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Education level and hospitalization for ambulatory care sensitive conditions: an education approach is required

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Background: Studies in several different countries and settings suggest that ambulatory care–sensitive conditions (ACSCs)-related hospitalizations could be associated more with socioeconomic variables than with the quality of primary healthcare services. The aim of the present study was to analyze the potential links between education levels or other social determinants and ACSC-related hospitalization rates. **Methods:** We analyzed a total of 467 504 records of ordinary discharges after acute hospitalization in 2015–16 for patients 20–74 years old residing in the Veneto Region. We calculated the prevention quality indicators (PQIs) developed by the Agency for Healthcare Research and Quality. Rate ratios (RRs) and 95% confidence intervals (95% CIs) were estimated with a set of Poisson regressions to measure the relative risk by sociodemographic level. **Results:** Hospitalizations for ACSCs accounted for 3.9% of all hospital admissions (18 436 discharges), and the crude hospitalization rate for ACSCs among 20- to 74-year-olds was 26.6 per 10 000 inhabitants (95% CI, 25.8–27.4). For all conditions, we found a significant association with formal education. In the case of the overall composite PQI#90, e.g. poorly educated people (primary school or no schooling) were at significantly higher risk of hospitalization for ACSCs than the better educated (RR, 4.50; 95% CI, 4.13–4.91). **Conclusions:** Currently available administrative data regarding ACSCs may be used effectively for reveal equity issues in the provision of health care. Our results indicate that an educational approach inside Primary Health Care could address the extra risk for preventable healthcare demands associated with poorly educated patients.

Introduction

Socioeconomic disparities in people's state of health have been documented in many Western countries, and they are increasingly recognized as an important public health issue.[1,2] The mechanisms behind inequalities are often complex, varying across different conditions and populations because the link between socioeconomic status and health is influenced by patterns of risk-related behavior and features of healthcare systems.[3]

The quality of Primary Health Care (PHC) is a key element of effective and efficient healthcare systems.[4] The Agency for Healthcare Research and Quality (AHRQ) developed a set of PHC quality assessment indicators, which appears to be valid for judging the performance of PHC providers.[5] These indicators include a number of ambulatory care–sensitive conditions (ACSCs), i.e. acute and chronic conditions for which it is believed that hospitalization can be prevented with appropriate patient education, health promotion initiatives, early diagnosis, early treatment, and clinical management.[6] Studies in various different countries and settings have suggested, however, that ACSC-related hospitalizations could be more closely related to socioeconomic factors than to the quality of PHC,[7] and that social conditions influencing hospital admissions for ACSCs are inadequately considered and managed by primary care. Indeed, studies in the USA found a strong socioeconomic gradient in the rates of hospitalization for ACSC, showing that people from low-income areas, and people living in rural and/or more deprived areas are at much higher risk of being hospitalized for such conditions.[8]

The rationale behind universal healthcare systems should be to offer free health care for everyone, regardless of their financial conditions or personal characteristics, and taking into account the health needs of the population served as a whole. The above-mentioned socioeconomic disparities have nonetheless been described not only in countries without a universal health coverage, but also in Canada,[9] Sweden[10] and Italy,[4] where there are supposedly no financial barriers to the accessibility of PHC. In Europe, socioeconomic inequalities in health have not only persisted in the last three decades, but even widened according to recent reports.[11]

Educational level is clearly a determinant of inequalities[12] in health status, partly mediated by differences in access to healthcare services, treatment processes and outcomes. To give an example, low levels of education were associated with higher odds of 30-day mortality and 30-day readmission after hospitalization for acute myocardial infarction.[13] Few studies have examined the influence of education level on ACSC-related hospitalizations,[6] taking the education measure at census rather than individual level.

The aim of the present population study was to analyze whether there is any association between education level and hospitalization for ACSCs.

Methods

Context

Italy is divided administratively into 20 regions. Regional authorities plan and organize healthcare facilities and activities through their

regional health departments in accordance with a national health plan designed to assure an equitable provision of comprehensive care throughout the country. They coordinate and control local health units (LHUs), each of which is a separate unit in the Italian National Health System (NHS) that plans and delivers health services, primary care and hospital care to its local community, based on a regional health plan. LHUs may provide these services directly with their own facilities and personnel, or outsource them to other service providers. LHUs are organized into districts that coordinate all NHS and other publicly funded facilities providing services outside the hospital for a portion of the community. The main PHC providers in Italy are general practitioners (GPs), who are self-employed, independent physicians. GPs also serve as system gatekeepers, with a pivotal role in managing care for chronic diseases, such as diabetes, as they establish care programs and treatment pathways for individual patients.

