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Case-mix-adjusted mean number of polyps per 100 procedures: a new candidate gold standard colonoscopy key performance indicator

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ABSTRACT

Objective Adenoma detection rate (ADR) has been criticised as a colonoscopy key performance indicator (KPI), for excluding serrated polyps, requiring histological data and fostering a 'one-and-done' attitude. We hypothesised that a case-mix-adjusted mean number of polyps (aMNP) would address these criticisms and provide a better measure of colonoscopy quality. We aimed to develop an aMNP using the National Endoscopy Database (NED) and assess its relationship with quality metrics.

Methods We extracted colonoscopy data from NED for 1 January 2019–4 April 2019. Multiple negative binomial regression was undertaken to estimate effects of patient variables on MNP and generate aMNP. Associations between aMNP and polyp detection rate (PDR), proximal polypectomy rate (PPR), postcolonoscopy colorectal cancer (PCCRC) rate and Joint Advisory Group for GI endoscopy (JAG) Global Rating Scale (GRS) were explored.

Results 92 892 colonoscopies were analysed. Patient age, sex and procedure indication were significantly associated with MNP and used to create aMNP. At endoscopist level, aMNP strongly correlated with PDR (Spearman rho=0.834, p<0.001) and PPR (rho=0.709, p<0.001). Median aMNP was significantly lower in Trusts with higher versus lower PCCRC rates (73.9 vs 67.0 polyps per 100 procedures, p=0.047) and higher in units with GRS A/B versus C/D (aMNP 63.5 vs 55.2, p<0.001).

Conclusions We demonstrate a method to compute a novel case-mix-adjusted KPI, aMNP, which is significantly associated with PDR, PPR, PCCRC and JAG GRS. Histological data were unavailable. aMNP addresses many limitations of ADR, adjusts for warranted variation in detection, and hence may improve audit and feedback engagement. We propose it as a candidate gold standard KPI for reporting endoscopy quality.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Endoscopists with low polyp detection rates have higher postcolonoscopy colorectal cancer incidence and mortality rates. Traditional adenoma detection rate is criticised as a detection performance indicator for excluding significant non-adenomatous polyps, being dependent on histology for calculation and fostering a 'one-and-done' attitude.

WHAT THIS STUDY ADDS

⇒ We demonstrate how to calculate a case-mix-adjusted mean number of polyps (aMNP) and how this is associated with polyp detection, endoscopy unit quality and postcolonoscopy colorectal cancer.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Using aMNP as a detection metric in research and clinical audit and feedback may address many of the limitations of adenoma detection rate.

INTRODUCTION

Colorectal cancer (CRC) is diagnosed in half a million people each year in Europe and is the fourth most common cancer in the UK.[1 2] These cancers arise from polyps, and polyp detection and resection at colonoscopy is pivotal in their prevention.[3] Detection key performance indicators (KPIs) are important: colonoscopists with low polyp detection rates have higher postcolonoscopy CRC (PCCRC) incidence and mortality rates.[4 5]

The current standard detection indicator in colonoscopy is adenoma detection rate (ADR), defined as the proportion of colonoscopies where at least one adenoma is detected.[6–8] ADR has three main criticisms. First, it takes no account of serrated polyps, which account for up to 30% of CRCs.[9] Serrated polyps usually occur in the proximal colon and are easier to miss as they are often subtle, blending into the background mucosa.[10] Second, as a binary measure at the procedure level, ADR and polyp detection rate (PDR) risk creating a 'one-and-done' phenomenon through not incentivising the detection of polyps beyond the first,[11–13] hence deviating from cancer biology where every adenoma increases the risk of CRC incidence and mortality.[13] Third, ADR and sessile

detection measures are dependent on histological data. This is a substantial logistical disadvantage in quality assurance: in the UK, endoscopy reporting systems (ERSs) and histology reports are not linked, therefore endoscopy leaders must make considerable effort to combine datasets to generate an ADR for their centre and endoscopists.

