with a wide range of settings for all applications. New hardware and software features have significantly improved ease of use. Green X (Vatech) exhibited excellent image quality. Determine if cone beam is needed in your practice.