



**HAL**  
open science

## The contribution of teledentistry in detecting tooth erosion in patients with eating disorders

Nicolas Giraudeau, Paul Camman, Laurence Pourreyron, Camille Inquimbert,  
Patrick Lefebvre

### ► To cite this version:

Nicolas Giraudeau, Paul Camman, Laurence Pourreyron, Camille Inquimbert, Patrick Lefebvre. The contribution of teledentistry in detecting tooth erosion in patients with eating disorders. *The Lancet Digital Health*, 2021, 7, pp.20552076211019250. 10.1177/20552076211019250 . hal-03233940

**HAL Id: hal-03233940**

<https://hal.umontpellier.fr/hal-03233940v1>

Submitted on 26 Apr 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

# The contribution of teledentistry in detecting tooth erosion in patients with eating disorders

Digital Health  
Volume 7: 1–10  
© The Author(s) 2021  
Article reuse guidelines:  
sagepub.com/journals-permissions  
DOI: 10.1177/20552076211019250  
journals.sagepub.com/home/dhj



Nicolas Giraudeau<sup>1,2</sup> , Paul Camman<sup>2</sup>, Laurence Pourreyron<sup>2</sup>,  
Camille Inquimbert<sup>2,3</sup> and Patrick Lefebvre<sup>4</sup>

## Abstract

**Objective:** The aim of this study was to demonstrate that including a teledentistry consultation in the standard care provided to patients in an eating disorder day hospital could be beneficial, notably for screening for particular pathologies and preventing dental erosion.

**Methods:** We included 50 patients from the eating disorders unit of the University Hospital of Montpellier, all of whom underwent a dental examination using asynchronous telemedicine. We recorded the data using teledentistry software for the medical file and an intraoral camera for the clinical videos. Remote diagnosis was performed using the Basic Erosive Wear Examination index. In addition, the participants completed a questionnaire to assess their risk factors for dental pathologies.

**Results:** We found dental erosion in 92% of the patients, and 50% had at least one tooth with BEWE 2 or 3 type erosion.

**Conclusions:** Despite the fact that there can be wide variety within a group of individuals with similar risk factors, dental telemedicine could promote awareness within this at-risk population, as well as provide personalised prevention advice to each patient. Above all, it would make it possible to treat these patients' lesions at the earliest possible moment, thereby improving their outcomes.

## Keywords

Telemedicine, oral health, eating disorders, teledentistry, public health

Submission date: 23 February 2021; Acceptance date: 3 May 2021

## Introduction

Dental erosion is defined as demineralisation and/or dissolving of dental hard tissues by chemical, not bacterial, processes.<sup>1</sup> It occurs when the tooth enamel is in contact with an acidic environment (pH < 5.5), which can be caused by either extrinsic elements (acidic food or drink) or intrinsic elements (gastroesophageal reflux or self-induced vomiting). The severity and extent of the erosive lesions depend on numerous factors, such as the frequency of exposure to acid, the type of enamel, dental hygiene, and the buffering capacity of the saliva. The prevalence of dental erosions has been increasing in the general population for decades, in parallel with changes in lifestyle, eating and drinking habits, and hygiene. Additionally, according to the

meta-analysis conducted by Romanos et al.,<sup>2</sup> dental erosion is the most common oral manifestation in patients with eating disorders.

<sup>1</sup>CEPEL, UMR 5112, CNRS, Université de Montpellier, Montpellier, France

<sup>2</sup>Dental Department, University Hospital of Montpellier, University of Montpellier, Montpellier, France

<sup>3</sup>Systematic Health Care, EA 4129, University of Lyon 1, Lyon, France

<sup>4</sup>Eating Disorders Department, University Hospital of Montpellier, University of Montpellier, Montpellier, France

### Corresponding author:

Nicolas Giraudeau, Dental Department, University Hospital of Montpellier, University of Montpellier, Montpellier, France.

Email: nicolas.giraudeau@umontpellier.fr



Eating disorders are a series of self-imposed disturbances in a person's diet, and have a significant impact on the physical and psychological health of those affected. Anorexia and bulimia are the most well-known eating disorders, and each has multiple subcategories. Eating disorders can be associated with problems related to body image, often linked to the aesthetic ideals of western societies. They affect significantly more women than men, with a sex ratio of around nine women to one man. In addition to being increasingly prevalent in high-income countries, eating disorders are now also seen more and more frequently in low-to-middle-income countries despite prevention campaigns.<sup>3</sup> The nutritional imbalance caused by these pathologies can have serious consequences on the body as a whole (endocrine, bone, cardiovascular and haematological disorders etc.). Additionally, the suicide rate is 22 times higher in patients with eating disorders than in the general population, and between 5 and 10% of patients with anorexia die as a result of their disorder (undernourishment/suicide). These statistics further highlight the need for early intervention.

