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## Evaluation of image quality optimisation using VGC and ordinal regression analysis

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## Purpose

Visually grading the visibility of anatomical or pathological structures on images is a simple powerful method of quantifying the quality characteristics of an image (1-3). The aim of this research was to evaluate observer performance involving absolute visual grading analysis of image criteria using visual grading characteristic curves (VGC) and ordinal regression analysis during head CT examination optimisation.

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## Methods and Materials

An image criteria study was conducted quantifying subjective opinions of radiologists on the quality of images of CT head examinations pre and post optimisation. The visibility of a list of image quality criteria sourced from the European guidelines for CT was graded against each other (4). Images obtained from current and optimised head CT protocols (n=120) from 4 suites, were randomly presented using ViewDex (Figure 1) for evaluation by radiologists (n=6). The data was analysed using two modes of analysis: 1. Visual grading characteristic (VGC)...

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## Results

VGC curves (Figures 2-5) gave an indication that the optimised protocols do not differ significantly from the 0.5 threshold (Figure 6). Based on the logistic regression model image quality can be a significant predictor of protocol identification if p-value < 0.05. However, when p-value > 0.05 image quality between the protocols is equivalent. Ordinal regression analysis indicated no significant between protocols in suites 1 and 3 but discriminated between the protocols for suite 2 and 4. Analysis on individual criteria indicated a difference (p<0.05) in...

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## Conclusion

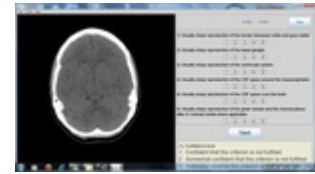


Fig. 1

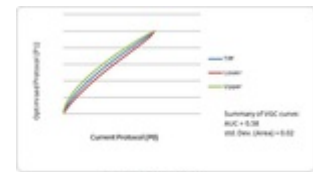


Fig. 2

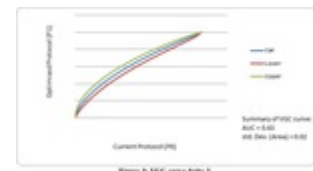


Fig. 4

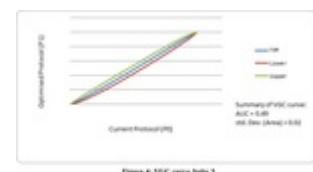


Fig. 5

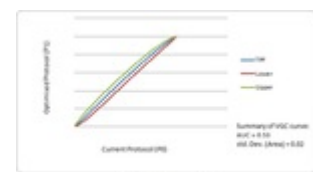


Fig. 3

No difference in image quality between the protocols for CT examinations of the head were recorded for all suites in terms of AUC in this VGC analysis. Ordinal logistic regression results specific to each quality criterion showed a difference in image quality at suite 2 identifying specific criteria where this differed. Using the most appropriate method of analysis in optimisation is highlighted as findings influence protocol implementation based on clinical requirements. An overall 15% dose saving was achieved as a result of optimisation. Optimised protocols...

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## References

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