UK reporting systems now send non-identifiable endoscopy data to the National Endoscopy Database (NED),[14] a novel registry that captures patient-level data automatically, allowing real-time analysis and presentation of polyp detection KPIs. This allows individual endoscopists and endoscopy unit leads to access and review their data easily.

A detection KPI that overcomes these criticisms would be advantageous. Randomised control trials in lower GI endoscopy have recommended using outcome measures considering the total number of adenomas, as reducing total numbers of adenomas is clinically meaningful in tackling the long-term CRC risk of an individual.[15 16] These metrics align to the principle that the second and third polyps are as valuable as the first. Recent Polish screening data demonstrated ADR, PDR and adenomas per colonoscopy had comparable inverse associations with PCCRC. Top performance quintiles of PDR and adenomas per colonoscopy had the lowest HR for PCCRC, suggesting the potential role of a mean polyp KPI.[17]

Mean number of polyps (MNP), the total number of polyps detected divided by the number of colonoscopies performed, reflects the full length of the colon with a broader detection definition to include the serrated cancer pathway. This has a strong correlation with ADR[11 18] and has been used as an outcome in endoscopy quality assurance studies.[11 19] A Delphi consensus of endoscopists across the UK demonstrated that MNP is an acceptable KPI to endoscopists. This consensus found that a cap of five polyps per procedure in calculating MNP was acceptable to reduce the perception of skew from polyposis, and multiplying MNP by 100 to create an integer rate per 100 colonoscopies was most acceptable.[20]

Endoscopists' detection KPIs are affected by patient case-mix. Comparing unadjusted average scores of individual endoscopists can be misleading, as the patient profiles of different endoscopists can vary; thus, differences in unadjusted detection KPIs might be 'warranted' variation and not represent differences in endoscopy quality. The Department for Health recommends case-mix adjustment to allow more meaningful comparisons.[21] The above Delphi consensus demonstrated that case-mix adjustment of MNP for patient age, sex and procedure indication was acceptable to endoscopists.[20]

In the UK, endoscopy is provided by individual endoscopy units, and each unit works within an organisation (NHS Trust or independent sector). The Joint Advisory Group for GI endoscopy (JAG) defines standards for clinical practice at an endoscopy unit level and has an important role in endoscopy quality assurance.[22] JAG accredits endoscopy units and uses a Global Rating Scale (GRS) to score endoscopy unit quality. Trust level PCCRC rates are used to compare organisations' quality.[7 23]

We aimed to:

1. Assess the association of the case-mix factors of patient age, sex and indication with warranted variation in polyp detection.
2. Use such variables to develop a new case-mix-adjusted MNP (aMNP).
3. Assess how aMNP correlates with other unadjusted detection KPIs, along with other metrics, including organisational level PCCRC rates and JAG GRS scores.

METHODS

Non-identifiable colonoscopy report data for the first consecutive 100 000 procedures undertaken from 1 January 2019 by independent endoscopists were extracted from NED; histological data were unavailable. Colonoscopies were excluded if (a) the patient was <18 or over 99 years old; (b) the patient had a prior total colectomy; (c) the procedure was abandoned or incomplete (intubation failing to reach the caecum, terminal ileum or neo-terminal ileum); (d) the withdrawal time was documented >120 min; (e) polypectomy site data were missing or (f) the procedure was performed as an emergency.

NED allows multiple indicators to be recorded per procedure. Procedure indications were collapsed into six clinical categories, to aid multivariable analysis. Each procedure was allocated to one indication category based on the following hierarchy:

1. Screening: a procedure undertaken because of a positive bowel cancer screening programme test or positive faecal blood result.
2. Inflammatory bowel disease assessment (IBD): a procedure undertaken for assessment or surveillance of IBD.
3. Previous polyps: a procedure undertaken for surveillance of previous polyps
4. Abnormal investigation: including previous endoscopic or radiological investigations.
5. Lower gastrointestinal (GI) symptoms: including iron deficiency anaemia, constipation, diarrhoea, alternating diarrhoea/constipation, lower GI bleeding, abdominal pain and abdominal mass.
6. Other: family history of CRC, CRC follow-up, tumour assessment, weight loss or other.