Despite receiving multidisciplinary care, patients with eating disorders often do not receive a dental examination to screen for or prevent erosive lesions, usually due to a lack of personnel and/or expertise. This has typically been the case at the University Hospital of Montpellier (UHM), where patients with eating disorders are treated in the Endocrinology, Diabetes and Nutrition Department. In most cases, patients are referred to the eating disorder day hospital either by their general practitioner, or by the eating disorder unit directly for a second consultation as part of their follow-up care.

Having noted the gap in the care provided at UHM, we proposed a teledentistry intervention in order to offer a dental consultation to every patient at the eating disorders day hospital. Previous research, for example the e-DENT project,<sup>4</sup> has shown that teledentistry makes it possible to conduct remote screening and consultation sessions in populations that have specific needs or particular risks, or that are isolated, so we considered that telemedicine could be well suited to our context.

To our knowledge, no other studies have been conducted into the use of teledentistry as a diagnostic tool to screen for erosive lesions in a population of patients with eating disorders. We are also not aware of any studies that have investigated the use of digital tools, such as intraoral cameras, in this particular population.

## Study aim

To assess the feasibility of providing a systematic dental examination via telemedicine for all patients in the eating disorders day hospital.

## Materials and methods

### Study population

Inclusion criteria: all patients consulting for the first time in the day hospital of the eating disorder unit of the University Hospital of Montpellier between 5 January 2017 and 28 April 2017 were invited to participate in the study.

Exclusion criteria: patients with eating disorders who were hospitalised in the long-term inpatient department and/or patients under 16 years old.

The prevalence of dental erosion was estimated at 80% in the target population. Using a precision of 5% and a significance level of  $p < 0.05$ , we therefore calculated that we would require a sample of 50 patients.

### Evaluation criteria

We used the Basic Erosive Wear Examination (BEWE) index to assess dental erosion in our population. This consisted of scoring each tooth (except the third molars) by examination of the five faces.

- 0: No erosive tooth wear
- 1: Initial loss of surface texture
- 2: Distinct defect; hard tissue loss  $< 50\%$  of the surface area (possible exposure of dentine)
- 3: Hard tissue loss  $\geq 50\%$  of the surface area (systematic exposure of dentine)

Each arch was then divided into three sextants (17–14, 13–23, 24–27, 37–34, 33–43, 44–47), and the highest score for each sextant was recorded. The sum of these scores gave the BEWE index score (from 0–18)<sup>5</sup> (Online Appendix 1).

### Methods

Our study investigated the use of asynchronous telemedicine in a population of patients with eating disorders. Asynchronous dental telemedicine (also known as store-and-forward dental telemedicine) usually consists of two phases:

- The visit (data acquisition): The health professional making the request (e.g. a nurse) collects the required data. During this phase, the nurse makes note of information about the patient's health, asks the patient to complete a dedicated questionnaire, and records four intraoral videos using the camera (one video per section of the mouth, including the palatal/lingual, vestibular and occlusal surfaces of each tooth).
- The analysis: The dental surgeon remotely gives a diagnosis (severity and prevalence of the erosive

dental lesions, for example) using only the information recorded by the nurse.

In our study, the visit and analysis phases were performed by the same dental surgeon, who was also a teacher at the University of Montpellier faculty of dentistry. In order to minimise recall bias for the practitioner performing the assessment, we imposed a three-month delay between the visit and the analysis phases. The patients were, however, given the results of the examination at the end of the visit phase to allow them to receive appropriate and timely treatment.

### Visit phase

During the visit phase, the dental surgeon obtained the patient consent then created a digital medical record. The dental surgeon then recorded the video using a Soprocara camera (Acteon group, La Ciotat, France) in "D-light" mode, which was connected to the e-DENT software (e-DENTECH, Montpellier, France). The e-DENT software stores the data on a secure server and manages each patient's data. It also provides the necessary information system for data transfer, secure identification of the different parties, and production of a report for each assessment that uses asynchronous telemedicine.

The patient was sitting on a classical examination chair facing a laptop. The practitioner stood behind the patient and used his right hand to hold the camera, and his left hand to move the head of the camera. The images appeared directly on the laptop screen.

The patient was then asked to fill in a written questionnaire designed to assess risk factors for dental pathologies, including treatments, self-induced vomiting frequency, eating and drinking habits, eating disorder pathology and hygiene (see Online Appendix 2).

