

# The Quality of Online Information on Cosmetic Injectable Fillers: Current Status

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## Abstract

Web-based health information plays an increasingly vital role in spreading health information. Many patients interested in aesthetic surgery study the procedure on the Internet. This study aims to evaluate the quality of online health information on injectable fillers using the modified “Ensuring Quality Information for Patients” (EQIP) tool. Nine different search terms, including “fillers,” “fuller cheeks,” “wrinkle removal,” and “antiwrinkle treatment” were identified and queried on Google. Unique links from the first three pages of each search term were identified and evaluated if the contents were in English language and were for general non-medical public use. A total of 172 websites were analyzed, with a median EQIP score of 20. In total 129 websites belonged to aesthetic practitioners, of which 81 were operated by medical doctors. Eighty-three percent of websites disclosed some forms of postoperative complications, most commonly edema (74%) and bruising (73%). Blindness and tissue necrosis were only mentioned by 12 and 10% of the websites, respectively. The current health information available on injectable fillers is of poor quality. While many do provide some information on risks, the majority of websites fail to disclose severe complications and quantifying risks. This poses a barrier against informed decision-making and may lead to unrealistic expectations. Patient satisfaction and expectations may be improved by developing better online education resources on fillers.

## Keywords

- ▶ injectable fillers
- ▶ patient information
- ▶ ensuring quality information for patients
- ▶ aesthetic surgery
- ▶ cosmetic procedures

Injectable filler is a popular cosmetic procedure utilized to reduce the appearance of wrinkles,<sup>35</sup> provides regional augmentation, and more recently, used for additional procedures such as nonsurgical rhinoplasty.<sup>1</sup> Various techniques are described for the introduction of injectable filler into the dermis or subcutaneous tissue, with non-permanent hyaluronic acid-based fillers most frequently used.<sup>2,3</sup> In the United States, injectable fillers are classified as

medical devices and are subjected to stringent regulations imposed by the Food and Drug Administration (FDA).<sup>1</sup> However, in other countries, such as the United Kingdom, these procedures remain almost entirely unregulated and were described as “a crisis waiting to happen” by the Department of Health.<sup>4</sup>

Injectable fillers constitute a multibillion-dollar industry, with an estimated 3.8 million procedures undertaken within

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the United States alone in 2019.<sup>5</sup> They continue to rapidly grow in popularity, with the number of procedures more than doubling over the last decade.<sup>6</sup> The increasing popularity of injectable fillers corresponds with an increased incidence of complications.<sup>7</sup> Common risks include pain, edema, erythema, and bruising, but these tend to be mild and self-limiting.<sup>7,8</sup> Hypersensitivity reactions, infection, persistent nodules, granulomas, and filler migration are less common, but may necessitate further medical or surgical treatment.<sup>9,10</sup> Severe complications are rare, but includes vascular occlusion which can lead to skin necrosis or permanent vision loss, both of which are well-described in the existing literature.<sup>9,11,12</sup> These severe complications lead to permanent, life-altering consequences for patients.<sup>12</sup> Litigatory proceedings following cases of severe complications have found that the majority of patients were not adequately counselled about the risks of injectable fillers.<sup>9</sup>

Up to 95% of patients considering a cosmetic procedure will consult online resources prior to any intervention,<sup>13</sup> creating the need for high quality and readily available online information. However, the lack of regulation of online resources can result in misinformation through the abundance of uncredible or biased sources.<sup>14</sup> The “Ensuring Quality Information for Patients” (EQIP) scale is a validated tool that can assess the readability, quality, and design of written health information.<sup>15</sup> We recently published our experience of using the modified EQIP tool to assess the quality of online information for aesthetic surgical procedures, such as rhinoplasty, and found the online information to be inadequate.<sup>16–18</sup> Our previous work helps demonstrate the importance of providing patients with balanced information on the risks and benefits of a procedure to enable informed consent and decision-making.<sup>18,19</sup> The quality of information on the internet available to patients relating to injectable fillers has not previously been assessed, making this the first study of its kind.

