Title: Artificial Intelligence (AI) in Military Dentistry

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Summary

Military dentists ensure that military personnel are "Dentally Fit" in order to fulfill their military duties to minimize loss of time and effectiveness due to dental or oral problems. Deep learning is a new technology that can assist military dentists in both diagnostics (e.g., detection of lesions, forensic expertise) as well as in therapy (e.g., tooth extraction, implant placement). And thereby helps dentists in assuring military personnel dentally fit.

AI in dentistry surfs on three big trends: X-ray gets more accurate; chips get more powerful and AI algorithms get smarter. This enables powerful AI applications for both diagnostics and therapy, with the ultimate goal of making dental services more efficient and effective. In diagnostics, AI can help with observations of caries, crowns, endo, apical lesions, but also with predictions of wisdom tooth eruption. In therapy, AI can help with planning difficult extractions, implant placements and predict the outcome of a maxillofacial surgery. The first step of planning is the accurate modelling of the anatomy of the facial structures. (https://relu.eu/virtual-patient-creator)

A present study (Verhofstadt, ICMM Review, June, 2022) compared a certified neural network software program (www.DentalXr.ai) with a group of four experienced dentists and found the AI model to show higher overall sensitivity and accuracy than dentists on bitewing and panoramic radiographs. The lowest sensitivity ratio to detect advanced and initial caries was found by the civilian accredited dentists. For initial caries lesions, the risk of under-detection by dentists was high. The neural network, in contrast, showed robust sensitivity regardless of the lesion depth. Compared to other systematic reviews, where the sensitivity for detection initial and advanced caries was between 0.24 and 0.43 (Schwendicke, J. Dent, 2015), the sensitivity for detecting caries on Bitewings in this study was twice as high at 0.86 for military dentists. Civil accredited dentists were in the normal average of 0.33. Apparently, you can train detection of caries. The detection of caries on panoramic radiographs was poor in all three groups compared to bitewings. The AI model found 20% less caries than on bitewings. The dentists found approximal 50% less caries on panoramic radiographs than on bitewings.