Defining and calculating aMNP

Observed MNP was defined as the number of polyps detected by an endoscopist divided by the number of colonoscopies performed. A cap of five polyps per procedure was applied to reduce the skewing effect of polyposis, given evidence that the correlation of MNP with ADR plateaus at five or more polyps.[24]

To enable the new KPI to be adjusted for case-mix, multiple negative binomial regression was undertaken at the procedure level to estimate the effects of patient age,

Table 1 Multivariable analysis of the number of polyps detected at a procedure level with incidence rate ratios (IRRs), coefficients and respective 95% CI for patient age by decade, sex and procedure indication, and Wald test p values for contribution of variable to model

Patient variable	IRR	IRR 95% CI	Coefficient	Coefficient 95% CI	P value
Age (years)					<0.001
<40	1.00	–	0	–	
40–49	1.41	1.33 to 1.50	0.347	0.289 to 0.405	
50–59	2.17	2.07 to 2.29	0.776	0.726 to 0.827	
60–69	2.71	2.58 to 2.85	0.998	0.949 to 1.047	
≥70	3.05	2.90 to 3.20	1.114	1.066 to 1.162	
Sex					<0.001
Female*	1.00	–	0	–	
Male	1.47	1.44 to 1.51	0.388	0.365 to 0.410	
Indication†					<0.001
Other	1.00	–	0	–	
Lower GI symptoms and anaemia	0.76	0.74 to 0.78	–0.272	–0.300 to –0.245	
Abnormal investigation	1.25	1.17 to 1.33	0.219	0.154 to 0.285	
Previous polyps	1.97	1.90 to 2.04	0.676	0.641 to 0.711	
IBD	0.54	0.50 to 0.58	–0.625	–0.699 to –0.551	
Screening	2.07	2.00 to 2.15	0.728	0.693 to 0.764	
Constant	–	–	*–1.558*	*–1.606 to –1.510*	

*Included 1005 procedures where sex was not recorded.
†Hierarchical categorical variable (ranging from 'highest'=screening to 'lowest'=other) using information from all reported indications for each procedure; a procedure was allocated to one category, based on which of the reported indications was highest in the hierarchy.
GI, gastrointestinal; IBD, inflammatory bowel disease.

sex and procedure indication on MNP. Variables were chosen as preprocedure objective factors with known associations with polyp detection.

Coefficients (table 1) from the multivariable model were used to compute an expected number of polyps for each procedure using the sum of these coefficients to the power of the natural log 'e' using the following formula:

$$\text{Expected number of polyps for a procedure} = e^{(\text{constant} + \text{age coefficient} + \text{sex coefficient} + \text{indication coefficient})}$$

The total expected MNP for any number of procedures was calculated by the sum of the expected number of polyps for each procedure divided by the number of colonoscopies performed:

$$Expected\ MNP = \frac{\sum expected\ number\ of\ polyps\ per\ procedure}{Number\ of\ colonoscopies}$$

In turn, observed MNP, expected MNP and a national average MNP were used to generate the aMNP using the Department for Health's suggested statistical adjustment methodology.[21] This divides the observed performance by expected performance and then multiplies this by a national average. Thus, aMNP for an individual endoscopist was calculated using the below formula, with a worked example and spreadsheet calculator provided in online supplemental materials 1 and 2:

$$Case-mix-adjusted\ MNP\ per\ 100\ procedures\ (aMNP) = \frac{Observed\ MNP}{Expected\ MNP} \times National\ MNP \times 100$$

Statistical analysis

PDR was defined and calculated at endoscopist level as the percentage of colonoscopies where at least one polyp was found. Proximal polypectomy rate (PPR) was defined as the percentage of colonoscopies conducted by an endoscopist where at least one polypectomy was performed proximal to, but not including, the splenic flexure. aMNP was correlated to unadjusted detection rates, as unadjusted KPIs are used in current practice.

