

# Smartphone Applications and Website Software Available for Pre-Operative Virtual Rhinoplasty Planning

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## Abstract

**Background:** There are emerging virtual simulation technologies that allow facial plastic surgeons to accurately and objectively show patients how they may appear following rhinoplasty surgery. There is no collective understanding of which virtual rhinoplasty preoperative planning software exist and their associated features.

**Aim:** This article will synthesise information on smartphone and web-based resources for virtual rhinoplasty planning to provide facial plastic surgeons with an up-to-date understanding of the available technologies.

**Methods:** This was a cross-sectional website and smartphone application software review. The Apple App Store and the Google Play were searched for smartphone applications and the Google search engine was searched for website software.

**Results:** Five websites and six smartphone applications met inclusion criteria. Software features included self-directed simulation, in-app purchases, multiple languages, three-dimensional facial rendering and patient-specific perioperative planning.

**Conclusion:** Many smartphone and website based software exist for surgeons to plan their patients' rhinoplasties. Further data is needed to understand how facial plastic surgeons and patients perceive this software.

**Conflicts of Interest:** The Authors declare no conflicts of interest.

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## Introduction

Rhinoplasty is one of the most performed operations in facial plastic and reconstructive surgery (FPRS). Establishing realistic surgical expectations prior to surgery leads to greater post-operative patient satisfaction (1).

Many surgeons use visual models to show patients how their nose may appear following surgical intervention, allowing them to establish reasonable objective expectations (2). An imperative part of the rhinoplasty consultation involves the acquisition of patient photographs. Facial plastic surgeons use these photographs with annotations/drawings to

show patients how their nose may appear following surgery and to assist with surgical planning (3).

In the last decade, technology has advanced with regards to virtual and augmented reality (VR and AR), with many applications in plastic surgery, including surgical planning, navigation, and training (4-5). What have emerged from these technologies are accessible platforms that allow surgeons to use (AR) to accurately and objectively show patients how they may appear following surgery. Despite this usage, there is no

collective understanding of which virtual rhinoplasty preoperative planning software exist and their associated features.

This article will synthesise information on smartphone and web-based resources for virtual rhinoplasty planning to provide facial plastic surgeons with an up-to-date understanding of the available technologies. With this unified understanding, facial plastic surgeons may be able to provide more objective and precise preoperative expectations for their patients, ultimately improving rhinoplasty patient satisfaction.

## Methods

This was a cross-sectional website and smartphone application software review. This article does not contain any studies with human participants or animals performed by any of the authors.

The searches were completed in December of 2021. The Apple App Store (California, USA) and the Google Play Store (California, USA) were searched for smartphone applications and the Google search engine (California, USA) was searched for websites with the following keywords “rhinoplasty or nose job simulator”, “rhinoplasty or nose job planner”, “virtual rhinoplasty or nose job”, “rhinoplasty or nose job model”. All smartphone applications were searched for each keyword. The first five pages from each keyword were searched on Google for relevant websites. All smartphone applications and websites that included a virtual rhinoplasty planner/simulator which would allow a surgeon to upload a patient photograph and virtually alter the patient’s nose were included in this review.

Virtual body/face editing applications and websites created for non-academic/surgical use (such as those for social media purposes) were excluded from this review. These applications were determined by observing no obvious or explicit academic/surgical descriptors on the application’s interface. All paid advertised websites were excluded. Surgeon/clinic

specific websites that embedded non-original software/technology into their websites were excluded from this review

## Results

### Website software results

Four hundred websites were searched using the aforementioned search strategy. Five websites met the inclusion criteria. 80% of the websites were published in the USA and all websites were published in English.

One website had 14 other languages available. All websites allowed users to upload pictures of them and simulate how their rhinoplasty may appear on their pictures. One website created a 3D (three-dimensional) rendering of the patient’s face to allow the viewer to see simulated surgical changes in 3D.

Further website details such as URLs, website names and pricing can be found in Table 1.

### Apple app store and Google play store results

The Apple App Store and the Google Play Store were searched using the search strategy. Six smartphone applications met inclusion criteria.

An additional 16 smartphone applications were found and exclude that used the software in the included applications for surgeon/surgical centre-specific applications. For example, Surgeon X, created an application for their own surgical practice using FaceTouchUp simulator embedded within their application.

One application allowed patients to scan their face to allow for 3D rendering of their face to simulate rhinoplasty surgical changes. Further details about the specific software can be found in Table 1.

