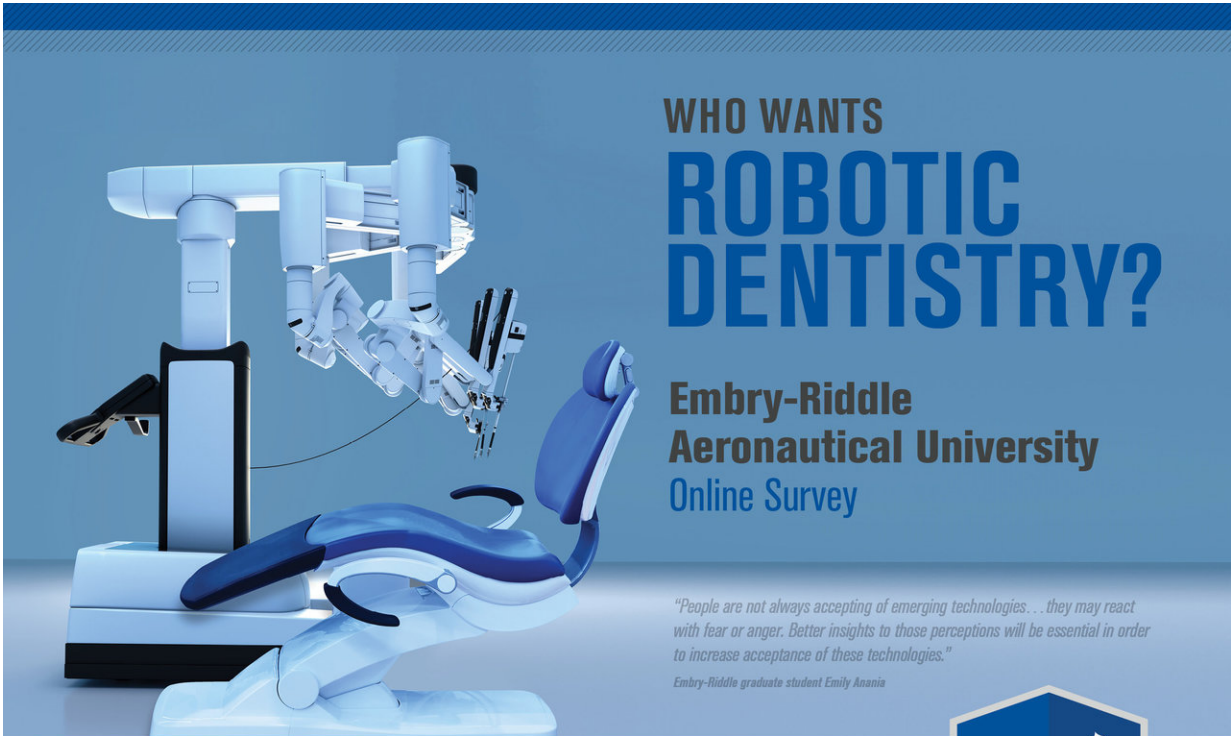


Patients more likely to accept robotic dentistry for non-invasive procedures

March 27 2018



WHO WANTS ROBOTIC DENTISTRY?

**Embry-Riddle
Aeronautical University**
Online Survey

"People are not always accepting of emerging technologies... they may react with fear or anger. Better insights to those perceptions will be essential in order to increase acceptance of these technologies."

Embry-Riddle graduate student Emily Anania

**With a
Discount**

83%

Said yes for cleaning & whitening with a 50% discount



502

Surveyed Respondents
- 260 Female

**Without
a Discount**

66%

Said no way for invasive dental procedures



51%

No thanks, in general

32%

No thanks, even for cleaning & whitening

Would you let a robotic dentist -

- ▶ Clean your teeth
- ▶ Extract teeth
- ▶ Perform a root canal
- ▶ Whiten your teeth
- ▶ Apply a sealant
- ▶ Apply a cap
- ▶ Bond your teeth
- ▶ Perform gum surgery
- ▶ Apply braces
- ▶ Fill a cavity



Survey participants were "significantly less willing to undergo more invasive procedures, such as gum surgery and a root canal, and significantly more willing to undergo procedures such as tooth cleaning or whitening performed by a robot."

Stephen Rice, Ph.D., associate professor, human factors

Research Authors: Emily Anania, Mattie N. Milner, Nadine Ragbir, Matt Pierce, Nathan W. Walters, Stephen Rice.