### Analysis phase

Three months after the initial visit, the dental surgeon analysed the video data and used the BEWE index to assess the number and severity of erosive lesions for each patient. The data collected from the video analysis was later cross-referenced with the results from the questionnaire for statistical analysis.

## Results

### Patient characteristics

In our study population, 48 patients were female (96%) and 2 were male (4%). The mean age of the patients was 26.8 years (min = 16; max = 54). Sixty-two percent

(n = 31) of the population was under 25 years old. The employment status of our participants was as follows:

- 30% (n=15) in employment
- 56% (n=28) in full-time education or training
- 12% (n=6) unemployed
- 2% (n=1) receiving disability benefits.

The mean number of years in higher education was 1.7 years (min = 0; max = 6). However, 34% (n = 17) of patients were aged 18 or under. The mean number of years in higher education for participants over 18 years old was 2.5 years (min = 0; max = 6).

### Medical characteristics

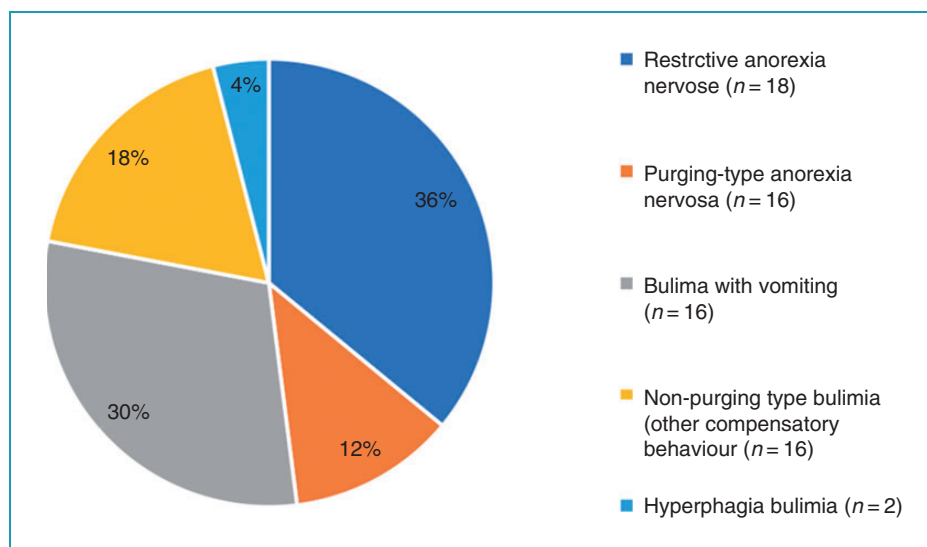
Forty percent (n = 20) of the participants were undergoing treatment for a physical pathology (asthma, diabetes etc.) other than their eating disorder. The initial signs of their eating disorder had appeared an average of 6.94 years before the study (min = 0, max = 34). In general, the older the patient, the longer they had been affected by their eating disorder. In most cases, the first signs of their eating disorder had appeared in adolescence, and the average age for the appearance of the eating disorder was 19.8 years (standard deviation 8.14). The distribution of types of eating disorder is reported in Figure 1.

The mean body mass index (BMI) in our cohort was 21.2 (min = 12.2; max = 47.8), which reflects the fact that the eating disorders represented in our group of patients included both restrictive eating disorders (low BMI) and overeating disorders (high BMI). Of the 50 patients, 23 were undergoing treatment with antidepressant medication (46% of the study population). Furthermore, 11 patients (22%) regularly used recreational drugs (mostly cannabis, two cases of cocaine). Forty-two percent (n = 21) of the participants had already received intervention from a nutritionist before their consultation at the eating disorder day hospital.

