Is Follow-Up Dental Care for Diabetic Patients Adapted?

Exploitation of ESPS 2008

Thierry Rochereau (Irdes),
Sylvie Azogui-Lévy (Université Paris-Diderot and Inserm U1018 CESP)

Diabetes is characterised by chronic hypoglycaemia caused by insufficient insulin secretion which, if left uncontrolled, can lead to severe complications. Periodontal disease is one of the complications related to uncontrolled diabetes. This bacterial infection destroys the tissues that surround and support the teeth leading to their loss. Yet, preventing dental infection could have a beneficial effect on controlling insulin levels and improving diabetics' quality of life.

Using data from the 2008 Health, Healthcare and Insurance survey (ESPS), representative of the general population, we describe the socioeconomic characteristics of individuals suffering from diabetes and question their access to and use of dental care.

In France, diabetes affects 4.5% of the population in general and 7.6% of individuals aged 35 and over studied here. Its prevalence increases significantly with age (by 1.6% for the 35-49 age group, and by 15.5% for individuals aged 70 and over) and affects more men than women. Furthermore, individuals suffering from diabetes are more disadvantaged than the rest of the population. Our results also show that among diabetics the use of dentists is no higher or lower than for non-diabetics even though they benefit from 100% coverage for diabetes-related conditions through the long-term illness scheme (LTI).

Type 2 diabetes (insert 1) is a chronic disease with an estimated prevalence of 4.4% in France in 2009 according to the InVS, affecting 2.7 million persons and constantly increasing (Fagot-Campagna *et al.*, 2010). Uncontrolled, diabetes can lead to severe and disabling complications including periodontal diseases (Mealey and Oates 2006; Manfredi *et al.*, 2004). These diseases are bacterial infections that destroy the tissues surrounding and supporting the teeth leading to their loss, thereby preventing chewing. Regular visits to the dentist can prevent these infections. Since 2007, the High Authority for Health (HAS) moreover recommends an annual dental visit as part of the follow-up care of diabetic patients.

In addition to the known effects of obesity and lack of physical exercise on the risks of developing diabetes, studies have shown that socioeconomic levels also have an impact on its prevalence (Romon *et al.*, 2006; Brown *et al.*, 2004). In France, significant social inequalities in terms of diabetic patients' access to care and the quality of follow-up care have been revealed, despite 100% coverage under the long-term illness scheme (LTI) and frequent visits to general practitioners (Fosse *et al.*,

E1

Diabetes and dental health

What is diabetes?

Diabetes is a metabolic disorder characterised by a chronic hypoglycaemia caused by insufficient secretion of insulin or target tissue insulin resistance, or a combination of both. It is classified as type 1 or type 2 diabetes (Grimaldi, 2009). Type 1 diabetes is caused by the auto-immune destruction of pancreatic beta cells, or the inability to secrete insulin. This form of diabetes is found in young subjects and represents 5.6% of diabetes cases treated in France. Type 2 diabetes is the most frequent form. It is characterised by insulin resistance and a relative insufficiency of insulin secretion. It is essentially found in adult subjects and represents over 92% of diabetes cases treated. The epidemic nature of type 2 diabetes is related to population ageing and changes in lifestyle (less physical activity, diet rich in saturated fats and less fibres) resulting in overweight and obesity.

The relationship between diabetes and oral health

The complications related to diabetes have damaging consequences on individuals' health and quality of life. These complications can be avoided or considerably reduced if the disease is well controlled with adequate medical and pharmacological treatments. The High Authority for Health (HAS) has published and updated recommendations concerning the medical monitoring of diabetes, and one of the aims of the 2004 Public Health Law was to ensure adequate medical surveillance for 80% of diabetic patients in conformity with good practice recommendations. This goal has yet to be attained even though several initiatives have been taken to improve diabetes monitoring through the coordination of health professionals' interventions (care network), cooperation between doctors and nurses (Asalée experiment) and the development of multidisciplinary health centres. Since 2008, the SOPHIA programme set up by the National Insurance Fund for Salaried Workers (CNAMTS) aims to improve the care of diabetic patients and in the long-term, reduce the costs of this disease.

