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ORIGINAL ARTICLE

Observational Study

Clinico-epidemiological factors of health related quality of life among people with type 2 diabetes

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Abstract

AIM

To investigate the quality of life (QOL) and its clinical and epidemiological correlates among people with type 2 diabetes.

METHODS

This cross-sectional study was conducted in Tabriz, Northwest of Iran, including a total of 394 people with type 2 diabetes using convenient sampling method from November 2014 to March 2015. General information including demographic, socioeconomic status and life-style factors were collected by trained interviewers. Clinical information was retrieved from clinic's record and QOL was assessed using the 26-item WHOQOL-BRIFE questionnaire. Univariate and multivariate linear regression were performed to assess the related factors and QOL dimensions.

RESULTS

The mean of overall health related QOL was 52.11 ± 11.53 and the maximum and minimum dimensions were

respectively seen in psychological (60.38 ± 14.54) and social (38.32 ± 16.94) dimensions. The results of multiple linear regression showed a significant overall relationship between HRQOL and age (*b* = -1.48%, 95%CI: -0.03 and -2.93) level of education (*b* = 4.12%, 95%CI: 2.73 and 5.5), number of comorbidities (*b* = -2.41%, 95%CI: -3.89 and -9.41), and level of income (*b* = 1.98, 95%CI: 0.05 and 3.9), functional limitation (*b* = -3.59, 95%CI: -2.26 and -4.92) and psychological distress (*b* = -2.02%, 95%CI: -2.83 and -1.21). Level of education, functional limitation, psychological distress were associated with the score of physical, mental and environmental dimensions, and number of comorbidities was associated with the score of physical and mental dimensions.

CONCLUSION

Based on our findings, lifestyle modification and increasing facilities of clinics providing service can be effective steps to improve the QOL among people with type 2 diabetes.

Key words: Diabetes mellitus; Type 2; Lifestyle; Quality of life; Psychological distress

Core tip: Health related quality of life (HRQOL) is an important outcome measure in chronic diseases. The aim of this study was to assess quality of life and a range of epidemiological and clinical factors among people with type 2 diabetes. The findings of the present study showed that age, level of education, income, body mass index, functional limitation, psychological distress and number of comorbidities have a decisive role on HRQOL of patients with type 2 diabetes. So, it is important to improve the HRQOL by considering above predictors as an appropriate mechanism for public health interventions for type 2 diabetes.

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INTRODUCTION

Diabetes is one of the most common metabolic diseases with increasing prevalence that reduces life expectancy by one third. Diabetes is known as a "silent epidemic" which due to the aging population, changing patterns of life, prevalence of risk behaviors and rapid growth of urbanization has increased around the world[1-3]. It is estimated that 415 million people worldwide and 4.5 million people in Iran had diabetes in 2015. It is predicted that the number rises to more than 642 million worldwide and 4.8 million in Iran by 2040. In addition diabetes caused 4.9 million deaths in 2014 and 48% of deaths occurred in people less than 60 years[4-6].

One of the important issues in the care of chronic diseases such as diabetes is to investigate the quality of their life, which significantly affects one's physical-psychological performance and social communication[7]. As defined by the World Health Organization, quality of life (QOL) refers to "individuals' perception of their position in life in terms of culture, value system where they live, goals, expectations, standards and priorities"[8,9]. In other words, the health related QOL (HRQOL) is a subjective issue that is measured using different dimensions include physical, mental and social functions[10]. HRQOL as a multi-dimensional concept focuses on the impact of health on QOL[11].

There is a mutual relationship between the quality of diabetes care and QOL so that reducing the HRQOL of people with type 2 diabetes leads to poor glycemic control and an increased risk of disease complications. On the other hand, poor quality of care leads to reduced HRQOL[12,13].

Some studies showed that demographic factors, socio-economic status, presence of comorbid conditions, and diabetes control affect HRQOL among people with type 2 diabetes. Results of most studies on this group of patients showed that their HRQOL was not desirable[14-18]. Considering that East Azerbaijan province, is among provinces, in which diabetes is highly prevalent and this disease is among research priorities outlined in the province as well as the different climatic, socio-cultural conditions, lifestyle of the area and the low quality of diabetes care that has been shown in multiple studies[19,20], the present study was designed and implemented in order to investigate the factors affecting the HRQOL of diabetic patients referred to diabetes clinics in Tabriz.