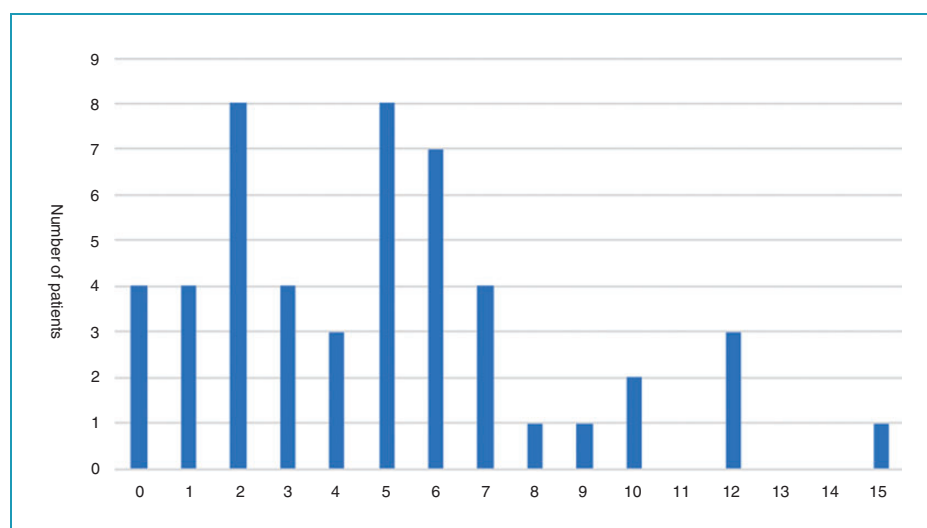
Only patients with purging-type anorexia nervosa or bulimia with vomiting reported self-induced vomiting (SIV), and all of these 21 patients reported at least one occurrence of SIV per week. Patients with SIV therefore represented 42% of our cohort. Forty-three percent (n = 9) of the patients with SIV reported vomiting at least once per day, which corresponded to 18% of the total number of participants. The average duration of SIV was 4.1 years, and 71% (n = 15) of patients with SIV were under 25 years old.

### Erosion questionnaire

Eighty-two percent (n = 41) of the patients included in our study had consulted their dentist in the two years



**Figure 1.** Distribution of the types of eating disorder.



**Figure 2.** Distribution of the BEWE index score in the population.

prior to the examination, and 88% percent ( $n=44$ ) reported brushing their teeth for a minimum of 1 minute 30 seconds at least once per day. Twenty-four percent ( $n=12$ ) reported experiencing dental pain or sensitivity. Fifty percent ( $n=25$ ) complained of dry mouth. This proportion was 65% ( $n=15$ ) in patients taking antidepressants and 45% ( $n=5$ ) in patients who regularly used recreational drugs. Fifty-four percent ( $n=27$ ) of patients reported consuming food and/or drink known to erode dental tissues (fizzy drinks, fruit juice, citrus fruits etc.) According to the results of the questionnaire, only 20% ( $n=10$ ) of patients had previously heard of dental erosion. Patients with SIV seemed to be better informed; 38%

( $n=8$ ) were aware of the phenomenon. This was a significant difference ( $p=0.04$ ).

### Diagnosis of dental erosion using BEWE scores

The mean BEWE index score was 4.9 (standard deviation: 3.5) with a minimum of 0 and a maximum of 15. Ninety-two percent of the patients ( $n=46$ ) had some level of dental erosion (confidence interval: 80.8%; 97.8%) (Figure 2).

The mean BEWE index score in participants under 25 years old was 4.5, compared to 5.4 in participants aged 25 and over. Of the patients under 25 years old, 66% ( $n=20$ ) had 5 or fewer teeth affected by dental

erosion. This proportion was 63% ( $n = 12$ ) in patients aged 25 and over.

Of the patients with SIV, 52% ( $n = 11$ ) had more than 10 teeth affected by dental erosion, compared to 21% ( $n = 6$ ) of patients without SIV ( $\chi^2$ ,  $p = 0.01$ ). Of the patients with SIV, 24% ( $n = 5$ ) had at least one tooth classed as BEWE 3 (hard tissue loss  $\geq 50\%$  of the surface area with systematic exposure of dentine), compared to 10% ( $n = 3$ ) of patients without SIV. Sixty-seven percent ( $n = 14$ ) of patients with SIV presented with lesions classed as BEWE 2 and/or BEWE 3, compared to 38% ( $n = 11$ ) of patients without SIV ( $\chi^2$ ,  $p = 0.04$ ). Additionally, 71% ( $n = 15$ ) of the patients with SIV had at least one erosive lesion on the maxillary incisor section, compared to 41% ( $n = 12$ ) of patients without SIV ( $\chi^2$ ,  $p = 0.03$ ).

Of the 27 patients who reported consuming acidic food or drink, 55% ( $n = 15$ ) presented at least one erosion classed as BEWE 2 or 3, compared to 43% ( $n = 10$ ) of the rest of the study population. We also noted that the percentage of patients whose maxillary incisors were affected was similar in patients who consumed acidic food/drink (52%) and patients who did not (57%).

Of the 23 patients who were taking antidepressants, 65% ( $n = 15$ ) had more than 5 teeth with erosive lesions. This figure was 64% ( $n = 7$ ) for patients who regularly used recreational drugs ( $n = 11$ ).

The results of the different assessments are summarised in Table 1.