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In an online survey of 502 individuals (260 female), participants were

'significantly less willing to undergo more invasive procedures, such as gum surgery and a root canal, and significantly more willing to undergo procedures such as tooth cleaning or whitening performed by a robot,' Embry-Riddle Aeronautical University researchers said. Credit: Jon Metz/Embry-Riddle Aeronautical University

You're waiting to get your teeth cleaned, half-doing in a chair with your mouth propped open when a robot appears to do the job. Would you be willing to undergo a dental cleaning performed by a robot? How about a root canal? Autonomous gum surgery, anyone?

What if the robotic procedure was offered at half-price?

In an online survey of 502 individuals (260 female), participants were "significantly less willing to undergo more invasive procedures, such as gum surgery and a [root canal](#), and significantly more willing to undergo procedures such as tooth cleaning or whitening performed by a [robot](#)," said Stephen Rice, associate professor of [human factors](#) at Embry-Riddle Aeronautical University.

Moreover, the promise of half-price dentistry increased participants' willingness to accept [dental care](#) from an autonomous robotic dentist, Rice and colleagues reported at the 2018 International Symposium on Human Factors and Ergonomics in Healthcare (HFEH) in Boston, Mass., March 26-28.

Currently, medical robots such as the da Vinci Surgical System are being used to help doctors perform various operations, including cardiac surgery. Medical robots can help doctors increase the precision, safety and quality of certain surgical procedures as well as rehabilitation and patient-care operations, Rice said. Yet, robotic dentistry is still in the

early stages of development.

In 2017, a robotic dentist in China fitted two dental implants into a woman's mouth. In addition, a Miami, Fla.-based company, Neocis, announced last year that it had received clearance from the U.S. Food & Drug Administration to introduce a robotically assisted dental surgical system called Yomi.

As robots become increasingly commonplace in many different settings, "It's important to understand consumer perceptions of autonomous technologies," said Embry-Riddle graduate student Emily Anania, the lead student author of the HFEH poster presentation. "People are not always accepting of emerging technologies. We know from many different studies, for example, that driverless cars and autonomous aircraft technologies cause some people to react with fear or anger. Better insights to those perceptions will be essential in order to increase acceptance of these technologies."



In an online survey of 502 individuals (260 female), participants were 'significantly less willing to undergo more invasive procedures, such as gum surgery and a root canal, and significantly more willing to undergo procedures such as tooth cleaning or whitening performed by a robot,' Embry-Riddle Aeronautical University researchers reported. Credit: Jon Metz/Embry-Riddle Aeronautical University

Ten Dental Procedures

The Embry-Riddle patient-perceptions survey, completed by Rice and five students on the university's Daytona Beach, Fla., campus, informed all participants that robotic dentistry is currently being tested. The survey then asked participants to indicate their willingness to have a robot perform ten separate procedures: teeth cleaning, tooth extraction, root canal, teeth whitening, applying sealant, applying a cap, bonding, gum

surgery, applying braces and putting in a filling.

Next, participants were asked similar questions, but with an added incentive: "Imagine that the dentist offers you a 50% (half-price) discount on all dental work done by a robot in his or her office," the survey said. "The robot will work autonomously (without human intervention)."

The data from the study revealed some interesting patterns.

In general, 51% of the respondents were moderately or strongly opposed to robotic dentistry, the research group reported. Respondents were particularly wary of [invasive procedures](#) like extractions, root canals, and gum surgery, where 66% of the participants were moderately or strongly opposed. Female respondents in general were less likely to be willing to accept robotic dentistry, Anania said.

On the other hand, there were two procedures that participants were less negative about, including teeth cleaning and/or whitening; here, only 32% of the participants were opposed at full price, and 83% were willing to undergo the [procedure](#) if the price was cut in half.

Public-perception surveys of emerging technologies are essential, Rice said, because "consumers help drive what is acceptable with automation, and healthcare is no exception."

Robotic dentists have the potential to improve the precision of different dental procedures, he said. Such technology could make dental care more accessible in rural or otherwise underserved areas. Finally, just as aircraft auto-pilot systems allow pilots to focus on safety, Rice added, robots could free up dentists to continuously improve healthcare practices and protocols.

The research presented at the HFEH event, "Factors Affecting Consumers' Acceptance of Robotic Dentists," was prepared by Rice and Anania, with her fellow graduate students Mattie N. Milner, Nadine Ragbir, Matt Pierce and Nathan W. Walters. A large contingent of Embry-Riddle faculty and students took part in the symposium, which was chaired by Assistant Professor Joseph R. Keebler.

Provided by Embry-Riddle Aeronautical University

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