MATERIALS AND METHODS

The present study was a cross-sectional study, which was conducted by trained interviewers on 394 patients with type 2 diabetes referred to diabetes clinics in Tabriz (Imam Reza and Sina Hospitals) in the form of face to face interviews using convenient sampling method from November 2014 to March 2015. Inclusion criteria included the willingness to cooperate and participate in the study, having diabetes type Ⅱ, age group above 25 years, having records of diabetes care in clinics of Tabriz (at least for a year), living in Tabriz and lack of specific (hemophilia, thalassemia, *etc*.) or debilitating diseases leading to hospitalization. Exclusion criteria included death, emigration, or any disability that prevents the provision of information by patients. Information required for the project was collected using a two-part questionnaire.

In the first part of the questionnaire, sociodemographic and clinical characteristics including age, sex, marital status, income, insurance status, education level, type of treatment (diet, oral medications, insulin), having comorbidities (hypertension, depression, kidney

Table 1 Demographic characteristics of diabetic people referring to diabetes clinics of Tabriz, 2015

Variable	Subgroups	*n* (%)
Age[1]	⩽ 49	85 (21.6)
	59-50	147 (37.3)
	⩾ 60	162 (41.1)
Gender	Male	134 (34)
	Female	260 (66)
Level education	Illiterate	143 (36.3)
	Primary school	149 (37.8)
	Secondary school and higher	102 (25.9)
Marital status	Single	45 (11.4)
	Married	349 (88.6)
Occupation	Employed	70 (17.8)
	Housekeeper	252 (63.9)
	Retired/other	72 (18.3)
Health insurance	Yes	378 (95.9)
	No	16 (4.1)
Household monthly income[2]	< 500	25 (6.3)
	1000-500	199 (50.5)
	> 1000	170 (43.1)
Smoking status	Yes	40 (10.2)
	No	354 (89.8)

[1]Mean and standard deviation: 56.67 ± 9.01; [2]Amounts are in 10000 Rials (1 USD equals to 33000 Islamic Republic of Iran's Rials).

disease, cardiovascular disease, cancer and other diseases) complications (retinopathy, neuropathy, nephropathy, cardiovascular complications), duration of diabetes, functional limitation, Kessler psychological distress (K10) and family history as well as anthropometric measures were collected. In the second part, the 26-item WHOQOL-BRIFE questionnaire was used. This questionnaire evaluates four broad areas, including physical health, psychological health, social relationships and environment. This questionnaire contained two questions on the assessment of the overall HRQOL and the level of self-perception of QOL. The 24 the next questions evaluate physical health (7 questions), mental health (6 questions), social relationships (3 questions) and environment (8 questions). The questionnaire was scored using Likert-5 point scale; *i.e.*, every question is assigned five answers (never, low, medium, high, very high), to each of which 1 to 5 points is assigned, respectively. The higher score in each of the dimensions reflects the better QOL. During analysis stage, those questionnaires, more than 20% of questions of which are remained unanswered (6 questions and more), were excluded, After calculating the raw score in each dimension, the scores can be converted and analyzed to 0-100 or 4-20 scale[21,22]. In this study, the 0-100 scale was used to analyze the results. The validity and reliability of the Persian version of the questionnaire, was determined by Nejat *et al*[23] in 2005.

Descriptive statistics [mean, standard deviation and frequency (percent)] was performed and test-*t*, Mann-Whitney, ANOVA, Kruskal Wallis were used and Welch test was employed to analyze the HRQOL according to demographic data and treatment options. Also, the multiple regression models were used to show the association between independent factors with dimensions of QOL. The level of significance of (P = 0.05) was considered in the present study. Data analysis was performed using SPSS 23.

This project was approved by Ethics Committee of Tabriz University of Medical Sciences (Ethic approval numberTBZMED.REC.2015.55). In addition, at the beginning of the study, informed consent was obtained in written forms from all of the participants.

