
Software Requirements Specification



for

Thousand Smiles Digital Charts – Dental and Hygiene Subsystem

Final Version 1.1

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Thousand Smiles Foundation

3/11/2020

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Revision History

Name	Date	Reason For Changes	Version
Syd Logan	12/21/2019	Initial Revision	0.9
Syd Logan	12/27/2019	Add hyperlink for NOM English translations	0.9.1
Syd Logan	03/08/2020	Make it more clear this is intended for use by hygienists as well as dentists. Add new mouth chart suggested by Dr. Irwin. Add discussion of tooth chart coloring suggested by Dr. Irwin, using Opidental as a possible source of inspiration.	0.9.2
Syd Logan	3/08/2020	Add some detail as to how X-Rays are viewed.	0.9.3
Syd Logan	3/09/2020	Confirmation of dental procedures from Dr. Cruz	0.9.4
Syd Logan	3/11/2020	Conditions and treatments are one in the same. Make clear that color and annotations in the chart are future features. Add sections detailing ideas from Dr. Cruz regarding the identification of priority patients based on medical history, and return to clinic notations.	1.0
Syd Logan	10/17/2020	Added CDT codes	1.1

1. Introduction

1.1 Purpose

The purpose of this document is to outline the basic requirements associated with the Dental portion of the Thousand Smiles Digital Chart. The overall requirements of the system are described in a separate document. This document focuses specifically on Dental requirements.

The dentists and hygienists to which this functionality is directed currently use paper charts to record the overall dental condition of the patient, and any treatments performed. In addition, the dentist will record free form notes as applicable.

The overall goal of these requirements is not to change what is currently being recorded in the paper chart, but how – by replacing it with a digital version. The paper charts that have been used by Thousand Smiles dental and hygiene staff have proven sufficient for our needs for many years. And there has been little indication from interviews of the dental staff that there is need for wholesale change.

However, it will be the case that use of the digital charts will inspire ideas that may extend beyond what is the current version of this requirement documents. The architecture and design of the Thousand Smiles Digital Charts allows for that expansion.

1.2 Document Conventions

There are no specific conventions associated with this document.

1.3 Intended Audience and Reading Suggestions

The intended audience includes:

Thousand Smiles Board Members: Board members should read this document to become familiar with the overall overall scope of recording dental data in the digital charts project. This knowledge may prove helpful as background when evaluating logistics and expenditures associated with the implementation of the system, e.g., equipment purchases.

Implementation Team: This document spells out requirements which guide the implementation of the system. It is not intended to be a design document, rather it spells out the requirements that a design must follow to be considered valid.

Dental Staff: This document must be read and approved by the end user(s) of the system, the dentists and hygienists which provide dental care at our clinics. Not all dentists will need to be involved, just those who have volunteered to become involved with the requirements process. This document will likely go through some number of revisions towards eventual approval. The dentists should read this document critically and identify omissions, errors, and changes so that they can be dealt with.

1.4 Product Scope

The dental charts portion of the digital chart is intended to provide the dentists and hygienists with the following capabilities:

- Ability to manage the data associated with the evaluation, diagnosis, and treatment of a child that the dentist or hygienists is tasked with at a Thousand Smiles clinic. The data collected here is specific to dentistry, collected at time of use. Some of the data will record the diagnosis of the patient, some will record the care given, and optionally some of the data will comprise care to be given at a future time.
- Ability to refer to a patient history that consists of evaluation, diagnosis, and treatments made by dental or hygiene at prior Thousand Smiles clinics on a per-clinic basis.
- View other portions of the digital chart associated with a child as relevant to dental and hygiene, including X-Rays and medical history.
- Eliminate the need for paper charts to the extent possible.

The benefits we hope to realize by migrating dental from paper charts to digital charts include:

- Increased access to data by other specialists. We aim to make the data recorded by dental is more easily located and viewed by other specialists involved with the care of the child during his or her visit at one of our clinics
- Increased reporting functionality. Migrating to a database-backed chart allows the organization to more readily generate reports; for example, number of children, types and numbers of procedures, incident counting (e.g., number of children seen with a specific condition). This data could be used for various purposes, both clinical and administrative in nature.

1.5 References

This document makes reference to the following documents

- *Standard Official Mexicana NOM-024-SSA3-2010*
https://github.com/slogan621/tscharts/blob/master/docs/nom/NOM-024-SSA3-2012_English.pdf

2. Chart Content

The dental chart consists of the following components:

- Tooth Chart
- Treatment Completed Today
- X-Rays
- Free-Form Notes

Each of these components is available to dental staff when the patient has been checked in to the tablet at a dental chair.

The following subsections describe the data collected and displayed in each of the above listed components, as well as specific requirements of each.

2.1 Tooth Condition/Treatment Needed Chart

The Tooth Condition/Treatment chart represents the care, diagnosis, and treatment of a child for all past and current clinic visits. There is one Tooth Condition/Treatment Chart per patient.

2.1.1 Content

The Tooth Condition/Treatment chart consists of a graphic tooth chart (see Figure 2.1, below).