The most recent endoscopy unit-level JAG accreditation status and GRS score were available and accessed in 2020. 3-year adjusted PCCRC rates from procedures performed in 2016 were available for Trusts in England provided by Public Health England.[25]

aMNP (and other variables) were positively skewed, so statistical comparisons were based on non-parametric statistics and tests. aMNP, PDR and PPR were described by their medians and IQRs, with means and SDs reported for completeness. Correlations between aMNP and PDR and PPR were assessed using Spearman's rank correlation at endoscopist, unit and Trust levels. Median unit-level aMNPs were computed by JAG accreditation category

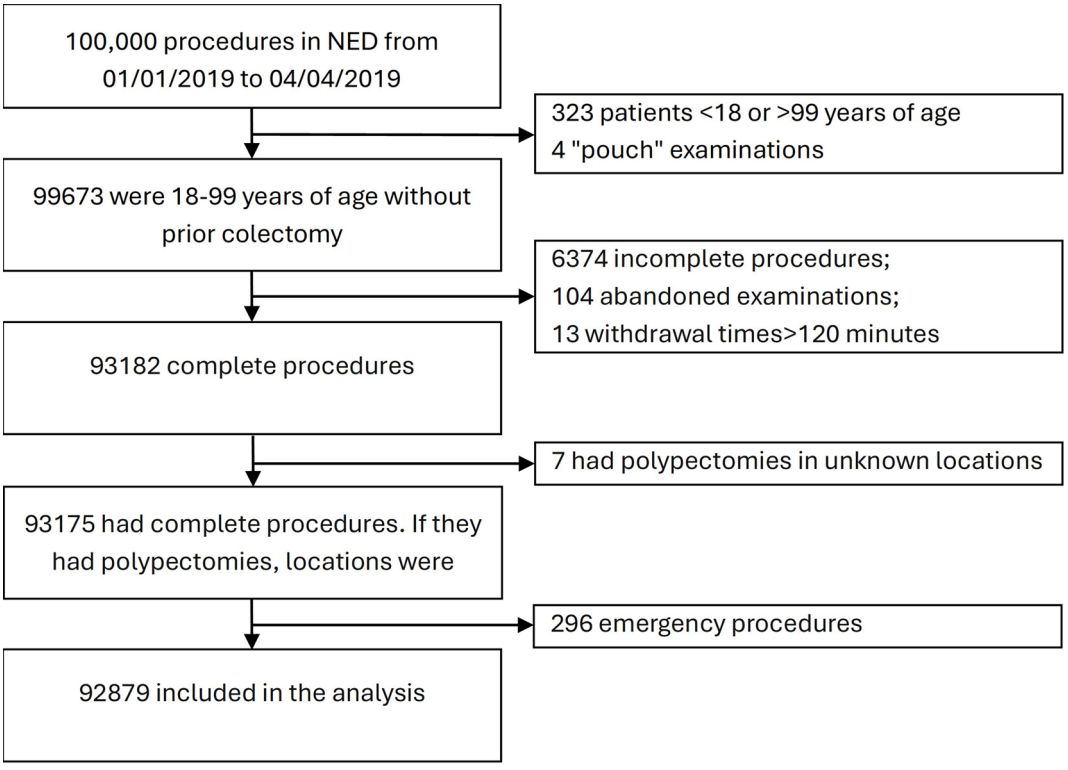

Figure 1 A flowchart of the study population and application of exclusion criteria. NED, National Endoscopy Database.

and GRS score category (with A and B combined as pass, and C and D combined as fail) and compared using Kruskal Wallis tests and Dunn's test with Bonferroni adjustment for posthoc pairwise comparisons. Due to the small number of Trusts, adjusted PCCRC rate data was split at the median, 6.70%, and median Trust-level aMNP compared for Trusts with high and low PCCRC rates. Trusts with fewer than five PCCRC cases were excluded from this analysis. In the analysis, age, sex and procedure indication were categorised (as shown in table 1) and fitted as factors. The negative binomial distribution was used due to the (over)dispersion of the data. Given the large number of statistical tests and large sample size, a Bonferroni correction for multiple tests was used. Statistical analysis was undertaken using Stata 16.0 software.