Hospitalisations continue to represent the highest expenditure item, and the frequency and gravity of complications have not been reduced (InVS, 2012). Among these complications one notes periodontal disorder (an infection of the tissues surrounding and supporting the teeth). Numerous clinical studies have shown that the relationship between diabetes and periodontal disorder is bi-directional (Manfredi *et al.*, 2004; Tsai *et al.*, 2002; Preshaw *et al.*, 2011; Bascones-Martinez *et al.*, 2011), leading to the reasonable assumption that the prevention of dental infections could improve glycemic control (Azogui-Lévy *et al.*, 2009). Hyperglycaemia favours the development of dental plaque bacteria but also triggers an inflammatory response destroying the connective tissue and favouring periodontitis. At the same time, the chronic inflammation resulting from periodontitis contributes to insulin resistance and thus hypoglycaemia.

E2

The use of dental care follows a social gradient

According to Health, Healthcare and Insurance survey (ESPS) data, within the general population and among the 73.5% that used dental care services during the course of the previous 24 months, individuals with a low education level, unemployed, at home and disadvantaged have a lower usage rate. Thus, individuals who left school at primary level are 58.5% to have consulted a dentist (OR=0.6***), against 84.2% of individuals with BAC or higher levels of education (OR=1.4***). Similarly, unemployed or house persons are respectively 68.5% (OR=0.8*) and 65.8% (OR=0.7***) to have consulted a dentist against 79.8% of individuals in employment at the time of the survey. Finally the use of dental care diminishes considerably with level of precariousness, from 82% for non-precarious individuals to 62% for the most precarious (OR=0.5***).

Complementary health insurance (CHI) also has a significant impact on the use of dental care services. Individuals without CHI have a much lower usage rate with only 53% having consulted in 24 months against 74.7% of individuals with CHI. Individuals benefitting from Universal Complementary Health Insurance (CMU-C) have a lower absolute usage rate at 69.7%, but a higher rate all other things being equal (OR=1.4***). These results confirm the positive effect of CHI concerning health care poorly reimbursed by the National Health Insurance for socially disadvantaged persons (Azogui and Rochereau, 2005; Tsakos *et al.*, 2011).

2011). Similarly, social inequalities in the use of dental care have been well documented, but to date no studies representative of the general population had studied this problem in relation to diabetics.

Using ESPS 2008 data (Sources insert), we describe diabetics' socioeconomic characteristics and attempt to answer several questions: do diabetics regularly consult a dentist as recommended by the High Authority for Health (HAS)? Is the gradient association between precariousness and use of dental care reduced among diabetics, in the majority benefitting from 100% coverage under the LTI scheme?

In France, according to ESPS 2008 data, diabetics represent 4.5% of the population, and are clearly more disadvantaged

---

According to ESPS 2008 data, the prevalence of diabetes is estimated at 4.5% within the population as a whole, which is comparable to other national surveys (Fagot-Campagna *et al.*, 2010; InVS, 2012), and at 7.6%

among individuals aged 35 and over studied here. It increases significantly with age (table 1): by 1.6% among persons aged 35-49 and by 15.5% in the 70 and over age group. With a prevalence rate of 9.1%, men are clearly more affected than women (6.4%).

The onset of diabetes is largely due to lack of physical exercise and overweight. Thus the prevalence of diabetes is 8.8% among overweight individuals and concerns 13.3% of obese individuals.

The prevalence rate of diabetes also differs according to education level, employment status and level of precariousness (Table 1). In this respect, ESPS results confirm those of other studies published on the subject (Bihan *et al.*, 2005; Dray-Spira *et al.*, 2008). Thus, 55% of diabetics' have a primary level of education, and only 13% have at least the 'baccalauréat' degree (against 29% and 34% respectively for non-diabetics). Similarly, fewer diabetics are in employment (18% *versus* 52%). Finally, the proportion of disadvantaged persons (EPICES score higher than 24) [Methods insert] is higher among diabetics (51% against 36%).