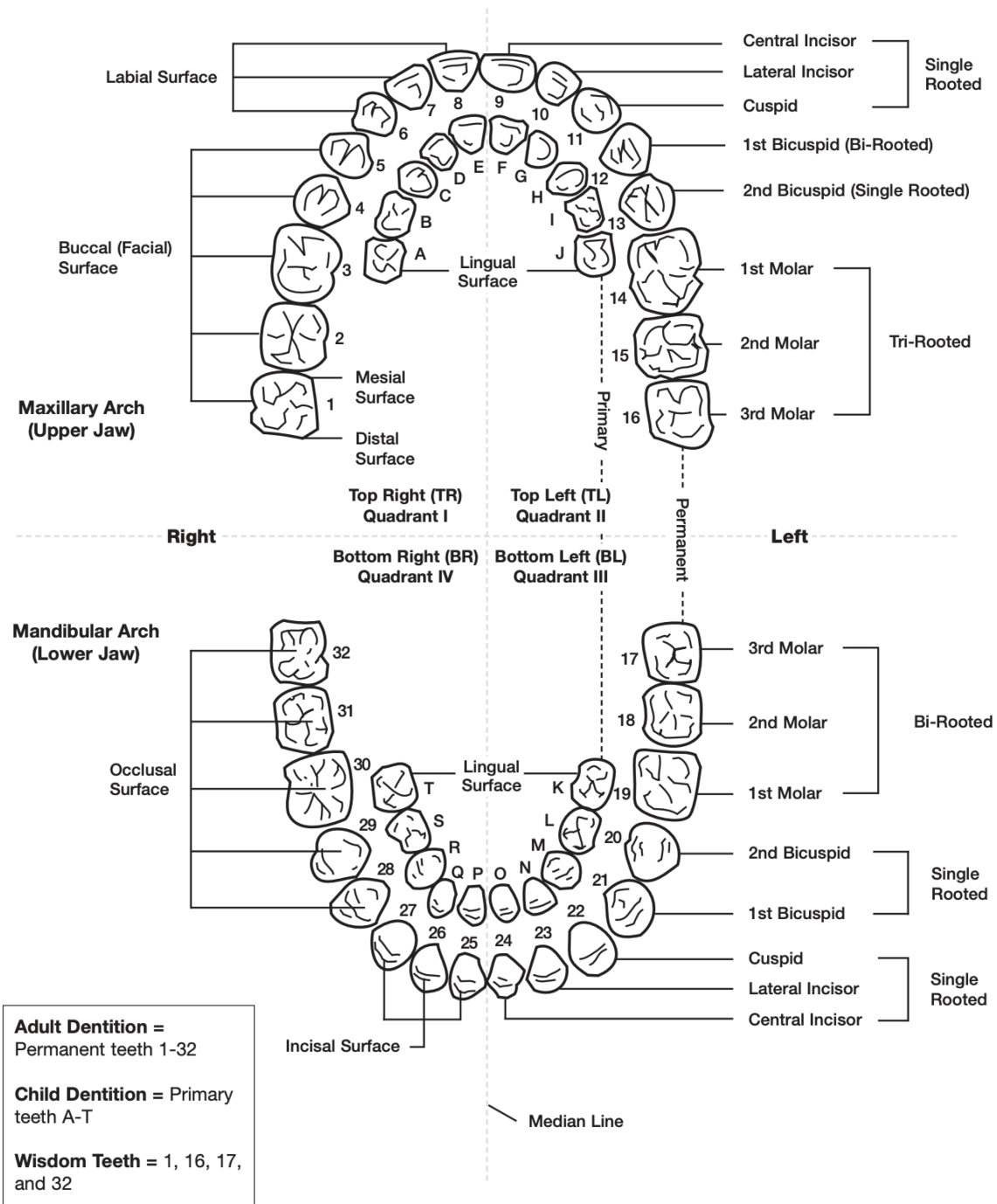


Figure 2.1 Tooth Chart

Each tooth in the tooth chart graphic may be clicked on. Clicking on a tooth will result in the display of a table listing a summary of problems, treatments, and status for the tooth which was selected. Each unique problem, treatment, and status is displayed as a separate line in this table. If a problem has multiple treatments, then each is given a separate row in this table.

The table will provide the following functions:

- Add – add a new problem/treatment for the tooth to the list.
- Remove – remove an existing problem/treatment from the list
- Edit – modify an existing problem/treatment in the list

Free-form notes can be added for each row in the table.

In the future (post 1.0) color will be used in the tooth chart to identify which teeth have the following:

- No problems
- Problems with treatments yet to be performed
- Problems with all treatments completed
- Tooth missing

Each treatment shall be selected from a list of recognized ADA problems and treatments where each term used corresponds to an ADA Code on Dental Procedures and Nomenclature (CDT Code). Each term and treatment should have a corresponding Spanish language equivalent. The user will type in letters or a code number, matches will display on the screen from which the desired procedure is selected.

If a problem or treatment is not available then it can be added as free-form text by the dentist via the tablet keyboard. However, a search of the available terms shall be performed for each word entered by the dentist and offered as an alternative so that dentists are forced to use terms known to the system, rather than making up their own terms.

Each treatment will indicate the date of creation, and the date the treatment was completed.