Data sources

We conducted a retrospective cohort study on administrative data in the Regional Hospital Information System (HIS) database. We selected all records concerning hospital discharges in the Veneto Region between 1 January 2015 and 31 December 2016, covering all regional LHUs and university hospitals, and concerning patients aged 20–74 years residing in the Veneto Region. We excluded admissions for day hospital care or rehabilitation, and those concerning patients residing outside the region.

For each patient, the database includes the following details, among others: an anonymized patient identification code, gender, date of birth, formal education, city of residence, type of admission, date of discharge, length of stay, discharge status, and codes for diagnoses and procedures, obtained using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM), 24th version of the Diagnosis-Related Group (DRG) Grouper.

Demographic data on the residents of the Veneto Region aged 20–74 years in the years 2015–16, stratified by age and gender, were extracted from the publicly-available data sets of the Italian National Statistics Institute (ISTAT). To obtain the distribution of the patients by formal education, we applied the percentage distribution of the resident population in the Veneto Region (derived from the data census by age, gender and formal education) to the above-described data obtained from the HIS database.[14]

ACSC indicators

We calculated all composite and 13 individual prevention quality indicators (PQIs), validated for the adult population, as defined by the US AHRQ, to capture hospitalizations for potentially preventable acute and chronic conditions.[15] These indicators are based on standardized algorithms that use administrative data on inpatients to flag cases for which hospitalization could have been avoided. In fact, the AHRQ PQI software flags patient discharges with ICD-9-CM codes and DRGs corresponding to each PQI indicator.

For this study, we considered the three PQIs that focus on broad composites of potentially preventable hospitalizations: the acute composite (PQI#91), the chronic composite (PQI#92) and the overall composite (PQI#90). The acute composite (PQI#91) included hospitalizations for dehydration, bacterial pneumonia and urinary tract infection. The chronic composite (PQI#92) included hospitalizations for diabetes (short-term complications, long-term complications, uncontrolled diabetes and lower-extremity amputation for diabetes), chronic obstructive pulmonary disease (COPD) or asthma in older adults, hypertension, congestive heart failure (CHF), angina without procedure and asthma in younger adults. The overall composite (PQI#90) combined the three PQI#91 conditions and the nine PQI#92 conditions.

We also analyzed *six single PQI indicators* accounting for more than 1000 cases recorded in the time frame considered in Veneto Region, i.e. CHF (PQI#8), bacterial pneumonia (PQI#11), perforated appendix (PQI#2), urinary tract infection (PQI#12), angina without procedure (PQI#13) and COPD (PQI#5).

Statistical analysis

The crude rates of overall hospitalizations and overall ACSC-related hospitalizations were calculated by dividing the number of individuals admitted to hospital in each sociodemographic group by the population in the same group. We also calculated the standardized rates of overall hospitalizations, overall ACSC-related hospitalizations and the six selected ACSCs. All rates were directly standardized by gender and age (considering three age groups) with respect to the Italian population in the years 2015–16. All rates with 95% confidence intervals (CIs) are reported per 10 000 inhabitants.

Rate ratios (RRs) and 95% CIs were estimated with a set of Poisson regressions to measure the excess risk by sociodemographic level. The patient characteristics considered in the analysis were: age (20–44 years; 45–64 years; 65–74 years), gender and formal education (master's/bachelor's degree, high school, middle school, primary school or no schooling).

The statistical analyses were performed using WinQI software, version 3.1,[16] and STATA software, version 12.1. All *P*-values reported are two-sided and results with *P*-values below 0.05 were considered statistically significant.

Ethical consideration

The study complied with the Helsinki Declaration and Italian privacy legislation (n. 196/2003). Resolution n. 85/2012 of the Guarantor for the protection of personal data has also recently confirmed that anonymized personal data may be processed for medical, biomedical and epidemiological research purposes, and data concerning people's health status may be used in aggregate form in scientific studies.

Results

We analyzed a total of 467 504 ordinary hospital discharges related to patients 20–74 years old residing in the Veneto Region in 2015–16.

