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BACKGROUND

Individuals with limited English proficiency (LEP) who are seeking care in clinic or hospital settings that have access to a trained language interpreter have better health outcomes compared to similar individuals with LEP and without access to an interpreter (Brandl et al., 2020; Brisset et al., 2013; Karliner et al., 2007; Jacobs et al., 2018).

While there is clear evidence regarding health outcomes, evidence is unclear on how individuals with LEP and access to an interpreter compare in their health care utilization compared to similar individuals with LEP and without access to an interpreter.

This paper seeks to examine the health care utilization of patients with LEP at Mayo Clinic (Rochester, Minnesota) who used an interpreter compared to similar patients with LEP who did not.

METHODS

The data set contained observations from January 2008 to December 2022. Patients were classified as having LEP based on the documented primary language in their electronic health record, as used by Barwise at al. (2018).

Propensity score matching was conducted to identify comparable patients with LEP. The propensity for a patient to belong to the interpreter subgroup ($T = 1$) given their characteristics was estimated using a probit model. Patients in the interpreter subgroup were matched to patients in the non-interpreter subgroup ($T = 0$) based upon their predicted propensity scores, implying that both groups are similar in terms of their observable characteristics at least. A matched data set was then created to conduct the econometric analysis.

Three sets of econometric analysis were conducted for this study. The first model examined ICU LOS using a negative binomial model. The second model examined hospital LOS using a negative binomial model. The third model examined whether an individual was readmitted to hospital using a probit model.

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Each model used robust standard errors and controlled for covariates (interpreter use (1 = yes; 0 = no), age, gender (1 = male; 0 = female), Apache score, Charlson score, history of cancer (1 = yes; 0 = no), history of myocardial infraction (1 = yes; 0 = no), ICU LOS and hospitalization readmission (1 = yes; 0 = no) when each was not the dependent variable).

RESULTS

The matched data set contained 2,417 hospitalizations of patients with LEP that received access to an interpreter and 1,394 hospitalizations of similar patients with LEP that did not receive access to an interpreter over the period 2008 - 2022.

The two groups (used an interpreter; did not use an interpreter) were balanced across the covariates used post matching with all covariates having a standardized difference of less than 10% (Kelleher et al., 2020). These results and the sample descriptive statistics can be seen in table 1.

The incremental effect of a patient with LEP having used an interpreter compared to a similar patient with LEP not having used an interpreter is 0.64 days ($p < 0.01$) in the ICU ceteris paribus. These results can be seen under *model 1* in table 2.

The incremental effect of a patient with LEP having used an interpreter compared to a similar patient with LEP not having used an interpreter is 2.17 days less ($p < 0.01$) in hospital ceteris paribus. These results can be seen under *model 2* in table 2.

If a patient with LEP had used an interpreter, they were eight percentage points less likely ($p < 0.01$) to have been readmitted to hospital compared to a similar patient with LEP who did not use an interpreter ceteris paribus. These results can be seen under *model 3* in table 3.

DV = Dependent variable
SE = Standard error
SD = Standard deviation

Table 1: Sample descriptive statistics and standardized difference calculations

Variable	No interpreter use		Interpreter use		Std. Diff.
	Mean or N	SD or (%)	Mean or N	SD or (%)	
Age	56.89	17.859	56.94	18.86	-0.003
Gender	0.569	0.495	0.555	0.497	0.027
Apache Score	65.55	29.831	65.46	30.018	0.003
Charlson score	5.318	3.827	5.269	3.999	0.012
History of Cancer	0.422	0.816	0.43	0.821	-0.009
History of MI	0.114	0.318	0.101	0.302	0.041

Table 3: (3) Probit model

Variable	Model 3. DV: Hospital Readmission	
	Coefficient	SE
Interpreter use	-0.081***	0.008
ICU LOS	0.003***	0.001
Age	0.000	0.000
Gender	0.017**	0.008
Apache Score	0.001***	0.000
Charlson score	0.004***	0.002
History of Cancer	0.003	0.012
History of MI	0.004	0.014
N	4,834	

***p < 0.01 **p < 0.05 *p < 0.1

*Frequency weights were expanded for the regression modelling

Table 2: (1) Negative binomial model and (2) Negative binomial model

Variable	Model 1. DV: ICU LOS		Model 2. DV: Hospital LOS	
	Coefficient	SE	Coefficient	SE
Interpreter use	0.639***	0.185	-2.171***	0.703
Age	-0.009*	0.005	-0.0538	0.029
Gender	0.151	0.182	1.486**	0.688
Apache Score	0.031***	0.003	0.128	0.013
Charlson score	-0.051	0.033	0.115	0.139
History of Cancer	-0.318	0.216	-0.943	0.928
History of MI	0.941*	0.534	-0.082	1.418
Readmission	2.418	0.551	29.23***	2.215
N	4,834		4,834	

***p < 0.01 **p < 0.05 *p < 0.1

*Frequency weights were expanded for the regression modelling

DISCUSSION

The results from this study show that patients with LEP who used of an interpreter had greater LOS in the ICU than similar patients with LEP who did not use of an interpreter.

This finding may suggest that patients with LEP who used an interpreter are more resource intensive in the ICU than similar patients with LEP without use of an interpreter. However, patients with LEP are then shown to become potentially resource-saving through their reduced LOS in hospital and lower probability of being readmitted to hospital.

The results from this study potentially demonstrate how providing patients with LEP with access to an interpreter can help ensure they get more appropriate levels of care in the ICU, which can then contribute to such patients having better health outcomes compared to similar patients with LEP who did not get access to an interpreter. These better health outcomes are evident in the reduced hospital LOS and lower probability of hospital readmission.

LIMITATIONS

The data set used in this study lacked information on social determinants of health and various sociodemographic information. As such, this is a limitation that may have affected the modelling results.

CONCLUSION

The results from this study will provide policymakers at Mayo Clinic and elsewhere with a further understanding of the effect of interpreters on the health care utilization of those with LEP.

The results from this study can inform policy initiatives aimed at increasing the number of language interpreters at Mayo Clinic and policy initiatives aimed at increasing access to language interpreters for more patients with LEP.

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