The software will allow the users to associate a surface with each problem or treatment recorded for the patient. The surfaces include:

- Labial
- Occlusal
- Buccal

The following figure illustrates how surfaces and conditions are represented in Opendental:

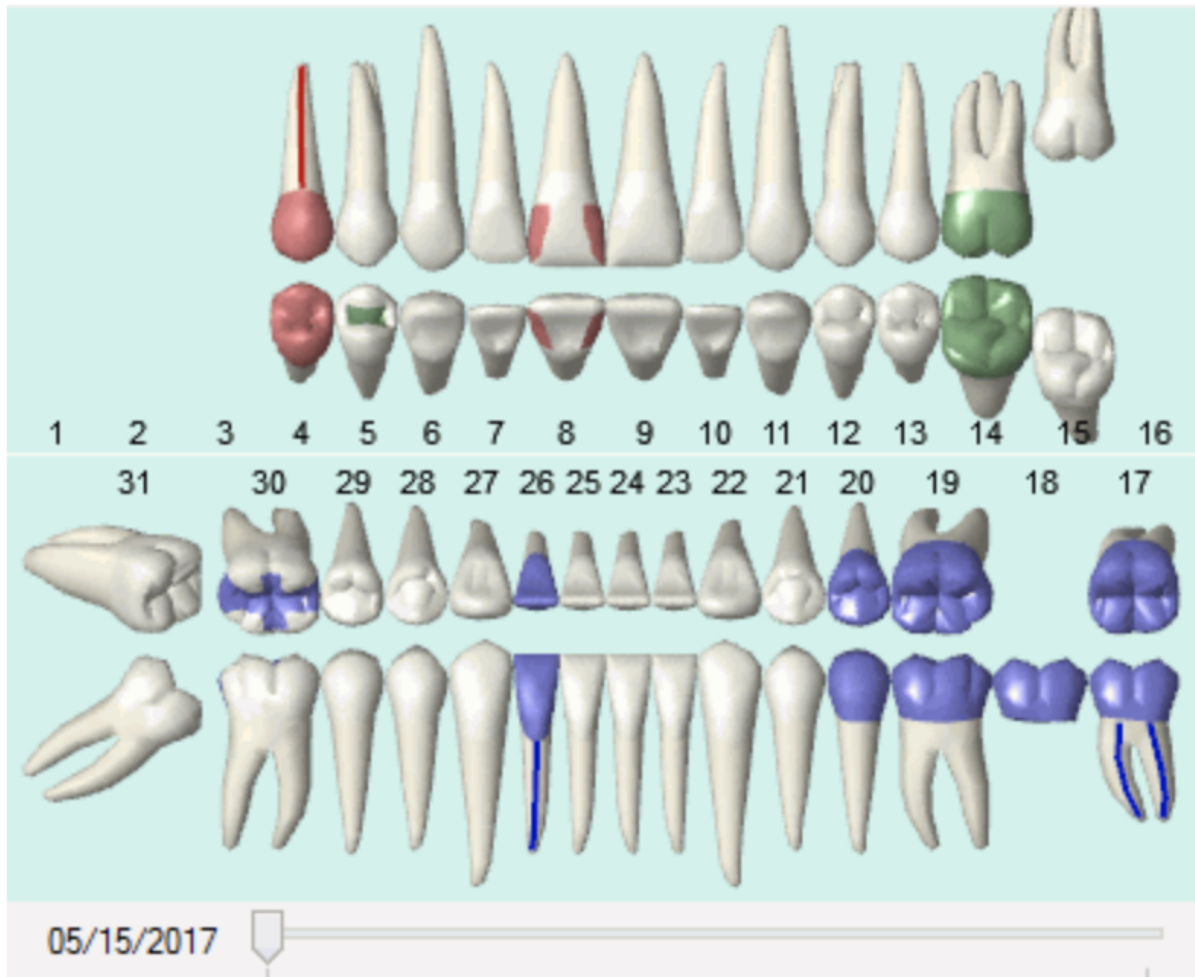


Figure 2.2 Surfaces and Colors Chart in Opendental

The above graphic represents various tooth surfaces (listed above), as well as indication as to how Opendental uses color to indicate where conditions exist, and treatments are completed, among other things.

The following colors are defined in Opendental (and are configurable):

Definitions			
Name		Color	Hide
Treatment Planned		Red	<input type="checkbox"/>
Complete		Blue	<input type="checkbox"/>
Existing Current Prov		Blue	<input type="checkbox"/>
Existing Other Prov		Green	<input type="checkbox"/>
Referred Out		Red	<input type="checkbox"/>
Treatment Planned (light)		Light Red	<input type="checkbox"/>
Complete (light)		Light Blue	<input type="checkbox"/>
Existing Current Prov (light)		Light Blue	<input type="checkbox"/>
Existing Other Prov (light)		Light Green	<input type="checkbox"/>
Referred Out (light)		Light Red	<input type="checkbox"/>
Main Background		Gray	<input type="checkbox"/>
Text		Black	<input type="checkbox"/>
Highlighted Text		Red	<input type="checkbox"/>
Highlighted Background		White	<input type="checkbox"/>
Background on TPs		White	<input type="checkbox"/>
Text on TPs		Black	<input type="checkbox"/>
Condition		Dark Red	<input type="checkbox"/>
Condition (light)		Light Red	<input type="checkbox"/>

Figure 2.3 Color codes in Opidental

One thing that the flat graphic (Figure 2.1) does not indicate are the individual conditions, where these conditions are located on the various surfaces, and the treatment states. Open issues for a future design include:

- Do we want to graphically represent the surfaces of the mouth, or is the flat graphic (Figure 2.1) preferable?
- What do we want to indicate? Treatment state (scheduled, completed, or just location)?
- To what extent do we want to color the charts to begin with? For example, as seen in the following graphic, Figure 2.1 has been “colored” by drawing circles and an ‘X’ over and around areas relevant to the exam/treatment. It does not indicate the actual condition or treatment, it just helps to identify which teeth have (or have had) some condition or treatment. Perhaps this is all we need? If so, we could possibly automate it.