**Table 1.** Website and application software for virtual rhinoplasty planning

| Software name and platform     | App store available          | Website URL                                                                                                                   | Software company | Year published | Country published | Language                                          | Cost                                                                                                                | Size     | Features                                                                                                                                               |
|--------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|-------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Facetouchup                    | N/A                          | <a href="https://www.face touchup.com/plastic-surgery-simulator/">https://www.face touchup.com/plastic-surgery-simulator/</a> | N/A              | 2021           | USA               | English                                           | \$0                                                                                                                 | N/A      | Rhinoplasty simulator using patient's own photos                                                                                                       |
| Plastic Surgery Simulator      | N/A                          | <a href="https://www.plastic-surgery-simulator.com/">https://www.plastic-surgery-simulator.com/</a>                           | N/A              | 2018           | N/A               | English                                           | \$0                                                                                                                 | N/A      | Rhinoplasty simulator using patient's own photos                                                                                                       |
| Crisalix Virtual Aesthetics    | N/A                          | <a href="https://www.crisalix.com/en">https://www.crisalix.com/en</a>                                                         | N/A              | N/A            | Switzerland       | English and 14 languages available                | \$24 USD                                                                                                            | N/A      | 3D before and after simulator with patients own 3d simulation                                                                                          |
| New Look Now                   | N/A                          | <a href="https://www.newlooknow.com/">https://www.newlooknow.com/</a>                                                         | N/A              | 2021           | USA               | English                                           | Only available to providers - cost not specified on website                                                         | N/A      | Upload photograph and in less than 24 hours rhinoplasty simulation provides high-quality simulation of surgical results for rhinoplasty                |
| Discover Beauty                | N/A                          | <a href="https://www.discoverbeauty.com/consult">https://www.discoverbeauty.com/consult</a>                                   | N/A              | 2015           | USA               | English                                           | \$0                                                                                                                 | N/A      | Rhinoplasty simulator using patient's own photos                                                                                                       |
| Rhinoplasty Pakistan Simulator | Apple app store              | N/A                                                                                                                           | Temur Khurram    | 2021           | Pakistan          | English                                           | \$0                                                                                                                 | 698.4 KB | Rhinoplasty planner using the patient's own face Has guiding-lines features, adjustable sensitivity allowing the amount of displacement in each touch. |
| FaceTouchUp Nose Job Simulator | Apple app store, Google Play | N/A                                                                                                                           | Pixineers Inc.   | N/A            | USA               | English, Arabic, German, Chinese Spanish, Swedish | \$0 with In-App purchases (\$2.79 for 5 photo credits, \$13.99 for 25 photo credits, \$39.99 for 100 photo credits) | 35.3 MB  | Rhinoplasty simulator using patient's own photos                                                                                                       |
| Rhinote                        | Apple app store              | N/A                                                                                                                           | Can Alper Cagici | N/A            | Turkey            | English and Turkish                               | \$0 (one month free trial and then 27 TL per month)                                                                 | 13.5 MB  | Patient specific illustrations created about patient specific surgery                                                                                  |
| GS Clinic                      | Apple app store              | N/A                                                                                                                           | IMED APPS LCC    | N/A            | Russia            | English and Russian                               | \$0                                                                                                                 | 16.5 MB  | Rhinoplasty simulator using patient's own photos                                                                                                       |
| AEDIT: 3D Aesthetic Simulator  | Apple app store              | N/A                                                                                                                           | AEDIT LCC        | N/A            | USA               | English                                           | \$0 with in app purchase (All access pro monthly 1 month = \$8.49, all access pro annual 1 year = \$68.99, All      | 200.4 MB | Try on aesthetic procedures with medically accurate 3D simulators - connect with board certified providers.                                            |

|                              |                |     |                 |      |       |         | access pro<br>semiannual =<br>\$40.99) |          |                                                                                                                                                                               |
|------------------------------|----------------|-----|-----------------|------|-------|---------|----------------------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Photo Plastic<br>Surgery Pro | Google<br>Play | N/A | Jiang<br>Wenyou | 2021 | China | English | \$0                                    | 38<br>MB | Rhinoplasty Simulator<br>using patient's own<br>photos, allows for change<br>to nose position<br>(horizontal / vertical),<br>scale, rotation, size<br>(horizontal / vertical) |

N/A = not applicable

## Discussion

This review highlighted the available website and smartphone applications for preoperative virtual rhinoplasty planning. The results demonstrate that there is multiple softwares available across different countries in the world, published in greater than fourteen languages. This finding demonstrates the global usage of such virtual rhinoplasty applications. Certain software rendered 3D images of the patient to give the surgeon and patient a more realistic view of how their rhinoplasty may appear. Other smartphone and web-based software exist for individuals to virtually edit all anatomical locations of their bodies including their faces. For example, the most common for facial editing is FaceTune. These applications are mostly created for social media users and not for medical or surgical purposes. Certain pitfalls of these applications include the abundant choices available to individuals with the potential for powerful body and face editing by non-professionals. A study found that 56.5% of users of face-editing applications positively influenced the user to pursue facial cosmetic procedures. However, 66% of individuals that reported regret after using face-editing applications felt these technologies gave unrealistic surgical expectations (6). In another study, Chen et al. showed casual observers and FPRS expert's pictures of edited and unedited faces (7). The casual observer rated edited photos as more feasible from a surgical

perspective than the surgeon experts. This finding further accentuates the unrealistic expectations that self-editing applications may provide for patients if these edits are not completed in congruence with an experienced surgeon. If patients simulate their faces to unattainable surgical results this may lead to unrealistic preoperative surgical expectations. Hence, there is a role for face-editing applications such as the ones included in this review, but any virtual face/nasal augmentation should be used by surgeons in a clinical setting to ensure realistic expectations for patients. This investigation has inherent limitations. Our search criteria may not have captured all or the most useful applications for practitioners and was limited to those primarily available in the English language. Furthermore, search engine optimization introduces an inherent bias in the produced results. Finally, application and website software are rapidly evolving and constantly updating. Regardless, this writing serves as a guidebook for surgeons interested in reviewing the most used facial editing applications.

## Conclusion

Many smartphone and website based software exist for surgeons to plan their patients' rhinoplasties. Further data is needed to understand how facial plastic surgeons and patients perceive these softwares. Additionally, it would be important to research if these applications contribute to improved patient satisfaction following rhinoplasty.

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