## Materials and Methods

### Eligibility Criteria, Information Sources, and Data Selection

A search was conducted on the most popular search engine, Google,<sup>20</sup> to create a database of websites. Only one search engine was used to identify relevant websites as previous research has shown that utilizing additional search engines will only duplicate results.<sup>21–23</sup> Nine different search terms were identified by two specialists (E.S. and A.D.S.) to identify websites with health information on fillers: “treatment for wrinkling,” “antiwrinkle treatment,” “eye lift,” “fresh forehead,” “forehead creases,” “fillers,” “fuller cheeks,” “wrinkle removal,” and “crease removal.” All websites that contained health information intended for patients and consumers were included. Websites intended for scholars in scientific journals, in languages other than English, only providing video-based information for purely marketing purposes, were excluded. Any websites that are hidden behind paywalls or not accessible to the general public, such as content locked behind General Data Protection Regulation restric-

tions, were also excluded. As the scope of our study does not extend to the use of botulinum toxin or other neurotoxins, websites solely explaining these procedures will be excluded; websites focusing on fillers but mention neurotoxins as an alternative are included. The creation of the database, assessment, and analysis of eligible websites was performed between July and September 2021.

### Website Search

Web scraping is conducted based on the habits of general web users, as the majority do not search beyond the first page and even fewer past the first three pages.<sup>24</sup> Therefore, the first three pages of returned websites were collected. To ensure diverse representation of websites from other countries, a virtual private network was used to alter the internet protocol address of the search to display the results that patients based in those locations would see. As only English language websites are included, the four main contributing countries identified from previous studies were used as the origin of website search: Australia, Canada, United Kingdom, and the United States of America. The final database consisted of unique weblinks from each of the nine search terms that were queried from the four individual locations.

### Data Entry and Additional Items

Under supervision of #1, the websites were assessed independently by three authors (#2, #4, and #5) all of whom are fluent in English language. Website assessment was completed using a Google Form of the 36 EQIP criteria through “Yes,” “No,” and “N/A” responses. The country of origin and the type of information source were also collected: academic centre, encyclopedia, health department, hospital, industry/pharmaceutical sources, news service, patient group, practitioner (medical doctors), practitioners (non-medical), practitioner (unspecified), and professional society. Concerns or ambiguities during websites assessment are discussed and resolved by consensus.

This study has adapted the EQIP assessment specifically to fillers, and includes whether adverse outcomes are reported adequately. The inclusion of information on injectable fillers and nonsurgical rhinoplasty is recorded where mentioned. Specific postoperative information was also evaluated, including both medical and cosmetic complications.

### Modified EQIP Tool

The original EQIP tool was a 20-item checklist developed to assess written health care information.<sup>15</sup> It was designed to evaluate aspects of health information that are important, ranging from the clarity of information and the quality of written work to the actual design and structure of the information. The EQIP tool, and its 36-item modified version, provide robust and effective analysis of patient information. The tools set out to satisfy the patient information collaboration guidelines of both the International Patient Decision Aids Standards<sup>25</sup> and the British Medical Association.<sup>26</sup> Our group previously utilized the modified EQIP tool to assess online rhinoplasty information,<sup>18</sup> alongside various other specialties and diseases, ranging from appendicitis,<sup>21</sup> gallstone disease,<sup>22</sup> and the Coronavirus pandemic.<sup>23</sup>

Our assessment utilized the more comprehensive modified version of EQIP which consists of three domains: content (items 1–18), identification (items 19–24), and structure (items 25–36). Similar to previous studies, only “Yes,” “No” options were used in 36 items to avoid introducing subjectivity. An option of “N/A” was included for five items that were irrelevant for certain types of sources. Similar to previous studies, the 75th percentile serves as a cut-off to discriminate high-scoring websites from low-scoring websites.<sup>21,22</sup>

### Patient and Public Involvement

There was no patient or public involvement in the conception, design, or data collection of the study or the production of the manuscript.

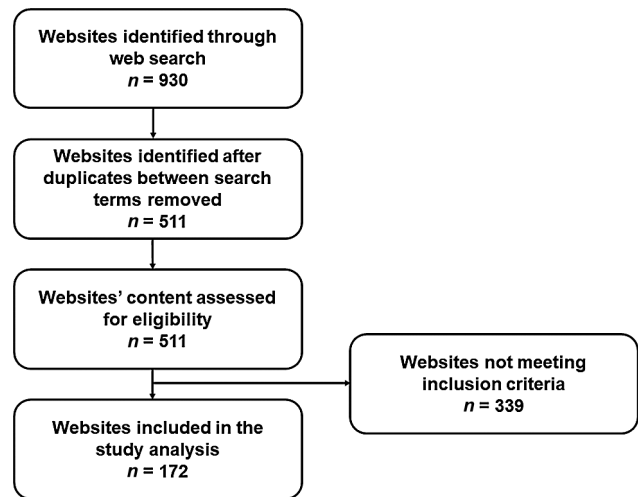
## Results

### Website Search

The nine search terms returned a total of 930 websites, of which 511 were assessed after removing duplicates between search locations and search terms. A further 339 websites were removed based on exclusion criteria, leaving a final database of 172 websites. The workflow of dataset creation is shown in ►Fig. 1.

