

HANDHELD DENTAL X-RAY UNITS: 5 THINGS TO CONSIDER BEFORE YOU BUY



Handheld dental X-ray units were originally developed for situations where fixed units could not be used, like in field hospitals and emergency triage facilities. With handheld dental X-ray units becoming more widely used in dental practices, dentists are faced with a question. Are these units a better choice than conventional X-ray units for their practice? While the appeal of handheld units is strong, many dentists have discovered the reality of using them in daily practice is full of challenges. To help you make an informed decision, here are the top five things to consider before you invest.

1. SAFETY

When using a wall-mounted X-ray unit, the operator leaves the room, eliminating the potential for exposure to both leakage and scatter radiation. Exposure to radiation is a significant safety concern for the operator of any handheld device. Since the operator is holding the X-ray source assembly, the principle of "distance" as a safety factor against leakage radiation cannot be applied.

Very specific operating procedures must be followed to minimize scatter radiation exposure as well. These procedures include keeping the body perpendicularly behind the shield, moving the patient's head to position for the exposure and keeping the shield all the way at the end of the cone. Handheld units have been tested to be safe if used properly, but how many operators are using them exactly according to the manufacturer's instructions?

And, how many know if they are positioning the device properly without indicators to alert them when they are no longer in the safety zone?

The patient's radiation dose also increases as the battery charge decreases. This increase in dose happens because kilovoltage can drop to as low as 54 kVp when the battery loses charge, which means the exposure time must increase to compensate.

2. IMAGE QUALITY

It can be more difficult to take consistently good X-rays with a handheld unit. While the first image taken on a fully charged handheld unit may perform at a fixed 60 kVp, subsequent images will be taken with diminished radiation (10% less or down to 54 kVp) as the battery discharges. This

inconsistency in exposure may require on-the-fly adjustment of exposure timer settings and result in variable image quality. Because handheld X-ray units are often used with lower-than-recommended and inconsistent kVp, they result in more retakes due to underexposure.

Another hinderance to image quality in handheld units is their fixed and markedly lower milliampere (mA), 1.7 to 2.5 mA, than wall-mounted X-ray units, which typically operate with a fixed 7 mA or variable 4 mA to 7 mA. The lower amperage of handheld units, together with their reduced and possibly inconsistent kilovoltage, requires increased exposure time to provide the necessary radiation to produce acceptable diagnostic images. Yet, exposures longer than one second run a greater risk of blur artifacts caused by patient or operator movement, resulting in unusable images and more retakes.

Consider, also, the time it takes to capture a series of quality images. A one-second exposure time for a typical handheld dental X-ray unit requires a 60-second cooling down period before the next exposure. The cooling down period, or duty cycle, for a conventional wall-mounted dental X-ray unit is half that time. Those extra 30 seconds saved per exposure become the difference between performing a full-mouth series of twenty images in 5 minutes versus 10 minutes.

3. WORKFLOW AND ERGONOMICS

While it may seem staying in the room between exposures would improve workflow, it does not. Placing a receptor in the patient's mouth is a two-handed operation and if both hands are being used, the handheld generator would end up cradled in the operator's arm or placed on a work surface. This placement makes them highly susceptible to being dropped and damaged. It also causes arm and hand fatigue for the operator who has to hold the heavy device, which can weigh as much as 5-8 pounds, in awkward positions for longer exposures to get the best image.

Plus, constant repositioning of the sensor between acquisitions, such as in a full-mouth or bitewing series, can take longer and requires repeated handling of the device, leading to cross-contamination on top of ergonomic issues and damage risk. If the battery needs to be charged or multiple operators need the unit at the same time, clinical workflow can grind to a halt.

4. REGULATIONS

Not all handheld intraoral dental X-ray units available in the US are FDA-approved, and not all FDA-approved machines have been approved for use by every state. In the US, there are no standard federal regulations regarding the use of handheld X-ray units. Therefore, individual states vary in their approval and requirements for handheld X-ray units, which can include device secure storage to reduce risk of theft, use

of protective apron, and radiation monitoring. Some states provide cart blanche approval for the use of handheld units, while others give approval on a case-by-case basis, usually by an exemption.

5. COST AND LIFESPAN

Not only does one handheld unit cost almost the same as two wall-mounted units, the general life expectancy of a wall-mounted unit is 10 years with little to no maintenance. Because they are permanently fixed to the wall, there is no risk of dropping the unit. If handheld units are dropped, they must be sent to the manufacturer for evaluation before being used again. If the office has only one handheld unit, they would have no X-ray device until that unit is returned. The batteries, chargers and damage waiver warranties also add to the cost. In fact, the estimated 5-year cost for a popular handheld X-ray unit is over \$5,700 more than its wall-mounted counterpart, the Midmark Preva.

CONCLUSION

Handheld dental X-ray units are still best suited for use in situations where a wall-mount is not readily accessible. Because a handheld unit is only as stable as the operator can hold it and exposure times are long, motion artifacts and retakes are far too common. They also pose an increased radiation risk, which requires the adoption of several added protection protocols while still offering no operational safety features to warn of potential radiation exposure. Wall-mounted units deliver more consistent quality X-rays with less radiation exposure risk. Units such as the Midmark Preva Intraoral X-Ray offer features like an unimpeded exterior cone for proper positioning, braking systems to keep the device perfectly stable during exposure, secure placement on a wall or cabinet to prevent dropping or theft, and the ability to be programmed with the technique factors for optimal image quality.

For most dental practices, conventional dental X-ray units are still the safest, best option for routine daily use.

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