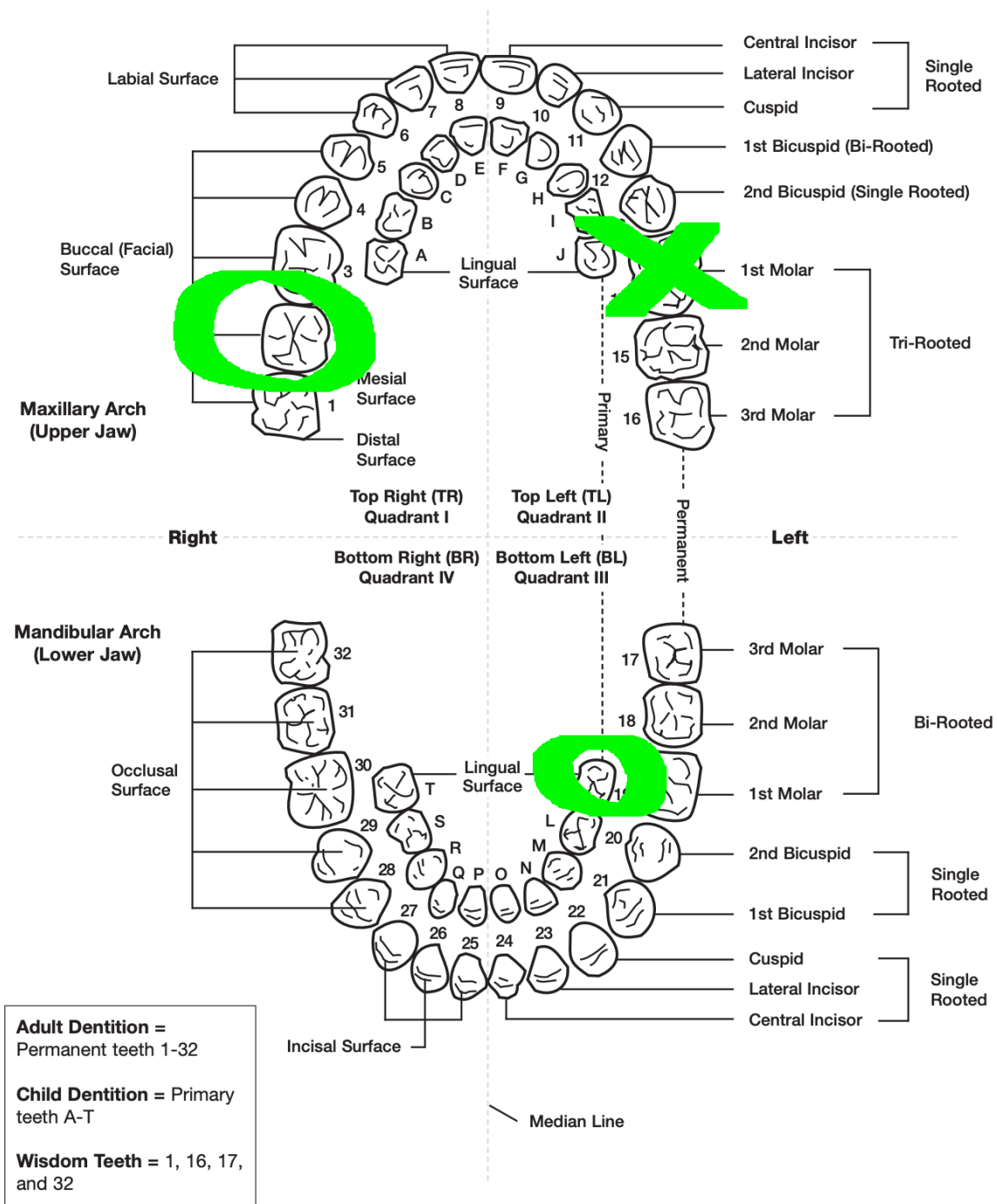


Figure 2.4 Using simple annotations to indicate which teeth have issues at a glance.

Alternately, and might indicate with colors various conditions. In Figure 2.5, teeth in green have had conditions successfully treated, while those in red indicate conditions are noted in the chart, but have yet to be resolved. Clicking on the tooth itself might display a dialog with a summary of the condition and treatment planned or completed.