Table 1 presents the number of hospital discharges, the percentage of ACSC-related discharges and the crude hospitalization rates ($\times$10 000 inhabitants) by gender, age and formal education. Overall, ACSC-related hospitalizations accounted for 3.9% of all hospitalizations (18 436 discharges), and the crude hospitalization rate for ACSCs involving 20- to 74-year-olds amounted to 26.6 (95% CI, 25.8–27.4) per 10 000 inhabitants. Our analyses showed that the ACSC rate was higher for the older age group (65–74 years: 92.0; 95% CI, 91.4–92.6) and for the worst educated (primary school or no schooling: 74.7; 95% CI, 74.2–75.3).

Table 2 presents the hospitalization rates ($\times$10 000 inhabitants) standardized by age and sex for the overall hospitalizations, the overall ACSC-related hospitalizations and the six selected ACSCs. Overall, the age- and gender-standardized ACSC rate was 26.3 per 10 000 inhabitants (95% CI, 26.2×10^4–26.4×10^4).

Table 3 presents the association between sociodemographic factors and ACSC-related hospitalizations overall, and separately for the six conditions. For all conditions, we found a significant relationship with formal education. In the case of PQI#90, for instance, the poorly educated had a significantly higher risk of hospitalization for ACSCs than the better educated (high school: RR, 1.41; 95% CI, 1.29–1.54; middle school: RR, 3.27; 95% CI, 3.00–3.56; primary school or no schooling: RR, 4.50; 95% CI, 4.13–4.91). Similarly, males were more likely to have ACSC-related hospitalizations (RR, 1.83; 95% CI, 1.78–1.89) than females. The rates were also

Table 1 Number of hospital discharges, percentage of ACSC-related hospitalizations and crude hospitalization rates (×10 000 population) by gender, age and formal education—adults aged 20–74 (years 2015–16)

		Total hospital discharges	Hospital admissions for ACSC (PQI #90)[a]	Total Hospitalization rates	ACSC-related hospitalization rates
Total		467 504	3.9% (18 436)	675.1 (671.4–678.7)	26.6 (25.8–27.4)
Gender	Male	209 910	5.4% (11 377)	610.0 (607.5–612.5)	33.1 (32.5–33.7)
	Female	257 594	2.7% (7059)	739.3 (736.5–742.1)	20.3 (19.8–20.7)
Age	20–44 years	164 296	1.3% (2111)	558.4 (556.1–560.6)	7.2 (6.9–7.4)
	45–64 years	163 873	3.9% (6449)	563.2 (560.9–565.4)	22.2 (21.7–22.6)
	65–74 years	139 335	7.1% (9876)	1298.1 (1296.0–1300.2)	92.0 (91.4–92.6)
Formal education	Bachelor's/master's degree	37 396	1.5% (574)	433.6 (432.5–434.7)	6.7 (6.5–6.8)
	High school	111 022	2.3% (2523)	425.0 (423.2–426.9)	9.7 (9.4–9.9)
	Middle school	154 484	4.0% (6218)	692.6 (690.4–694.8)	27.9 (27.4–28.3)
	Primary school/no schooling	164 602	5.5% (9121)	1348.8 (1346.6–1351.1)	74.7 (74.2–75.3)

[a]Excluding perforated appendix (PQI#2).

Table 2 Hospitalization rates, standardized by age and gender (×10 000 population)—adults aged 20–74 (years 2015–16)

Indicators	*N*	Rate	95% CI
Total hospitalization rate	467 504	673.3	672.8–673.8
ACSC-related hospitalization rates (overall and specific)			
Prevention quality indicators #90 (PQI#90)[a]	18 436	26.3	26.2–26.4
Prevention quality indicators #91 (PQI#91)	7215	10.3	10.2–10.4
Prevention quality indicators #92 (PQI#92)	11 221	15.9	15.8–16.0
Congestive heart failure (CHF) (PQI 8)	5539	7.9	7.8–8.0
Bacterial pneumonia (PQI#11)	5058	7.2	7.1–7.3
Perforated appendix (PQI#2)	3584	5.2	5.15–5.25
Urinary tract infection (PQI#12)	1924	2.8	2.76–2.84
Angina without procedure (PQI#13)	1632	2.3	2.27–2.33
Chronic obstructive pulmonary disease (COPD) (PQI#5)	1395	2.0	1.97–2.03

[a]Excluded perforated appendix (PQI#2).

higher among 65- to 74-year-olds (RR, 7.18; 95% CI, 6.81–7.57) than for younger people (20–44 years of age).

