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Original Research Article

Impact of non-English primary language on adequacy of bowel preparation for elective colonoscopy: a retrospective audit of a high-volume, culturally diverse endoscopy unit

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ABSTRACT

Background: Non-English primary language (non-EPL) is a recognized risk factor for inadequate bowel preparation for colonoscopy, which can lead to delayed procedures, repeat colonoscopies, and increased healthcare costs. New South Wales has the highest proportion of non-EPL residents of any Australian state, and endoscopy units serving these communities must implement effective multilingual strategies to maintain care standards. Auburn Hospital has adopted a proactive approach using professional interpreter services, translated preparation resources, and language-specific patient education clinics. This study aimed to assess the effectiveness of these interventions by comparing bowel preparation quality and the rate of inadequate colonoscopy preparation between non-EPL and English primary language (EPL) patients.

Methods: A retrospective review of elective colonoscopies performed from January to June 2025 was conducted at a high-volume, culturally diverse metropolitan Sydney hospital. The primary outcome was the rate of inadequate bowel preparation, defined as a Boston bowel preparation score (BBPS) below 6. Secondary outcomes included median BBPS and rates of deferred or repeated colonoscopies. Outcomes were compared between EPL and non-EPL cohorts using Fisher's exact test for categorical variables and the Mann–Whitney U test for BBPS score distributions.

Results: A total of 720 elective colonoscopies were analysed (non-EPL: n=324, 45%; EPL: n=396, 55%). Twenty-nine patients (4%) had inadequate preparation (BBPS <6); of these, 55% were EPL (n=16) and 45% were non-EPL (n=13), corresponding to inadequate preparation rates of 4.0% in both groups. There was no statistically significant difference in preparation quality, with both groups achieving a median BBPS of 8 (IQR 7–9; non-EPL mean 7.83 [SD 1.16]; EPL mean 7.96 [SD 1.04]).

Conclusions: Contrary to prior studies, non-EPL status was not associated with poorer bowel preparation at this institution. The overall inadequate preparation rate of 4% meets the GESA benchmark of less than 10% and is consistent with high-performing endoscopy centres, likely reflecting the effectiveness of the multilingual communication strategies in place.

Keywords: Colonoscopy, Bowel preparation, Boston bowel preparation scale, Culturally and linguistically diverse, Non-English speaking background, Health equity, Endoscopy quality indicators

INTRODUCTION

Adequate bowel preparation is a fundamental quality indicator for colonoscopy. Suboptimal preparation reduces adenoma detection rates, prolongs procedure time, increases the risk of complications, and generates avoidable healthcare costs through the need for early repeat examinations.[1-3] The Gastroenterological Society of

Australia (GESA), through its recertification programme aligned with the Australian Commission on Safety and Quality in Health Care (ACSQHC) Colonoscopy Clinical Care Standard, mandates that the rate of inadequate preparation defined by a Boston bowel preparation scale (BBPS) score below 6 should not exceed 10% at a unit level, with high-performing centres aspiring to rates below 5%.[4]

Multiple patient-level factors predict inadequate preparation, including older age, higher American Society of Anesthesiologists (ASA) physical status, constipation, diabetes mellitus, prior stroke, and limited health literacy or language proficiency.[2,3] Patients from culturally and linguistically diverse (CALD) backgrounds particularly those whose primary language is not English (non-EPL) have been identified as a high-risk group for preparation failure in several studies.[5-7] Proposed mechanisms include difficulty comprehending written preparation instructions, reduced capacity to seek telephone clarification, and lower uptake of preprocedural nursing education. Reddy and colleagues confirmed Non-EPL status as an independent risk factor for suboptimal preparation in a paediatric cohort, while a recent multicentre adult study from the United States found no significant difference in inadequate preparation rates when professional interpreter services were in place.[6,7]

New South Wales has the highest proportion of overseas-born residents of any Australian state, and Western Sydney is one of the most linguistically diverse metropolitan regions in the country.[8] Auburn Hospital, within the Western Sydney Local Health District, serves a catchment in which 45% of patients attending for elective endoscopy are non-EPL. In recognition of this, the unit has implemented a structured multilingual preparation programme encompassing professional interpreter services at pre-procedural consultation, translated preparation instruction sheets in the most prevalent community languages, and language specific patient education clinics.

No Australian study has examined whether systematic, institution-level multilingual strategies can equalise bowel preparation outcomes between CALD and non-CALD patients in a high volume public hospital. This study aimed to audit the rate of adequate bowel preparation stratified by EPL versus non-EPL status at Auburn Hospital over a six-month period, and to assess whether preparation quality was equivalent across language groups in the context of these institutional measures.