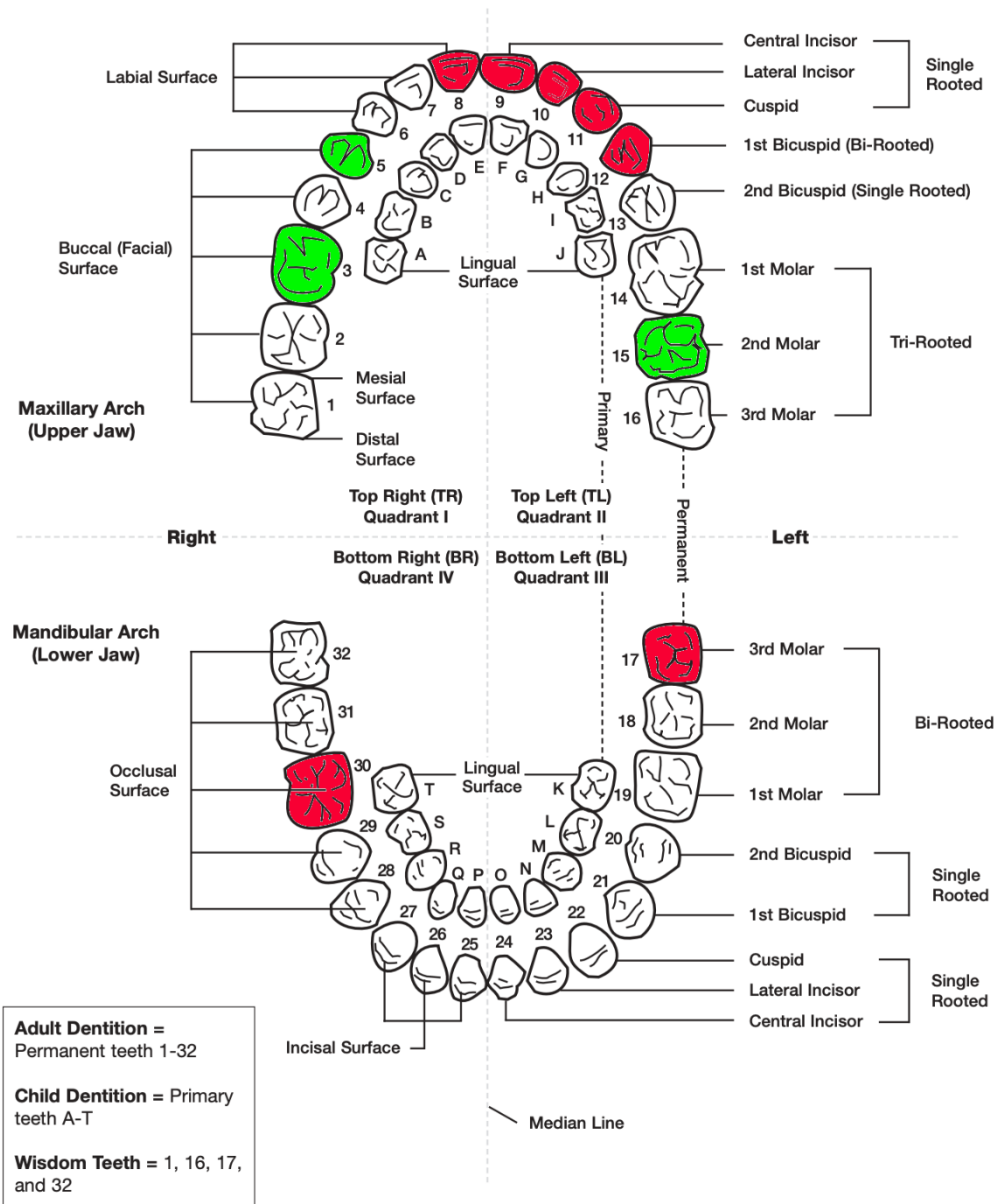


Figure 2.5 Treatment completed (Green) and Treatment planned (Red)

Ideally, the color can be automated. Meaning, if a dentist or hygienists adds a condition or changes the state of the treatment, the software can color the tooth chart automatically. This would be preferable to having the dentist or hygienists draw on the tooth interactively, if only because it is a simpler thing to implement in software. As long as we keep the use of color to a minimum, automation is perhaps the best solution.

In version 1.0, color will be used to indicate if the treatment is complete or not. The color will be added to the drawing automatically by software.

2.1.2 CDT Codes

The following is the list of CDT codes supported by the software.

PERSONS SERVED (ENCOUNTER CODES)

0000 First Visit (of fiscal year by the patient)
0190 Dental Revisit (For Any Reason)
0003 BBTD/ECC Dental Patient
0004 Head Start Program Dental Patient
0007 High-risk Periodontal Patient
9320 Diabetic Screening Procedures
9321 Diabetic Referral Or Follow-up
9330 Hypertension Screening
9331 Hypertension Referral Or Follow-up
9340 Dental Visit, Pre-Natal Mother
9341 Dental Visit, Nursing Mother
9990 Planned Treatment Completed
9991 Patient Refuses Recommended Treatment

DIAGNOSTIC SERVICES

D0120 Periodic Oral Evaluation (update existing chart)
D0140 Limited Evaluation-Problem Focused (Emerg. Exam)
D0145 Oral Evaluation for Patient under 3 years of age
D0150 Comprehensive Oral Evaluation (new chart made)
D0160 Extensive Oral Evaluation-Problem Focused
D0180 Comprehensive Periodontal Evaluation
D0210 Intraoral Complete Series
D0220 Intraoral Periapical, Single Film
D0230 Intraoral Periapical, Additional Film
D0240 Intraoral Film
D0270 Bitewings, Single Film
D0272 Bitewings, Two Films
D0273 Bitewings, Three Films
D0274 Bitewings, Four Films
D0330 Panoramic-Maxilla And Mandible Film
D0340 Cephalometric Film
D0350 Oral/Facial Images
D0425 Caries Susceptibility Test
D0460 Pulp Vitality Tests (Per Quad)
D0470 Diagnostic Casts (Per Set)
D0471 Diagnostic Photographs