Furthermore, 80% of individuals self-reporting diabetes also declare benefitting from the LTI scheme.

Despite care and follow-up care recommendations under the LTI scheme, diabetics' consultation rate for dental care is lower than for non-diabetics and non-LTI

All other things being equal, and despite HAS recommendations and recognition under the LTI scheme, diabetics do not consult dentists more frequently than non-diabetics. The logistic model (Table 2, model 1) thus shows that after controlling for the main factors determining the use of dental care, diabetics have a very similar usage rate to non-diabetics (OR=0,864). Moreover, inequalities in the use of dental care, already well-known, are as high among diabetics as non-diabetics whereas one could have expected that current benefit schemes, such as 100% coverage for diabetics, would have reduced these inequalities within this population (Insert 2). All other things being equal, there is a gradient association between precariousness and the use of dental care among non-diabetics (p<0,001); and diabetics (p<0.01, Table 2, model 2) with a minimal difference between the two (p=0,998).

Finally the low rate of dental care use is not specific to populations registered under the LTI scheme but, in all likelihood, specific to diabetics. Thus, all other things being equal, diabetics under the LTI scheme have a significantly lower rate of dental care use than non-diabetics without LTI bene-

T1

Socio-demographic characteristics of diabetics in ESPS 2008			
	Diabetics	**Non-diabetics**	**Prevalence of diabetes**
Total number = 8 961	N = 648	N = 8 313	
Gender			
Men	55%	45%	9.1%
Women	45%	55%	6.4%
Age			
35-49 years old	7%	34%	1.6%
50-59 years old	18%	24%	5.9%
60-69 years old	26%	18%	10.7%
70 and over	46%	21%	15.5%
Not known	3%	4%	6.7%
Level of education			
Primary	55%	29%	13.2%
Middle school, CAP, BEP	31%	34%	7.0%
Secondary school or higher	13%	34%	3.0%
Other, not known	2%	2%	6.6%
Main occupation			
Employed	18%	52%	2.7%
Unemployed	5%	5%	7.4%
Retired	65%	36%	13.0%
House person	9%	5%	11.7%
Other, not known	4%	2%	3.9%
Income			
1st quintile	25%	15%	11.9%
2nd quintile	21%	16%	9.6%
3rd quintile	14%	17%	6.5%
4th quintile	14%	18%	6.1%
5th quintile	13%	21%	4.8%
Not known	13%	13%	7.5%
Precarity			
Not precarious (score ≤ 24)	31%	52%	4.6%
Precarious (score > 24)	51%	36%	10.5%
Not known	19%	13%	10.8%
Complementary health insurance			
Private CHI	86%	90%	7.3%
CMU-C	4%	4%	7.9%
No CHI	8%	5%	12.1%
Not known	1%	1%	7.7%
Index of body mass			
Thin	6%	12%	3.9%
Normal	22%	43%	4.0%
Overweight	38%	33%	8.8%
Obese	34%	13%	18.3%
Not known	3%	4%	6.6%
Health care use over the last 24 months			
Yes	57%	69%	6.4%
No	36%	24%	11.0%
Not known	7%	7%	8.0%
LTI affiliation	**80%**	**18%**	

Source: Enquête santé protection sociale (ESPS) 2008, Irdes.

⌐ **Data available for download**

SOURCE

fits, whereas at the same time, the use rate probability for non-diabetics registered under LTI is comparable to that for non-diabetics/non-LTI (Table 2, model 2). This lower use rate specific to diabetics can be explained by the fact that this population suffers from multiple social and health problems (multiple pathologies) with the result that dental care is not a priority.

