

A SURGICAL REFERENCE FOR ANGLE FRACTURES OF THE
MANDIBLE: A MODEL FOR THE CREATION OF AN ONLINE GUIDE
TO ORAL AND MAXILLOFACIAL TRAUMA SURGERY

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DEDICATION

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TO ORAL AND MAXILLOFACIAL TRAUMA SURGERY

by

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THESIS

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The University of Texas Southwestern Medical Center

In Partial Fulfillment of the Requirements

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Supervising Professor: Lewis E. Calver, M.S.

The goal of this thesis was to create a model for a web-delivered surgical training reference that could potentially make oral and maxillofacial surgery preparation more comprehensive and time efficient. The subject for the model is treatment of angle fractures of the mandible. The model could potentially serve as an interactive training guide, a source of review for a returning user, and a template for the creation of a complete oral and maxillofacial trauma surgery reference. Illustrations, surgical photographs, video clips, suggested readings, and literature were combined in one easily accessed resource.

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CHAPTER ONE

Introduction

Thesis Research Problem

No useful single comprehensive source of information about the management of oral and maxillofacial (OMF) trauma surgery exists in one location that can readily be accessed to assist the surgeon in planning and executing operations. Is it possible to create a resource that could combine the necessary information and make it readily available for a surgeon to plan and prepare for an OMF trauma surgery?

Background

The angle of the mandible is a commonly fractured region of the skull. Trauma to this region requires treatment, usually in the form of open reduction and internal fixation with various devices, such as bone plates and wires. However, a confusing array of methods can be employed to treat this fracture. Usually the treatment choice is based on the experience of the surgeon, which poses a problem for surgeons with little or no experience. Surgeons need to be aware of what treatment methods are available, as well as which treatment is appropriate in different situations. Without having experience on which to base the many decisions, surgeons may find the surgical literature concerning the treatment of angle fractures of the mandible to be of limited assistance.¹

¹ Dr. Edward Ellis III, committee planning meeting, November 2005.

Goal and Objectives

The goal for this thesis project was to create a model for a web-delivered surgical training reference that could potentially make OMF trauma surgery preparation more comprehensive and time efficient. Treatment of the angle fracture of the mandible was chosen as the subject for the online reference, which would serve as a model for the production of a larger OMF trauma surgery resource.

In order to achieve this goal several objectives were pursued. The first objective of this thesis was to work with Dr. Edward Ellis III, D.D.S., M.S., Professor in the Department of Oral and Maxillofacial Surgery at The University of Texas Southwestern Medical Center, to determine the necessary content for the surgical management of mandibular angle fractures, gather existing resources to determine what would need to be acquired or produced, and produce the necessary media and resources for the site. The next objective was to design and develop interface for web delivery and integrate the necessary media into the interface. The final objective was to post the completed site online for surgical residents to review and to evaluate their responses concerning the project. Their responses would determine whether the final product met the goals and objectives set forth for this project. .

Importance

Before the creation of the online reference, a survey was sent to oral and maxillofacial surgery residents at Parkland Memorial Hospital in Dallas, Texas, regarding their current methods of surgery preparation. The residents who responded indicated that they use a

variety of resources found in a variety of locations to prepare for surgery. The usefulness of these resources ranged from “never” to “always.” Surgical residents often face extreme time constraints, making review of printed and online journals, text books, videos, other surgeons, and the internet before a surgery impractical and inefficient especially if the resource proves to be of little assistance. Consequently, this project achieves significant importance by combining useful surgical information into one online resource. Novice surgeons will be able to research as well as refresh their knowledge.

Purpose

The model created for this project would serve three main purposes. First, it would be an interactive web-delivered training resource that would guide novice surgeons through the steps of diagnosing and treating an angle fracture of the mandible. Second, it would serve as a quick review for a returning user, and finally the reference would be a template for the creation of a complete OMF trauma surgery reference.

Limitations

This thesis project is limited to information regarding the treatment of simple and comminuted angle fractures of the mandible for dentulous patients.

CHAPTER TWO

Review of Literature

In order to create a model for a unique and useful training resource and surgical reference, a thorough review of currently available literature was important. Only two online surgical references were found, and both dealt exclusively with orthopedic surgery. Also, a pre-project survey of current OMF surgery residents at Parkland Memorial Hospital was conducted to determine how they typically prepare for surgery. According to their responses, textbooks and journals were the most popular sources of review for surgery preparation. At least one example of each type of surgery preparation method indicated to be useful was reviewed.

Online Resources

AO Foundation Surgery Reference

The AO, Association for Osteosynthesis, is an organization of a network of surgeons “who are committed to the study, practice, and teaching of AO principles and their advancement in the field of trauma and musculoskeletal surgery.”² The AO Foundation Surgery Reference is an interactive training guide and was a valuable resource for determining what elements would and would not work in this model. The homepage states that the site is an online library with quick answers to clinical questions that makes decision making in daily clinical life easier.³

² AO Foundation. “AO Foundation Surgery Reference,” <http://www.aofoundation.org>, Web page (accessed 2006).

³ AO Foundation. <http://www.aofoundation.org/wps/portal/surgeryskully>.

The site is confusing to a first time user for a number of reasons. Navigation of the complex site is not intuitive, and the pages contain no obvious instructions. Only through trial and error do users learn that they must make a decision within the page to move forward. Also, the AO Foundation's diagnosis page contains a pictorial list of fractures clearly represented by schematic illustrations (Figure 2-1), but the lack of instructions makes understanding the illustrations' purpose unclear.

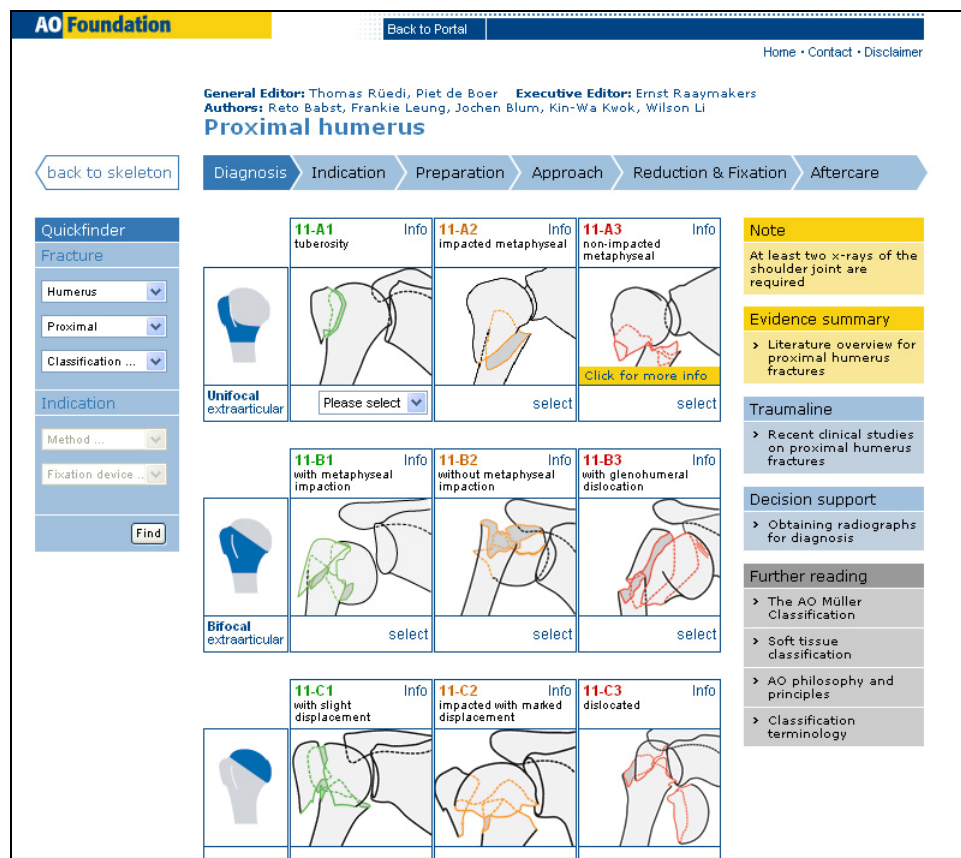


Figure 2-1. AO Foundation Surgery Reference diagnosis page. Screenshot from the *AO Foundation surgery reference*, AO Foundation, with permission from Michael Reddies, Head of Knowledge Services.

Although there is also a very useful *click for more information* option, this option is invisible unless the user happens to roll over the correct area.

Improvements could also be made on the pages that explain the desired surgical approach, reduction and fixation. For example, reduction and fixation of a fractured ulna using a plate (open reduction internal fixation) is explained with only a few illustrations.⁴ An entire procedure is difficult to interpret with these few schematic illustrations. More illustrations, a series of surgical photographs, or a video clip would better illustrate this process.

The Head of Knowledge Services for the AO Foundation, Michael Reddies, explained that the site went public in April of 2006. He stated that after only two months the site already had an average of ninety-eight user sessions per day (See Appendix A).⁵ This large number of users reinforced the hypothesis that a composite online surgical reference would prove to be useful.

Wheeless' Textbook of Orthopaedics

Wheeless' Textbook of Orthopaedics is an online reference that is available through the Duke University Medical Center's Division of Orthopaedic Surgery, in conjunction with Data Trace Internet Publishing Company. The Wheeless' Textbook of Orthopaedics is very informative, but is lacking visual aids, interactivity, and has room for significant

⁴ AOFoundation. <http://www.aofoundation.org/wps/portal/surgeryskully>.

⁵ Michael Reddies, email message to Head of Knowledge Services, AO Foundation, 1, June 2006.

improvements. The site is entered by clicking on an illustration of a human skeleton taken from Vesalius' "De Humani Corporis Fabrica."

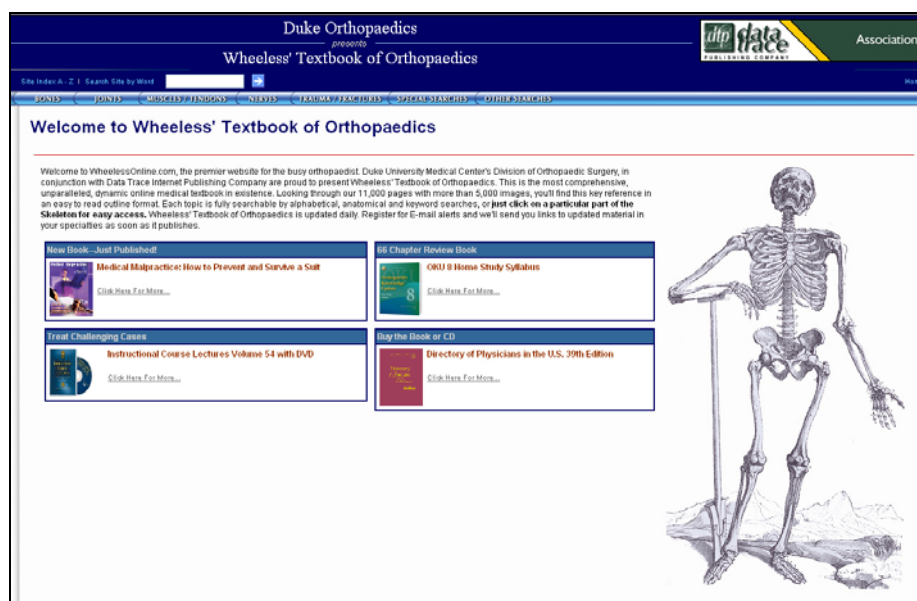


Figure 2-2. The Wheelless' Textbook of Orthopaedics, Screenshot from *Wheelless' Textbook of Orthopaedics*, Duke University, Copyright 2001-2006.