PREVENTIVE SERVICES

D1110 Prophylaxis, Adult (Permanent Dentition)
D1120 Prophylaxis, Child (Primary or Mixed Dentition)
D1203 Topical Fluoride Not Including Prophy-Child
D1204 Topical Fluoride Not Including Prophy-Adult
D1206 Topical Fluoride Varnish (mod to high risk pts)
D1310 Nutritional Counseling For Oral Health
D1320 Tobacco Use Counseling
D1330 Oral Hygiene Instructions
D1351 Sealant (per tooth)
D1510 Space Maintainer, Fixed Unilateral
D1515 Space Maintainer, Fixed Bilateral
D1550 Space Maintainer, Recementation
D1555 Removal of Fixed Space Maintainer

RESTORATIVE DENTISTRY

D2140 Amalgam, One Surface (Perm or Primary)
D2150 Amalgam, Two Surface (Perm or Primary)
D2160 Amalgam, Three Surface (Perm or Primary)
D2161 Amalgam, Four+ Surfaces (Perm or Primary)
D2330 Composite Resin, One Surface, Anterior
D2331 Composite Resin, Two Surfaces, Anterior
D2332 Composite Resin, Three Surfaces, Anterior
D2335 Composite Resin, Four Surfaces or Incisal
D2390 Composite Resin Crown, Anterior
D2391 Comp Resin, One Surf., Post., Perm or Prim (includes PRR)
D2392 Composite Resin, Two Surfaces, Post. (Perm or Primary)
D2393 Composite Resin, Three Surfaces, Post. (Perm or Primary)
D2394 Composite Resin, Four Surfaces, Post. (Perm or Primary)
D2740 Crown-Porcelain/Ceramic Substrate
D2750 Crown-Porcelain Fused To High Noble Metal
D2751 Crown-Porcelain Fused to Base Metal
D2752 Crown-Porcelain Fused To Noble Metal
D2790 Crown- Full Cast High Noble Metal
D2791 Crown-Full Cast Base Metal
D2792 Crown-Full Cast Noble Metal
D2799 Provisional Crown
D2915 Recement Cast/Prefab Post and Core
D2920 Recement Crowns
D2930 Crown-Stainless Steel, Primary Tooth
D2931 Crown-Stainless Steel, Perm. Tooth
D2932 Crown-Prefab. Resin, Primary Tooth
D2940 Sedative Filling
D2950 Core Buildup, Including Any Pins
D2951 Pin Retention (Per Tooth) Excludes Restoration
D2954 Post And Core (Prefab.), Excl Crown
D2970 Temporary Crown (fractured tooth)

PERIODONTICS

D4210 Gingivectomy Or Gingivoplasty (4 or more contig. teeth)
D4211 Gingivectomy Or Gingivoplasty (1 to 3 teeth)
D4240 Gingival Flap Proc. w/ Root Planing (4 or more contig. teeth)
D4241 Gingival Flap Proc. w/ Root Planing (1 to 3 teeth)
D4249 Crown Lengthening Proc. - Hard Tissue
D4260 Osseous Surgery (4 or more contig. teeth)
D4261 Osseous Surgery (1 to 3 teeth)
D4263 Bone Replacement Graft, First Site In Quadrant
D4274 Distal Prox. Wedge Procedure (w/o other Surg)
D4341 Root Planing (4 or more contig. teeth)
D4342 Root Planing (1 to 3 teeth)
D4355 Full Mouth Debridement (For Perio. Evaluation)
D4381 Controlled Release Of Chemo. Agents, Per Site
D4910 Periodontal Maintenance After Therapy

ENDODONTICS

D3110 Pulp Cap, Direct (Excluding Final Restoration)
D3220 Vital Pulpotomy, Primary or Perm. Tooth
D3221 Pulpal Debridement, Primary or Perm Tooth
D3230 Pulp Therapy, Primary Anterior
D3240 Pulp Therapy, Primary Posterior
D3310 Endodontic Fill, Anterior
D3320 Endodontic Fill, Bicuspid
D3330 Endodontic Fill, Molar
D3346 Retreat Previous Endo Fill - Anterior
D3347 Retreat Previous Endo Fill -Bicuspid
D3348 Retreat Previous Endo Fill -Molar
D3351 Apexification/Recalcify, Initial Visit
D3352 Apexification/Recalcify, Interim Visit
D3353 Apexification/Recalcify, Final Visit
D3410 Apicoectomy/Periradicular Surg., Ant. Tooth
D3430 Retrograde Filling, Per Root
D3950 Fitting For Preformed Dowel
D3960 Bleach Discolored Tooth (Vital or Non-Vital)

REMOVABLE PROSTHODONTICS

D5110 Complete Denture - Maxillary
D5120 Complete Denture - Mandibular
D5130 Immediate Denture - Upper
D5140 Immediate Denture - Lower
D5211 Upper Partial, Resin Base incl. Clasps
D5212 Lower Partial, Resin Base Incl. Clasps
D5213 Upper Partial, Cast Frame, Resin Bases, Clasps
D5214 Lower Partial, Cast Frame, Resin Bases, Clasps
D5410 Adjust Full Denture, Upper or Lower
D5421 Adjust Partial Denture, Upper or Lower
D5510 Repair Full Denture Base, Upper or Lower
D5520 Replace Missing/Broken Denture Teeth (Per Tooth)
D5610 Repair Resin Partial Denture Base
D5640 Replace Missing/Broken Denture Teeth (Per Tooth)

D5710 Rebase, Full Denture
D5720 Rebase, Partial Denture
D5750 Reline, Full Denture (Laboratory Procedure)
D5760 Reline, Partial Denture (Laboratory Procedure)
D5850 Tissue Conditioning (Per Arch)
D5860 Overdenture, Full