RESULTS

Of the 100 000 consecutive colonoscopies extracted from NED undertaken between 1 January 2019 and 4 April 2019, 7121 procedures were excluded (figure 1). 92 879 procedures were included in the analysis; these were undertaken by 2496 endoscopists, in 330 endoscopy units, within 111 Trusts. The mean patient age was 58.8 years (SD 15.04); 50.4% of procedures were performed on females.

Multivariable analysis at the procedure level showed that patient age, sex and procedure indication were significantly associated with mean number of polyps detected (table 1). The incidence rate ratio (IRR) increased with patient age (70+ vs <40 years: IRR=3.05, 95% CI 2.90 to 3.20) and was higher for male than female patients (IRR=1.47, 95% CI 1.44 to 1.51). Compared with other indications, bowel cancer screening (IRR=2.07, CI 2.00 to 2.15) and previous polyps (IRR=1.97, CI 1.90 to 2.04) had increased MNP rates, whereas IBD (IRR=0.54, CI 0.50 to 0.58) and lower GI symptoms (IRR=0.76, CI 0.74 to 0.78) had lower rates. Coefficients used to calculate expected number of polyps per procedure are shown.

Distribution of aMNP and correlation to other KPIs

The mean number of procedures per endoscopist was 37.2 (SD 39.1). At the endoscopist level, the median aMNP was 58.5 (IQR 53.6) and mean 62.8 (SD 48.0) (table 2). The mean number of procedures per Trust was 836.8 (SD 724.2). At the Trust level, the median aMNP was 67.4 (IQR 24.0) and mean 67.9 (SD 18.0).

The distribution of aMNP at the endoscopist level plus a scatter plot showing the strong correlation with observed MNP (online supplemental figures S1 and S2). There was a strong, statistically significant correlation between aMNP and PDR and PPR at both the endoscopist and Trust level (table 2 and online supplemental figure S3).

aMNP and PCCRC rates

Of the 136 Trusts with 3-year adjusted PCCRC rates, 50 did not have endoscopy data uploaded to NED in the study period. Three Trusts were excluded with fewer than five PCCRC cases; therefore, 83 Trusts were used in the analysis. Trusts with adjusted PCCRC rates less than the median (6.70%) had a higher median aMNP score than those with adjusted PCCRC rates ≥6.70% (aMNP 73.9 vs 67.0 per 100 procedures, p=0.047, online supplemental figure S4).

Table 2 Distribution of aMNP, PDR and PPR per endoscopist and per Trust

	Descriptive			Correlation with aMNP*		
	Median	IQR	Mean	SD	Rho	P value
Endoscopist level n=2496						
aMNP†	58.5	31.4–85.0	62.8	48.0	–	
PDR (%)	30.4	18.2–42.9	31.4	20.6	0.834	<0.001
PPR (%)	12.1	2.4–22.2	15.1	15.1	0.709	<0.001
Trust level n=111						
aMNP†	67.4	55.5–79.6	67.9	18.0	–	
PDR (%)	36.3	29.8–41.0	35.8	10	0.759	<0.001
PPR (%)	17.9	13.1–22.2	17.5	7.1	0.725	<0.001

*Rank correlation.
†Adjusted mean number of polyps detected per 100 procedures.
aMNP, adjusted mean number of polyps; PDR, polyp detection rate; PPR, proximal polypectomy rate.

