Diagnostic Challenges in Fava Bean Triggered G6PD Crisis – A Case study and Narrative Review of Literature of Limited English Proficiency in the Inpatient Setting

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Submitted: 2 March 2022; *Accepted:* 10 June 2022; *Published:* 9 August 2022

DOI: https://doi.org/10.22374/cjgim.v17i3.622

Abstract

Limited English proficiency (LEP) affects many Canadians. Patients with LEP are at high risk of medical error, readmission, and increased length of stay. We report on the case of a 66-year-old male with LEP and a diagnosis of glucose-6-phosphate dehydrogenase (G6PD) deficiency associated hemolysis, and how the language barrier affected his care. Using our case as an example, we describe trends in the LEP literature in the inpatient setting, its effects on patient care and the evidence surrounding the use of point of care interpretation.

Résumé

La maîtrise limitée de l'anglais (MLA) touche de nombreux Canadiens. Les patients ayant une MLA courent un risque élevé d'erreur médicale, de réadmission et de prolongation du séjour à l'hôpital. Nous faisons état du cas d'un homme de 66 ans ayant une MLA qui a reçu un diagnostic d'hémolyse associée à un déficit en glucose-6-phosphate déshydrogénase (G-6-PD) et de la façon dont la barrière linguistique nuit à ses soins. En utilisant notre cas comme exemple, nous décrivons les tendances de la documentation sur la MLA en milieu hospitalier, les effets de la MLA sur les soins aux patients et les données probantes concernant l'utilisation de l'interprétation au point de service.

Keywords: Hemolytic anemia; limited English proficiency; social determinants of health; health equity; interpreter

Case Report

A 66-year-old gentleman of Iraqi background presented to the emergency department of a tertiary care center in Southern Ontario with a seven-day history of painless jaundice, anorexia, and fatigue. The patient was primarily Arabic-speaking but did speak limited English. Unfortunately he was not accompanied by family members due to COVID-19 restrictions and they were not reachable by phone. The admitting team felt reassured despite his limited English proficiency that an accurate and reliable history had been gathered. As such other communication adjuncts such as an interpreter or digital resources were not consulted.

Initial investigations were suggestive of intravascular hemolysis (see Table 1). The peripheral blood smear showed blister cells, classically seen in G6PD-deficiency related hemolysis. Serum beta-hydroxybutyrate was also elevated, while capillary blood glucose was normal.

Potential causes for G6PD-deficiency associated hemolysis were entertained, including consumption of fava beans, medications, critical illness, and infection. The patient initially denied any dietary triggers. The patient was admitted, pan-cultured, and underwent diagnostic imaging. Ontario Drug Benefit (ODB) records indicated he had started taking Empagliflozin, a sodium-glucose co-transporter-2 (SGLT2) inhibitor, eight-days prior to hospitalization. Although it is not classically associated with hemolysis in G6PD deficiency, given the patient's elevated serum beta-hydroxybutyrate, an evolving euglycemic DKA secondary to the SGLT2 inhibitor was attributed as the most likely cause.

On the third day of admission, an Arabic-speaking resident inquired about the consumption of "Foul Mudammas", a dish containing fava beans. The patient surprisingly described recent heavy consumption of this along with bread made with fava bean flour, believing these would improve his glycemic control.

A quantitative G6PD assay returned at 0.4 IU/g (normal range 5.5 to 20.5 units/gram of hemoglobin) confirming G6PD-deficiency. He received dietary counseling prior to discharge, and a follow-up plan was reviewed using 3-way virtual communication with his family and the medical team. His DKA resolved, hemoglobin stabilized, and he was discharged home in stable condition.

The patient later reported that while he could express himself with limited English, his comprehension of the initial medical interview had been relatively poor. He admitted that he did not recognize the term "Fava beans" in English, and also could not identify them in a photo.