FIXED PROSTHODONTICS

D6080 Implant Maintenance Procedures
D6210 Pontic – Cast High Noble Metal
D6211 Pontic – Cast Base Metal
D6212 Pontic – Cast Noble Metal
D6240 Pontic - Porcelain Fused To High Noble Metal
D6241 Pontic - Porcelain Fused To Base Metal
D6242 Pontic - Porcelain Fused To Noble Metal
D6545 Retainer-Cast Metal For Resin Bonded Pros.
D6740 Abutment-Porcelain/Ceramic
D6750 Abutment – Porcelain Fused To High Noble Metal
D6751 Abutment – Porcelain Fused To Base Metal
D6752 Abutment – Porcelain Fused To Noble Metal
D6790 Abutment - Full Cast High Noble Metal
D6791 Abutment - Full Cast Base Metal
D6792 Abutment - Full Cast Noble Metal
D6930 Recement Bridge
D6972 Post and Core, (Prefab.) Excl. Retainer
D6973 Core Buildup For Retainer, Incl. Pins
D6980 Bridge Repair (By Report)

ORTHODONTICS

D8010 Limited Ortho. TX, Primary Dentition
D8020 Limited Ortho. TX, Transitional Dentition
D8030 Limited Ortho. TX, Adolescent Dentition
D8040 Limited Ortho. TX, Adult Dentition
D8050 Interceptive Ortho. TX, Primary Dentition
D8060 Interceptive Ortho. TX, Transitional Dentition
D8070 Comprehensive Ortho. TX, Transitional Dentition
D8080 Comprehensive Ortho. TX, Adolescent Dentition
D8090 Comprehensive Ortho. TX, Adult Dentition
D8210 Habit Control, Removable Appliance
D8220 Habit Control , Fixed Appliance
D8660 Pre-Orthodontic Treatment Visit
D8670 Periodic Orthodontic Treatment Visit
D8680 Ortho. Retention, Remove Appl. & Make Retainer
D8691 Repair of Orthodontic Appliance
D8692 Replacement of Lost or Broken Retainer
D8693 Rebond/Recement/Repar Fixed Retainer

ORAL SURGERY

D7111 Coronal Remnants (Primary Tooth)
D7140 Extraction (Erupted Tooth or Exposed Root)
D7210 Surgical Extraction, Erupted Tooth
D7220 Surgical Extraction, Soft Tissue Impaction
D7230 Surgical Extraction, Bony Impaction
D7240 Surgical Extract, Bony Impact.-Section Tooth
D7241 Surgical Extract, Bony Impact-Section-Unusual
D7250 Remove Residual Roots, Unexposed
D7270 Reimplant/Stabilize Avulsed Teeth
D7280 Surgical Exposure to Attach Ortho Wire
D7283 Placement of Device to Facilitate Eruption
D7286 Biopsy of Oral Tissue (Soft or Hard Tissue)
D7288 Brush Biopsy
D7291 Transeptal Fiberotomy
D7310 Alveoloplasty w/Extractions (4 or more teeth/spaces)
D7311 Alveoloplasty w/Extractions (1-3 teeth/spaces)
D7320 Alveoloplasty w/o Extractions (4 or more teeth/spaces)
D7321 Alveoloplasty w/oExtractions (1-3 teeth/spaces)
D7410 Excision of Benign Lesion (up to 1.25 cm)
D7420 Excision of Benign Lesion (greater than 1.25 cm)
D7460 Remove Nonodontogenic Cyst
D7465 Destroy Lesion by Physical or Chemical Means
D7471 Removal of Exostosis, Maxilla or Mandible
D7510 Incision And Drainage of Abscess, Intraoral
D7520 Incision And Drainage of Abscess, Extraoral
D7530 Removal Foreign Body
D7620 Fracture, Closed Reduction - Maxilla
D7630 Fracture, Open Reduction - Mandible
D7640 Fracture, Closed Reduction - Mandible
D7650 Fracture, Arch/Open - Malar/Zygomatic
D7660 Fracture, Arch/Closed - Malar/Zygomatic
D7670 Fracture, Alveolus Open Reduction
D7830 Manipulation of TMJ Under Anesthesia
D7880 Occlusal Orthotic Appliance
D7899 Unspecified TMD Therapy
D7910 Suture Traumatic Wounds (Any Size)
D7960 Frenectomy, As Separate Procedure
D7970 Excise Hyperplastic Tissue/Arch
D7971 Excise Pericoronal Gingiva
D7997 Appliance Removal (not by dentist who placed app)

ADJUNCTIVE GENERAL SERVICES

D9110 Palliative TX of Dental Pain (Minor Procedure)
9130 Broken Appointment (No Show)
9140 Canceled Appointment
9170 Emerg. Encounter (Report w/ any exam code)
D9210 Local Anesthesia, Not In Conjunction w/ Other Proc.
D9211 Regional Block Anesthesia
D9212 Trigeminal Division Block
D9215 Local Anesthesia
D9220 General Anesthesia

