

Clinical Workflow Associated with Spanish-Speaking Patient Encounters at JayDoc Community Clinic-Wichita: A Quality Improvement Project

Leah C. Duncan, MS-3

Wyel Halimeh, M.D., M.S.

Dania Jumpa, M.D.

Carlos Schwindt, MS-4

Evie Schmitz, MS-3

Dulcinea Rakestraw, Ph.D., MPH

The University of Kansas School of
Medicine-Wichita, Wichita, Kansas

Received June 22, 2026; Accepted for
publication October 15, 2026; Pub-
lished online October 16, 2026, Kans J
Med 2026 Sept-Oct; 19:160-166. <https://doi.org/10.17161/kjm.vol19.25667>.

Acknowledgements: The authors
would like to thank Hayrettin Okut,
Ph.D. for his review and advice on the
data analysis.

Conflict of Interest: None.

Corresponding Author:

Leah C. Duncan, MS-3

The University of Kansas School of
Medicine-Wichita

1010 N. Kansas St., Wichita, KS 67214

lduncan@kumc.edu

ABSTRACT

Introduction. JayDoc Community Clinic-Wichita is a student-run free clinic serving a predominantly Spanish-speaking patient population. Authors of this study evaluated whether interpreter staffing represents a potentially modifiable systems-level factor associated with clinic workflow.

Methods. This retrospective observational quality improvement evaluation included 715 patient encounters nested within 128 clinic sessions at JayDoc from November 2023 to July 2025. Encounter-level workflow differences by Spanish-speaking status were evaluated using linear mixed-effects models accounting for clustering within clinic sessions and adjusting for clinic day. Clinic-session-level multivariable linear regression evaluated associations among Spanish-speaking patient volume, in-person interpreter staffing, and clinic workflow.

Results. After accounting for clustering and clinic day, Spanish-speaking encounters were 5.3 minutes longer than non-Spanish-speaking encounters, although the difference was not statistically significant ($p = 0.065$). Spanish-speaking encounters had significantly longer medical preparation time (adjusted mean difference, 2.57 minutes; 95% CI, 0.83 to 4.31; $p = 0.004$) and wait-to-present time (adjusted mean difference, 3.46 minutes; 95% CI, 0.47 to 6.45; $p = 0.024$). At the clinic-session level, each additional Spanish-speaking patient was associated with a 6.7-minute increase in clinic-session duration after controlling for total patient volume and interpreter staffing ($p < 0.001$). Each 1-unit increase in the Spanish-speaking patient-to-interpreter ratio was associated with a 3.72-minute increase in clinic-session duration ($p = 0.052$).

Conclusions. Spanish-speaking encounters had longer medical preparation and wait-to-present times, while greater Spanish-speaking patient volume was associated with longer clinic-session duration. In-person interpreter staffing was not independently associated with session duration. These findings support further evaluation of strategies to better align interpreter resources with patient needs.

INTRODUCTION

In the United States, more than one in five individuals aged 5 years or older speak a language other than English, and 61.0% of these individuals speak Spanish.¹ In Wichita, Kansas, the Hispanic/Latino population increased from 58,352 in 2010 to 72,786 in 2020,² and 18.4% of city residents report speaking a language other than English at home.³

JayDoc Clinic, a student-run free clinic at the University of Kansas School of Medicine-Wichita, serves this region and a high proportion of Spanish-speaking patients. Language differences can create barriers to effective health care when patients and clinicians do not share a common language, potentially affecting communication, patient understanding, and participation in clinical decision-making. Limited access to trained medical interpreters may further compound these challenges, particularly when clinics rely on family members, students, or clinical staff without formal interpreter training. Ad hoc interpretation may introduce inaccuracies or omissions, limit discussion of sensitive information, and place additional communication demands on patients and clinicians.

Before 2023, access to formal interpreter services at JayDoc was limited, and family members, volunteer physicians, medical students, or nursing staff frequently assisted with interpretation. In 2023, JayDoc implemented a formal interpreter service that increased access to trained interpreters, including multiple in-person interpreters during clinic sessions and telephone interpretation when in-person interpreters were unavailable.

This change provided an opportunity to examine the relationship between interpreter staffing and clinic workflow. Student-run free clinics commonly experience long patient visits and slower clinic flow, which may contribute to patient dissatisfaction and underscore the need to monitor clinic efficiency.⁴ Insufficient interpreter coverage may contribute to downstream workflow delays.⁵

Improved access to in-person interpreters may facilitate more efficient communication and timely care while addressing language-related disparities in health care. The objective of this study was to examine associations among Spanish-speaking patient volume, interpreter staffing, and clinic workflow in a student-run free clinic. Specifically, we evaluated differences in the duration of various phases of patient encounters between Spanish-speaking

and non-Spanish-speaking patients and examined whether Spanish-speaking patient volume and interpreter staffing were associated with overall clinic-session duration.