While the illustration makes the site friendly, it is the only memorable image in the website. X-rays and simple illustrations exist on pages within the site, but are small and scattered throughout the deeper level pages.

While reviewing literature for the creation of this model, it was essential to make sure that there was not already an existing reference specifically for OMF trauma surgery. In the Wheelless' textbook, clicking on the skeleton's skull reveals a list of topics addressed in the site. The list includes topics such as hyperventilation, stroke, head injury in the child, seizures, and others. Clicking on the *Trauma/Fractures* button reveals an extensive list of topics covered in the surgery reference, but not one trauma or fracture was an oral or facial

trauma. *Craniofacial* was an option under *Bones* but this leads directly back to the same options revealed by clicking on the skull. While the site has extensive surgical information in its 11,000 pages, the fractures addressed in this OMF trauma surgery model were not included.

Review of the Wheelless' site on November 1, 2006 indicated that the site was in need of some updates. A link to an outside article about an approach to head injured patients led to a website for a cable and internet provider.⁶

eMedicine from Web MD

One of the survey participants said that eMedicine, specifically the otolaryngology and facial plastic surgery portion of the medical reference, had proven to be useful for OMF surgery preparation. This website is a wealth of information, but is strictly a reference, and not a training guide. It is a great resource with links to articles, history of procedures, problems with procedures, pathophysiology, clinical indications, relevant anatomy, and more. In some cases, if the user scrolls to the bottom of the pages, a few photos may even be available. While this resource is a seemingly popular website, visual aides and interactivity could possibly enhance the teaching quality of the site.⁷

⁶Duke Orthopaedics, "Wheelless' Textbook of Orthopaedics," <http://www.wheelessonline.com>, Web page (accessed 1 November, 2006).

⁷EMedicine from Web MD, "Otolaryngology and Facial Plastic Surgery," <http://www.emedicine.com/ent/index.shtml>, Web page (accessed October, November 2006).

Written References

Peterson's Principles of Oral and Maxillofacial Surgery

The pre-project survey indicated that textbooks are a popular method of surgery preparation. A chapter in Peterson's Principles of Oral and Maxillofacial Surgery entitled "Rigid versus Nonrigid Fixation" summarizes the treatment of fractures and fixation techniques that would be addressed in the OMF trauma surgery model. The short chapter is full of illustrations and descriptions (Figure 2-3).

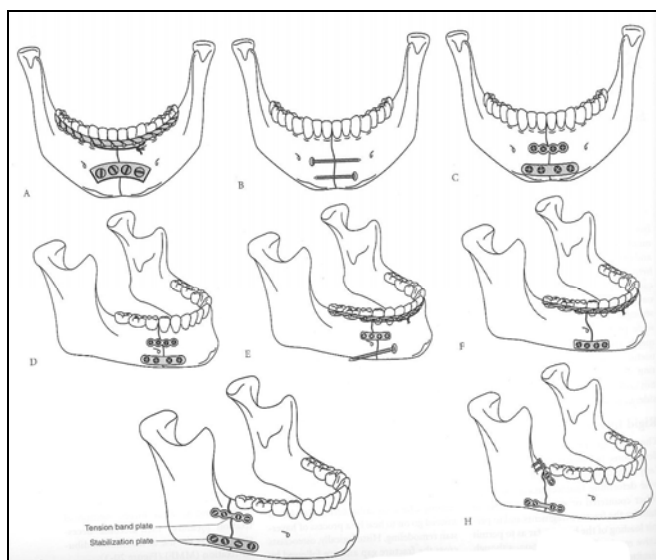


Figure 2-3. Schematic Illustrations representing the fractured mandible with hardware, Reprinted from chapter 20 in: *Peterson's Principles of Oral and Maxillofacial Surgery*, 2nd edition, Copyright 2004, with permission from BC Decker Inc, Ontario, Canada.

The illustrations are descriptive schematic drawings, but it was decided that the illustrations for the OMF trauma surgery reference would use tone and color to easily make obvious the points of interest and would hopefully be more descriptive to a less experienced audience.⁸

⁸Edward Ellis III, "Rigid Versus Non-Rigid Fixation" chapter 20 in: *Peterson's Principles of Oral and Maxillofacial Surgery*, 2nd edition, ed. M Miloro, G Ghali, P Larson, and P Waite (BC Decker Inc, Ontario, Canada, 2004), 372.

The Journal of Cranio-Maxillofacial Trauma

More than one pre-project survey respondent indicated that journals are a favorable method of preparing for surgery. To get an idea of the visual aides in a journal, an article by Dr. Ellis entitled “Treatment Methods for Fractures of the Mandible,” in *The Journal of Cranio-Maxillofacial Trauma*, was reviewed. This article reviews the results of a study done to evaluate the effectiveness of treatment modes for the mandibular angle fracture. This article uses radiographs, illustrations and surgical photographs with color (Figure 2-4). These visuals were very descriptive and would be incorporated into the OMF site.⁹

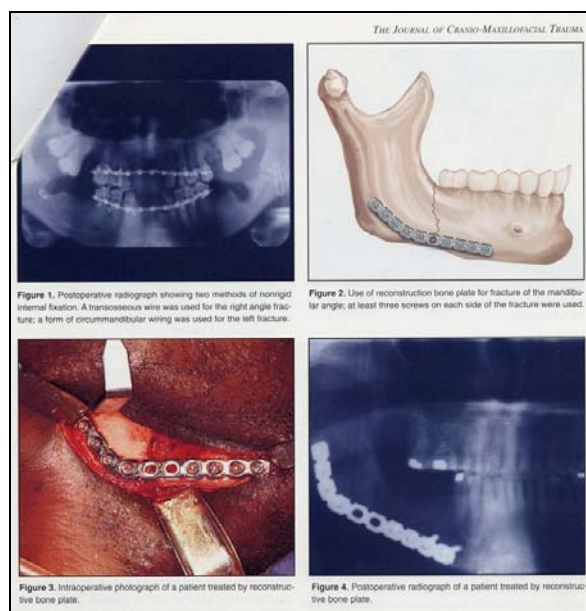


Figure 2-4. Visual aids accompanying a journal article showing three types of visual aides. Reprinted from *The Journal of Cranio-Maxillofacial Trauma*, Edward Ellis III, Copyright 1996.

⁹ Ellis, Edward E., “Treatment Methods for Fractures of the Mandibular Angle.” *The Journal of Cranio-Maxillofacial Trauma* 2, no.1(1996): 29.

Conclusion

The internet is a valuable resource for surgeons preparing for surgery and reviewing information. According to responses from the pre-project survey and the literature review, a few online sources are useful but none combine illustrations, surgical photographs, video clips, literature, and suggested references. The success of the AO Foundation's site indicates that an interactive web-delivered surgery reference is useful. Textbooks and journals were also said to be useful to the residents. After reviewing the visual aids in textbooks and journals, it was decided that the site would employ not only color illustrations, but also radiographs and color photographs that would guide the user through procedures in a step by step manner. Articles and books would be mentioned throughout the site to guide users to additional informative sources, such as the ones reviewed for this project.

The literature review has proven the original thesis problem to be accurate: Comprehensive information about the management of oral and maxillofacial trauma surgery does not exist in a single location that can readily be accessed to assist the surgeon in planning and executing operations.

CHAPTER THREE

Methodology

Concept Development

The goal of this project was to create a model for an interactive online surgical reference to make surgery preparation more comprehensive and time efficient. In order to accomplish this goal a series of objectives were developed. These objectives determined the step by step process for completing the model. After determining the necessary content and media for a website about the surgical management of the mandibular angle fracture, an interface for online delivery and page layouts was designed to include the necessary elements for the site. After these objectives were met, the completed media and gathered resources were integrated into the new interface and posted online. Finally, surgical residents evaluated the model, and their feedback was reviewed.

Target Audience

In the very beginning stage of the project, a target audience was determined. Choosing a target audience was essential in order to successfully complete the model with the elements that would meet the needs of the particular audience. The target audience was oral and maxillofacial surgery residents who are either learning surgical procedures or looking for an efficient review of a procedure.

Project Planning

Meetings

In initial meetings with Dr. Ellis decisions were made about the necessary information and content needed for a new surgeon to understand the surgical management of mandibular angle fractures. It was decided that the site would be interactive and include information regarding the treatment of simple and comminuted angle fractures for dentulous patients. Dr. Ellis provided surgical instructions and content, but more information was needed about how residents prepare for surgery and what they find to be useful visual aids.

Pre-Project Survey

Before creating the model, a survey was sent to the target audience to understand how they typically prepare for surgery (See Appendix B). The survey was also to ensure that the residents would find a site such as the one for this project to be useful. Of the twenty OMF surgery residents at Parkland Memorial Hospital surveyed, four responded (See Appendix C). Their responses indicated that the most common surgery preparation method is the use of printed or online journals. Only one resident listed a single website that had proven to be useful. All of the responding residents agreed that a complete online guide for oral and maxillofacial trauma surgery would be very useful.

Visual Elements of the Site

Meetings with the thesis advisory committee, literature review, and review of the pre-project survey results helped to determine visual aides and resources that would be available in the

model. Illustrations, surgical photographs with step by step instructions, and video clips would be created. Additionally relevant references would be gathered and included in the site.

Illustrations

An illustration was created to visually describe each completed fixation technique in the site.

Illustrations were created using graphite and then scanned into the computer (Figure 3-1a).

Color was added and modifications were made using Adobe® Photoshop® (Figure 3-1b).

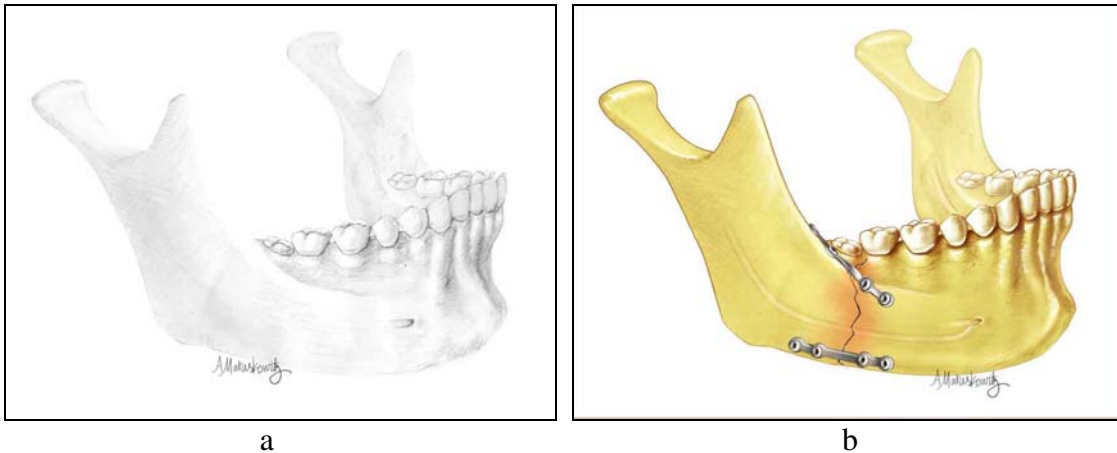


Figure 3-1. Examples of illustrations of the mandible.

a) A graphite illustration.

b) A graphite illustration modified in Photoshop®.

The entire mandible was rendered but because the fractures and hardware are the distinguishing features of the mandibles, a cropped version of each illustration was also created to make obvious the point of interest (Figure 3-2).