### Website Demographics

Assessed websites originated from the four countries where the search was executed. Australia contributed the greatest number of websites. The median EQIP scores range between 19 and 21.5 (►Fig. 2). Distribution of websites by country and EQIP score is shown in ►Table 1. ►Supplementary Table S1 (available in the online version only) displays the performance of individual EQIP criteria for the website cohort and the differences in criteria fulfilment between high- and low-scoring websites. The minimum and maxi-

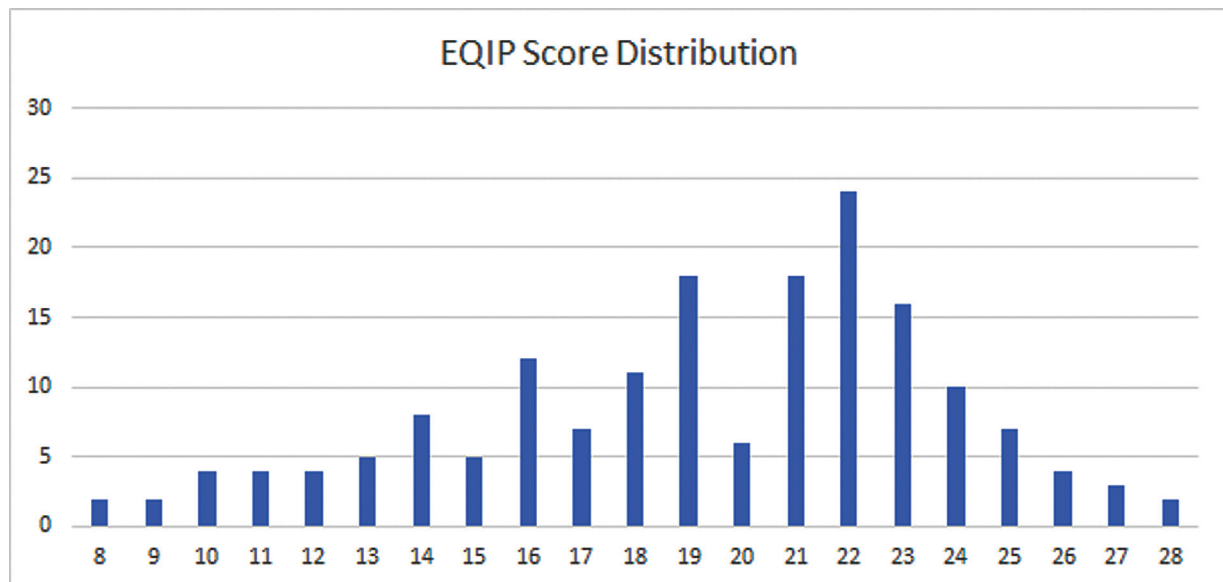


**Fig. 1** Flow diagram representing the number of websites included at each stage of the search process.

imum EQIP scores are 8 and 28, respectively. The 75th and 99th percentile EQIP score is 22 and 27. The breakdown and distribution of scores by EQIP category is shown in ►Table 2. Majority of websites ( $n = 132$ ) are from practitioners, of which 81 were medical doctors, 38 were not specified, and 13 were non-medical practitioners. The News Service cohort had the highest median EQIP score of 23. EQIP scores by the source of information are shown in ►Table 3.

### Postoperative Complications and Non-Injectable Alternatives

The majority of websites included some information about postoperative complications and risks, but 30 (17%) did not. The most commonly mentioned complication was edema ( $n = 128$ ; 74%) and bruising ( $n = 126$ ; 73%). Websites that discuss the potential need for further treatment or surgery for nodules following filler injections, received the highest



**Fig. 2** Distribution of ensuring quality information for patients (EQIP) score for websites analyzed.

**Table 1** Median Ensuring quality information for patients (EQIP) scores for each country of origin of the websites analyzed

Country	Articles <i>n</i> (%)	Median EQIP
Australia	54 (31%)	21
Canada	30 (17%)	21.5
United Kingdom	43 (25%)	19
United States	45 (26%)	19

**Table 2** Overview of ensuring quality information for patients (EQIP) score including scores in each subsection and overall total

	Content	Identification	Structure	Overall EQIP
Median	10	1.5	8	20
Minimum	2	0	3	8
Maximum	15	5	12	28
Quartile 1	7	1	8	16
Quartile 3	12	2	9	22
IQR	5	1	1	6
75th percentile	12	2	9	22
99th percentile	14.3	4.3	11.0	27.3