METHODS

Setting and Context

This retrospective observational quality improvement evaluation involved review of data collected from November 2023 to July 2025 at JayDoc Community Clinic-Wichita. JayDoc is a student-run free clinic that operates twice weekly, on Monday evenings and Saturday mornings, year-round. The clinic primarily is staffed by a multidisciplinary team of volunteer interpreters, medical students, pharmacy students, premedical students, medical residents, pharmacists, and attending physicians. Approximately 70% of patient encounters involve Spanish-speaking patients, making interpreter services an integral component of routine clinic operations.

Staffing models differ by clinic day. Monday clinics are staffed by an Internal Medicine resident, whereas Saturday clinics include a Family Medicine resident and attending physician, in addition to varying numbers of volunteer interpreters and student learners. Typically, six patients are scheduled for Monday clinics and eight patients for Saturday clinics. Each clinic session generally lasts approximately 3 hours. Clinic-session duration was defined as the time elapsed between the start-of-clinic huddle, led by the student director, and the discharge of the final patient. These times were recorded on a data collection form maintained by the JayDoc Board of Directors.

Intervention

Review of clinic tracking-board data by the JayDoc board consistently identified in-person interpreter staffing as a potential operational bottleneck associated with prolonged clinic visits and reduced workflow efficiency. In response, the clinic initiated an ongoing quality improvement effort to improve access to interpreter services and better align interpreter staffing with patient demand.

As part of this initiative, the clinic partnered with a new interpreter service, expanded in-person interpreter staffing during clinic sessions, increased the use of telephone interpretation, and adjusted interpreter staffing over time based on patient demand, workflow observations, and op-

erational needs. These changes were introduced incrementally rather than at a single predefined intervention time point and were refined throughout the study period as part of the clinic's continuous quality improvement process. The intervention was intended to improve communication efficiency, reduce workflow bottlenecks, and better align interpreter resources with the linguistic needs of the clinic population.

Measures and Data Collection

Encounter-level and clinic-session-level data were extracted from the clinic's electronic time-stamped tracking board. Variables included Spanish-speaking status, total patient volume, Spanish-speaking patient volume, number of in-person interpreters available, and workflow intervals.

Spanish-speaking status was recorded at the patient-encounter level based on the clinic's tracking data. In-person interpreter staffing was defined as the number of in-person interpreters available during each clinic session. Telephone interpretation was available when in-person interpreters were unavailable; however, telephone interpreter use was not consistently captured in the tracking dataset and therefore could not be quantified. Accordingly, the interpreter staffing measure reflects in-person staffing rather than total interpreter capacity.

The tracking board routinely records timestamps for each phase of the patient encounter, including wait-to-be-roomed time, premedical student intake time, preparation time for medicine and pharmacy, pharmacy student encounter, medical student encounter, wait time to presentation to the supervising attending, attending encounter, discharge time, and overall clinic-session duration. These workflow intervals represent the standard sequence of care at JayDoc and were selected because they could reasonably be influenced by interpreter availability and communication-related workflow delays.

Encounter-level outcomes included total patient visit duration and individual workflow intervals. At the clinic-session level, overall clinic-session duration was the primary outcome used to evaluate associations with patient volume, Spanish-speaking patient volume, and in-person interpreter staffing.

Workflow data routinely were collected during each clinic session. As volunteers advanced patients through each stage of care, they entered workflow milestones into the

tracking board, which automatically recorded timestamps in Microsoft® Excel® (Microsoft Corp., Redmond, WA) and calculated workflow intervals and summary metrics. Formal validation of timestamp accuracy was not performed; however, clinic leadership emphasized contemporaneous data entry and monitored data completeness during clinic sessions to maximize data accuracy. Some degree of human error, including delayed or missed entries, was considered unavoidable.

Before analysis, clinic sessions were excluded if they had substantial missing workflow documentation (approximately >30% incomplete tracking-board data), missing clinic-session duration, or operational characteristics that were not representative of routine clinic workflow. The latter included sessions staffed primarily by board members rather than the usual complement of student volunteers, residents, and attending physicians. In total, 27 clinic sessions were excluded.

Analysis

Analyses were conducted at two levels: patient encounter and clinic session. Encounter-level analyses included 715 individual patient encounters and evaluated differences in workflow intervals according to Spanish-speaking status. Clinic-session-level analyses included 128 clinic sessions and evaluated associations between clinic characteristics; including total patient volume, Spanish-speaking patient volume, in-person interpreter staffing, and Spanish-speaking patient-to-interpreter ratio; and overall clinic-session duration.