Table 1. Initial lab-work

Hemoglobin	88 g/L
Hematocrit	0.264 L/L
MCV	105.6 fL
Reticulocyte Hemoglobin	39.8 pg
Total Bilirubin	132 mcmol/L
Unconjugated Bilirubin	122 mcmol/L
ALT	25 IU/L
ALP	64 IU/L
LD	147 UL
Direct Antiglobulin Test	Negative
Haptoglobin	Reduced
Free HB	Absent
G6PD assay	0.4 IU/g (normal range 5.5 to 20.5 units/gram of hemoglobin)
Blood Smear Comments	Anemia with spherocytes and polychromasia. Rule out hemolysis. Megathrombocytes noted. Macrocytic Erythrocytes, few blister cells.
Glucose	5.6 mmol/L
Urine Ketones	2+
Serum B-Hydroxybutarate	3.99mmol/L
Serum pH	7.34
Serum Bicarbonate	25 mEq/L

Discussion

This case describes a patient with LEP admitted with G6PD-deficiency associated hemolysis in which language proficiency directly impacted time to diagnosis. The diagnosis of favism (fava bean triggered G6PD-deficiency related hemolysis) was almost missed due to miscommunication. Additionally, due to the language barrier, communication with the patient was challenging, and lead to self-reported "confusion and worry" from the patient and his family. Fortunately, no medical errors took place during the patient's admission.

Notable oversights occurred during this admission. Specifically, the patient's English proficiency was overestimated. Also, no professional interpreter or communication adjuncts were used. Patient care could have been improved with appropriate knowledge of the typical challenges facing patients with LEP and ways to mitigate them. As a result, we sought to summarize the literature surrounding LEP in the inpatient setting.

Literature Review

We conducted a review of the literature in OVID Medline surrounding patients with LEP and the use of interpreters in the inpatient setting from 2010 to 2021, using a librarian approved search strategy. 363 papers were identified and screened in duplicate by 2 reviewers. 99 papers were subsequently identified to explore LEP in healthcare settings in North America. Of these, 20 papers focused on the hospital setting (including inpatient or emergency department). 13 papers focused on pediatric patients. The majority of the papers were primary research (69 papers) while 12 papers were editorial, or opinion articles, and 18 papers were reviews (8 of which were systematic reviews). Among the primary articles, 6 were case reports, 22 were retrospective cohort studies, 27 were cross-sectional studies or surveys, and 8 were prospective non-randomized studies (including pre-post and non-randomized cohort designs). Notable findings from our literature review are described below.

Individuals with LEP represent a significant portion of patients admitted to hospital in North America.[1–3] LEP refers to individuals who do not have fluency in spoken or written English.10% of Canadians speak a non-English or French language at home, which has risen by 2% over the last 10 years. Outside of Quebec, non-French speakers also face language barriers in healthcare.[1,4]

LEP is an established risk factor for poor health status. A 2012 random-digit-dial telephone survey of 51,000 Californians identified that among individuals with LEP, there were higher rates of low health literacy identified by a respondent's ability to understand written information from their doctor's office or understand prescription instructions (44.9% vs 13.8% $p<0.001$).[5] The same study also showed that patients with LEP and low health literacy had the highest prevalence of poor health status among those surveyed, and were more than twice as likely to have poor health compared to the full cohort. Studies have also demonstrated lower self-reported confidence in the quality of healthcare received and longer subjective perceptions of wait-times for non-English speaking, non-Caucasian race patients.[6]

Admission to hospital represents a particularly vulnerable time for patients with LEP. There is evidence to support increased medical error rates, increased lengths of stay, increased rates of readmission and less effective pain control.[2,3,7,8] In a 2019 retrospective cohort study of 9881 inpatients in Toronto, Ontario, patients with LEP had increased re-hospitalization rates for exacerbations of chronic obstructive pulmonary disease and heart failure.[2] A 2014 study conducted by the Agency for Healthcare Research and Quality, demonstrated that patients with LEP requiring interpreter use at least once during their hospitalization were more likely to experience an adverse event than English Proficient patients. Of these adverse events, medication errors (49% vs 42% $p = 0.003$) were most common.7 There is little evidence of increased inpatient mortality with LEP.[1,3] A 2014 review of United States Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project and 2009 State Inpatient Databases for California, revealed that speaking a non-English principal language (and having a non-white race/ethnicity) did not lead to higher rates of inpatient mortality, with the exception of Japanese speaking patients, who had a higher propensity for mortality due to stroke (OR 1.64; $p < 0.01$).[3]