Discussion

The rates of hospitalization associated with the ACSCs considered in our study were influenced by education level, and also by age and gender.

The first important finding was that hospitalization for ACSCs accounted for 3.9% of all admissions considered in our study, and for 2.6% of those involving patients under 65 years of age. This is consistent with the results of a recent study conducted in Portugal,[6] where ACSCs accounted for 2.6% of hospital admissions in the same age bracket. Affinities between the Italian and Portuguese healthcare system are such that such a similarity seems realistic. Hospital admission rates for potential ACSCs in our area continue to be much lower than in the USA, as also emerged from other studies[5] and a glance at the OECD health statistics,[17] according to which hospital admissions for a primary diagnosis of asthma, or COPD among people aged 15 years or more, for instance, were four times higher in the USA than in Italy. Such a huge difference could be attributable to how primary care is organized in the two countries. In Italy, all patients in Italian universal health system are registered with a GP or pediatrician, who provides most primary care, and who also manages health promotion and disease prevention, new health complaints, long-term conditions and patients' referral to hospital services, as appropriate. The prevalence of a given disease, the availability of hospital care and the differences in coding practices from one country to another may contribute to explaining their variable rates of ACSC-related hospitalization.

Examining how these rates were influenced by socioeconomic factors, the likelihood of ACSC-related hospital admissions was significantly higher for males, with the sole exception of 'PQI#12 Urinary tract infection'. This is consistent with the findings of most cross-sectional studies investigating potential predictors of hospitalizations for ACSC,[4,18] regardless of country involved. The risk also increased with older age for all the PQIs investigated except for 'PQI#2 Perforated Appendix' (consistently with the age distribution in the incidence of appendicitis) and 'PQI#12 Urinary Tract Infection'. That older people are admitted to hospital for ACSCs more than younger people had already been extensively demonstrated in various countries[4–7,19] with substantially different healthcare systems. This relationship can therefore presumably be attributable to the complexity, frailty and comorbidities typical of older age.

More intriguingly, we found that less well-educated people were at significantly higher risk of hospitalization for ACSCs than the better educated, and a constant gradient over different education levels was confirmed in all the single and composite (overall, acute conditions, chronic conditions) PQIs investigated. On the whole, individuals with no schooling or who only attended primary school had a 5-fold higher likelihood of being hospitalized for ACSCs than people with a better formal education. A similar pattern emerged in previous research,[6,7,18,20] but the magnitude of this effect differs considerably among these studies, probably due to education levels being defined differently, making it difficult to draw comparisons. There are several possible partial explanations to consider. For instance, individuals with less schooling may be less able to self-manage their health issues[21] or become involved in health promotion activities[22]—although a cohort study found no significant associations with smoking habits or obesity.[7] On the other

Table 3 RRs (95% CI) for selected conditions—adults aged 20–74 (years 2015–16)