Figure 3-2. Example of a cropped illustration focusing on the fracture and placement of hardware.

The illustrations were used to explain what is not always clear in a photograph. An isolated mandible was chosen to clearly show fractures and placement of the hardware in relation to the mandibular canal, and the inferior alveolar nerve was an important consideration in the illustrations. The illustrations in the pilot are specific to this project (See Appendix D). In order to create a complete OMF trauma surgery reference, new illustrations would be needed. The style and placement of illustrations throughout the site could be based on the use of the illustrations in this model.

Surgical Photographs with Step By Step Instructions

Photographs were taken during Dr. Ellis's angle repair surgeries. Several methods of displaying surgical photographs were considered, including interactive slideshows created in Macromedia® Flash® and lists of photographs created in Dreamweaver®. The interactive slideshows allowed the user to view thumbnails and click through the thumbnails to view the desired illustration. However, the slideshows were not effective because the thumbnails and photographs took up too much space leaving little room for the instructions. Also, viewing these slideshows might require a user to download Flash® thus discouraging the user from taking advantage of the slideshow option. To avoid this, lists of photographs with explanations typed on the photographs were created. Again, displaying the photograph along

with the text was not ideal and the instructions were too difficult to read. To resolve these problems, PowerPoint® presentations were created using the photographs and serve as the main display method for the surgical procedures in the model. Each surgical approach (including observation), is explained with a PowerPoint® presentation. Illustrations were then added as the final slide to each PowerPoint® presentation. Step-by-step explanations of each slide were added in a separate box. The presentations were converted to html format and saved as web pages. The user can click a button on the fixation technique pages, and the presentation explaining the steps of the procedure is displayed in a new window (Figure 3-3).

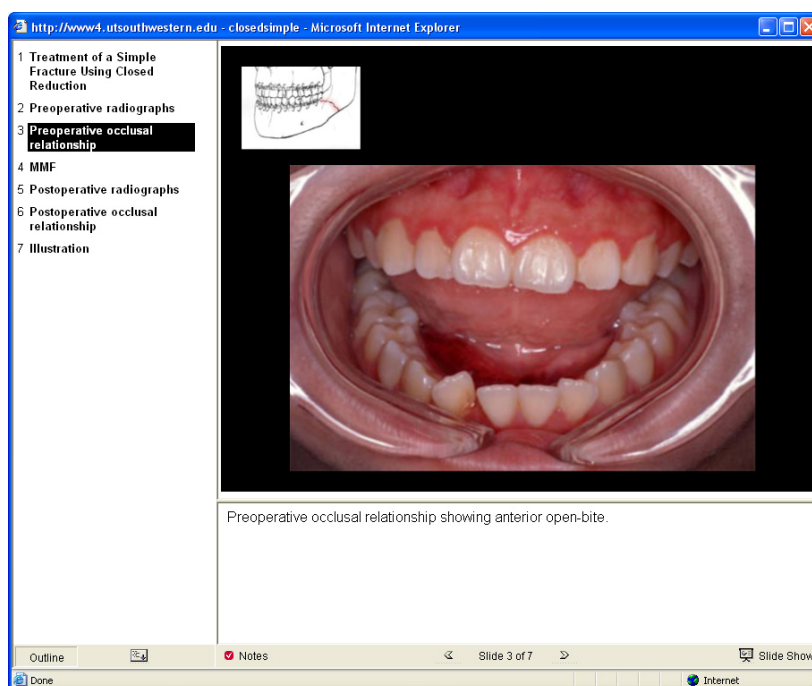


Figure 3-3. An example of a PowerPoint® presentation as it appears on the web.

PowerPoint® presentations seemed to be the best method of displaying photographs and instructions because, as a webpage, the user can click through the slideshow using buttons at the bottom of the window, click the outline to jump to a surgical step, and view the

instructions and explanations all in one window. The user is also given the option to view the presentation as a slideshow using the entire screen or resize the window enlarging the images.

Video Clips

The video footage used in the model was shot in one of Dr. Ellis's open reduction internal fixation surgeries to repair a simple angle fracture using one miniplate. The video was edited and titles were added in Adobe® Premiere®. The entire surgery was recorded, but the video was split into two smaller clips. The clips were exported from Premiere® using the following settings (Figure 3-4).

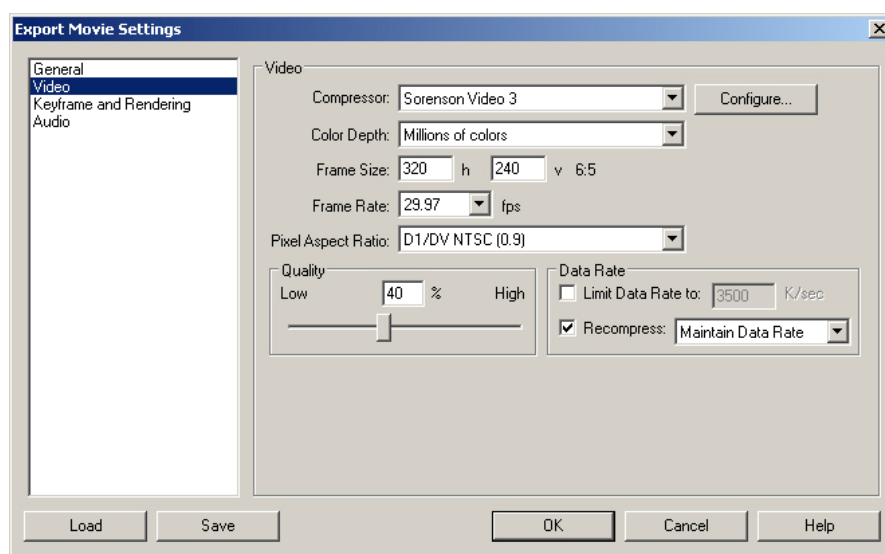


Figure 3-4. The settings used to export video clips.

The videos were exported using these settings in order to create a clip that would be easily loaded and viewed on the internet. In order to make these videos load as quickly and play as smoothly as possible, the site would need to be posted on a server that would use streaming

to play the clips. A template for the layout of pages that incorporates video clips is shown later in Figure 3-13a.

Relevant References

Most of the fixation techniques are accompanied by a list of references. The additional references were provided by Dr. Ellis. If a resident wishes to find more information regarding one of the procedures, he or she can click on the button, and a list of additional references is provided.

Site Design

Site Map

In order to design the site, a diagram would be needed to determine the flow of the web site. Because the site would include simple and comminuted fractures, it was decided that the user would be asked to diagnose the fracture, choose a treatment mode, select a fixation technique, and finally view the necessary post operative care. A flow diagram was designed keeping in mind the decisions that the surgeon would be asked to make (Figure 3-5). Based on the diagram, the two types of fractures would require slightly different navigational systems and maps.

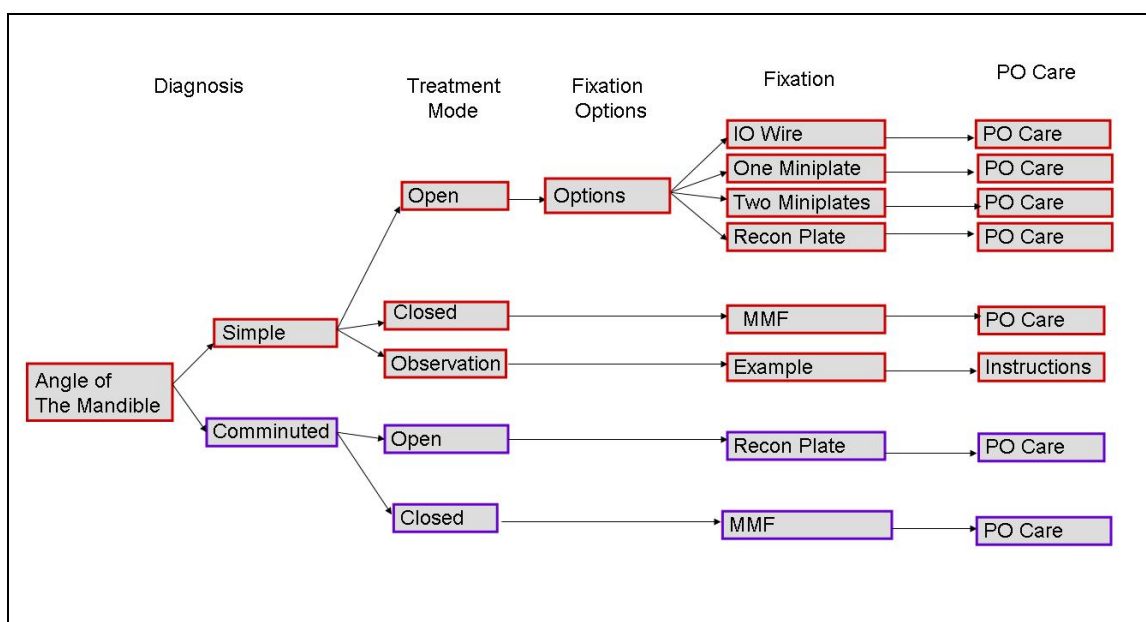


Figure 3-5. The flow diagram used to plan the site. Note the differences between the two Diagnoses.

Navigation

Navigation bars were designed based on the flow diagram in figure 3-5. Due to the interactivity that would be used to navigate the site, the user can move back, but cannot move forward by clicking the navigation bar. The navigation bar indicates the user's location within the site. Navigation forward through the site is determined by decisions made on each page. For example, the user must determine whether the angle fracture is simple or comminuted on the diagnosis page in order to move on to the page with appropriate modes of treatment for the specified diagnosis.

The majority of the treatment plans in the site use a standard navigation bar (Figure 3-6).

However, unlike any other treatment plan, a simple fracture treated by open reduction can be

treated with one of four fixation techniques. The user must select the technique (intraosseous wire, one miniplate, two miniplates, or a reconstruction plate) that best suits the specific case.

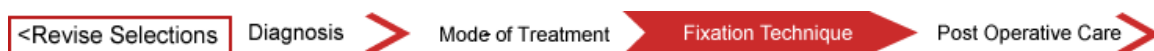


Figure 3-6. The standard navigation bar.

Because the user must make an additional decision, an additional webpage was needed. A navigation system and separate navigation bar were created for when the user chooses this type of treatment (Figure 3-7).



Figure 3-7. The navigation bar used when the user chooses an open reduction for a simple fracture.

The model contains samples of two navigation systems that may be used as templates in a complete surgical reference depending on specific injuries and treatments.

Design

The web pages were laid out in Macromedia® Fireworks®. A banner was designed with a cropped illustration showing oral and maxillofacial features of the skull. The banner would be appropriate for any oral and maxillofacial trauma surgery in the composite reference (Figure 3-8). A simple but striking palette of red, black, and white was chosen to unify the pages because they would become dense with information, illustrations, and photographs as the user clicks through the options on the pages.



Figure 3-8. The banner created for the pilot that can be used throughout a complete oral and maxillofacial trauma surgery reference.

A home page was then designed (Figure 3-9) using a pen and ink line drawing of the entire skull. The site dedicated to treatment of angle fractures of the mandible is entered by clicking on the mandible portion of the skull. A complete OMF trauma surgery reference could use this homepage. Rollovers could be added to the regions of the skull as the portions of the surgery reference are completed.

