F19 Aribex NOMAD™: A Useful and Safe Portable Hand-Held X-Ray Machine for Forensic Odontology?

Ahmad A. Abdelkarim, DDS, Robert P. Langlais, DDS, and David R. Senn, DDS, University of Texas Health Sciences Center, San Antonio, Dental Diagnostic Science Department UTHSCSA, 7703 Floyd Curl Drive, San Antonio, TX 78229*

After attending this presentation, attendees will be able to assess the value of a portable X-Ray machine for use in forensic odontology and multiple fatality incidents.

This presentation will impact the forensic community and/or humanity by demonstrating how being portable and battery powered; NOMAD makes it easier for the operator to acquire images in virtually any position. NOMAD is a practical imaging system for forensic odontology. When teamed with digital sensors it facilitates film-less imaging that saves time. Consequently, the collection of postmortem information in multiple fatality incidents can be much faster and more efficient.

The Aribex NOMAD system is a handheld, battery-operated, portable imaging system. This presentation will describe major aspects of Nomad that is the latest development in portable X-Ray machines. Specifications of NOMAD will be presented (including physical properties, pictures and cross-sectional diagrams of the system). Several features of the NOMAD address the safety concerns. Understanding these features and the internal design of this system explains why it is safe for the operator and the public. The National Council on Radiation Protection and Measurements (NCRP) recommendations for annual operator exposure will be presented as well as the annual exposure values of Nomad used with film and digital sensors. NOMAD received the FDA's approval in July 2005. This device has been recently used in multiple fatality incidents after the Tsunami in Southeast Asia and after Hurricane Katrina in Louisiana and Mississippi. Details of its use in these disasters, safety issues and applications and digital sensor use with Nomad will be discussed. Operators in disaster morgue settings were instructed to wear protective gear, because safety was an important issue with heavy use of this machine. The supine position of the person being imaged required the operators standing near the gurney to be in an at risk position using a very new machine in a non-standard configuration. A brief comparison of image quality between the NOMAD and stationary X-Ray systems will be presented.

Methodology: Back scatter radiation was measured at different sites in the zone of significant occupancy (as defined by the IEC standard) within which the operator can be standing, once with the protective shield provided by the manufacturer, and once without the shield. Also, radiation leakage was measured at 11 different sites around the machine. Three measurements were taken, and the mean of these values was calculated. Data obtained will be presented, as well as zones of significant occupancy and the measurement sites for leakage radiation.

Discussion: Given the Leakage Radiation and Backscatter Radiation measurements at the instrument backplane, it is possible to estimate the maximum dose that would be received by an operator using the NOMAD. The typical whole body exposure to the operator can be estimated using the measured sum of backscatter and leakage radiation level at the control panel of approximately 1 mR/hr. Exposure to the hand is even more benign relative to the recommended exposure limits. The highest leakage data was 3.8mR/hr.

Conclusions: Radiation shielding inside NOMAD ensures that leakage from the X-Ray source itself is virtually eliminated, protecting the operator's hands and other areas close to the devices. The use of Nomad in its intended applications presents no more risk to the operator than using stationary X-Ray equipment. With moderate care, the operator can prevent any risk to the public. Image quality obtained by Nomad rivals that of stationary equipment, even when the X-Ray source is handheld, particularly in cases using digital sensors with correspondingly short exposure times. Being portable and battery powered, NOMAD makes it easier for the operator to acquire images in virtually any position. Nomad is a practical imaging system for forensic odontology. When teamed with digital sensors it facilitates film-less imaging that saves time. Consequently the collection of postmortem information in multiple fatality incidents can be much faster and more efficient.

Forensic Odontology, Portable Dental X-Ray Machines, Radiation Safety

 ** Presenting Author*