Attempts at communicating without interpreters or use of ad-hoc interpreters (a person not trained as an interpreter including family members and other healthcare providers) rather than use of professional interpreters remains common. A 2011 study of two San Francisco hospitals found that among 234 patients admitted to internal medicine or surgery wards, use of ad-hoc interpreters was more common than professional interpreters (28% vs 17%). Up to 14% reported that physicians attempted to communicate without an interpreter.[9] However, professional interpreters have been shown to make significantly fewer mistakes compared to ad hoc interpreters or physicians with no interpreter at all. An analysis of audio-taped emergency department visits in Massachusetts demonstrated that the proportion of errors which were potentially clinically significant was higher with no interpreter (20%) and ad-hoc interpreters (22%) compared to with a professional interpreter (12%, $p<0.01$). Among professional interpreters with more than 100 hours of training, less than 2% of errors were determined to be clinically significant ($p<0.01$).[10] In patients who are not given access to professional interpreters, increased length of stay and increased rates of readmission are reported.[8]

Data informing the best practices to utilize interpreters effectively in a clinical setting remains limited. However, descriptive commentary and narrative review papers advise the following strategies.[11,12] 1) Face-to-face interpretation is most desirable generally since eye contact and body language can be conveyed. However, use of telephone interpreters is also appropriate where limitations exist such as accessibility, confidentiality or pandemic infection risk. 2) Clinicians should prioritize patient comfort and safety when selecting interpreters. For discussions of intimate areas, gender concordant translators are preferred. Cultural awareness

Table 2. Advice for utilizing interpreters in the inpatient setting

Choosing an appropriate interpreter	Professional interpreters are preferred over ad-hoc interpreters and "getting by" without an interpreter
	Face-to-face interpreters are desirable, but telephone interpreters may be appropriate in many situations
	Gender concordant interpreters are preferred in discussions of intimate subject matter
	Be aware of the cultural background of patients and interpreters where ethnic/religious and state conflicts may exist
Verbal Communication	Speak clearly, slowly and avoid jargon
	Direct speech to the patient, rather than the interpreter
	Avoid speaking privately to the interpreter, which may jeopardize trust
	Avoid interrupting the patient or interpreter
Body Language	Position yourself to where you can see both the interpreter and patient
	Make eye-contact with the patient, rather than the interpreter
	Demonstrate active listening by nodding while the patient and interpreter are speaking

is crucial in patient and translator interactions, especially where ethnic, religious, or state conflicts may exist. 3) When working with interpreters, clinicians should speak slowly, in moderate sequences and make regular eye contact with the patient (rather than the interpreter). Training modules for education of physicians, trainees and other healthcare providers have been shown to be well received and may help further when interacting with patients with LEP (Table 2). It is crucial for physicians speaking multiple languages to be able to appropriately assess when they can "get by" in the clinical setting. This often depends on time constraints, time of day, acuity of the clinical situation and availability of translation aids or interpretation services.[13]

This case and review of the literature demonstrate that understanding barriers for patients with LEP is crucial to optimizing healthcare outcomes. Patients with LEP are vulnerable to medical error, extended length of stay, rehospitalization and potentially increased morbidity and mortality. Our case highlights how this problem was further magnified by the COVID-19 pandemic and protocols for infection control. Restrictions on family visitation, physical distancing the use of personal protective equipment (especially facemasks, shields and N95 respirators) and expedited consultations by healthcare team members to minimize contact with suspected COVID-19 cases, are all factors that make communication with a language barrier even more challenging,[14] Strategic use of professional interpreters and audio-visual technology has the potential to help improve delivery of care and should be a priority for clinicians caring for patients with LEP.

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