## Discussion

The aim of this cross-sectional descriptive study was not to determine a causal link between eating disorders and dental erosion, as this has already been the subject of numerous studies.<sup>6-8</sup>

### BEWE index

Before 2008, a large number of different dental erosion indexes were in use, which all had very specific criteria and were not well suited to clinical practice. As a response to this, Bartlett and Lussi developed the BEWE index, published in 2008, with the aim of simplifying and popularising the detection and evaluation of dental erosion.<sup>9</sup> The idea was to create a simple scoring system based on only four stages of erosion, which would be recognised internationally and would make it possible to compare different epidemiological studies using the same criteria. The BEWE index was developed for use during classical consultations, as well as for examinations of dental models, photographs or video footage. Since 2008, many studies of dental erosion have used this index as an evaluation criterion.

Almost all of these have aimed to assess the prevalence of dental erosion in the general population and analyse the different risk factors, but the majority were performed in populations of children and/or teenagers. Many studies have also been conducted into the prevalence of dental erosion in patients with eating disorders. However, to our knowledge none of these have used the BEWE index as an evaluation criterion.

None of the articles that we found had used the average total BEWE score as an evaluation criterion, because this figure is not fully representative of the distribution of erosive lesions. However, it is interesting to calculate the percentage of patients in each category in order to compare them to existing studies. Each category (BEWE 1, BEWE 2 or BEWE 3) corresponds to a particular care pathway, and patients with BEWE 2 and BEWE 3 lesions will eventually require treatment (preventive treatments and/or prosthetics).

In 2013, Bartlett et al. studied the prevalence of dental erosions on a large scale, with a cohort of 3817 patients aged between 18–35 years across 6 European countries including France. The BEWE scores were calculated during classic dental consultations performed by practitioners who had been trained beforehand so as to limit interpretation bias. In addition to the consultation, a standardised questionnaire was used to measure and analyse the potential risk factors.<sup>10</sup>

In our study, we found dental erosion in 92% ( $n = 46$ ) of the patients we examined, compared to 56.9% ( $n = 1819$ ) in the study by Bartlett et al. A comparison of the different results is presented in Table 2.

The most useful evaluation criterion, which is that used by Bartlett et al., is the total percentage of patients with BEWE 2 or BEWE 3 erosion. These two categories indicate a large, irreversible loss of dental tissue.

There are clear differences between our results, collected in an at-risk population (patients with eating disorders) and those collected in a cohort based on the general population. This is expected, because it has been established that eating disorders are a risk factor for dental erosion.<sup>11</sup> Other possible reasons for the differences include the relatively small number of patients in our study and the fact that our patients were 16–54 years old, whereas the patients in the study conducted by Bartlett et al. were aged between 18–35 years. We know that the older a patient is, the higher the risk of erosion lesions, and the more likely it is that the existing lesions are at a more advanced stage.<sup>12</sup> For information, we report that of the 50 patients in our cohort, 7 had a total BEWE score between 9 and 18 (with 18 being the highest possible score). These scores represent a high level of dental tissue erosion, which requires appropriate treatment. The large difference between our study population and the general

**Table 1.** Results of the video analysis categorised by risk factor (percentage per item and corresponding number of participants in brackets).

	Number in the category	BEWE between 0 and 2	BEWE between 3 and 8	BEWE between 9 and 16	0 to 4 teeth eroded	5 to 10 teeth eroded	>10 teeth eroded	No maxillary incisor erosion	Maxillary incisor erosion
Male	4% (2)	0% (0)	50% (1)	50% (1)	0% (0)	50% (1)	50% (1)	50% (1)	50% (1)
Female	96% (48)	33.33% (16)	54.17% (26)	12.5% (6)	29.17% (14)	37.5% (18)	33.33% (16)	45.83% (22)	54.17% (26)
Under 25 years old	54% (27)	33.33% (9)	59.26% (16)	7.41% (2)	29.63% (8)	33.33% (9)	37.04% (10)	44.44% (12)	55.56% (15)
25 years or older	46% (23)	30.43% (7)	47.83% (11)	21.74% (5)	26.09% (6)	43.48% (10)	30.43% (7)	44.44% (11)	52.17% (12)
Restrictive anorexia nervosa	36% (18)	44.44% (8)	44.44% (8)	11.11% (2)	44.44% (8)	38.89% (7)	16.67% (3)	72.22% (13)	27.78% (5)
Purging-type anorexia nervosa	12% (6)	16.67% (1)	33.33% (2)	50% (3)	16.67% (1)	16.67% (1)	66.67% (4)	16.67% (1)	83.33% (5)
Bulimia with vomiting	30% (15)	33.33% (5)	60% (9)	6.67% (1)	26.67% (4)	26.67% (4)	46.67% (7)	33.33% (5)	66.67% (10)
Bulimia with other compensatory behaviours	18% (9)	22.22% (2)	66.67% (6)	11.11% (1)	11.11% (1)	66.67% (6)	22.22% (2)	33.33% (3)	66.67% (6)
Hyperphagia bulimia	4% (2)	0% (0)	100% (2)	0% (0)	0% (0)	50% (1)	50% (1)	50% (1)	50% (1)
No recreational drug use	78% (39)	33.33% (13)	53.85% (21)	12.82% (5)	28.21% (11)	41.03% (16)	30.77% (12)	51.28% (20)	48.72% (19)
Recreational drug use	22% (11)	27.27% (3)	54.55% (6)	18.18% (2)	27.27% (3)	27.27% (3)	45.45% (5)	27.27% (3)	72.73% (8)
No antidepressants	46% (23)	37.04% (10)	55.56% (15)	7.41% (2)	29.63% (8)	44.44% (12)	25.93% (7)	48.15% (13)	51.85% (14)
Antidepressants	54% (27)	26.09% (6)	52.17% (12)	21.74% (5)	26.09% (6)	30.43% (7)	43.48% (10)	43.48% (10)	56.52% (13)