	Gender (ref. female)	Age (ref. 20–44 years)		Formal education (ref. bachelor's/master's degree)		
	Male	45–64 years	65–74 years	High school	Middle school	Primary school/no schooling
PQI#90[a]	**1.83 (1.78–1.89)**	**2.36 (2.24–2.48)**	**7.18 (6.81–7.57)**	**1.41 (1.29–1.54)**	**3.27 (3.00–3.56)**	**4.50 (4.13–4.91)**
PQI#91	**1.37 (1.31–1.44)**	**1.41 (1.32–1.51)**	**3.36 (3.11–3.62)**	**1.37 (1.21–1.57)**	**2.98 (2.62–3.37)**	**4.66 (4.10–5.30)**
PQI#92	**2.24 (2.15–2.33)**	**4.11 (3.79–4.45)**	**14.40 (13.27–15.63)**	**1.45 (1.28–1.64)**	**3.55 (3.16–4.00)**	**4.55 (4.04–5.12)**
CHF (PQI#8)	**2.62 (2.48–2.78)**	**9.08 (7.61–10.85)**	**47.14 (39.49–56.28)**	**1.72 (1.40–2.11)**	**4.37 (3.49–5.31)**	**5.27 (4.33–6.40)**
Bacterial pneumonia (PQI#11)	**1.76 (1.66–1.86)**	**1.83 (1.68–2.00)**	**4.57 (4.15–5.02)**	**1.45 (1.22–1.72)**	**3.45 (2.94–4.06)**	**5.21 (4.42–6.15)**
Perforated appendix (PQI#2)	**1.28 (1.20–1.37)**	**0.27 (0.25–0.30)**	**0.08 (0.07–0.09)**	**1.58 (1.36–1.85)**	**2.71 (2.33–3.16)**	**15.05 (12.88–17.57)**
Urinary tract infection (PQI#12)	**0.74 (0.68–0.82)**	**0.80 (0.71–0.90)**	**1.53 (1.33–1.76)**	**1.26 (1.02–1.55)**	**2.25 (1.83–2.76)**	**4.11 (3.31–5.10)**
Angina without procedure (PQI#13)	**2.50 (2.25–2.78)**	**12.16 (9.10–16.26)**	**27.58 (20.47–37.14)**	1.09 (0.82–1.45)	**2.55 (1.95–3.32)**	**3.12 (2.39–4.08)**
COPD (PQI#5)	**1.84 (1.65–2.05)**	**6.75 (4.98–9.15)**	**31.30 (23.07–42.47)**	**1.52 (1.04–2.23)**	**3.48 (2.43–4.99)**	**4.66 (3.27–6.68)**

Poisson regressions; in bold *P*-values <0.05.
[a]Excluded perforated appendix (PQI#2).

hand, less well-educated patients may have more substantial difficulties in navigating the health system,[22] resulting in fewer referrals to specialist consultations,[21] delays in receiving care[23] and worse compliance with treatments or their physician's recommendations.[24]

Our findings therefore point to education being an important, significant predictor of preventable hospitalizations. Self-management programs can overcome the likely disadvantages experienced by the less well educated in terms of their basic understanding of the information they need to make appropriate health-related decisions, better manage their own health, and improve their understanding of how their conditions affect their lives and how to cope with their symptoms.[25] Targeted health education can help patients live better lives and have more control over their health.[26] Systematic reviews have found intervention to improve patients' self-management effective in reducing unscheduled admissions for patients with COPD and asthma, for instance.[27] Compared with usual care, such education for patients with asthma reduced hospitalizations (relative risk, 0.64, 95% CI, 0.50–0.82). In particular, asthma self-management programs—which involve self-monitoring by either peak expiratory flow or symptoms coupled with regular medical review and a written action plan—improve health outcomes for adults with this condition. Training programs that enable people to adjust their medication using a written action plan also appear to be more effective than other forms of asthma self-management.[28] A study conducted in Canada, a country with a universal healthcare coverage system, evaluated an intervention targeting adults with moderate-to-severe asthma, which included education plans based on peak flow and symptom monitoring. It proved that was effective in reducing hospitalizations.[29] On the other hand, culture-specific programs targeting patients from minority groups, and generally socially disadvantaged, seem to have no impact on health outcomes even though they are effective in improving quality of life.[30] A study conducted in the USA on urban Afro-Americans also found no statistically significant differences vis-à-vis the baseline or changing trends in the frequency of asthma symptoms, self-management behavior or use of healthcare resources between intervention and control groups at 3 and 6 months.[31] Self-management interventions seem to be successful for chronic heart disease too.[32] For example, the 'Women take pride' education program of self-management, addressed to American women aged 60 years and over (in a health system based on private insurance)—which included 2.5-hour group sessions over 4 weeks and was tailored to the patients' particular needs, plus an educational video, a pedometer and other written resources—demonstrated the ability to reduce healthcare utilization and potentially yield monetary benefits in a health plan.[33] In general, educational interventions included within comprehensive disease management programs performed better than 'stand-alone' educational schemes in reducing ambulatory care sensitive hospitalizations.[34] In order to be effective, such educational interventions should be based on research evidence, tailored to the needs of target patients and the community to which they belong, and adapted to the healthcare system in which the program is developed.[35]

Policy-makers and healthcare providers should aim to promote the self-management of patients with long-term conditions for which there is an evidence of a benefit.[21] But if primary care providers are reimbursed on the basis of capitation alone, there is no incentive for them to perform additional tasks such as health education for people with chronic conditions.[36] Financial incentives could play an important part in improving their performance in promoting a standardized evidence-based approach to improving patients' self-management and health education. The Joint Commission and other organizations have also called on healthcare organizations to provide the necessary resources to enable healthcare providers to develop appropriate patient-centered, culturally competent communications that address patients' needs across the continuum of care, thereby reducing the impact of a poor general education.