Descriptive statistics were used to summarize encounter-level workflow intervals and clinic-session-level characteristics. Continuous variables were summarized using means and standard deviations and medians, quartiles, ranges, minimums, and maximums, as appropriate. Encounter-level workflow intervals were compared between Spanish-speaking and non-Spanish-speaking patient encounters using linear mixed-effects regression models. Spanish-speaking status and clinic day (Monday vs. Saturday) were included as fixed effects, and clinic session was included as a random intercept to account for correlation among patient encounters occurring within the same clinic session. Separate models were estimated for each workflow interval using restricted maximum likelihood estimation. Model estimates are reported as adjusted mean differences

with 95% confidence intervals (CIs) and two-sided *P* values. No adjustments for multiplicity were applied.

Clinic-session-level analyses used the clinic session as the unit of analysis because interpreter staffing, patient volume, and overall clinic-session duration were measured at the session level. Each clinic session constituted one observation (*n* = 128). Separate multivariable linear regression models were constructed to evaluate the associations of language-service demand, in-person interpreter staffing, and interpreter workload with clinic-session duration while adjusting for relevant covariates.

Spanish-speaking patient volume was used as a proxy for language-service demand, and the number of in-person interpreters represented interpreter staffing capacity. Interpreter workload was operationalized as the Spanish-speaking patient-to-interpreter ratio, calculated as the number of Spanish-speaking patients divided by the number of in-person interpreters available during the clinic session. Because the Spanish-speaking patient-to-interpreter ratio was mathematically derived from Spanish-speaking patient volume and in-person interpreter staffing, the ratio and its component variables were not included simultaneously in the same regression model. Variance inflation factors (VIFs) and tolerance statistics were examined to assess multicollinearity among predictors included in each model.

Regression coefficients (β), standard errors, 95% CIs, *P* values, and adjusted *R*² values were reported, as appropriate. Statistical significance was defined as a two-sided *p* < 0.05.

This project was reviewed by the University of Kansas Medical Center Institutional Review Board (IRB) and determined to constitute a quality improvement project. This manuscript was prepared in accordance with the Standards for Quality Improvement Reporting Excellence (*SQUIRE*) 2.0 guidelines.⁶ All analyses were conducted using SAS® version 9.4 (SAS Institute Inc., Cary, NC).

RESULTS

Among the 715 patient encounters, 422 occurred on Saturday and 293 occurred on Monday. Spanish-speaking patients accounted for 286 (67.8%) Saturday encounters, 208 (71.0%) Monday encounters, and 494 (69.1%) encounters overall. Saturday clinics had a mean of 2.43 interpreters per session (SD = 0.88; range, 1-5), whereas Monday clinics had a mean of 1.95 interpreters per session (SD = 0.38; range, 1-3).

In encounter-level linear mixed-effects models accounting for clustering of patient encounters within clinic sessions and adjusting for clinic day, Spanish-speaking

Table 1: Comparison between Spanish-speaking and non-Spanish-speaking encounters.

Outcome (min)	Non-Spanish-speaking patients Mean $\pm$ SD	Spanish-speaking patients Mean $\pm$ SD	Mean difference (95% CI)*	<i>P</i> value
Total patient visit duration	98.7 $\pm$ 37.1	107.9 $\pm$ 38.1	5.30 (−0.33 to 10.92)	0.065
Wait to be roomed	10.4 $\pm$ 17.7	11.8 $\pm$ 17.7	0.46 (−2.29 to 3.21)	0.743
Premed time	7.2 $\pm$ 6.6	7.7 $\pm$ 6.4	0.46 (−0.59 to 1.51)	0.393
Prep time (medical)	7.8 $\pm$ 9.1	10.7 $\pm$ 11.2	2.57 (0.83 to 4.31)	0.004
Prep time (pharmacy)	18.9 $\pm$ 27.1	19.3 $\pm$ 30.7	−3.12 (−12.82 to 6.59)	0.529
Medicine encounter time	24.4 $\pm$ 9.7	24.3 $\pm$ 10.2	−0.23 (−2.17 to 1.72)	0.818
Pharmacy encounter time	19.3 $\pm$ 13.1	18.7 $\pm$ 15.9	−0.63 (−5.53 to 4.27)	0.801
Wait to present (medical)	19.2 $\pm$ 11.6	22.7 $\pm$ 12.3	3.46 (0.47 to 6.45)	0.024
Attending time	9.8 $\pm$ 6.1	11.6 $\pm$ 6.7	1.59 (−0.24 to 3.42)	0.089
Discharge time	28.4 $\pm$ 18.5	26.6 $\pm$ 17.9	−0.33 (−3.80 to 3.15)	0.855