(continued)

Table 1. Continued.

	Number in the category	BEWE between 0 and 2	BEWE between 3 and 8	BEWE between 9 and 16	0 to 4 teeth eroded	5 to 10 teeth eroded	>10 teeth eroded	No maxillary incisor erosion	Maxillary incisor erosion
No vomiting	58% (29)	34.48% (10)	55.17% (16)	10.34% (3)	31.03% (9)	48.28% (14)	20.69% (6)	58.62% (17)	41.38% (12)
Vomiting	42% (21)	28.57% (6)	52.38% (11)	19.05% (4)	23.81% (5)	23.81% (5)	52.38% (11)	28.57% (6)	71.43% (15)
No dry mouth	50% (25)	32% (8)	56% (14)	12% (3)	32% (8)	36% (9)	32% (8)	52% (13)	48% (12)
Dry mouth	50% (25)	32% (8)	52% (13)	16% (4)	24% (6)	40% (10)	36% (9)	40% (10)	60% (15)
No citrus consumption	58% (29)	34.48% (10)	58.62% (17)	6.9% (2)	31.03% (9)	48.28% (14)	20.69% (6)	44.83% (13)	55.17% (16)
Citrus consumption	42% (21)	28.57% (6)	47.62% (10)	23.81% (5)	23.81% (5)	23.81% (5)	52.38% (11)	47.62% (10)	52.38% (11)



**Table 2.** BEWE scores in our study vs Bartlett et al.

	Eating disorder unit study, 2017	Bartlett et al. study, 2013
Number of patients	50	3187
% of patients with erosion	92% (n = 46)	56.9% (n = 1819)
% of patients with erosion max = BEWE 1	42% (n = 21)	27.7% (n = 883)
% of patients with erosion max = BEWE 2	34% (n = 17)	26.1% (n = 831)
% of patients with erosion max = BEWE 3	16% (n = 8)	3.3% (n = 105)
% of patients with erosion max $\geq$ BEWE 2	50% (n = 25)	29.4% (n = 936)

population clearly shows the necessity of providing specific care for people with eating disorders.

### *Intrinsic and extrinsic risk factors*

Dental erosion can be induced by both intrinsic acids (gastric acid) and extrinsic acids (acidic food and drink). Bartlett and Coward<sup>13</sup> demonstrated in a laboratory experiment that gastric acid has a lower pH and a higher titratable acidity than carbonated drinks and fruit juices, and that gastric acid is therefore more likely to cause erosive lesions on the tooth enamel and dentine. These risk factors were both present in the patients in our study, of whom 42% (n = 21) reported self-induced vomiting, and 54% (n = 27) reported consuming citrus fruit or fizzy drinks on a daily basis.

We quantified self-induced vomiting in terms of frequency (per week) and duration (in years since the first appearance of signs of the disorder). Nearly 43% (n = 9) of the patients with SIV reported vomiting at least once per day, but only 3 patients reported vomiting over a period of 5 years or more. This figure is relatively low, and could be explained by patients recovering over the course of their treatment, signalling the end of self-induced vomiting, and/or by the fact that patients whose condition worsens are no longer followed up in the day hospital. The small number of patients in this category meant that we were not able to determine whether erosive lesions are present to a greater extent and at a more advanced stage in patients who have had SIV for more than five years.