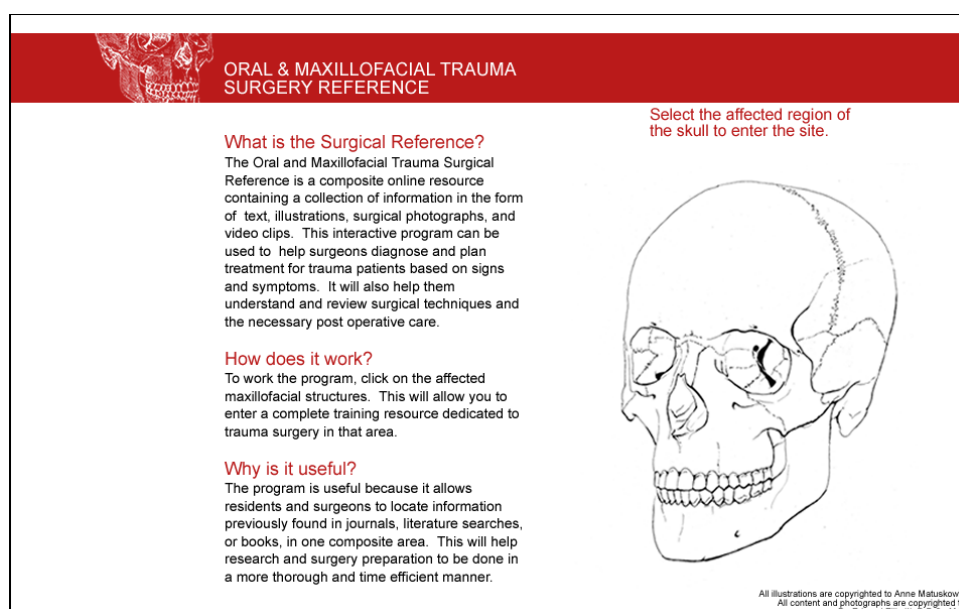


Figure 3-9. The homepage created for the pilot that can be used for the entire surgical reference.

The first part of the angle fracture portion of the trauma surgery reference requires the user to select the affected region of the mandible (Figure 3-10).

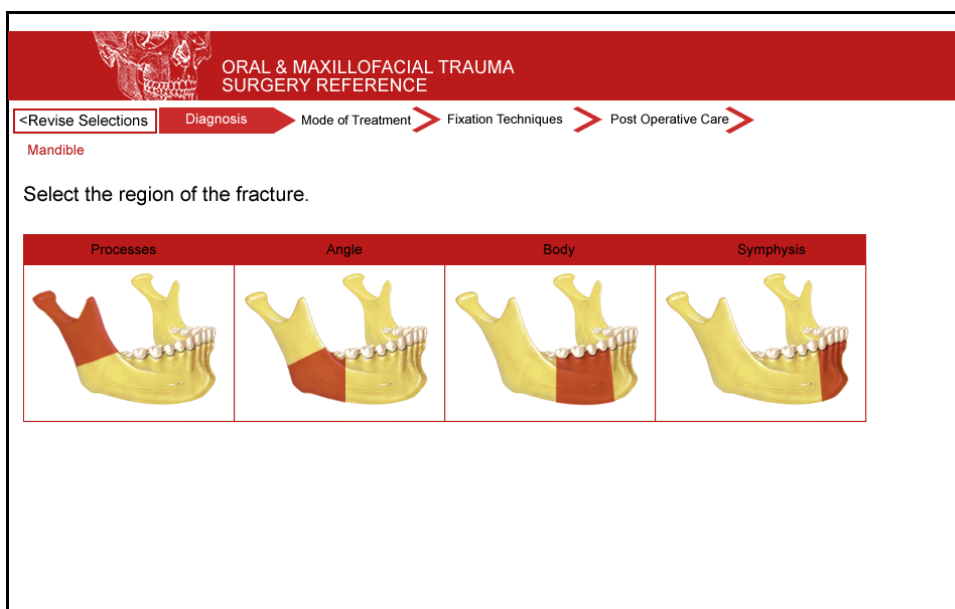


Figure 3-10. The first diagnosis page of the pilot that could also serve as a diagnosis page for trauma to any region of the mandible.

Sections devoted to trauma to any of these regions of the mandible could be created using this page as a starting point.

Three treatment modes exist as options for treating a simple angle fracture. Comminuted fractures are treated by one of two treatment modes. Open reduction of a simple fracture may be treated by one of four fixation techniques. A design problem was encountered regarding how to fit the clinical criteria and surgical indication information into their respective pages. However, resolution to the problem provided for three layout design templates for information pages in the model (Figure 3-11). In this case the design and layouts are interchangeable even though the content on the individual pages is different.

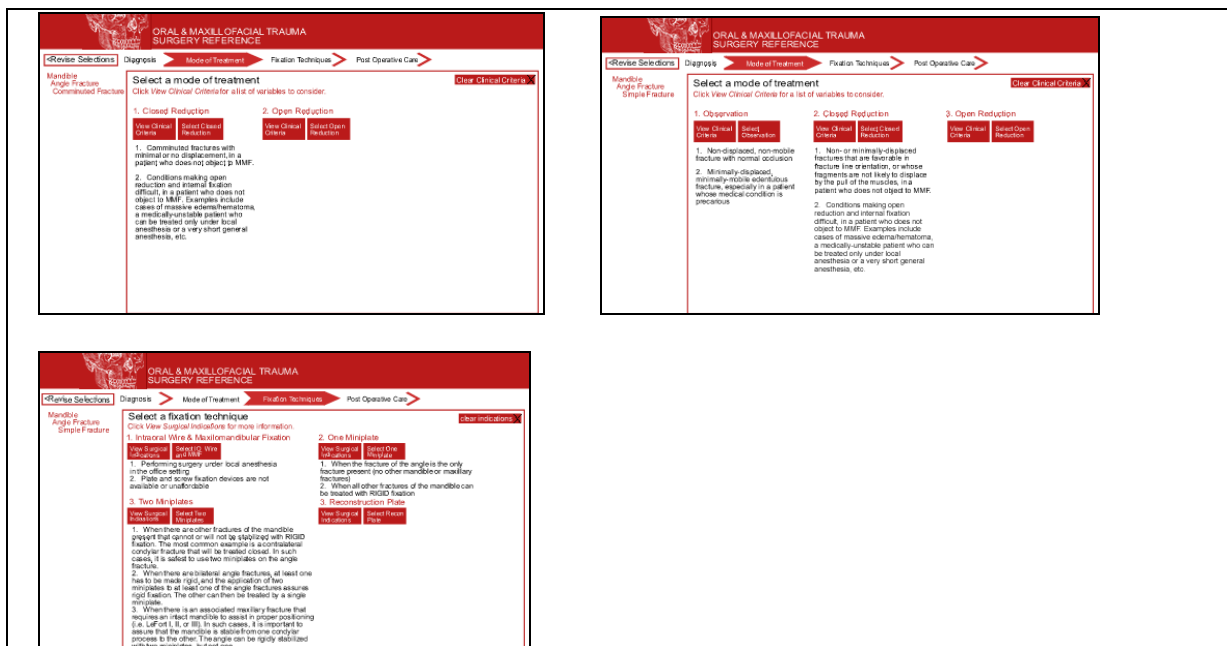


Figure 3-11. Three layouts that display different amounts of information serve as templates for the complete oral and maxillofacial surgery reference.

Three templates for ways of displaying varying amounts of information have been created for the model using Fireworks®.

Each fixation technique is explained on a separate page. There are eight possible fixation techniques for treating angle fractures of the mandible. Six of the eight pages have the same layout (with the exception of the navigation bar as previously discussed) and were created using the identical slice systems in Fireworks® (Figure 3-12a-b). The slices remain the

same, while the text and images are different on each page.

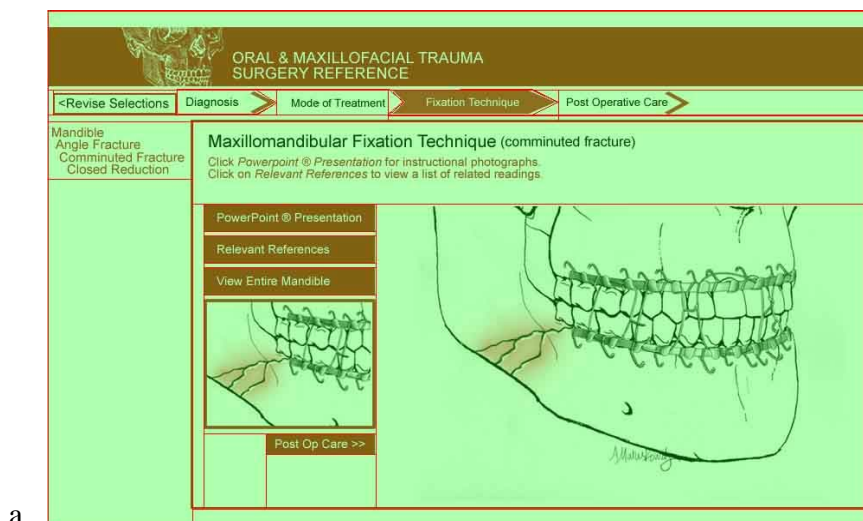


Figure 3-12. Two of the six fixation techniques that use the same template. The green boxes are the slices

- a) Fixation technique page for closed reduction of a comminuted fracture using maxillomandibular fixation.
- b) Fixation technique page for open reduction of a simple fracture using an intraosseous wire.

Pages that detail simple fractures requiring treatment with a single miniplate or by observation have slightly different layouts. Open reduction with a single miniplate has all

the elements of the other techniques and two short video clips (Figure 3-13a). No relevant references or illustrations for treatment by observation are available (Figure 3-13b).

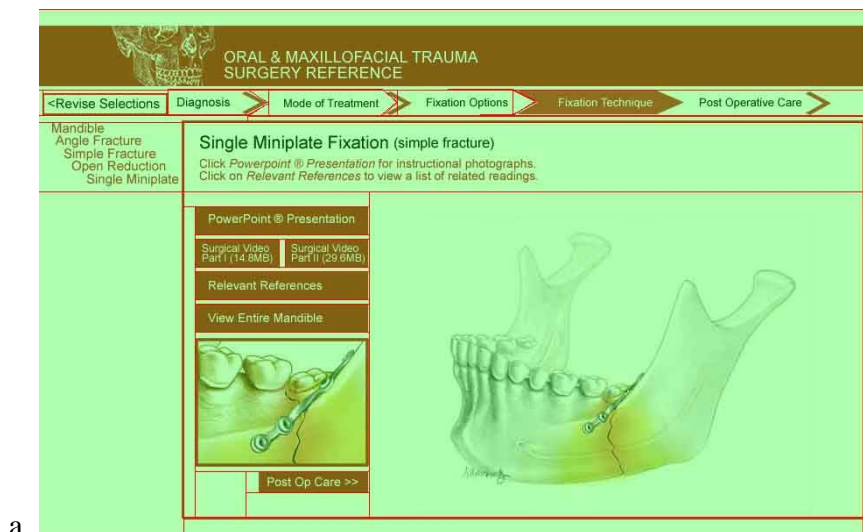


Figure 3-13. Two layouts showing the slices in Fireworks® for fixation technique pages that are different from the other six fixation techniques in the site.

- a) A layout used to include more elements.
- b) A layout used for a page that has fewer elements.

The fact that there are different layouts for examples of fixation technique pages is desirable for this site as a model because three templates have been created that could be used in the creation of a complete OMF trauma surgery reference.

Pictorial Flow Diagram

The complex nature of the website as a training guide required the addition of a pictorial flow diagram (Figure 3-14) in order to make the site also useful as a resource for quick review.

The reference becomes specific to angle fractures of the mandible on the second diagnosis page. At this point, the user is given the option to view a diagram of the entire site for review. Clicking in a box on the diagram allows the user to skip to specific information in the site rather than clicking through the entire site as a training guide.