RESULTS

The mean patient age was 56.67 ± 9.01 years. of the majority of participants (66%) were female, and married (88.6%), 36% were illiterate, most of them (96%) had health insurance and 56.8% of them had a monthly income of less than 10 million Rials, respectively. Smokers accounted for 10.2% of the participants and 48.7% of patients suffered complications, in 39.6% of whom the neuropathy was observed. A total of 74.1% of people had comorbidities, the most prevalent of which was high blood pressure (40.4%). A total of 56.9% of them used oral medicine and 55.3% of patients had a family history of diabetes (Table 1).

The mean of overall HRQOL was 52.11 ± 11.53 and the maximum and minimum dimensions of HRQOL were respectively seen in psychological 60.38 ± 14.54 and social dimension 38.32 ± 16.74 (Table 2).

A total of 79.8% of individuals had undesirable BMI (< 25) and HRQOL score was significantly lower in all HRQOL dimensions. The majority (63.5%) of individuals mentioned the disease duration of over 7 years. Also, the association between disease duration and QOL was statistically significant in all dimensions, except in social relations dimensions. HRQOL scores were low in all dimensions in people with functional limitation and those suffering from two or more comorbidities and patients with kidney disease had the lowest HRQOL score in all dimensions but in physical and mental dimensions. Blood biochemical indicators such as levels of HbA1c, cholesterol levels were not significant in each of HRQOL dimensions (P = 0.05) (Table 3).

The results of multiple linear regression showed a significant overall relationship between HRQOL and age (b = -1.48%, 95%CI: -0.03 and -2.93) level of education (b = 4.12%, 95%CI: 2.73 and 5.5), number of comorbidities (b = -2.41%, 95%CI: -3.89 and -9.41), and level of income (b = 1.98, 95%CI: 0.05 and 3.9), functional limitation (b = -3.59, 95%CI: -2.26 and -4.92) and psychological distress (b = -2.02%, 95%CI: -2.83 and -1.21). Also, there was association between the physical (level of education, BMI, functional limitation, psychological distress and number of comorbidities), social (age, level of education and functional limitation), mental (level of education and functional limitation, psychological distress and the number of comorbidities) and environmental dimensions (level of education, functional limitation,

Table 2 The status of different domains of health related quality of life according to the gender of diabetic people referring to diabetes clinics of Tabriz, 2015

HRQOL dimensions	Total		Male		Female		*P*-value
	Mean	SD	Mean	SD	Mean	SD	
Physical health	51.24	13.34	54.97	12.92	49.34	13.18	< 0.001
Psychological health	60.38	14.54	65.26	13.30	57.88	14.54	< 0.001
Social relationship	38.32	16.74	41.96	16.71	36.46	16.48	0.002
Environmental	58.48	10.48	59.64	11.13	57.88	10.10	0.115
Total HRQOL score	52.11	11.53	55.46	11.34	50.39	11.27	< 0.001

HRQOL: Health related quality of life.

Table 3 Different dimensions of health related quality of life according to the clinical aspects of diabetes among diabetic people referring to diabetes clinics of Tabriz, 2015