METHODS

In this retrospective study of colorectal carcinoma, the analysis of incidence, clinicopathological features and outcome after different therapies of 70 cases was done, from the available case records. Patients underwent surgery, RT or CT in the department of surgery, G.R. Medical College and J.A. Group of Hospital Gwalior and Cancer Hospital and Research Institute Gwalior, (CHRJ, Gwalior) during the year Jan.2001 to 2006. The patients were investigated and treated according to the protocols.

Study design and setting

A single-centre retrospective audit of all elective colonoscopies performed at Auburn Hospital between January and June 2025 was conducted. Auburn Hospital is a 160-bed metropolitan public hospital within the Western Sydney Local Health District, operating a high-volume endoscopy unit serviced by both gastroenterology and general surgery.

The study was conducted under low-risk audit approval from Auburn Hospital, Western Sydney Local Health District, with waiver of individual patient consent consistent with the National Statement on Ethical Conduct in Human Research (2023).

Patient population

All adult patients (aged ≥18 years) who underwent elective colonoscopy during the study period were eligible. Emergency and inpatient colonoscopies performed outside the elective programme were excluded, as were patients for whom language group status was not recorded in the hospital administrative system.

Data collection

Procedural data were extracted from the hospital perioperative information system. Variables collected included date of procedure, patient age, ASA physical status grade, BBPS as recorded by the operating endoscopist, NESB (non-English speaking background) status from hospital administrative language coding, and documentation of procedure deferral attributable to inadequate bowel preparation.

Language group classification

Non-EPL status was determined from the hospital administrative record, which classifies patients as NESB or non-NESB based on the language spoken at home as recorded at hospital registration, consistent with AIHW definitions of CALD status.

Outcome definitions

Primary outcome

Rate of inadequate bowel preparation, defined as BBPS below 6.

Secondary outcomes

Median BBPS score by language group; BBPS score category distribution; rate of procedure deferral attributable to inadequate preparation.

Statistical analysis

Continuous variables are presented as medians with interquartile ranges (IQR) and means with standard deviations (SD). Categorical variables are presented as frequencies and proportions. Fisher's exact test was used for between-group categorical comparisons given the small cell counts in the inadequate preparation category. BBPS score distributions were compared using the Mann–Whitney U test, as BBPS is an ordinal scale with a characteristically right-skewed distribution. ASA grade distribution was assessed by Chi squared test. A two-tailed p value below 0.05 was considered statistically significant. No imputation was performed for missing values.

RESULTS

Study population

A total of 720 elective colonoscopies performed between January and June 2025 were included in the final analysis. Three hundred and ninety-six patients (55.0%) were classified as EPL and 324 (45.0%) as non-EPL. Baseline characteristics are summarised in Table 1. Non-EPL patients were significantly older than EPL patients (median 64 [IQR 54–71] versus 57 [IQR 44–66] years, p<0.001). The groups were well matched on ASA physical status grade (p=0.929).

Table 1: Patient characteristics by language group.

Characteristic	EPL (n=396), N (%)	Non-EPL (n=324), N (%)	P value
Age - median (IQR), years	57 (44–66)	64 (54–71)	<0.001[1]
ASA grade I	43 (15.1)	30 (14.0)	0.929[2]
ASA grade II	170 (59.9)	130 (60.5)	-
ASA grade III	59 (20.8)	46 (21.4)	-
Elective procedure	396 (100)	324 (100)	-

[1]Mann–Whitney U test; [2]Chi-squared test (ASA grades I, II, III); EPL: English primary language; IQR: interquartile range; non-EPL: non-English primary language

Primary outcome: rate of inadequate bowel preparation

Twenty-nine patients (4.0%) had a BBPS below 6 and were classified as having inadequate bowel preparation. Of these, 16 (55.2%) were EPL and 13 (44.8%) were non-EPL, corresponding to inadequate preparation rates of 4.0% in both cohorts. Fisher's exact test demonstrated no statistically significant difference between groups (OR=1.00, p=1.000). The institutional inadequate preparation rate of 4.0% met the ACSQHC/GESA benchmark of less than 10% and is consistent with rates at high-performing endoscopy centres internationally.[4] Results are summarised in Table 2.

Table 2: Bowel preparation outcomes by language group.