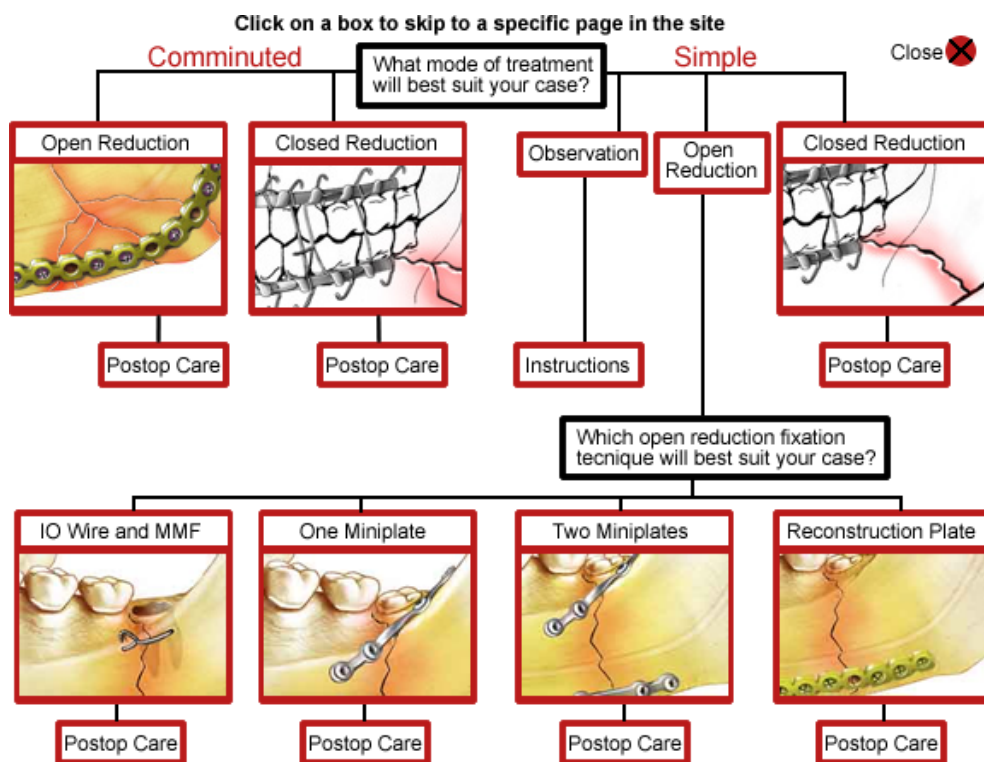


Figure 3-14. The pictorial flow diagram used to make the site useful as a review.

Images from the specific pages are used to easily direct the user to the desired web page.

The diagram, like the other pages in the site was created in Fireworks® and exported to and linked in Dreamweaver®. The diagram contains buttons and interactivity. Therefore in order for the user to click on a button to view the diagram and then to be able to click on buttons within, special coding was needed in Dreamweaver® (See Appendix E). The flow diagram was added to the page as an iframe. This document could be modified and used as a template in all of the divisions of the complete OMF trauma surgery reference.

Integration of the Elements

After all of the elements of the website had been created, the final step was to integrate the media and add the element of user interactivity. The Fireworks® documents were exported to Macromedia® Dreamweaver® using a strict filing system. Simple rollovers within the documents were preserved from Fireworks, but the interactivity that allows the user to click to view content within pages (Figure 3-15a) and move through the site (Figure 3-15b) was created in Dreamweaver®.

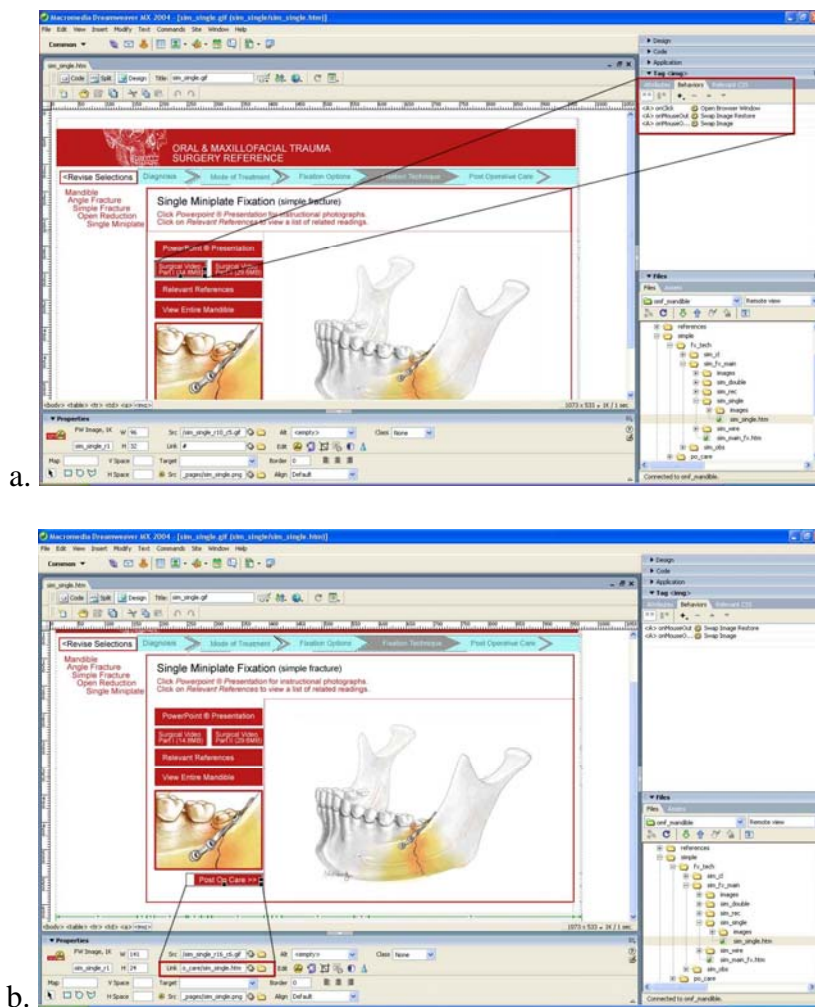


Figure 3-15. Screens in Macromedia® Dreamweaver® used to add interactivity.

- The red box outlines behaviors used to add interactivity to a button.
- The red box outlines buttons within the page linking to other pages.

Evaluation

Finally, the website was posted on the University of Texas Southwestern Medical Center Biomedical Communication's temporary server. The effectiveness and success of the model was to be evaluated by a survey sent to the target audience who viewed the site.

Conclusion

In order to create an effective model website for a complete OMF surgery reference, a complex subject matter that would employ various teaching tools and page layouts was necessary. An angle fracture of the mandible can be diagnosed as either a simple or comminuted fracture. Each of these diagnoses has a complex breakdown of treatment modes and fixation techniques. The complexity of the subject matter provided for various navigational paths and design solutions that could be used as templates. The templates provide options for ways to display varying amounts of information, visual aids, and media.

CHAPTER FOUR

Results

Survey Development

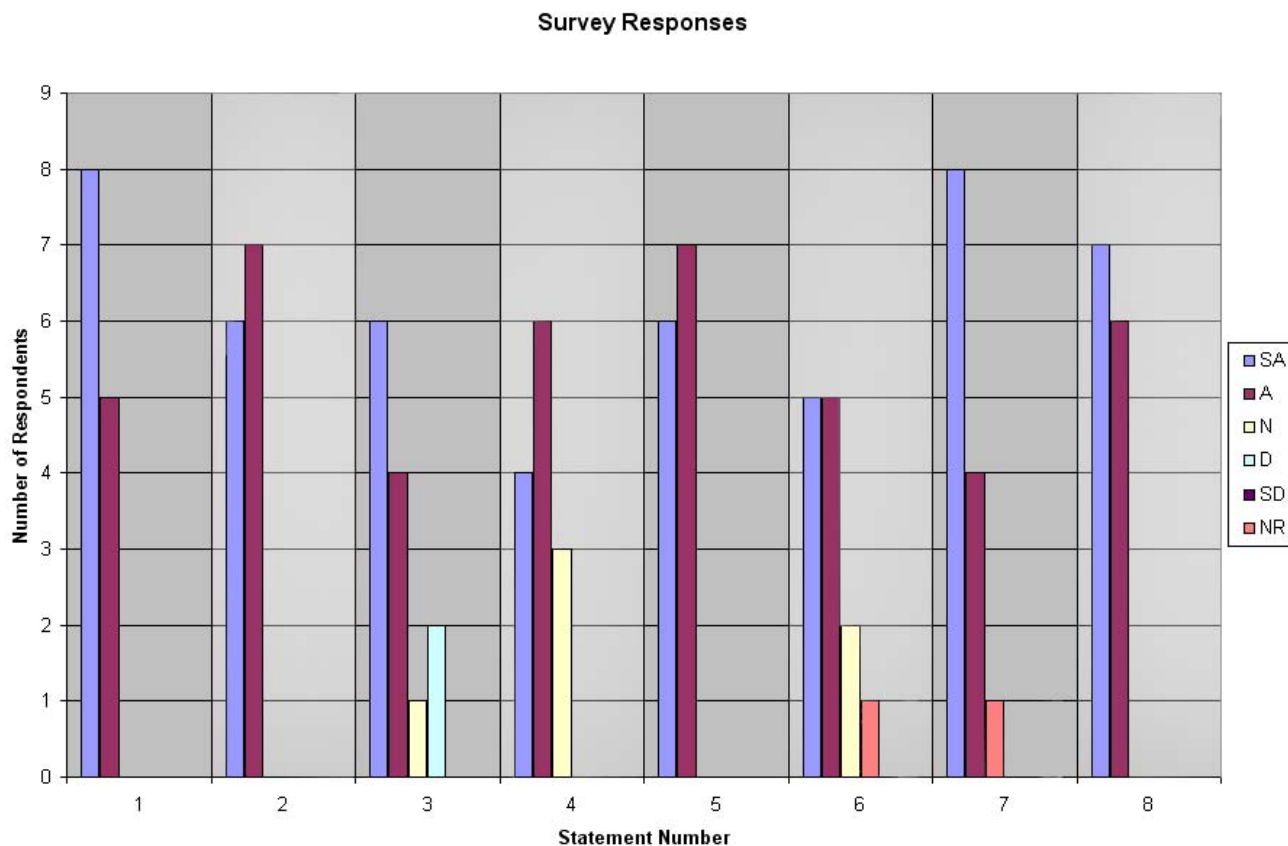
A completed version of the model was posted online for review by the current OMF surgery residents at Parkland Memorial Hospital. A survey was created and distributed via email to the residents (See Appendix F). The survey consisted of a link to the live website and eight statements about the website. The survey was created using a 5-point Likert scale ranging from Strongly Agree (SA) to Strongly Disagree (SD). The residents were asked to indicate their level of agreement with each statement by checking the appropriate box. At the end of the survey, the residents were asked whether or not they would use the site for surgery preparation. Also included in the survey were three questions regarding the user's type of computer, operating system, and internet browser used to view the program. Finally, each statement was followed by space for additional comments. The survey was created using Microsoft Word and was sent as a protected document so that only the check boxes and space for additional comments could be altered by the survey participants.

Survey Distribution

The survey was sent to twenty-four residents who were asked to view the site, fill out the survey, and return the completed survey to me as an attachment. Thirteen of the twenty-four residents responded (See Appendix G).