Variable	Subgroups	*n* (%)	Physical health	Social relationship	Environmental	Psychological health	Total HRQOL
Gender	Male	134 (34)	54.97 (12.92)	41.96 (16.71)	59.65 (11.14)	65.26 (13.30)	55.46 (11.34)
	Female	260 (66)	49.34 (13.18)	36.46 (16.48)	57.88 (10.11)	57.88 (14.54)	50.39 (11.27)
	P-value	-	< 0.001	0.002	0.115	< 0.001	< 0.001
Age	≤ 49	85 (21.6)	58.65 (11.64)	47.8 (17.59)	61.64 (11.14)	64.11 (16.15)	58.8 (11.66)
	59-50	147 (37.3)	52.36 (12.97)	39.68 (15.17)	59.71 (10.9)	61.37 (14.71)	53.28 (11.19)
	≥ 60	162 (41.1)	46.32 (12.53)	32.08 (15.02)	55.68 (9.01)	57.5 (12.91)	47.89 (10.11)
	P-value	-	< 0.001	< 0.001	< 0.001	0.002	< 0.001
Education	Illiterate	143 (36.3)	44.56 (11.04)	29.8 (13.21)	54.34 (8.57)	55.06 (12.25)	45.94 (8.73)
	Primary school	149 (37.8)	51.99 (12.93)	40.25 (16.08)	57.46 (10.13)	59.79 (14.31)	52.37 (10.87)
	Secondary school and higher	102 (25.9)	59.61 (11.92)	47.55 (16.52)	65.83 (9.7)	68.77 (14.15)	60.44 (10.68)
	P-value	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Income	Low (< 1000)	224 (56.8)	48.43 (12.82)	35.44 (17.47)	56.22 (9.98)	57.9 (14.73)	49.50 (11.39)
	acceptable	170 (43.2)	54.23 (13.27)	41.38 (15.41)	60.86 (10.49)	63 (13.9)	54.86 (11.06)
	P-value	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Disease duration (yr)	≥ 3 yr	51 (12.9)	56.12 (13.81)	41.88 (16.86)	61.7 (12.31)	65.48 (14.81)	56.29 (12.18)
	4-7	93 (23.6)	51.09 (10.95)	37.3 (16.15)	57.52 (9.29)	59.47 (12.48)	51.34 (10.06)
	≤ 7 yr	250 (63.5)	50.33 (13.89)	38 (16.91)	58.19 (10.43)	59.7 (15.03)	51.55 (11.78)
	P-value	-	0.019	0.26	0.058	0.029	< 0.001
	< 25	72 (20.2)	55.21 (12.90)	42.08 (17.32)	60.77 (12.09)	64.36 (15.85)	55.6 (12.53)
	25-29.9	148 (41.6)	54.2 (13.01)	39.25 (15.68)	59.2 (10.26)	62.15 (14.22)	53.7 (11.66)
	≥ 30	136 (38.2)	47.97 (12.85)	35.27 (17.46)	57.16 (9.98)	58.23 (13.79)	49.66 (11.08)
	P-value	-	< 0.001	0.014	0.052	0.008	0.001
HbA1c	< 7	180 (47.2)	51.11 (12.70)	38.02 (16.02)	57.8 (10.84)	60.1 (14.12)	51.76 (11.07)
	≥ 7	201 (52.8)	51.21 (14.01)	37.96 (17.35)	58.89 (10.25)	60.83 (14.75)	52.22 (12.05)
	P-value	-	0.938	0.969	0.136	0.62	0.696
	NORMAL	195 (49.6)	53.83 (10.78)	38.33 (15.11)	60.4 (9.57)	64.73 (11.81)	54.32 (9.74)
Kessler psychological distress	MILD	72 (18.3)	52.01 (13.65)	41.97 (18.03)	57.47 (10.25)	60.84 (12.61)	53.07 (11.57)
	MODERATE	52 (2.13)	50.96 (14.41)	39.19 (19.07)	58.57 (12.12)	59.76 (16.61)	52.12 (13.91)
	SEVER	74 (18.8)	43.9 (15.76)	34.14 (17.23)	54.33 (66.10)	48.87 (15.22)	45.31 (11.66)
	P-value	-	< 0.001	0.042	< 0.001	< 0.001	< 0.001
Functional limitation	No	106 (26.9)	61.25 (10.89)	47.47 (15.85)	63.05 (11.16)	67.91 (14.37)	59.92 (10.79)
	Moderate	78 (19.8)	54.92 (11.51)	44.34 (18.16)	61.12 (9.62)	64.79 (12.13)	56.29 (10.18)
	Sever	210 (53.3)	44.8 (11.35)	31.44 (13.25)	55.17 (9.26)	54.91 (13.17)	46.58 (9.23)
	P-value	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Treatment	Oral medication	223 (57.4)	53.57 (12.59)	38.69 (15.71)	58.97 (10.37)	61.69 (14.64)	53.11 (11.09)
	Oral medication + insulin injection	164 (42.2)	48.92 (13.64)	37.82 (17.96)	58.07 (10.55)	58.78 (14.38)	50.9 (11.97)
	P-value	-	0.007	0.883	0.161	0.101	0.12
Comorbidities	No	102 (25.9)	58.93 (11.79)	42.23 (18.29)	63.37 (10.57)	66.51 (14.82)	57.76 (11.75)
	1	207 (52.5)	50.82 (12.07)	38.28 (16.42)	57.56 (10.03)	60.49 (13.19)	51.79 (10.66)
	≥ 2	85 (21.6)	43.05 (12.99)	33.74 (14.41)	54.83 (9.39)	52.75 (13.88)	46.09 (10.09)
	P-value	-	< 0.001	0.002	< 0.001	< 0.001	< 0.001

HRQOL: Health related quality of life.