*Adjusted mean differences and *p* values were estimated using linear mixed-effects models with Spanish-speaking status and clinic day (Monday vs. Saturday) included as fixed effects and clinic session included as a random intercept to account for clustering of patient encounters within clinic sessions. Positive estimates indicate longer workflow times among Spanish-speaking encounters. Sample sizes varied by outcome because of missing workflow timestamps. Abbreviations: SD, standard deviation; CI, confidence interval.

encounters had an adjusted mean total patient visit duration that was 5.30 minutes longer than that of non-Spanish-speaking encounters; however, this difference was not statistically significant (95% CI, -0.33 to 10.92; $p = 0.065$). Spanish-speaking encounters were associated with significantly longer medical preparation time (adjusted mean difference, 2.57 minutes; 95% CI, 0.83-4.31; $p = 0.004$) and wait-to-present time (adjusted mean difference, 3.46 minutes; 95% CI, 0.47-6.45; $p = 0.024$). No statistically significant differences were observed in wait-to-be-roomed time, premedical student intake time, medical student encounter time, attending encounter time, or discharge time (Table 1).

At the clinic-session level, after adjusting for total patient volume and in-person interpreter staffing, each additional Spanish-speaking patient was associated with a 6.70-minute increase in clinic-session duration (95% CI, 3.18-10.22; $p < 0.001$). In a separate model adjusting for total patient volume, each 1-unit increase in the Spanish-speaking patient-to-interpreter ratio was associated with a 3.72-minute increase in clinic-session duration; however, this association was not statistically significant (95% CI, -0.03 to 7.47; $p = 0.052$). In another model adjusting for total patient volume, each additional in-person interpreter was associated with a 2.21-minute increase in clinic-session duration, although this association was not statistically significant (95% CI, -3.03 to 7.45; $p = 0.406$). No substantial multicollinearity was identified among predictors included in the multivariable models, with VIFs ranging from 1.04 to 2.16 and tolerance values ranging from 0.46 to 0.96 (Table 2).

DISCUSSION

In this quality improvement evaluation, differences in workflow associated with Spanish-speaking patient encounters were concentrated in specific phases of care rather than in overall patient visit duration. After accounting for clustering of encounters within clinic sessions and adjusting for clinic day, Spanish-speaking encounters had an estimated 5.3-minute longer patient visit duration than non-Spanish-speaking encounters; however, this difference was not statistically significant. Significant differences were observed in medical preparation and wait-to-present times, two workflow phases involving preparation for and communication of patient information. At the clinic-session level, greater Spanish-speaking patient volume was associated with longer clinic-session duration. Given that approximately 70% of patient encounters involved Spanish-speaking patients, these findings highlight the operational importance of aligning interpreter resources with language-service demand.

The longer workflow intervals were concentrated in phases of clinic flow that are communication intensive. Specifically, medical preparation time was approximately 2.6 minutes longer and wait-to-present time approximately 3.5 minutes longer among Spanish-speaking encounters after accounting for clinic-session clustering and clinic day. Medical preparation time corresponds to medical student chart review and preparation for the patient encounter, whereas wait-to-present time corresponds to the period during which learners wait to present patient cases

Table 2: Multivariable regression analysis of Spanish-speaking patient volume and clinic workflow.

Model and Predictor	β (min)	SE	95% CI	<i>P</i> value	Adjusted R^2	<i>n</i>	Covariates
Model 1: Spanish-speaking patient volume Each additional Spanish-speaking patient	6.70	1.8	3.18 to 10.22	<0.001	0.265	128	Total patient volume; in-person interpreters
Model 2: Interpreter workload Each 1-unit increase in Spanish-speaking patients per interpreter	3.72	1.9	-0.03 to 7.47	0.052	0.207	128	Total patient volume
Model 3: In-person interpreter staffing Each additional in-person interpreter	2.21	2.6	-3.03 to 7.45	0.406	0.187	128	Total patient volume

Abbreviations: β , regression coefficients; SE, standard error; CI, confidence interval; Adjusted R^2 , adjusted R-squared; *n*, sample size.

to the resident or attending. These phases may be particularly sensitive to language-related workflow demands, including time spent waiting for an in-person interpreter or coordinating telephone interpretation services. Because interpreter modality was not consistently captured at the encounter level, however, the observed differences cannot be attributed specifically to limited in-person interpreter availability.

