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## Original research

# Health literacy and quality of care of patients with diabetes: A cross-sectional analysis

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## ABSTRACT

**Background:** Limited health literacy (HL) may lead to poor health outcomes and inappropriate healthcare use, particularly in patients with chronic diseases. We aimed to assess the association between functional HL (FHL) and quality of care, as measured by process- and outcome-of-care indicators, in patients with diabetes.

**Methods:** This cross-sectional study used data from the 2013 CoDiab-VD cohort follow-up, which included non-institutionalised adults with diabetes from canton of Vaud, Switzerland. Using self-administered questionnaires, we collected patients' characteristics, processes [annual HbA1C check, lipid profile, urine test, foot examination, influenza vaccination, eye examination (24 months), physical activity and diet recommendations] and outcomes of care (HbA1C knowledge, HbA1C value, SF-12, ADDQoL, PACIC, self-efficacy). A single validated screening question assessed FHL. Unadjusted and adjusted regression analyses were performed.

**Results:** Of 381 patients 52.5% (95%CI: 47.5%–57.5%), 40.7% (95%CI: 35.7%–45.6%) and 6.8% (95%CI: 4.3%–9.4%) reported high, medium and poor FHL, respectively. Significant associations were found for two out of seven outcomes of care; lower self-efficacy scores associated with medium and poor FHL (adjusted:  $\beta$  -0.6, 95%CI -0.9 to -0.2 and  $\beta$  -1.8, 95%CI -2.5 to -1.2, respectively), lower SF-12 mental scores associated with poor FHL (adjusted:  $\beta$  -8.4, 95%CI -12.5 to -4.2).

**Conclusions:** This study found few outcomes of care associated with FHL. Further exploration of the impact of limited HL on quality of care indicators will help tailor initiatives – both on patients' and providers' side – to improve diabetes care.

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## 1. Introduction

The burden of diabetes continues to increase worldwide, with more than 550 million people predicted to be affected by this disease in 2030 [1]. To manage their chronic condition daily, people with diabetes need self-care and self-efficacy skills. With the increasing focus on patient-centred care and patient empowerment of patients with chronic conditions, health literacy (HL) emerges as an important aspect to consider. Indeed, lower HL has not only been shown to be a barrier to optimum self-management and efficient empowerment [2], but has also been shown to be associated with suboptimal health and care outcomes [3].

Health literacy can be defined as “the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions” [4]. It is a multidimensional concept, whose three dimensions range from one that requires more basic skills to one that requires more complex skills: functional, interactive and critical HL. Functional HL (FHL), which focuses on “the basic skills in reading and writing that are necessary to function effectively in everyday situations” [5,6], has been the most investigated dimension. Many validated instruments measuring this dimension exist, including brief instruments that allow for easy use in self-administered questionnaires [7].

Until now, published studies targeting patients with diabetes, which have focused mainly on the association between HL and patients’ health behaviours (e.g. self-care), diabetes knowledge or diabetes clinical intermediate outcomes, such as HbA1C and LDL-cholesterol levels, have shown mixed results [3,8,9]. The effect of HL on processes of care and other patient-reported outcomes has more rarely been investigated. In that context, the aim of our study was, first, to measure the level of one dimension of HL (i.e. FHL) among patients with diabetes and, second, to explore the association between FHL and outcomes less often considered until now: self-reported process and outcome of care indicators.

## 2. Methods

### 2.1. Study design and population

This cross-sectional study was based on data from the 2013 follow-up questionnaire of the CoDiab-VD cohort [10]. This prospective cohort study, launched in 2011 in the canton of Vaud, Switzerland, recruited patients with diabetes visiting community-based pharmacies with a diabetes-related prescription during two six-week periods in 2011 and 2012.

Eligible patients were non-institutionalised adults ( $\geq 18$  years) with diabetes of at least one year duration, residing in the canton of Vaud, with a sufficient level of French to complete a questionnaire and without cognitive impairment or gestational diabetes. Participants were then followed up annually, filling in a self-reported paper questionnaire investigating various aspects of living with diabetes [10,11]. Among the 519 patients recruited in 2011–2012, we sent the 2013 follow-up questionnaire to the 449 patients who were not lost to follow-up. Among the 395 patients who sent the questionnaire back,

381 answered the FHL question and were considered in the analyses.

### 2.2. Data

#### 2.2.1. Main exposure (independent) variable: health literacy

Health literacy (HL) was measured by using the validated French version [12] of a single screening question assessing FHL [7], which had been shown to have good sensitivity and specificity to detect people with HL limitations [7,13]. Participants responded to the 5-point Likert scale question: “When you get written information on a medical treatment or your medical condition, how often do you have problems understanding what it is telling you?” [12]. Responses were divided into three categories: a good level of FHL (never having problems), a medium level of FHL (occasionally or sometimes having problems) and a poor level of FHL (often or always having problems).

#### 2.2.2. Dependent variables: quality of care indicators

The quality of care indicators targeted were both processes and outcomes of care. The processes of care for the past 12 months that we considered were: the number of times that the HbA1C level was checked among HbA1C-aware patients (1 $\times$ ,  $\geq 2\times$ , none, do not know), the number of times a lipid profile was done (1 $\times$ , 2–3 $\times$ ,  $\geq 4\times$ , none, do not know), whether a urine test for microalbuminuria was done (yes, no, do not know), whether a foot examination was performed by a healthcare professional (yes, no, do not know), whether an eye examination was performed by an ophthalmologist (<1 year ago, 1–2 years ago, >2 years ago, never, do not know) and whether the patient received an influenza vaccination (yes, no, do not know). We also considered the following two processes of care without a time frame: whether patients had received any physical activity recommendations (yes, no, do not know) and written or verbal diet recommendations (yes, no, do not know). All processes of care variables were dichotomised as patients having received at least one check vs no check. The “do not know” answers were considered as missing values. For example, if patients answered “1 $\times$ ”, “2–3 $\times$ ” or “ $\geq 4\times$ ” for lipid profile, they were categorised as having received one check; those answering “none” were categorised as having received no check; and those answering “do not know” were categorised as missing values and excluded from the denominator. The outcomes of care considered were: HbA1C awareness (yes, no, do not know), the patient’s reported HbA1C level, (health-related) quality of life as measured by a generic questionnaire [12-item Short Form Health Survey (SF-12): physical component score (PCS) and mental component score (MCS), range: 0 = worst score to 100 = best score; scores constructed to have a mean of 50 and a standard deviation of 10 in the general US population] [14] and a diabetes-specific questionnaire [Audit of Diabetes-Dependent Quality of Life 19 (ADDQoL), range: –9 = maximum negative impact of diabetes to +3 = maximum positive impact of diabetes] [15], the patient’s assessment of how care is congruent with the Chronic Care Model recommendations (Patient Assessment of Chronic Illness Care (PACIC) questionnaire; range: 1 = lowest score to 5 = highest score) [16,17],

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