aMNP, JAG accreditation status and GRS

Of the 330 endoscopy units in the colonoscopy dataset, JAG accreditation data were available for 305: 161 within NHS Trusts and 145 within the independent sector. JAG accreditation status was 'accredited' in 144 units (47%), 'not assessed/undergoing assessment' in 105 units (34%), 'assessed: improvements required' in 40 units (13%) and 'not awarded' in 16 units (5%). Median aMNP was significantly different across accreditation status categories (Kruskal-Wallis test p<0.001) with descriptive data shown in table 3; posthoc pairwise comparison showed that 'accredited' units had a higher median aMNP than 'not assessed' (contrast 11.4 aMNP, 95% CI 20.4 to 2.50, Dunn's test p<0.001) and 'not assessed' units had lower median aMNP than 'not awarded' units (contrast −19.9 aMNP, 95% CI −38.6 to −1.18, Dunn's test p=0.016).

GRS scores were available for 301 units in the colonoscopy dataset. 246 units were awarded passing scores (A or B), and 55 units were awarded failing scores (C or D). Units with passing GRS scores had a higher median aMNP than units with failing GRS scores (63.5 vs 55.2 per 100 procedures, Dunn's test p<0.001) (table 3 and figure 2).

DISCUSSION

We have created a new case-mix-adjusted detection KPI for colonoscopy, aMNP, which has the potential to address some of the limitations of ADR. aMNP differentiates endoscopists by detection performance and strongly correlates with known detection KPIs. For the first time, we have demonstrated that JAG-accredited and higher GRS scoring units have a significantly higher aMNP, supporting the credibility of this as a new KPI.

Strengths and limitations

We have demonstrated a robust methodology for calculating a case-mix adjustment for colonoscopy, which can be calculated automatically using routinely recorded NED data. Our parallel Delphi work has demonstrated the acceptance of case-mix adjustment to UK endoscopists,[20] and qualitative interviews with endoscopists suggested a case-mix-adjusted detection measure has good face validity and may improve engagement in audit and feedback processes.[26]

Through case-mix adjustment, aMNP offers endoscopists a tailored assessment of their practice. The composition of the patient population endoscopists colonoscope within the current NHS system is not under the control of the endoscopist. Case-mix adjustment is therefore likely to better reflect an individual's performance and aid identification of potential underperformance. Moreover, a qualitative study of endoscopists described the potential rejection of unadjusted KPIs in audit and feedback messages, as participants perceived benchmarks may not apply to their own clinical case mix.[27] This reflects the anecdotal experience of the authors and has implications for endoscopists' acceptance of the need to improve from performance data, with consequences for patient care. Thus, by accounting for 'warranted' variation, case-mix adjustment reduces the risk of rejection and might improve engagement in audit and feedback processes. Our data correlating aMNP to endoscopy service accreditation demonstrates the robustness of this

Table 3 UK Joint Advisory Group for GI endoscopy (JAG) accreditation status, Global Rating Scale and aMNP

JAG accreditation status	Units (%)	Unit median aMNP*	IQR	Unit mean aMNP*	SD
Accredited	144 (47%)	65.5	51.3–80.2	65.6	25.3
Assessed: improvements required	40 (13%)	61.0	49.2–80.2	63.9	26.3
Not assessed/undergoing assessment	105 (34%)	53.1	38.6–70.2	54.1	26.7
Not awarded	16 (5%)	67.4	61.3–76.1	74.0	31.2
Global Rating Scale scores					
A and B (pass)	246 (82%)	63.5	48.8–78.3	64.2	26.3
C and D (fail)	55 (18%)	55.2	38.8–67.6	53.5	26.5

*Adjusted mean number of polyps detected per 100 procedures.
aMNP, adjusted mean number of polyps.