Outcome	EPL (n=396), N (%)	Non-EPL (n=324), N (%)	P value
Inadequate preparation (BBPS <6)	16 (4.0)	13 (4.0)	1.000 (Fisher's)
Adequate preparation (BBPS ≥6)	380 (96.0)	311 (96.0)	-
Median BBPS (IQR)	8 (7–9)	8 (7–9)	0.348 (MWU)
Mean BBPS (SD)	7.96 (1.04)	7.83 (1.16)	-
Odds ratio for inadequate prep (EPL ref.)	-	1	1.000 (Fisher's)
Deferred procedure	11 (3.9)	8 (3.7)	1.000 (Fisher's)

BBPS: Boston bowel preparation scale; EPL: English primary language; IQR: interquartile range; MWU: Mann–Whitney U test; non-EPL: non-English primary language; OR: odds ratio; SD: standard deviation

Secondary outcomes: BBPS score distribution

Both cohorts achieved a median BBPS of 8 (IQR 7–9). In the EPL group, the mean BBPS was 7.96 (SD 1.04); in the non-EPL group it was 7.83 (SD 1.16). The Mann–Whitney U test demonstrated no statistically significant difference in BBPS score distribution between groups (p=0.348). The distribution of BBPS score categories was similar across language groups, with the majority of patients in both cohorts achieving good (score 8) or excellent (score 9) preparation. Full distributions are presented in Table 3 and illustrated in Figures 1 and 2.

Table 3: Boston bowel preparation scale score distribution by language group.

BBPS category	EPL, N (%) (n=396)	Non-EPL, N (%) (n=324)	Total, N (%) (n=720)
<6 - inadequate	16 (4.0)	13 (4.0)	29 (4.0)
6–7 - fair	115 (29.0)	80 (24.7)	195 (27.1)
8 - good	130 (32.8)	119 (36.7)	249 (34.6)
9 - excellent	135 (34.1)	112 (34.6)	247 (34.3)

BBPS: Boston bowel preparation scale; EPL: English primary language; non-EPL: non-English primary language

Deferred procedures

Eleven EPL patients (3.9%) and eight non-EPL patients (3.7%) had their colonoscopy deferred due to inadequate bowel preparation. No statistically significant difference in deferral rates was observed between groups (p=1.000).

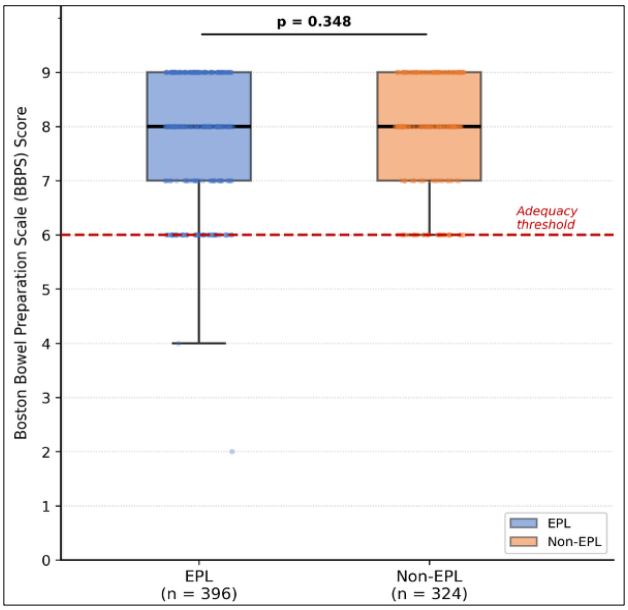

Figure 1: Box plot of Boston bowel preparation scale scores stratified by language group (EPL: n=396; non-EPL: n=324).

The central line represents the median (8 in both groups); the box spans the interquartile range (7–9 in both groups); whiskers extend to 1.5×IQR. Individual data points are overlaid as a jitter plot. A horizontal dashed line at BBPS=6 indicates the adequacy threshold. Groups were compared using the Mann–Whitney U test (p=0.348). EPL: English primary language; non-EPL: non-English primary language

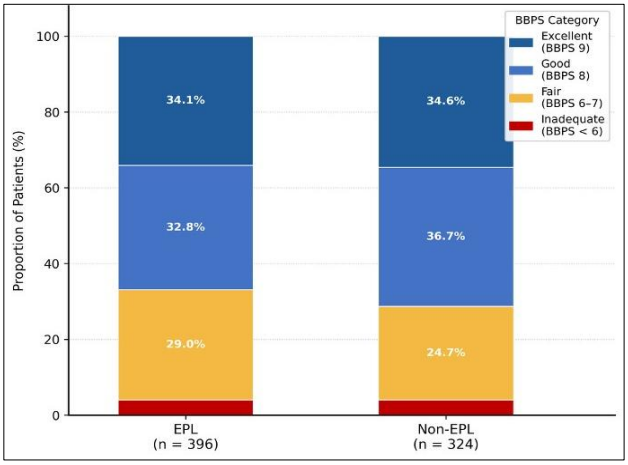

Figure 2: Stacked bar chart showing the distribution of BBPS score categories (inadequate BBPS <6, fair 6–7, good 8, excellent 9) by language group, expressed as proportions normalized to 100%.