Survey Results

The thirteen survey respondents were oral surgery residents who would complete their residency between 2007 and 2012. This was a favorable sampling because the participating residents had differing degrees of experience in the field. The surveys were collected and evaluated. A graph was created compiling data from the entire survey to show the overall response to the model (Figure 4-1). SA means Strongly Agree, A means Agree, N means Neutral, D means Disagree, and SD means Strongly Disagree. NR means no reply.



List of Statements

1. *The program is an effective reference for preparing to treat angle fractures of the mandible.*
2. *The program is an effective resource for learning and reviewing the procedures.*
3. *The navigation is clear and easy to use.*
4. *The PowerPoint® presentations make clear the steps of the surgeries.*
5. *The text is useful and accurate.*
6. *The additional references given are useful.*
7. *The diagram of the entire site on the second diagnosis page is a helpful tool.*
8. *A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide.*

Figure 4-1. Summary of survey responses.

Evaluation of Responses

Statement 1: The program is an effective reference for preparing to treat angle fractures of the mandible.

8 Strongly Agreed, 5 Agreed.

This statement was about the effectiveness of the model as a training guide. The response to this statement was positive, which means that all of the residents believe that the resource would be an effective surgery preparation reference.

Statement 2: The program is an effective resource for learning and reviewing the procedures.

6 Strongly Agreed, 7 Agreed.

The positive response indicates that all of the respondents found the program to be effective as a resource for learning and for review. No additional comments were made.

Statement 3: The navigation is clear and easy to use.

6 Strongly Agreed, 4 Agreed, 1 Remained Neutral, 2 Disagreed.

The fact that two of the respondents disagreed that the navigation is clear and easy to use is a concern. One of the respondents who disagreed added the comment: "I found the organization of the information difficult to comprehend initially. Scrolling through the information would be easier to navigate than use of the power point presentations." Another respondent added "The guide would be a useful learning tool. As a reference it is too

difficult to scroll through pages to find what you are looking for.” The user interactivity within the site requires the user to make a decision in order to move to the appropriate page. Although the pages instruct the user to make a decision to move on, the navigation of the site is different from a typical website. The user can not move forward using the navigation bar, which may have been the cause of disagreement with the statement.

Statement 4: The PowerPoint® presentations make clear the steps of the surgeries.

4 Strongly Agreed, 6 Agreed, 3 Remained Neutral.

The hope for using PowerPoint® presentations in the model was that they would be an effective method of web delivery for step by step explanations of surgical procedures. One participant that responded neutrally added: “Some pictures were very detailed, others with few notes.” This comment pertains to the information within the PowerPoint® presentations, not the delivery method. No one indicated problems loading or viewing the presentations. The overall response to the statement was positive.

Statement 5: The text is useful and accurate.

6 Strongly Agreed, 7 Agreed.

It can be concluded from the positive response that the text is a useful and accurate element in the training guide.

Statement 6: The additional references given are useful.

5 Strongly Agree, 5 Agreed, 2 Remained Neutral, and 1 gave No Reply.

An additional comment made at the end of the survey was that it would be useful to have links to the articles. This is a valuable consideration for the creation of a complete OMF trauma surgery reference. Response to the statement that the additional references given were useful was overall agreement.

Statement 7: The diagram of the entire site on the second diagnosis page is a helpful tool.

8 Strongly Agree, 4 Agree, 1 gave No Reply.

The diagram of the entire site was added so that users would have the option of skipping through the site as a training guide and using the site as a quick reference for review. The participant that did not reply indicated that he was not sure that he understood the statement. It is possible that this respondent did not click to view the diagram. Perhaps to be sure users take advantage of this option the button could be moved to a more conspicuous location on the page or made larger. One of the participants added that the diagram was “a very good comprehensive overview.”

Statement 8: A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide.

7 Strongly Agreed, 6 Agreed.

The overall purpose of the creation of the model is to see whether or not a complete OMF surgery training resource would be useful. The response was positive. One respondent added “I wish a series for the entire facial skeleton could be completed.”

Final Question: Would you use this program to prepare for surgery?

Participants were asked to check boxes labeled yes, no, and maybe.

9 said yes, 0 said no, and 4 said maybe.

It can be concluded from the positive response and none of the thirteen respondents saying no, that it is a strong possibility that residents would use the program to prepare for surgery.

A follow up question asked: *What specific changes would you make to improve the program?*

One resident replied: “I like the overall layout of the program, in particular the indications for types of treatment. I think it is a great starting point but would benefit from more detailed info if it is to be geared towards residents.” Perhaps the addition of more information to the model would have encouraged more definite yes answers instead of maybe.

Computer Information Questions

The survey asked what computer platform the participants used, what operating system was used, and what internet browser was used. Three participants failed to answer these questions. All of the respondents used a personal computer. All respondents used Windows XP. Seven used Internet Explorer and three participants used Mozilla Firefox. These questions were asked to make sure that the program worked on any computer, operating system, or browser. The program was tested using a Macintosh on a variety of operating systems and internet browsers and also on a PC with a variety of operating systems and browsers. The only difference noted was a slight color change in the images when viewed on

a Mac. None of the users indicated difficulty loading or viewing the program due to computer platform, operating system, or internet browser.

Additional Comments and Suggestions

Very few additional comments and suggestions were made. One resident responded with a comment and did not fill out the survey, and a few residents wrote comments in the emails that accompanied their completed surveys. A few of the comments and suggestions were as follows:

“Very impressive. I like it a lot. but I think the menu system is quite complicated. Not hard to navigate with the top menu though. Good job.”

“Good job! I'm eager to see the finished product.”

“Nice concept and illustrations. Good Luck.”

“instead of "select" buttons, make navigation easier by allowing clicking on the picture itself.”

[no changes] “other than the fact that it should be expanded because it is such a fantastic resource.”

“More pictures of step by step procedures would be very beneficial. Also list more indications vs contraindications.”

The overall response from the residents was positive and their suggestions were constructive for changes and additions that could be made for a complete surgical reference.

CHAPTER FIVE

Conclusions and Recommendations

Project Summary

The thesis research problem that this project attempted to solve was that there is no single source of information about the management of OMF trauma surgery that can be readily accessed to assist the surgeon in planning and executing operations. The goal for this project was to create a model for a web-delivered surgical training reference that could potentially make OMF trauma surgery preparation more comprehensive and time efficient. Treatment of the angle fracture of the mandible was chosen as the subject for the online reference, which would serve as a model for the production of a larger OMF trauma surgery resource.

In order to achieve this goal several objectives were met. Under the instruction of Dr. Ellis, necessary content for the surgical management of mandibular angle fractures was determined. A literature review and pre-project survey were conducted to determine what resources existed and were useful, and what needed to be acquired or produced. Illustrations, PowerPoint® presentations explaining surgical procedures, and video clips were created and resources were gathered. A layout was designed and interface was developed for web delivery of the model. The necessary media was integrated into the design and interface and interactivity was added to make the resource a training guide. Finally, the completed model was posted online and viewed by a sampling of the target audience. A survey was conducted and the responses were reviewed and evaluated to test the possible effectiveness of a complete OMF trauma surgery reference.

Discussion

Several methods of information display, layout, and navigation were tested during the creation of this model. Different methods of displaying instructive photographs, such as Flash® interactive slideshows, PowerPoint® presentations, and a webpage list of photos created in Dreamweaver® were investigated. The layout used for the webpages was designed to display the information in a way that would not make the pages cluttered and difficult to understand. The navigation was accompanied by instructions within the pages to guide users through the pages as easily as possible. All thirteen of the responding residents indicated that they would maybe or definitely use a reference created in the manner of this model. The positive survey response indicates that the goal and objectives for this project were successfully accomplished. Only one statement was disagreed with, indicating that there is room for improvement for the site's navigation. No one strongly disagreed with any of the statements, and neutral responses were minimal.

Suggestions for Further Research

This thesis project sought to create a model for a much larger website. The results of this project will be helpful in developing the larger site. Acquiring feedback from a larger audience, especially from different institutions, about how to improve the site as a training guide and source of review would be useful. The site could benefit from the addition of a forum for discussions to give users and doctors an opportunity to offer input and comments about the information provided in the site.

An element of the site that needs further research is the navigation. The navigation of this site was intended to improve the navigation of an existing interactive orthopedic website. Perhaps research could be done to further improve the navigation of this site and make navigation based on interactivity more intuitive for a first time user.

Yet another suggestion for further research would be a search option. After a complete OMF site is created, a search option would be helpful for surgeons who wish to use the site for review. Creating a search by image, word, or topic would be an extremely useful addition to the site.

APPENDIX A

AOFoundation Email Correspondence

"Anne Matuskowitz" <Anne.Matuskowitz@UTSouthwestern.edu>
01.06.2006 03:19

To
<foundation@aofoundation.org>, <support@aofoundation.org>
cc

Subject
Please help!

I am currently working on a medical illustration graduate thesis and found your site while doing some research. I was wondering if there was a way that I could get in touch with the editors or people who created this site to ask them a few questions. Even just one name will help me a lot. Thanks for the site! It really is a great module and surgical reference.

Sincerely,
Anne Matuskowitz

Mark Slater/AO-Center/CH
01.06.2006 13:21

To
Michael Redies/AO-Center/CH@AO-Center
cc

Subject
Fw: Please help!

Wärscht das was für dich?

Best regards / Mit freundlichen Grüßen

Mark Slater

AO Foundation
Knowledge Services
Clavadelstrasse 8
7270 Davos Platz
Switzerland
Phone: +41 (0)81 414 28 24
Fax: +41 (0)81 414 22 80

----- Forwarded by Mark Slater/AO-Center/CH on 01.06.2006 13:20 -----

Anne

>>> <michael.redies@aofoundation.org> 06/01/06 6:30 AM >>>

Dear Ms Matuskowitz,

I'd be happy to take your questions regarding our website and the AO Surgery Reference.

Kind regards,
Michael Redies

Michael Redies
AO Foundation
Head of Knowledge Services

Contact:
Mobile: +41 - 79 - 33 88 002
Email: michael.redies@aofoundation.org

Office Davos
Clavadelstrasse 8, CH-7270 Davos Platz
Telephone: +41 - 81 - 41 42 809
----- Forwarded by Michael Redies/AO-Center/CH on 01.06.2006 13:29 -----

"Anne Matuskowitz" <Anne.Matuskowitz@UTSouthwestern.edu>
01.06.2006 18:19

To
<michael.redies@aofoundation.org>
cc

Subject
Re: Fw: Please help!

Dear Mr. Redies,

Thank you for your quick response! I am creating a website for a doctor at UTSouthwestern. He suggested that I look at different medical websites on line and ask a few questions about their development as part of my research before I begin. I was wondering if there are any other sites like the AOfoundation surgical reference that you know of. I can't imagine there would be anything quite as extensive, but was the site modeled after other websites? And also, do you have any idea how often your site is referenced? Thank you so much for your help and your willingness to answer my questions! I hope to hear from you soon.

Anne

Hi Anne,

there are other websites with similar contents as the AO Surgery Reference, although none is as large. The best I know of is the Wheelless Textbook of Orthopedics (<http://www.wheelessonline.com/>).

When we modeled the AO Surgery Reference, however, we decided to start from scratch as we were planning to make much more information available than any other trauma/orthopedic site. Our main structuring metaphor is

the "Surgical Management process".

As the AO Surgery Reference only went public a month ago (24 April), we don't really have an extensive data pool about the usage yet. Since the launch we've had 98 user sessions/day with 1590 page views/day on average, but that number is quickly rising as the site is becoming better known. During the last week, the numbers were more like 140 user session/day with 2100 page views/day. We expect that number to continue rising rapidly as the Surgery Reference becomes better known in the surgical community.