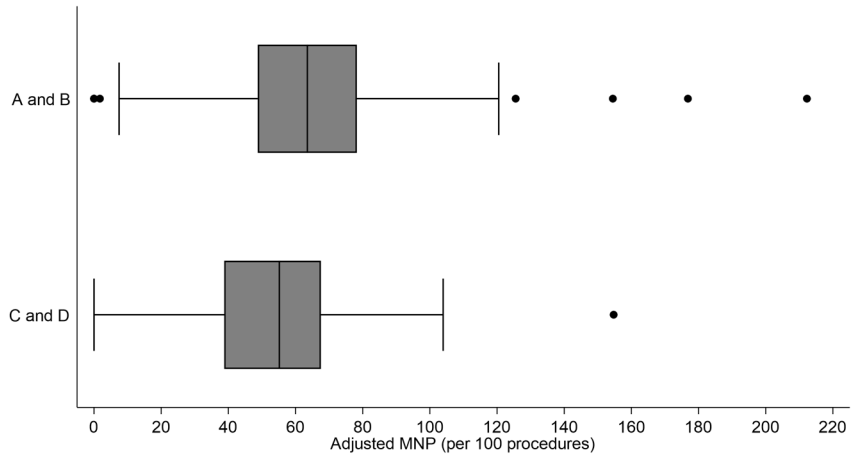

Figure 2 A box and whisker plot of endoscopy unit-adjusted mean number of polyps (aMNP) by Global Rating Scale (GRS) grades A and B versus grades C and D.

detection measure at assessing quality. Previously, retrospective national audits have shown improvement in the quality of colonoscopy since the introduction of JAG accreditation.[28] Endoscopy service accreditation and the introduction of the GRS have been associated with non-detection performance KPIs such as caecal intubation rate, sedation and patient comfort.[29] However, this is the first association of endoscopy centre JAG quality scores and a detection KPI.

We have demonstrated statistically significantly higher aMNP rates in Trusts with below-median 3-year adjusted-PCCRC rates, demonstrating that aMNP is higher in an important health outcome. Caution should be applied in interpreting this result, as the NED data used in our analysis covers a period 3 years after the procedures associated with subsequent PCCRCs. Assessing relationships with PCCRC data is challenging due to the historical nature of PCCRC calculation, requiring 3 years for events to occur and access to data for research.[25] Despite this potentially diluting an association at the Trust level, a significant difference was seen. This is likely due to the overlap of the endoscopy workforce and organisational features between these periods relevant to procedure quality. However, statistical significance should not be taken to imply clinical relevance; while the difference in aMNP between units with lower and higher PCCRCs was 6.9 per 100 procedures, it is unclear that this would be considered clinically meaningful.

A key limitation of this work (but also one of the drivers for developing a measure that does not rely on histology) is that without histological data we are unable to directly correlate aMNP with ADR. We have highlighted the critique of ADR as a detection measure; however, previous retrospective colonoscopy cohorts have shown strong correlations between ADR and unadjusted polyps per procedure,[11 18] PDR[19] and PPR.[30] aMNP was the primary outcome of the National Endoscopy Database Automated Performance Reports to Improve Quality Outcomes Trial (NED-APRIQOT) audit and feedback trial; within that trial, over a 2-week period analysing 4966 procedures, aMNP correlated with ADR (Spearman ρ=0.65, 95% CI 0.61 to 0.70).[31 32]

Another limitation of our study is that histology was not available for our dataset. Polyp detection measures have been criticised for their lack of correlation with ADR in the distal colon, as shown in small retrospective colonoscopy cohorts.[33 34] Polyp detection can be perceived as risking 'gaming' of the system with over-reporting of diminutive hyperplastic polyps in the distal colon.[27] Although a significant proportion of trusts in the study did not have PCCRC data available, we demonstrate an association between aMNP with PCCRC rate and strong correlation to PDR, which should alleviate gaming concerns.[27] Epidemiological studies confirm our findings relating to polyp detection and PCCRC risk. Recent data from the German Pharmacoepidemiological Research Database demonstrate the cumulative CRC incidence is statistically significantly higher in patients examined by endoscopists with lower PDRs;, significant differences were maintained when stratified by distal and proximal colon location.[35] Similarly, in a Canadian cancer registry, patients of endoscopists with a higher polypectomy rate (>30% vs <10%) had almost 40% lower odds of developing a proximal PCCRC (OR 0.61, 95% CI 0.42 to 0.89).[36] This data is likely to reflect the importance of the sessile serrated pathway in the development of PCCRC and the necessity of its inclusion in detection measures, such as aMNP.

