

Understanding Variations in Mean Polyps Detection as a Key Performance Indicator (KPI) for Endoscopists in England: A Simulation Study

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Abstract: Colorectal cancer (CRC), the fourth most common cancer in the UK, arises from benign polyps over a long period of time. Detection and removal of polyps through colonoscopy is therefore a critical step in the reduction of CRC incidence and mortality. There is substantial variation in polyp detection rate, and therefore colonoscopy quality, and the optimal statistical approach for quantifying this variation in performance is unknown. In this study we compare the performance of different statistical methods in estimating KPI for endoscopists using routinely collected big data in the National Endoscopy Database. When there was substantial variation between sites, generalised mixed-effects models (GLMM) showed higher accuracy in ranking performance of endoscopists (96% and 81% accuracy for top 25% and bottom 25%, respectively) compared to Poisson and Negative Binomial models (88% and 87%, respectively). When there was variation between endoscopists and not between sites, GLMM showed higher accuracy in identifying endoscopists in the top 25% compared to Poisson and Negative Binomial models (92% and 82%, respectively). However, Poisson and Negative Binomial model (81%) performed better than generalised linear mixed effects (75%) model in ranking endoscopists in the bottom 25%.

Key words: Generalised Mixed Effect Models; Polyp Detection; KPI, Poisson Regression and Negative Binomial Regression.

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