At the clinic-session level, each 1-unit increase in the Spanish-speaking patient-to-interpreter ratio was associated with an estimated 3.72-minute increase in clinic-session duration; however, the confidence interval included the null value (95% CI, -0.03 to 7.47), and the association was not statistically significant ($p = 0.052$). This uncertainty may reflect the relatively small number of clinic sessions available for the clinic-session-level analyses, which may have limited the precision of the estimates. These findings indicate that the relationship between language-service demand and in-person interpreter capacity warrants further prospective evaluation rather than establishing that increased interpreter staffing improves clinic efficiency.

These findings can be considered in the context of prior studies examining interpreter services and clinical workflow. Johnston, et al.⁷ reported that total and Spanish-speaking patient visit times were significantly shorter when either video or in-person interpreter services were used in an otolaryngology clinic. Fagan, et al.⁸ found that hospital-based interpreters were more time-efficient than telephone-based interpretation and estimated that providing hospital-based interpreters for Spanish-speaking patients could allow additional visits in an outpatient teaching clinic. Although these studies support the potential operational importance of interpreter modality and availability, their findings should be interpreted cautiously when compared with the present study because the settings, study designs, and outcomes differed.

Unlike many prior studies that evaluated individual patient visits, this quality improvement initiative examined both encounter-level workflow and clinic-session-level interpreter staffing from a systems perspective as part of an ongoing quality improvement initiative. Rather than focusing solely on encounter-level differences, we evaluated how language-service demand, relative to in-person interpreter staffing, was associated with the operation of the clinic as a whole. This system-level approach provides practical in-

formation for clinic leadership regarding the relationship between language-service demand, interpreter resources, and clinic workflow. Student-run free clinics and other resource-limited ambulatory settings may benefit from using routinely collected workflow data to monitor these relationships and inform interpreter scheduling. However, because the number of in-person interpreters was not independently associated with clinic-session duration in the present study, these findings should not be interpreted as demonstrating that increasing interpreter staffing alone improves clinic efficiency.

Interpreter services are necessary for effective communication with patients who have limited English proficiency, while also representing an operational resource that requires planning and coordination. In this setting, the findings suggest that interpreter demand should be considered when planning clinic staffing and workflow. Monitoring Spanish-speaking patient volume, interpreter availability, and communication-intensive workflow intervals may help clinic leadership identify periods in which interpreter resources and patient demand are misaligned. Such monitoring may provide a basis for testing different interpreter staffing models in future quality improvement initiatives. Because the present study did not demonstrate an independent association between the number of in-person interpreters and clinic-session duration, prospective evaluation is needed to determine whether specific staffing strategies improve workflow efficiency without compromising the quality or accessibility of interpreter services.

Limitations

Several limitations should be considered when interpreting these findings. First, this study was conducted at a single student-run free clinic, which may limit generalizability to other practice settings. Second, because this was an observational quality improvement project and the intervention was introduced incrementally and refined over 20 months, causal relationships between interpreter staffing and workflow efficiency cannot be established. Although mixed-effects models accounted for clustering of patient encounters within clinic sessions and clinic-session-level regression models adjusted for measured staffing and patient-volume characteristics, residual confounding by factors such as patient complexity, learner experience, interpreter experience, and staffing composition may remain.

Third, in-person interpreter staffing was measured at the clinic-session level and does not represent total interpreter access or actual interpreter utilization by individual patients. Telephone interpretation was available when in-person interpreters were unavailable, but its use was not consistently captured. Therefore, associations involving in-person interpreter staffing should not be interpreted as estimates of the effects of overall interpreter access or receipt of interpreter services during individual encounters. Fourth, the relatively small number of clinic sessions may have limited the precision of clinic-session-level estimates, particularly for the association between the Spanish-speaking patient-to-interpreter ratio and clinic-session duration. Fifth, clinic sessions occurring on Mondays and Saturdays could not be differentiated in the data analysis and differences in interpreter staffing could not be accounted for.

Finally, workflow measures were derived from routinely collected operational data and were not formally validated, making delayed or missed timestamp entry a potential source of measurement error. The quality improvement initiative also focused on operational efficiency and did not evaluate patient satisfaction, communication quality, clinical outcomes, or the costs associated with interpreter services. Future quality improvement initiatives should prospectively evaluate interpreter staffing models while incorporating patient-centered outcomes, including satisfaction, communication quality, and access to care. Evaluation of the sustainability and cost-effectiveness of different interpreter staffing strategies would further inform efforts to optimize clinic workflow while maintaining equitable care for linguistically diverse patient populations.

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Keywords: *medically uninsured; Hispanic or Latino; communication barriers; limited English proficiency; student run clinic*