The accumulation of medical and social vulnerabilities, such as being diabetic and disadvantaged, further reduces the probability of consulting a dentist (table 2, model 2 - OR=0,495***) compared to non-diabetics that are not disadvantaged. If the CMU-C (Universal complementary health insurance for the most deprived population) acts as a safety net regarding access to dental care, this doesn't appear to be the case for the LTI scheme. In contrast, access to complementary health insurance seems to be a determinant factor in the use of dental care. Yet, the fact of benefitting from 100% coverage for medical care directly related to diabetes is often a motive for not subscribing to complementary health insurance (CHI). Thus, 12% of individuals exempt from co-payments do not have CHI against 4.8% within the general population. This result could partially explain the low rate of dental care use among diabetics, especially when they are more disadvantaged. Dental treatments present high out-of-pocket payments that are partially reimbursed by CHI according to the guarantees subscribed to. The 100% coverage under the LTI scheme only concerns treatments without excess fees which can lead more disadvantaged populations without CHI to forego dental care.

How to improve oral health care for diabetics and their care pathway?

This study shows that diabetics' rate of dental care use is no greater than the rate for non-diabetics, even when they are covered by the LTI scheme,

T2

Probability of having consulted a dental surgeon over the last 24 months (N = 8,362)			
	Model 1[a]	Model 2[a]	Model 3[a]
Variables			
Gender			
Men	**0.605 ***	**0.605 ***	**0.607 ***
Women	1	1	1
Age			
35-49 years old	1	1	1
50-59 years old	1.055	1.056	1.056
60-69 years old	1.104	1.104	1.101
70 and over	**0.622 ***	**0.621 ***	**0.626 ***
Complementary health insurance			
Covered by private complementary health insurance	1	1	1
Covered by CMU-C	**1.447 **	**1.444 **	**1.433 **
Not covered	**0.689 **	**0.688 **	**0.688 **
Situation not known	0.953	0.953	0.954
Family situation			
Couple	1	1	1
Single parent household	0.848	0.849	0.851
Single person	**0.718 ***	**0.718 ***	**0.721 ***
Other types of household	0.873	0.873	0.870
Level of education			
Primary	**0.621 ***	**0.620 ***	**0.622 ***
Middle school, CAP, BEP	1	1	1
Secondary school or higher	**1.380 ***	**1.379 ***	**1.381 ***
Other	0.927	0.925	0.927
Main occupation			
Employed	1	1	1
Unemployed	0.811	0.812	0.812
House person	**0.752 ***	**0.754 ***	**0.756 ***
Retired	1.031	1.034	1.045
Others, not known	**0.630 **	**0.630 **	**0.654 **
Income			
1st quintile	**0.723 **	**0.724 **	**0.725 **
2nd quintile	0.832	0.833	0.832
3rd quintile	0.925	0.926	0.925
4th quintile	0.882	0.883	0.879
5th quintile	1	1	1
Not known	0.930	0.931	0.926
Precarity score			
Not precarious (score ≤ 24)	1		1
Precarious (score > 24)	**0.586 ***		**0.588 ***
Not known	**0.792 ***		**0.792 **
Diabetes			
Not diabetic	1		
Diabetic	0.864		
Precariousness* diabetes			
Not precarious and not diabetic		1	
Not precarious and diabetic		0.843	
Precarious and not diabetic		**0.587 ***	
Precarious and diabetic		**0.495 ***	
Not known		0.778	
Precariousness gradients			
Among non-diabetics		**p<0,001 ***	
Among diabetics		**p<0,01 **	
Diabetics vs non-diabetics		p=0,998 NS	
Diabetes*LTI			
Non-diabetics non-LTI			1
Non-diabetics LTI			0.949
Diabetics non-LTI			1.143
Diabetics LTI			**0.790 ***

[a] See Method insert page 5 for statistical methods.

Source : Enquête santé protection sociale (ESPS) 2008, Irdes.

⎙ **Data available for download**

*M*ETHOD

Identification of diabetics: In ESPS, individuals are considered as being diabetic when they self-report diabetes in the list of proposed diseases or declare having taken at least one anti-diabetic treatment the day before the survey from the list of proposed drugs.