Table 4 Multivariate linear regression models of significant factors predicting health related quality of life domains among diabetic people referring to diabetes clinics of Tabriz, 2015

HRQOL domains	Variables	B (SE)	Beta	*P*-value	95%CI of B		Adjusted R2
					Lower	Upper	
Physical health	Education	3.35 (0.83)	0.198	< 0.001	1.77	4.93	0.436
	BMI	-1.55 (0.75)	-0.087	0.039	-3.12	0.07	
	Functional limitation	-4.79 (0.77)	-0.229	< 0.001	-6.11	-3.07	
	Kessler psychological distress	-1.98 (0.46)	-0.174	< 0.001	-2.90	-1.06	
	Comorbidies	-4.05 (0.85)	-0.210	< 0.001	-5.73	-2.37	
Social relationship	Age	-4.65 (1.2)	-0.212	< 0.001	-7.01	-2.28	0.279
	Education	5.3 (1.15)	0.246	< 0.001	3.03	7.56	
	Functional limitation	-4.05 (1.11)	-0.208	< 0.001	-6.24	-1.87	
Psychological health	Education	3.52 (0.94)	0.190	< 0.001	1.67	5.38	0.353
	Functional limitation	-3.94 (0.9)	-0.234	< 0.001	-5.72	-2.15	
	Comorbidies	-3.72 (1.0)	-0.176	< 0.001	-5.69	-1.75	
	Kessler psychological distress	-3.96 (0.55)	-0.317	< 0.001	-5.04	-2.88	
Environment	Education	4.3 (0.73)	0.318	< 0.001	2.86	5.75	0.257
	Comorbidies	-2.37 (0.78)	-0.154	0.003	-3.91	-0.83	
	Kessler psychological distress	-1.33 (0.43)	-0.135	0.004	-2.07	-0.38	
	Functional limitation	-1.77 (0.7)	-0.145	0.012	-3.17	-0.38	
	Income	2.13 (1.02)	0.101	0.037	0.12	4.14	
Total HRQOL score	Education	4.12 (0.7)	0.278	< 0.001	2.73	5.5	0.433
	Functional limitation	-3.59 (0.67)	-0.267	< 0.001	-4.92	-2.26	
	Age	1.48 (0.73)	-0.098	0.044	-2.93	-0.03	
	Kessler psychological distress	-2.02 (0.41)	-0.203	< 0.001	2.83	-1.21	
	Income	1.98 (0.97)	0.085	0.044	0.05	3.9	
	Comorbidities	-2.41 (0.75)	-0.143	0.001	-3.89	-9.41	

HRQOL: Health related quality of life.

psychological distress and level of income) (Table 4).