We found at least one dental erosion lesion in 100% (n = 21) of the patients with SIV. This figure was higher than in other studies assessing dental erosion in patients with SIV (reported prevalence between 47% and 93%).<sup>6,7,12</sup> This difference could be explained by the fact that patients in our study were all being followed up in a dedicated unit (which implies a certain level of severity of the disorder and a need for treatment). It is interesting to identify that 52.38% (n = 11)

of these people had more than 10 teeth eroded and 71.43% (n = 16) had a total BEWE score superior to 3.

In our study, 54% (n = 27) of patients reported consuming food/drink known to erode enamel and dentine (fizzy drinks, citrus fruits etc.). Of these patients, 70% (n = 19) had more than 5 teeth with an erosive lesion, and 65% had at least 1 tooth with BEWE 2 or 3 type erosion. For comparison, Bartlett et al. found this type of lesion in 36.6% (n = 45) of patients who consumed acidic food/drink on a daily basis (n = 1135).

Multiple studies have demonstrated that the accumulation of different risk factors, and the subsequent increase in the frequency with which the teeth are exposed to acidity, increases the number and severity of dental erosion lesions in a given individual.<sup>6,14,15</sup>

### *Influence of saliva*

We found large variations in the prevalence and severity of dental erosion within our group of patients, who nevertheless had common risk factors. A wide range of factors, including salivary flow, composition of the saliva, quality of the acquired enamel pellicle, and enamel type seem to be just as important as the exposure of the dental surfaces to acid.<sup>11</sup> A study conducted by Frydrych et al. showed that qualitative differences in the composition of the saliva seem to be responsible for the speed of progression of erosive lesions in patients with SIV.<sup>15</sup> Touyz et al. found that patients with eating disorders had a lower salivary pH than the control group.<sup>12</sup> Conversely, Milosevic et al. did not find a significant difference in salivary pH in patients with bulimia compared to the control group.<sup>16</sup>

Frydrych et al. also studied the levels of salivary amylases, immunoglobins and various electrolytes present in the saliva, and found no differences between patients with eating disorders and the control group.<sup>15</sup> Other studies have shown a decrease in salivary flow in patients with SIV.<sup>6,17</sup> This difference could be explained by the fact that a large number of patients

receiving treatment for eating disorders are prescribed antidepressants, and the effects of psychotropic medications and antidepressants on salivary flow have long been recognized.<sup>18</sup> In our study, 54% (n=27) of patients were undergoing treatment with antidepressants and 22% (n=11) of patients reported regular use of recreational drugs. It should be noted, however, that we did not conduct any salivary tests in our study.

### Interest of dental telemedicine

The integration of a dental consultation via telemedicine in a hospital ward such as the eating disorders unit has a number of possible advantages. Many pathologies treated in hospital have direct repercussions on dental health, and vice versa. Due to long waiting lists and lack of availability it can be difficult to make an appointment with a dental surgeon, which means that it is not always possible for patients to receive a timely dental consultation. Dental telemedicine could be a solution to this problem, as it makes it possible to collect the necessary data from the patient on site. It would also make it possible to provide systematic dental check-ups in a given population.

If the practice of dental telemedicine became widespread long term, it is possible that in cases where the patient required treatment, the results of the asynchronous examination, and even the videos themselves, could be passed on to the dental surgeon treating the patient, which would reduce the time taken to treat the patient.

### Limitations of the study

In this study, the videos were recorded and analysed by the same person, an experienced practitioner who was skilled both in using the camera and in dental surgery. If this kind of project were to be implemented long-term in eating disorder units, the videos would be recorded by one of the staff in the unit, for example a nurse, then would be analysed by an authorised dental surgeon. In the current version of the software used, it is not possible to include the characteristics of the dental erosion while analysing the video. For the analysis, it was therefore necessary to record the various erosive lesions for each patient by hand while watching the video in order to calculate the different scores.

The teledentistry software we used did not allow us to identify the face of the tooth where the lesions were located. We were therefore not able to characterise the location of the dental erosion lesions according to the different tooth surfaces, as has been done in other studies.<sup>8,14,19,20</sup> However, the aim of our study was to assess whether or not the patient had lesions, rather than to analyse the location of the lesions.

## Conclusion

Despite the high prevalence of dental erosion in patients with eating disorders, there are not currently any specific treatment approaches. The use of teledentistry in a day hospital setting could lead to earlier detection of dental lesions, and therefore improved patient care. This method could also be used as a template for other applications of teledentistry in the future.