Measuring the use of dental care: The use of dental care is measured by the number of self-reported visits to the dentist during the course of the previous 2 years.

Measuring the level of precariousness – EPICES Score: An individual score measuring level of precariousness or social vulnerability. It is based on 11 questions taking into account the material and psycho-social determinants of precariousness. The combination of responses and coefficients associated with each question makes it possible to determine an EPICES score for each individual. It can vary from 0 signifying absence of precariousness, to 100 for maximum precariousness. Within the framework of this study, dividing the EPICES score into quintiles is as follows: distribution determined on the basis of individuals for whom we have both age and gender characteristics.

	Score	Total number
1st quintile	[0-7]	1,671
2nd quintile	]7-14.5]	1,461
3rd quintile	]14.5-24]	1,526
4th quintile	]24-39]	1,539
5th quintile	]39-100]	1,573
-	not known	1,191

Distribution established on the basis of individuals for which we have both age and gender characteristics.

The ESPS 2008 data confirm a threshold of precariousness from the fourth quintile, also demonstrated in a previous IRDES study (Afrite *et al.*, 2010).

In models requiring a binary division, we thus considered as precarious individuals classed in the fourth and fifth quintiles and as non-precarious, individuals classed in the first three quintiles.

Statistical methods: We carried out three logistic regressions modelling the self-reported use of dental care during the course of the previous twelve months, taking into account the main factors determining access to dental care in the survey (gender, age, family situation, employment status, CHI status, income level and level of precariousness). In the first model, we added the indicator identifying diabetics in order to determine their rate of use of dental care. In the second model, we crossed the degree of precariousness with the indicator identifying diabetics so as to compare the gradient association between precariousness and use of dental care in diabetics and non-diabetics. In the third model, we cross the indicator identifying diabetics with the indicator identifying individuals registered as LTI so as to study the impact of the LTI scheme in the result on diabetics' rate of use of dental care.

which is the case for 80% of the diabetic population. The gradient association between precariousness and use of dental care is the same for both populations. Our results confirm the importance of the socioeconomic dimension in access to dental care. We have shown that 100% coverage under the LTI scheme does not provide adequate access to dental care for diabetic patients, especially when they are more disadvantaged. The combination of poor National Health Insurance reimbursement rates for dental care and the lack of complementary health insurance appear to further limit disadvantaged populations' access to dental care. Thus, the 100% coverage of healthcare expenditures under the LTI scheme is the second reason for not subscribing to CHI after the lack of financial means. The questions posed to individuals not covered by CHI in the 2010 and 2012 ESPS will allow us to examine these observations more closely in the future.

This study also poses the question of diabetics' care pathway and the impact of follow-up care recommen-dations. The aim of the standard care pathway is to institute regular follow-up care for individuals with a chronic disease, such as diabetes, but does not deal with access to healthcare which is partially conditional on out-of-pocket expenditures and individuals' level of social protection (complementary health insurance coverage). The place of oral healthcare is not explicit in these care pathways and recommended visits to the dentist are the same as for non-diabetic adults (an annual visit). Yet oral infections can be prevented and controlled in adults if they regularly consult a dentist.

In view of our results, the more socially vulnerable diabetics should benefit from easier access to dental care. Changes in the type of healthcare covered by the LTI scheme or financial assistance in the purchase of complementary health insurance could contribute to improve access. The low use of dental care, specific to diabetics in this study, also raises the question of access to preventive care for this population. The therapeutic education programmes instituted in the Hospital, Patients and Territories Law (HPST) include dental care but their implementation requires close cooperation with general practitioners in regular contact with the patients. The dissemination of good practice recommendations in therapeutic education and their implementation also requires training health professionals and thus dentists. ♦

*C*ONTEXT

POUR EN SAVOIR PLUS

- Afrite A., Bourgueil Y., Célant N. *et al.* (2010). « Score Epices : comparaison des résultats dans les échantillons ESPS et Cetaf ». In *Santé, soins et protection sociale en 2008*. Rapport Irdes n° 547 (biblio n° 1800ter), juin, 43-65.