**Table 3** Ensuring quality information for patients (EQIP) performance categorized by website source of information

Source of information	Articles <i>n</i> (%)	Median EQIP
Hospital	15 (9%)	19
Industry	1 (1%)	10
News service	14 (8%)	23
Others	5 (3%)	18
Practitioner (doctor)	81 (47%)	19
Practitioner (non-medical)	13 (8%)	18
Practitioner (not specified)	38 (22%)	20.5
Professional society	5 (3%)	19

median EQIP scores of 24 (*n* = 10; 6%). ► **Table 4** shows the performance of websites by the postoperative complications discussed. The median EQIP score for websites that do not disclose complications or risks have a poorer median EQIP score of 20. Of the 142 websites that discussed complications and risks, none quantified the risks: risks were discussed using qualifiers such as “common,” “uncommon,” and “rare” when mentioned. A total of 131 (76%) websites specifically mentioned injectable fillers specifically, of which only 17 failed to specify any risk and complication. Of the 18 websites that mentioned injectable fillers use in nonsurgical rhinoplasty, only six mentioned risks. Commonly reported filler-specific risks include swelling, tenderness, bruising, and discoloration.

**Table 4** Mean performance of websites by specific postoperative complications and risks mentioned

Postoperative complications	Articles <i>n</i> (%)	Median EQIP
No complications mentioned	30 (17%)	20
Edema	128 (74%)	21
Bruising	126 (73%)	21
Erythema	88 (51%)	21
Pain	70 (41%)	22
Lumps, asymmetry, or contour irregularity	53 (31%)	22
Infections	43 (25%)	22
Hypersensitivity	29 (17%)	22
Blindness	20 (12%)	23
Local tissue and skin necrosis	18 (10%)	23
Nodules requiring minor treatment and surgery	10 (6%)	24
Tyndall effect	8 (5%)	22

## Discussion

This is the first study evaluating the quality of online patient information for aesthetic injectable fillers. The median EQIP score of 20 found in this study suggests that current online information for patients regarding injectable fillers is of poor quality. This is in keeping with our previous study that demonstrated the low quality of online patient information for rhinoplasty (median EQIP 17).<sup>18</sup> Other authors have reported low EQIP scores on breast augmentation<sup>16</sup> and liposuction<sup>17</sup> with median scores of 15 and 16, respectively.

Seventy-two percent of the resources analyzed in this study were from medical practitioners who offered injectable fillers. These included both the lowest (EQIP 8) and highest (EQIP 28) scoring websites, and despite being the predominant source of online patient information, they had the highest variability when it came to assessment of quality. Four websites from professional societies were identified, all being from the United States. The quality of these resources compared unfavorably with a median EQIP score of 19 (range = 14–23). Comparatively, the National Health Service of England webpage was a higher scoring resource with a score of 26. With the overall low quality of information available to patients, there is an opportunity for professional societies to produce reliable and unbiased resources to fill this void.

The study has highlighted two main areas where online patient information for injectable fillers is inadequate: details of the risks and complications of the procedure and the transparency of the presented data and information in the creation of their webpages.

### Risks and Complications of Injectable Fillers

Our findings suggest that online patient resources related to injectable fillers are inadequate in detailing the risks and complications associated with the procedure. While most resources (83%) gave some information on risks, the majority limited this to the common and generally self-limiting side effects of: edema (74%), bruising (73%), erythema (51%), and pain (41%). The severe and potentially life altering complications of blindness and tissue necrosis were mentioned in only 12 and 10% of websites, respectively. Webpages that did mention the more severe complications tended to have higher associated EQIP scores (– **Table 4**). Resources which only mention the mild risks may inadvertently give patients the impression that there are no more serious complications. Furthermore, in the United Kingdom, the guidelines of the General Medical Council on decision-making and consent emphasize that high quality medical information should be provided to patients to make informed decisions, with specific inclusion of “any risk of serious harm, however, unlikely it is to occur.”<sup>27</sup> Failure to mention these severe complications is likely to fall short of the standards of informed consent.<sup>28</sup> Seventeen percent of websites made no comment on the risks at all.