The described correlation coefficients for aMNP are based on a snapshot of colonoscopy practice in January 2019. The advantage of using data from 2019 is that it is not affected by the impact of the COVID-19 pandemic on endoscopy volume, workload and practice[37]). However, it also means that the stability of these coefficients over time is unclear. Recent national changes such as the introduction of faecal immunochemical testing into symptomatic referral pathways, the ongoing impact of the coronavirus pandemic on colonoscopy services and

the planned expansion of Bowel Cancer Screening to those aged 50 and above are likely to affect the incidence of polyps and these correlation coefficients.[37 38] Hence, these coefficients should be reviewed and revised periodically: this process could potentially be automated, which is a significant advantage.

Implications for care

Average detection KPI such as adenomas per colonoscopy are being increasingly considered in the colonoscopy quality literature.[39] The improved feasibility of aMNP compared with KPIs dependent on histology such as adenomas per colonoscopy has significant implications for clinical care. As described, the inclusion of the serrated polyp pathway in the detection KPI is important;, however, the use of separate serrated KPIs risks overwhelming endoscopists with too many metrics and continues to be dependent on local histological data collection. Through the successful adoption, and near nationwide roll-out, of the NED in the UK, data capture from ERSs and calculation of aMNP can be automated without the need for time-consuming data collection and analysis.[31] This centralisation of KPI calculation and dissemination to unit leads removes the local burden and therefore heterogenous quality of ad hoc histology audits. Centralisation of data capture also allows NED to generate a national picture of quality and aid the development of meaningful benchmarks. These advantages are not dependent on the UK context—any setting using a centralised automated system would be amenable to similar benefits.

Statistically, aMNP correlates strongly with traditional PDR; however, it has a wider SD and IQR. This allows better differentiation of endoscopists and endoscopy units.

Implications for KPI clinical research

With ongoing adaptation of the NED dataset, future research should consider assessing the association between aMNP and PCCRC prospectively over a longer time frame and consider the role of faecal immunochemical test (FIT) results in aMNPs calculation. Adapting to a new KPI is a process which takes time. Although acceptability of this new KPI has been demonstrated in a Delphi process, this was in selected endoscopists with an interest in colonoscopy quality.[20] If aMNP was introduced into wider clinical practice, it would be important to assess the acceptability and buy-in of the new KPI across a wider population of endoscopists.

Our statistical analysis was undertaken at the endoscopist level, and statistically this does not consider the effects of clustering of patient-level data within endoscopists. This was intentional to assess unwarranted variation between endoscopists, as the behaviours under their control, such as colonic mucosal inspection time, etc, are relevant to endoscopy quality. However, future work using aMNP in other ways (eg, to assess the impact of interventions on detection) should consider statistical methods for clustered observations

CONCLUSION

We have demonstrated a method to compute a new case-mix-adjusted KPI, aMNP, addressing many limitations of ADR in reflecting detection of all lesions across the whole colon. aMNP strongly correlates with PDR and PPR. High aMNP is associated with lower Trust level PCCRC rate and higher JAG quality standards. aMNP allows consideration of the warranted variation in detection and may improve engagement in audit and feedback processes. aMNP should be considered a candidate gold standard KPI for reporting endoscopy quality at the endoscopist and unit level.

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Contributors JC contributed to the conception and design of the analysis and data collection and analysis and drafted the paper. JC is the corresponding author and guarantor. LL conceived and designed the analysis, collected the data and performed the analysis. LS contributed to the conception and design of the analysis, supervised and undertook the analysis and contributed to drafting the paper. MR contributed to the conception of the analysis, data collection and drafting the paper.

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