- Azogui-Lévy S., Anagnostou F., Etienne D. (2009). « Santé bucco-dentaire et diabète ». Chapitre dans *Traité de diabétologie* sous la direction de A.Grimaldi ; Flammarion.

- Azogui-Levy S., Rochereau T. (2005). « Comportements de recours aux soins et santé bucco-dentaire ». *Questions d'économie de la santé*, n° 94, mai.

- Banchereau C., Doussin A., Rochereau T., Sermet C. (2002). « L'évaluation sociale du bilan bucco-dentaire : le BBD a-t-il atteint sa cible ? ». Rapport Irdes n° 515 (biblio 1396), novembre.

- Bascones-Martinez A., Matesanz-Perez P., Escribano-Bermejo M., González-Moles M.Á., Bascones-Ilundain J., Meurman J.H. (2011). "Periodontal disease and diabetes-Review of the Literature". *Med Oral Patol Oral Cir Bucal*. 16:e722-9.

- Bihan H., Laurent S., Sass C. *et al.* association among individual deprivation, glycemic control, and diabetes complications (2005). "The Epices score. Diabetes Care"; 28:2680-2685.

- Brown A.F., Ettner S.L., Piette, *and al.* (2004). "Socioeconomic position and health among persons with diabetes mellitus: a conceptual framework and review of the literature". *Epidemiol Rev*; 26: 63-77.

- Dray-Spira R., Gary T.L., Brancati F.L. (2008). "Socioeconomic position and cardiovascular disease in adults with and without diabetes mellitus: United States trends, 1997-2005". *J Gen Intern Med*; 23:1634-41.

- Fagot-Campagna A., Romon I., Fosse S., Roudier C. (2010). « Prévalence et incidence du diabète, et mortalité liée au diabète en France ». Institut de veille sanitaire. Synthèse épidémiologique, novembre.

- Fosse S., Dalichampt M., Fagot-Campagna A. (2011). « Prévalence du diabète et recours aux soins en fonction du niveau socio-économique ». Institut de veille sanitaire www.invs.sante.fr/surveillance/diabete

- Grimaldi A. (2009). *Traité de diabétologie*, Flammarion 2e édition.

- Haute Autorité de santé (2007). *Guide affection de longue durée. Diabète de type 1 ; Diabète de type 2.* Juillet.

- Institut National de Veille Sanitaire (2012). « Dossier thématique diabète ».

- Manfredi M., McCullough M.J., Vescovi P., Al-Kaarawi Z.M., Porter S.R. (2004). "Update on diabetes mellitus and related oral disease Oral Dis". *J;10(4):187-200.*

- Mealey B.L. and Oates T.W. (2006). "AAP-Commissioned Review Diabetes Mellitus and Periodontal Diseases". *J Periodontol*; 77:1289- 1303.

- Preshaw P.M., Alba A.L., Herera D. *et al.* (2011). "Periodontitis and diabetes: a two-way relationship". *Diabetologia.*

- Romon I., Dupin J., Fosse S., Dalichampt M., Dray-Spira R., Varroud-Vial M., Weill A., Fagot-Campagna A. (2006). « Relations entre caractéristiques socio-économiques et état de santé, recours aux soins et qualité des soins des personnes diabétiques, Entred 2001 ». *Bulletin Epidémiologique Hebdomadaire*, n° 45.

- Tsai C., Hayes C., Taylor G.W.(2002). "Glycemic control of type 2 diabetes and severe periodontal disease in the U.S. adult population". *Community Dent Oral Epidemiol*;30:182-192.

- Tsakos G., Demakakos P., Breeze E., Watt R. (2011). "Social gradients in oral health in older adults: findings from the English longitudinal survey of aging". *American J of Public Health*; 18: e1-e8.