**Acknowledgements:** The authors want to acknowledge Jennifer Dobson for her work in the translation of the document and her participation in writing process. They also want to acknowledge the work of all the staff of the eating disorders department of the University Hospital of Montpellier who helped the investigators with the data collection.

**Contributorship:** Nicolas Giraudeau: Conception, Design, analysis and interpretation. Paul Camman: Acquisition, analysis and interpretation. Laurence Pourreyron: Conception and Design. Camille Inquimbert: Analysis and interpretation. Patrick Lefebvre: Conception, Design and interpretation.

**Declaration of conflicting interests:** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethical approval:** Ethical approval was obtained from the University Hospital of Montpellier (study number 9804). All patients signed a written informed consent form.

**Funding:** The author(s) received no financial support for the research, authorship, and/or publication of this article.

**Guarantor:** Nicolas Giraudeau.

**Peer review:** Hani Ounsi, Lebanese University, has reviewed this manuscript.

**ORCID ID:** Nicolas Giraudeau  <https://orcid.org/0000-0003-1141-0171>

## References

1. Lussi A and Jaeggi T. *L'érosion dentaire : diagnostic, évaluation du risque, prévention, traitement [Dental erosion: diagnosis, risk assessment, prevention, treatment]*. Germany: Quintessence International, 2012 (French).
2. Romanos GE, Javed F, Romanos EB, et al. Oro-facial manifestations in patients with eating disorders. *Appetite* 2012; 59: 499–504.
3. Pedinielli J-L, Ferran A, Grimaldi M-A, et al. *Les troubles des conduites alimentaires [Eating disorders]*. Paris: Armand Colin, 2012.
4. Giraudeau N, Valcarcel J, Tassery H, et al. Projet e-DENT: Téléconsultation bucco-dentaire en EHPAD. *Eur Res Telemed* 2014; 3: 51–56.

5. Bartlett D, Ganss C and Lussi A. Basic erosive wear examination (BEWE): a new scoring system for scientific and clinical needs. *Clin Oral Invest* 2008; 12: 65–68.
  6. Rytömaa I, Järvinen V, Kanerva R, et al. Bulimia and tooth erosion. *Acta Odontol Scand* 1998; 56: 36–40.
  7. Ohrn R, Enzell K and Angmar-Månsson B. Oral status of 81 subjects with eating disorders. *Eur J Oral Sci* 1999; 107: 157–163.
  8. Johansson A-K, Norring C, Unell L, et al. Eating disorders and oral health: a matched case-control study. *Eur J Oral Sci* 2012; 120: 61–68.
  9. Vered Y, Lussi A, Zini A, et al. Dental erosive wear assessment among adolescents and adults utilizing the basic erosive wear examination (BEWE) scoring system. *Clin Oral Invest* 2014; 18: 1985–1990.
  10. Bartlett DW, Lussi A, West NX, et al. Prevalence of tooth wear on buccal and lingual surfaces and possible risk factors in young European adults. *J Dent* 2013; 41: 1007–1013.
  11. Robb ND, Smith BG and Geidrys-Leeper E. The distribution of erosion in the dentitions of patients with eating disorders. *Br Dent J* 1995; 178: 171–175.
  12. Touyz SW, Liew VP, Tseng P, et al. Oral and dental complications in dieting disorders. *Int J Eat Disord* 1993; 14: 341–347.
  13. Bartlett DW and Coward PY. Comparison of the erosive potential of gastric juice and a carbonated drink in vitro. *J Oral Rehabil* 2001; 28: 1045–1047.
  14. Uhlen M-M, Tveit AB, Stenhagen KR, et al. Self-induced vomiting and dental erosion—a clinical study. *BMC Oral Health* 2014; 14: 92.
  15. Frydrych AM, Davies GR and McDermott BM. Eating disorders and oral health: a review of the literature. *Aust Dent J* 2005; 50: 6–15; quiz 56.
  16. Milosevic A and Dawson LJ. Salivary factors in vomiting bulimics with and without pathological tooth wear. *Caries Res* 1996; 30: 361–366.
  17. Dynesen AW, Bardow A, Petersson B, et al. Salivary changes and dental erosion in bulimia nervosa. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008; 106: 696–707.
  18. Hunter KD and Wilson WS. The effects of antidepressant drugs on salivary flow and content of sodium and potassium ions in human parotid saliva. *Arch. Oral Biol* 1995; 40: 983–989.
  19. Hellström I. Oral complications in anorexia nervosa. *Eur J Oral Sci* 1977; 85: 71–86.
  20. Järvinen V, Rytömaa I and Meurman JH. Location of dental erosion in a referred population. *Caries Res* 1992; 26: 391–396.
-