DISCUSSION

HRQOL is one of the most important assessment indices of health cares in chronic disease[24]. In this study, HRQOL based on the WHOQOL-BRIFE and its correlates among people with type 2 diabetes was examined. Based on these findings, the mean of overall HRQOL was 52.11 ± 11.53 which was similar to other studies that have also shown that HRQOL dimensions of diabetes patients was moderate[25-27], while some studies reported the lower score of the mean of overall HRQOL[28-30]. Based on these findings, in all dimensions, men had higher average HRQOL than women (55.46 ± 11.34 and 50.39 ± 11.27 in males and females, respectively), which was consistent with the result obtained in studies conducted by Rasouli *et al*[31], Khalde *et al*[32] and Redekop *et al*[33]. These studies attributed women's low HRQOL score to biological and psychological differences (women's menopause and sensitivity in dealing with the disease). But Saadatjoo *et al*[34] reported that women's HRQOL score obtained in different dimensions was higher than men, which is different from the results obtained in the present research. Some studies also have shown no significant association between gender and HRQOL[35]. In the present study, the lowest and highest HRQOL scores were obtained in mental and social dimensions, respectively. The score was different in other studies due to socioeconomic status and cultural conditions as well as collection tools. The findings of the present study showed a significant association between the HRQOL of patients, and factors including age, income, BMI, level of education, functional limitation, psychological distress, and number of comorbidities which was consistent with the study conducted by Didarloo *et al*[36]. There was a significant relationship between BMI and HRQOL so that by increasing BMI levels, HRQOL level was decreased. The results of regression analysis showed that there was a relationship between BMI and HRQOL in terms of physical dimension (b = -1.5), which were consistent with many studies conducted in this area[30,37,38]. The association between age and HRQOL was consistent with many studies so that the lowest and highest mean HRQOL scores were obtained in young and elderly patients, respectively[19,39,40]. The results of the present study showed that there was a significant relationship between level of education and all HRQOL dimensions so that people with higher education levels also had better QOL, which is consistent with findings obtained in different studies[12,41,42]. Moreover, the findings of the present study indicated that the frequency of comorbidities in patients was associated with a reduced HRQOL and this relationship was significant in the physical, psychological and environmental dimensions based on the results obtained in multiple regression analysis[3,43]. There was a negative correlation between functional limitation and HRQOL among people with type 2 diabetic in the current study. This means that increasing functional limitation score was indicative of the fact that patients faced limitation in doing their daily

activities, which in turn reduced their HRQOL. There were no similar studies for comparison purposes in this context.

The results of the current study showed that the psychological distress had negative effects on the average HRQOL of patients and led to reduced HRQOL in these people. The results of multiple regression analysis were indicative of a significant relationship between psychological distress and all HRQOL dimensions (except social dimension). These findings are consistent with other studies done in this area[24,44]. In the present study, there was a reverse relationship between duration of diabetes, and HRQOL scores; but after adjustment for other variables it was no longer significant in any of HRQOL dimensions. Studies[45,46] also indicated that there was no significant relationship between duration of diabetes and HRQOL, which confirmed the results of the present study.

In conclusion, the findings of the present study showed that age, level of education, income, BMI, functional limitation, psychological distress and number of comorbidities have a decisive role on HRQOL of patients with type2 diabetes. So, it is important to improve the HRQOL by considering above predictors as an appropriate mechanism for public health interventions for type 2 diabetes. Therefore, correcting lifestyle and increasing facilities of clinics providing service can be an effective step to improve the QOL of patients.

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COMMENTS

Background

One of the important issues in the care of chronic diseases such as diabetes is to investigate the quality of their life, which significantly affects one's physical-psychological performance and social communication. Although, some studies showed that demographic factors, socio-economic status, presence of comorbid conditions, and diabetes control affect health related quality of life (HRQOL) among people with type 2 diabetes, a comprehensive assessment of a range of epidemiologic and clinical factors related to the quality of life (QOL) among people with type 2 diabetes in this area is needed.

Research frontiers

Diabetes an emerging health problem in Iran and will continue to rise in the next decades. Considering that East Azerbaijan province, is among provinces, in which diabetes is highly prevalent and the different climatic, socio-cultural conditions, lifestyle of the area as well as the low quality of diabetes care can affect the QOL, a comprehensive assessment of clinical and epidemiological correlates of QOL can provide a more clear picture of the problem in order to implement an appropriate public health interventions.

Innovations and breakthroughs

To the knowledge, limited studies in this area have been conducted to assess QOL and a range of different epidemiological and clinical factors specially there is no information about the association between functional limitation, and psychological distress and QOL in Iran. This study designed to capture a more details about the QOL and its correlates using a valid questionnaires and trained interviewers.

Applications

QOL is considered as an outcome measure therefore identification of any modifiable factor associated with that could be of interest for further intervention. Diabetes will continue to rise; health policy makers need to be updated about the required information in order to implement the new interventional programs and also to enhance the current practice related to diabetes care.

Terminology

QOL: Individuals' perception of their position in life in terms of culture, value system where they live, goals, expectations, standards and priorities; HRQOL: A subjective issue that is measured using different dimensions include physical, mental and social functions; Kessler psychological distress (K10): A 10-item questionnaire intended to measure the level of distress based on questions about anxiety and depressive symptoms over the recent 4 wk.

Peer-review

The paper is interesting and has been developed with appropriate methodology.

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