None of the online resources analyzed gave quantitative data on the rate of the complications reported. A minority of sources used terminology such as: “common,” “rare,” “very rare” to quantify complication rate with little expansion of the definition of these terms. Provision of the rates of complications can be helpful, but only when done in a manner that avoids introducing confusion.<sup>29</sup> However, providing reliable data on the complications of injectable fillers is hindered by the lack of accurate reporting due to their unregulated nature in many countries, as well as variations in complication rate by anatomical site and the injectable filler substance introduced. As these confounding factors may make it difficult to portray individualized data concisely, adopting simple quantifiers may provide an acceptable option which can be expanded upon at consultation or through further resources.

Of the 18 websites that mentioned nonsurgical rhinoplasty using injectable fillers, only six mentioned risks. This procedure is becoming more common, and is used off-license. The risks mentioned include swelling, tenderness, bruising, and discoloration. There was a lack of emphasis that this is a temporary measure, with no long-term data on its outcomes and also carries a higher risk of skin necrosis than other areas of the face. In our experience, subsequent surgical rhinoplasty results may also be compromised, particularly where tip refinement is required because of the effect of fillers on soft tissues and nasal cartilages.

### Transparency of Presented Data and Information

Only 7% of the analyzed resources contained a referenced bibliography to support the assertions made within the article. Furthermore, many resources included patient case examples, often in the form of “before and after” photo-

graphs, which may not be representative of the procedure's general outcomes. Only 6% of the resources included a statement on the source of these exemplary cases, and how these were collected. Together, these features indicate a lack of transparency in the accumulation and presentation of scientific and patient data, presenting another barrier against informed decision making.

To ensure patients can make effective and informed decisions, balanced, reliable and up-to-date information must be accessible. Patients seek for such information which helps address their concerns and leads to better health outcomes.<sup>30,31</sup> Through better patient education, we can optimize the shared decision-making process and ensure expectations are maintained in cosmetic procedures like injection of fillers.

As seen in other similar studies, the use of websites and social media is increasingly popular among medical practitioners who seek to promote themselves and their services to potential customers.<sup>17,23,32,33</sup> In a competitive marketplace, it is possible that the clear signposting of risks and complication rates of their own practice may deter potential clients<sup>17</sup> and push them toward surgeons who do not declare such information. It is known that there is a higher incidence of publications with positive conclusions from surgeons with financial conflicts of interest versus those with no financial interests.<sup>34</sup> This is supported by our findings where qualitative benefits of the surgery were explained in nine out of 10 websites, but complications rates in less than one, thus, highlighting the potential conflict between financial interests and accurate representation of the risks and benefits of these cosmetic procedures and the need for better regulation of information provided by these services.

### Limitations

The selection of search terms may not be a comprehensive representation of all the search terms used by patients seeking information regarding injectable fillers. Similarly, as only the first three pages of each Google search were included in this study, our results are limited to a snapshot of both websites content and their relative popularity. Content posted exclusively on social media was not included in this study, and this content may contribute considerably to patients seeking information on injectable fillers due to increase in marketing on these platforms.<sup>13</sup> Furthermore, while all of the returned websites were written in English, other online resources encountered by patients will be in other languages and may be of different quality but is out of the scope of our study.

While our study assesses the quality of some online resources, further work is needed to summarize the quality of information provided on social media, video-based content, and physical paper leaflets provided to patients. We recognize that websites cannot always include all the information a patient may want or need to make fully informed decisions and that clinicians vary in how they deliver such information and hence our assessment will not be comprehensive. Furthermore, the argument could be made that

online webpages are not the medium through which informed consent should try to be achieved, and detailed discussion of risks could be unnecessary. However, given the popularity of using the internet and web-based resources for marketing purposes, it is good practice to provide honest, transparent, and up-to-date information irrespective of the clinician's or organization's agenda. This can act as a useful adjunct to the personalized individual consultation and provide a more complete informed consent process. As we have entered an era where patients will often perform research on the internet for information on their procedure or doctor, it is vital to maintain the integrity of information available to allow patients to make unbiased and informed decisions.

## Conclusion

Our work has identified that online resources regarding injectable facial fillers, including nonsurgical rhinoplasty, are of low quality, with the majority failing to inform patients accurately of the risks, complications, and outcomes of the procedure. This lack of information may lead to unrealistic expectations and increase patient dissatisfaction, which is particularly relevant to elective cosmetic procedures. Similar to our previous work, and existing literature on cosmetic procedures, we identified that health care professionals should produce higher quality and balanced information to adequately educate patients and enable informed decision making.

### Note

The authors confirm that the ethical policies of the journal, as noted on the journal's author guidelines page, have been adhered to. Formal ethical approval was not required as there was no involvement of patients in any form with this study.

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### Conflict of Interest

None declared.

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