Hope this helps.

Kind regards,

Michael

Michael Redies
AO Foundation
Head of Knowledge Services

Contact:

Mobile: +41 - 79 - 33 88 002

Email: michael.redies@aofoundation.org

Office Davos

Clavadelstrasse 8, CH-7270 Davos Platz

Telephone: +41 - 81 - 41 42 809

APPENDIX B

Pre-Project Survey

A Surgical Reference for Angle Fractures of the Mandible: An Online Guide to Oral Surgery Preparation

Pre-Project Survey

| | Always | Sometimes | Never |
|--|--------------------------|--------------------------|--------------------------|
| What references do you currently use to prepare for surgery? | | | |
| Printed or online journals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

| | Very useful | Sometimes useful | Not useful |
|---|--------------------------|--------------------------|--------------------------|
| How useful do you find these references when preparing for surgery? | | | |
| Printed or online journals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

What internet sites have been useful oral surgery references?

| | | |
|--|--------------------------|--------------------------|
| Would you find an online interactive training guide that would provide information in the form of illustrations, surgical photographs, videos, and literature in one location useful in preparing for surgery? | Yes | No |
| | <input type="checkbox"/> | <input type="checkbox"/> |

| | | |
|--|--------------------------|--------------------------|
| Have you used any medical websites of this nature? | Yes | No |
| | <input type="checkbox"/> | <input type="checkbox"/> |

If yes, please specify

| | | |
|---|-----|----|
| As an oral surgery resident, do you think that there is a need for this type of site? | Yes | No |
|---|-----|----|

☐☐

APPENDIX C

Completed Pre-Project Surveys

A Surgical Reference for Angle Fractures of the Mandible: An Online Guide to Oral Surgery Preparation

Pre-Project Survey

| | Always | Sometimes | Never |
|--|--------------------------|-------------------------------------|-------------------------------------|
| What references do you currently use to prepare for surgery? | | | |
| Printed or online journals | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

| | Very useful | Sometimes useful | Not useful |
|---|-------------------------------------|-------------------------------------|--------------------------|
| How useful do you find these references when preparing for surgery? | | | |
| Printed or online journals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

What internet sites have been useful oral surgery references?

| | | |
|--|-------------------------------------|--------------------------|
| Would you find an online interactive training guide that would provide information in the form of illustrations, surgical photographs, videos, and literature in one location useful in preparing for surgery? | Yes | No |
| | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Have you used any medical websites of this nature? Yes No

☐ ☒

If yes, please specify

As an oral surgery resident, do you think that there is a need for this type of site? Yes No

☒ ☐

A Surgical Reference for Angle Fractures of the Mandible: An Online Guide to Oral Surgery Preparation

Pre-Project Survey

| | Always | Sometimes | Never |
|--|-------------------------------------|-------------------------------------|--------------------------|
| What references do you currently use to prepare for surgery? | | | |
| Printed or online journals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

| | Very useful | Sometimes useful | Not useful |
|---|-------------------------------------|--------------------------|--------------------------|
| How useful do you find these references when preparing for surgery? | | | |
| Printed or online journals | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

What internet sites have been useful for oral surgery reference?

| | | |
|---|-------------------------------------|--------------------------|
| Would you find an online interactive training guide that would provide information in the form of illustrations, surgical photographs, video, and literature in one location useful in preparing for surgery? | Yes | No |
| | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

| | | |
|--|--------------------------|-------------------------------------|
| Have you used any medical websites of this nature? | Yes | No |
| | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

If yes, please specify

As an oral surgery resident, do you think that there is a need for this type of site? Yes No

☒ ☐

A Surgical Reference for Angle Fractures of the Mandible: An Online Guide to Oral Surgery Preparation

Pre-Project Survey

| | Always | Sometimes | Never |
|--|-------------------------------------|-------------------------------------|-------------------------------------|
| What references do you currently use to prepare for surgery? | | | |
| Printed or online journals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

| | Very useful | Sometimes useful | Not useful |
|---|-------------------------------------|-------------------------------------|--------------------------|
| How useful do you find these references when preparing for surgery? | | | |
| Printed or online journals | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

What internet sites have been useful oral surgery references? journal oms; random other sites

Would you find an online interactive training guide that would provide information in the form of illustrations, surgical photographs, videos, and literature in one location useful in preparing for surgery? Yes No

☒ ☐

Have you used any medical websites of this nature? Yes No

☐ ☒

If yes, please specify

As an oral surgery resident, do you think that there is a need for this type of site? Yes No

☒ ☐

A Surgical Reference for Angle Fractures of the Mandible: An Online Guide to Oral Surgery Preparation

Pre-Project Survey

| | Always | Sometimes | Never |
|--|----------------------------|----------------------------|----------------------------|
| What references do you currently use to prepare for surgery? | | | |
| Printed or online journals | x <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | x <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input type="checkbox"/> | x <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | x <input type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | x <input type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

| | Very useful | Sometimes useful | Not useful |
|---|----------------------------|----------------------------|--------------------------|
| How useful do you find these references when preparing for surgery? | | | |
| Printed or online journals | x <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Textbooks | x <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Videos | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Consult with surgeons | <input type="checkbox"/> | x <input type="checkbox"/> | <input type="checkbox"/> |
| Internet | <input type="checkbox"/> | x <input type="checkbox"/> | <input type="checkbox"/> |
| Other | | | |
| If other please specify | | | |

What internet sites have been useful oral surgery references?

<http://www.emedicine.com/ent/index.shtml>

Would you find an online interactive training guide that would provide information in the form of illustrations, surgical photographs, videos, and literature in one location useful in preparing for surgery? Yes No

x ☐

Would you find an online interactive training guide that would provide information in the form of illustrations, surgical photographs, videos, and literature in one location useful in preparing for surgery? Yes No



Have you used any medical websites of this nature? Yes No

☐
☒

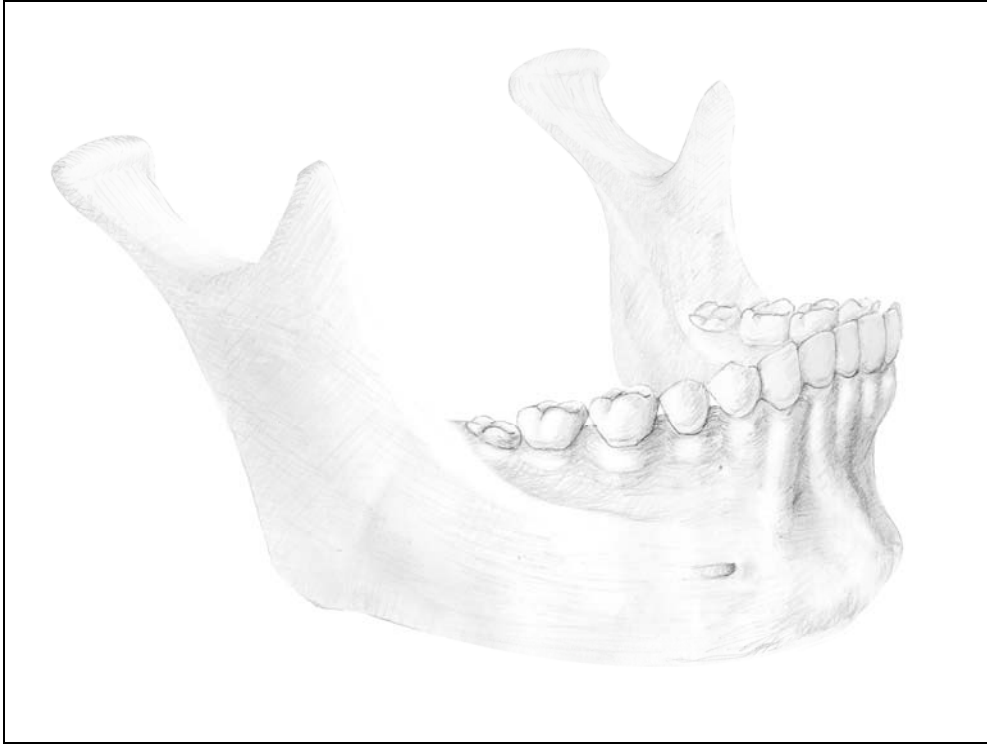
If yes, please specify

As an oral surgery resident, do you think that there is a need for this type of site? Yes No

☒
☐

APPENDIX D

Process of Illustrations



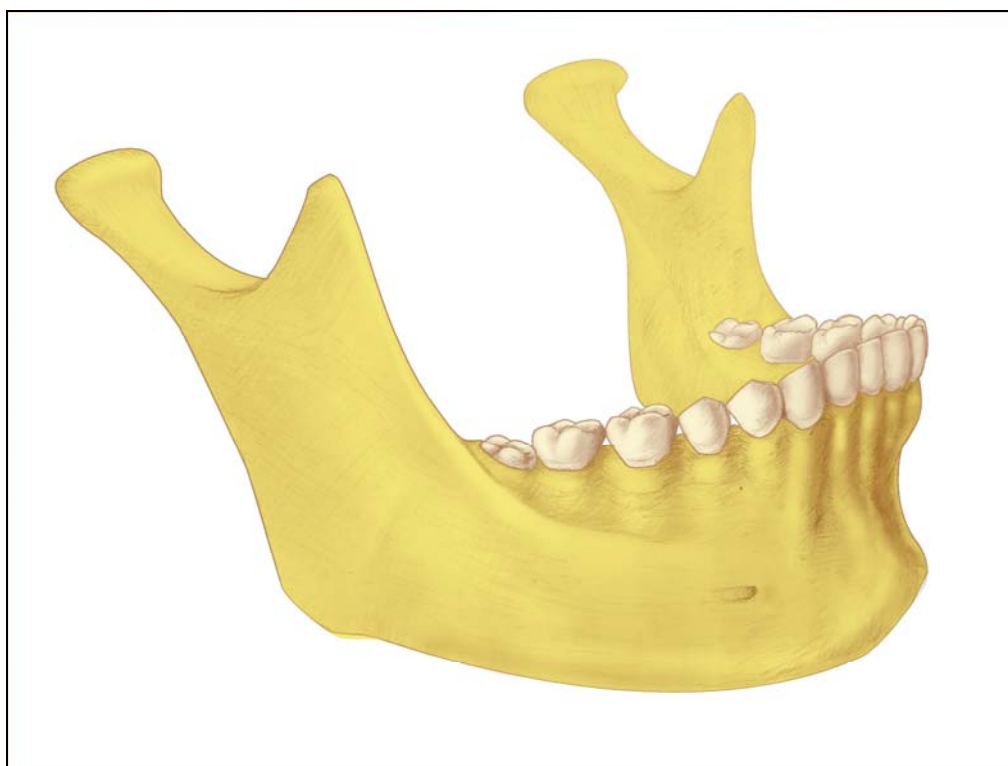
Graphite drawing



Graphite and Photoshop tone



Graphite and tone converted to sepia duotones



Addition of color



Addition of highlights and shadows



Completed illustration with mental canal

APPENDIX E

iFrame Coding

Coding for the iFrame

```
<td colspan="10" rowspan="9" valign="top"><iframe src="iframe_pages/iframe_spacer.htm"
name="floater" width=615 height=464
align="middle" frameborder="0"></iframe></td>
```

Coding for the iFrame button

```
<td rowspan="5" valign="top"><span class="style1"><a href="iframe_pages/algorithm.htm"
target="floater" class="style1">click to view a diagram of entire site for
review</a></span></td>
```

APPENDIX F

Questionnaire

Questionnaire

A Composite Surgical Reference for Angle Fractures Of the Mandible:

**A Pilot for an interactive, web-delivered training guide
for Oral and Maxillofacial Trauma Surgery**

Please visit:

http://www4.utsouthwestern.edu/medillus/omf_trauma

Only the pages regarding the angle fracture of the mandible are available at this point. First, click on the mandible on the homepage. Then click on the angle region of the mandible on the first diagnosis page. Everything after that point is complete.