However, education is not the only social determinant of ambulatory case sensitive admissions,[37] and the literature has also demonstrated that multicomponent interventions, addressing different aspects and social determinants have proved effective in reducing the burden of ambulatory sensitive hospitalizations. Some such schemes include comprehensive, multidisciplinary, patient-centric programs that have aimed to improve the accessibility or provide a wider coverage of healthcare delivery services, observation units for diseases that are amenable to home-based pharmacological management, telemedicine, computer-based programs and self-management education programs.[38]

The strength of the present study lies in that it exploits administrative datasets to investigate the association between ACSC-related

hospitalization rates and certain sociodemographic factors at population level. The study also has its limitations, however. First, it was an observational study, which limits our ability to draw causal inferences. In particular, we cannot disentangle whether the disparities identified arose because of a disparity in the quality of care provided by the health services in relation to patients' different social status, or whether the disparities could be attributable instead to the influence of patients' level of formal education on their attitudes, behavior or clinical characteristics. On the other hand, studies on such disparities can only be observational. In any case, physicians are responsible for encouraging patients to manage their health and disease to the best of their ability, whatever their social status. Another limitation of our study concerns our inability to take into account the different distributions in the prevalence and severity if the diseases (including any presence of comorbidities) across groups by education level, a factor that could influence the hospitalization rates.[39] Another shortcoming might relate to the reliability of our data regarding patients' self-reported level of education, though a previous study examined the validity of information on formal education obtained from hospital discharge records in another Italian region and found it ranged from good to excellent for patients hospitalized for cholecystectomy and coronary heart disease, and was sufficient for patients with hip fractures.[40]

Currently available administrative databases can be used for a first screening of hospital admissions for ACSCs, revealing where there is room for improvement in the delivery of an effective PHC, and in the equity of healthcare outcomes. Our results indicate that the PHC organization is in the best position to handle the extra risks associated with patients being poorly educated.

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Conflicts of interest: None declared.

Key points

- Previous literature demonstrated that ACSC-related hospitalizations are closely related to socioeconomic factors, such as gender age and citizenship.
- Present study demonstrated that the risk of ACSC-related hospitalizations is greater in low-educated patients.
- An educational approach can reduce the inappropriate healthcare services demands mainly in disadvantaged population group.

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Constructing data-derived family histories using electronic health records from a single healthcare delivery system

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Background: In order to examine the potential clinical value of integrating family history information directly from the electronic health records of patients' family members, the electronic health records of individuals in Clalit Health Services, the largest payer/provider in Israel, were linked with the records of their parents. **Methods:** We describe the results of a novel approach for creating data-derived family history information for 2 599 575 individuals, focusing on three chronic diseases: asthma, cardiovascular disease (CVD) and diabetes. **Results:** In our cohort, there were 256 598 patients with asthma, 55 309 patients with CVD and 66 324 patients with diabetes. Of the people with asthma, CVD or diabetes, the percentage that also had a family history of the same disease was 22.0%, 70.8% and 70.5%, respectively. **Conclusions:** Linking individuals' health records with their data-derived family history has untapped potential for supporting diagnostic and clinical decision-making.

Introduction

Individuals with a family history of certain prevalent chronic diseases have an increased risk of developing those and other chronic and acute conditions, accounting for a significant proportion of health care costs, morbidity and mortality in the USA.[1–6] Until now, documentation of family history in routine clinical practice has been considered patient-reported, and therefore dependent upon a patient volunteering such information, without being able to validate the completeness and accuracy. Clinicians are limited in their capacity to obtain and include the presence or absence of family history in their decision-making process due to multiple factors, including time pressures during the clinical encounter,[7–9] the possibility that patients have incomplete or unreliable knowledge of their own family history[7,8,10–14] and the limited existence of technologies for the collection and integration of family history into medical record taking.[8,15–22]

In many instances, documentation of family history in electronic medical records is missing despite the known impact of family history on future risk.[23,24] Furthermore, some family histories are recorded only after the patient has already been diagnosed with a