EPL: English primary language; non-EPL: non-English primary language

DISCUSSION

This retrospective audit of 720 elective colonoscopies at a high-volume, culturally diverse Australian endoscopy unit found no significant association between non-English primary language status and inadequate bowel preparation. Both EPL and non-EPL patients achieved a median BBPS of 8, and the institutional inadequate preparation rate was 4.0% across both groups well within the GESA benchmark of less than 10% and consistent with high-performing international centres. These findings are consistent with a recent multicentre US study by Blaney and colleagues, who similarly found no significant difference in inadequate preparation rates between Spanish-speaking and English-speaking patients when professional interpreter services were systematically deployed, and are contrary to prior reports identifying language barriers as a significant predictor of preparation failure in settings without targeted language support.[5-7]

The most plausible explanation for the absence of a language-related disparity is the structured multilingual preparation programme in place at Auburn Hospital. Our approach addresses the principal pathways by which language barriers compromise preparation quality: failure to comprehend written instructions, inability to seek telephone clarification, and reduced uptake of pre-procedural nursing education. Where patients have limited English proficiency, professional interpreter services are engaged at the pre-procedural consultation, and preparation instructions are provided in the patient's primary language. Nguyen and Wieland demonstrated that health literacy which correlates strongly with language proficiency was the strongest modifiable predictor of poor preparation in a diverse urban cohort, directly supporting the mechanistic rationale for our approach.[5]

The overall inadequate preparation rate of 4.0% compares favourably against published benchmarks. The ACSQHC mandates a unit-level target of less than 10%.[4] Our rate falls below this threshold and sits well below the rates described in prior studies of non-EPL populations at centres without targeted language support.[5-7] Non-EPL patients represent 45% of this cohort substantially higher than most published series making the equivalence in preparation quality across groups particularly noteworthy.

A significant age difference was observed between the two groups: non-EPL patients were a median of seven years older than EPL patients (64 versus 57 years, p<0.001). Older age is a recognised independent risk factor for inadequate bowel preparation.[2] The fact that non-EPL patients at theoretical double disadvantage from both language barrier and older age nevertheless achieved equivalent preparation quality to EPL patients lends further weight to the argument that the institutional multilingual programme is effectively compensating for these compounding risks. Future multivariate analysis adjusting for age, ASA grade, and indication would clarify whether language group retains a null association after full confounder control.

The proportional distribution of the 29 inadequate preparation events across language groups mirrors their cohort representation: 55% EPL and 45% non-EPL,

exactly matching the 55%/45% cohort split. Had Non-EPL status been an independent risk factor in this setting, an over-representation of non-EPL patients among those with inadequate preparation would have been expected, as has been described in settings without language-specific interventions.[5,6] The proportional distribution observed here is consistent with the null hypothesis and reinforces the conclusion that language group was not a determinant of preparation quality at this unit.

From a health service perspective, these findings carry practical relevance for endoscopy units across CALD-dense catchments in Australia. Investment in multilingual preparation materials and interpreter access incurs modest marginal cost at units already providing these services for other clinical purposes. Given that a deferred colonoscopy requires rescheduling, repeat preparation, and additional procedural resources, the prevention of even a modest number of preparation failures generates meaningful clinical and economic benefit for health systems operating under endoscopy waitlist pressure.

Limitations

Several limitations require acknowledgement. The retrospective, single-centre design limits generalisability. NESB classification was based on a binary administrative field that does not capture the spectrum of English language proficiency, and bilingual patients may be misclassified. The specific multilingual interventions received by individual patients were not documented, precluding assessment of intervention fidelity. No multivariate analysis was performed to adjust for the significant age difference between groups and other potential confounders. Without a historical control period predating the multilingual programme, causal attribution cannot be established.

CONCLUSION

Non-English primary language status was not associated with inferior bowel preparation quality for elective colonoscopy at this high-volume, culturally diverse metropolitan public hospital. Both EPL and Non-EPL patients achieved a median BBPS of 8, and the institutional inadequate preparation rate of 4.0% met national ACSQHC/GESA benchmarks across both language groups. These results suggest that structured, service-level multilingual communication strategies may effectively attenuate language-related disparities in colonoscopy preparation quality. Prospective studies incorporating pre-post design, intervention fidelity measurement, and multivariate confounder adjustment are required to confirm causality and inform preparation protocols at CALD-dense endoscopy units.

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