Please return completed questionnaires to
Anne.Matuskowitz@UTSouthwestern.edu by
Tuesday, November 7th

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)?

Which operating system did you use (OSX, Windows XP, etc.)?

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?

| | Strongly Agree | Agre e | Neutral | Disagree | Strongly Disagree |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agre e | Neutral | Disagree | Strongly Disagree |
|--|-------------------|-----------|---------|----------|----------------------|
| <i>Comments:</i> | | | | | |
| | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe <input type="checkbox"/> If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program: | | | | | |

Thank You!

APPENDIX G
Completed Questionnaires

Questionnaire

**A Composite Surgical Reference for Angle Fractures
Of the Mandible:**

A Pilot for an interactive, web-delivered training guide
for Oral and Maxillofacial Trauma Surgery

Please visit:

http://www4.utsouthwestern.edu/medillus/omf_trauma

Only the pages regarding the angle fracture of the mandible are available at this point. First, click on the mandible on the homepage. Then click on the angle region of the mandible on the first diagnosis page. Everything after that point is complete.

Please return completed questionnaires to
Anne.Matuskowitz@UTSouthwestern.edu by
Tuesday, November 7th

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)?

Which operating system did you use (OSX, Windows XP, etc.)?

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|----------------|-------|---------|----------|-------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | x | | | | |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | | x | | | |
| 3. The navigation is clear and easy to use <i>Comments:</i> | | x | | | |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | | x | | | |
| 5. The text is useful and accurate <i>Comments:</i> | x | | | | |
| 6. The additional references given are useful <i>Comments:</i> | x | | | | |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | | x | | | |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide <i>Comments:</i> | | x | | | |
| 9. Would you use this program to prepare for surgery? | Yes | No | Maybe | | |

| |
|---|
| If no, why not, and what improvement could be added that would make this a useful tool before surgery?: |
|---|

| |
|---|
| What specific changes would you suggest to improve the program: |
|---|

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? PC

Which operating system did you use (OSX, Windows XP, etc.)? Windows XP

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?

Internet Explorer

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> I think that the site is very helpful for learning but as a reference it is difficult to navigate around to the bit of information that is desired. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> I found the organization of the information difficult to comprehend initially. Scrolling through the information would be easier to navigate than use of the power point presentations. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> surgical steps are clear. The extraoral approach to the mandible is lacking in detail. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> I don't agree with the use of the water pik in areas with incisions. | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agree e | Neutral | Disagree | Strongly Disagree |
|--|-------------------|------------|---------|----------|----------------------|
| maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide <i>Comments:</i> The guide would be a useful learning tool. As a reference it is too difficult to scroll through pages to find what you're looking for. | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe <input checked="" type="checkbox"/> If no, why not, and what improvement could be added that would make this a useful tool before surgery?:Must have access to a computer and site. | | | | | |
| What specific changes would you suggest to improve the program: not utilize power point to present material. I was unable to access the movies. | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? pc

Which operating system did you use (OSX, Windows XP, etc.)? xp

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?
mozilla

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> Some of the radiographs and photos were grainy | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------|-------|---------|----------|----------------------|
| <i>Comments:</i> | | | | | |
| | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Maybe <input type="checkbox"/> | | | | | |
| If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program:links to the articles. | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? **PC**

Which operating system did you use (OSX, Windows XP, etc.)? **WINDOWS XP**

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?

INTERNET EXPLORER

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | X | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | X | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | X | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | X | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | X | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | X | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input type="checkbox"/> | X | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------|-----------------------------|--------------------------------|--------------------------|--------------------------|
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide <i>Comments:</i> | X | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| | | | | | |
| 9. Would you use this program to prepare for surgery? If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | Yes X | No <input type="checkbox"/> | Maybe <input type="checkbox"/> | | |
| | | | | | |
| What specific changes would you suggest to improve the program: | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? pc

Which operating system did you use (OSX, Windows XP, etc.)? xp

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)? ie

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|------------------------------|-----------------------------|---|----------|----------------------|
| | | | | | |
| 9. Would you use this program to prepare for surgery? | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Maybe <input checked="" type="checkbox"/> | | |
| If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program: | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? pc

Which operating system did you use (OSX, Windows XP, etc.)? windows XP

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)? IE

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|---|-----------------------------|--------------------------------|----------|----------------------|
| 9. Would you use this program to prepare for surgery? If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | Yes <input checked="" type="checkbox"/> | No <input type="checkbox"/> | Maybe <input type="checkbox"/> | | |
| What specific changes would you suggest to improve the program: I like the overall layout of the program, in particular the indications for types of treatments. I think it is a great starting point but would benefit from more detailed info if it is to be geared towards residents | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? PC

Which operating system did you use (OSX, Windows XP, etc.)? XP

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)? IE

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> I found it hard to move back and forth I had several browsers open after looking at 2-3 of the presentations | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> Some pictures were very detailed others with few notes | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> Not sure I understand this question | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------|-------|---------|----------|----------------------|
| <i>Comments:</i> If there is a way to facilitate the navigating | | | | | |
| | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe <input type="checkbox"/> If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program: | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? microsoft

Which operating system did you use (OSX, Windows XP, etc.)? win XP

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?

internet explore

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> i could click only one part. | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agre e | Neutral | Disagree | Strongly Disagree |
|--|-------------------|-----------|---------|----------|----------------------|
| <i>Comments:</i> | | | | | |
| | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Maybe <input type="checkbox"/> | | | | | |
| If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program:i could click only one part | | | | | |

Thank You!

Which computer platform did you use to view the program (Mac, PC, etc.)? PC

Which operating system did you use (OSX, Windows XP, etc.)? Windows

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)? Int. Explorer

Strongly Agree Agree Neutral Disagree Strongly Disagree

1. The program is an effective reference for preparing to treat angle fractures of the mandible

Comments: Strongly Agree

2. The program is an effective resource for learning and reviewing the procedures.

Comments: Strongly Agree

3. The navigation is clear and easy to use

Comments: Strongly Agree

4. The PowerPoint presentations make clear the steps of the surgeries

Comments: Strongly Agree

5. The text is useful and accurate

Comments: Strongly Agree

6. The additional references given are useful

Comments: Strongly Agree

7. The diagram of the entire site on the second diagnosis page is a helpful tool

Comments: Strongly Agree

8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide

Comments: Strongly Agree

9. Would you use this program to prepare for surgery? Yes No Maybe

If no, why not, and what improvement could be added that would make this a useful tool before surgery?:

What specific changes would you suggest to improve the program:

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)?

Which operating system did you use (OSX, Windows XP, etc.)?

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agre e | Neutral | Disagree | Strongly Disagree |
|---|-------------------|-----------|---------|----------|----------------------|
| <i>Comments:</i> | | | | | |
| | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Maybe <input type="checkbox"/> If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program: | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? pc

Which operating system did you use (OSX, Windows XP, etc.)? windows xp

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?
mozilla firefox

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|---|-------------------------------------|-------------------------------------|--------------------------|-------------------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> very good comprehensive overview | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Comments:

9. Would you use this program to prepare for surgery? Yes ☐ No ☐ Maybe ☒

If no, why not, and what improvement could be added that would make this a useful tool before surgery?:

What specific changes would you suggest to improve the program:instead of "select" buttons, make navigation easier by allowing clicking on the picture itself.

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)?

Which operating system did you use (OSX, Windows XP, etc.)?

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)?

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agre e | Neutral | Disagree | Strongly Disagree |
|---|-------------------|-----------|---------|----------|----------------------|
| <i>Comments:</i> I wish a series for the entire facial skeleton could be completed | | | | | |
| | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Maybe <input type="checkbox"/> If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program:none other than the fact that is should be expaned because it is such a fantastic resource | | | | | |

Thank You!

Instructions: Please click the square that corresponds to your level of agreement with the statement to the left. Please keep in mind that the program was designed to teach about the procedures and as a method of review for the novice surgeon. Additional comments may be added after each statement.

Which computer platform did you use to view the program (Mac, PC, etc.)? pc

Which operating system did you use (OSX, Windows XP, etc.)? xp

Which internet browser did you use to view the program (Internet Explorer, Mozilla, etc.)? mozilla

| | Strongly Agree | Agree | Neutral | Disagree | Strongly Disagree |
|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| 1. The program is an effective reference for preparing to treat angle fractures of the mandible <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. The program is an effective resource for learning and reviewing the procedures. <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. The navigation is clear and easy to use <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. The PowerPoint presentations make clear the steps of the surgeries <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. The text is useful and accurate <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. The additional references given are useful <i>Comments:</i> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. The diagram of the entire site on the second diagnosis page is a helpful tool <i>Comments:</i> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. A complete online guide to oral and maxillofacial surgery done in the manner of this pilot would be a useful trauma surgery guide | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Strongly Agree | Agre e | Neutral | Disagree | Strongly Disagree |
|---|-------------------|-----------|---------|----------|----------------------|
| <i>Comments:</i> | | | | | |
| | | | | | |
| 9. Would you use this program to prepare for surgery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Maybe <input type="checkbox"/> If no, why not, and what improvement could be added that would make this a useful tool before surgery?: | | | | | |
| | | | | | |
| What specific changes would you suggest to improve the program: More pictures of step by step procedures would be very beneficial. Also list more indications vs contraindications. | | | | | |

Thank You!

BIBLIOGRAPHY

AO Foundation. "AO Foundation Surgery Reference." <http://www.aofoundation.org>. Web page (accessed 2006).

Department of Medical Oncology, University of Newcastle "On-Line Medical Dictionary." <http://www.cancerweb.ncl.ac.uk/omd/>. Web page (accessed 2006).

Duke Orthopaedics. "Wheeless' Textbook of Orthopaedics." <http://www.wheelessonline.com>. Web page (accessed October, November 2006).

Ellis, Edward. "Rigid Versus Non-Rigid Fixation." chapter 20 in: *Peterson's Principles of Oral and Maxillofacial Surgery*, 2nd edition, edited by. M Miloro, G Ghali, P Larson, and P Waite, 271-382. Ontario, Canada: BC Decker Inc, 2004.

Ellis, Edward. "Treatment Methods for Fractures of the Mandibular Angle." *The Journal of Cranio-Maxillofacial Trauma*. 28 (Spring 1996): 28-36.

EMedicine from Web MD. "Otolaryngology and Facial Plastic Surgery." <http://www.emedicine.com/ent/index.shtml>.

VITAE

Anne Michelle Matuskowitz was born in Philadelphia, Pennsylvania, on May 22, 1981, the daughter of Mary Morrey Matuskowitz and E. Joseph Matuskowitz. After completing her work at Greensburg Central Catholic High School, Greensburg, Pennsylvania in 1999, she entered The College of the Holy Cross in Worcester, Massachusetts, where she received the degree of Bachelor of Art with a major in Visual Arts in 2003. During the Fall of 2003 she attended the Art Students League of New York in New York City, New York to further her education in Art. In May, 2004 she entered the Graduate School of Biomedical Communications at the University of Texas Medical Center. She was awarded the degree of Master of Arts in December, 2006.

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