D9221 General Anesthesia, Each Add. 15 Min.
D9230 Analgesia, Includes Nitrous Oxide
D9241 Intravenous Sedation (first 30 minutes)
D9242 Intravenous Sedation (each additional 15 minutes)
D9248 Non-intravenous Conscious Sedation (includes IM)
9260 Premedication, Oral Only
D9310 Consultation Provided (Per Session)
D9420 Hospital Call, Includes Admissions
D9430 Office Visit, Observation Only (During Office Hours)
D9440 Office Visit, After Office Hours
D9610 Therapeutic Injection (Sedatives/Antibiotics)
D9630 Other Drugs/Medicaments
D9910 Apply Desensitizing Medicaments
D9911 Application of Desensitizing Resin for Cervical/Root Surface
D9920 Behavior Management
D9930 Treat Post-surgical Complications
D9940 Occlusal Guard
D9941 Athletic Mouth Guard
D9942 Repair/reline Occlusal Guard
D9951 Occlusal Adjustment, Limited
D9973 External Bleaching (per tooth)
D9974 Internal Bleaching (per tooth)

2.2 Treatment Completed Today

The Treatment Completed Today section consists of a series of checkboxes that indicate additional visit-related data that does not correspond to an item covered by the Tooth Condition/Treatment Needed Chart (Section 2.1 above). Each item in the checkbox allows for free-form notes to be added by the dentist. If an item is not checked, then it does not apply to the patient.

2.2.1 Content

The list of check boxes includes the following.

- Examination ☐
- Prophyl (cleaning) ☐
- SRP UR ☐ LR ☐ UL ☐ LL ☐
- X-Rays Viewed ☐
- Head and Neck Oral Cancer Exam ☐
- Oral Hygiene Instruction ☐
- Fluoride Tx Varnish ☐
- Nutritional Counseling ☐
- Orthodontic Evaluation ☐ Tx ☐
- Oral Surgery Evaluation ☐ Tx ☐
- Local Anesthetic 20% Benzocaine Topical ☐ Lidocaine ☐ #of carps ____ Septocaine ☐ # of carps ____ Other ☐ _____

Underlines in the above indicate editable text. Use of “Other” in Local Anesthetic should be avoided by ensuring that any commonly used local anesthetics are listed rather than entered as free form text.

2.3 X-Rays

The dentist or hygienist may view X-Rays taken for the currently checked-in patient from all clinic, present and prior, Each X-Ray will be displayed as a thumbnail. The dentist may zoom in and out using his or her fingers (pinch-zooming). A select number of enhancements may be applied such as histogram equalization (contrast) and false coloring. The dentist may save any enhancements made as new images in the patient record.

2.3.1 Content

A list of all X-Rays for the patients is available by clicking on the X-Ray button on the left of the screen. The list will be organized by clinic, as shown in Figure 2.3.1 below

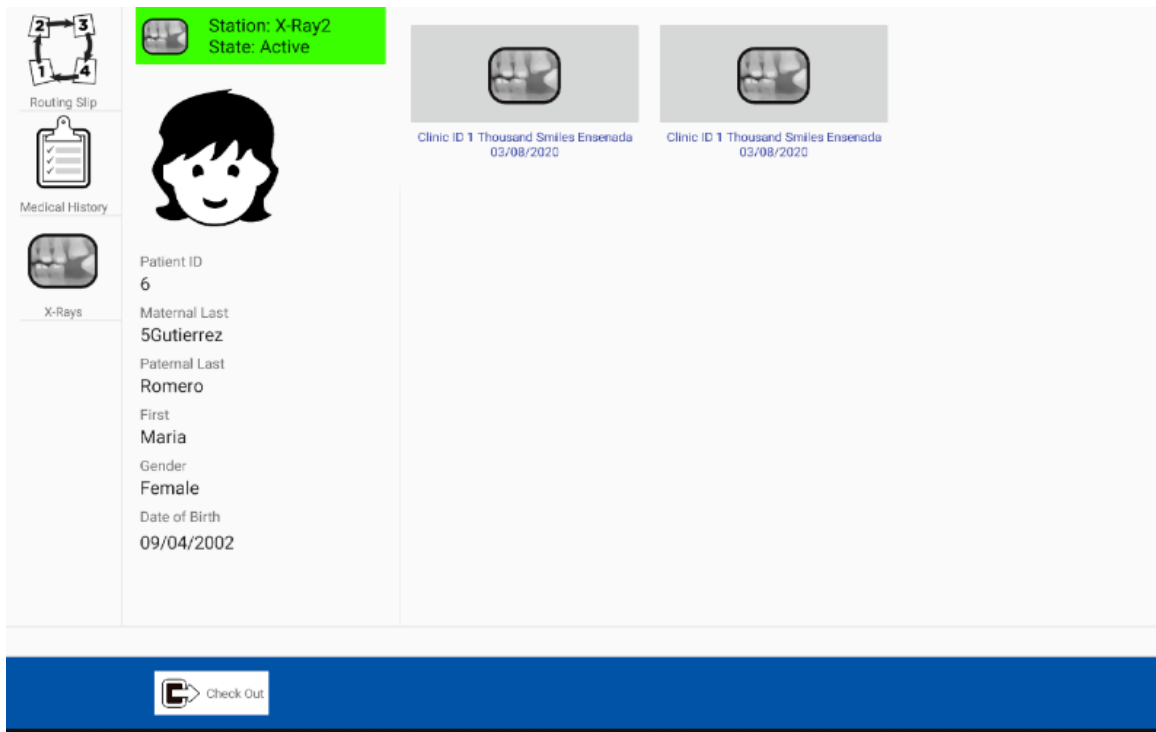


Figure 2.3.1 X-Ray Clinic Selector

Clicking on one of the clinics in the X-Ray Clinic Selector will show all the X-Rays that were scanned for the patient at that clinic, as shown in Figure 2.3.2:

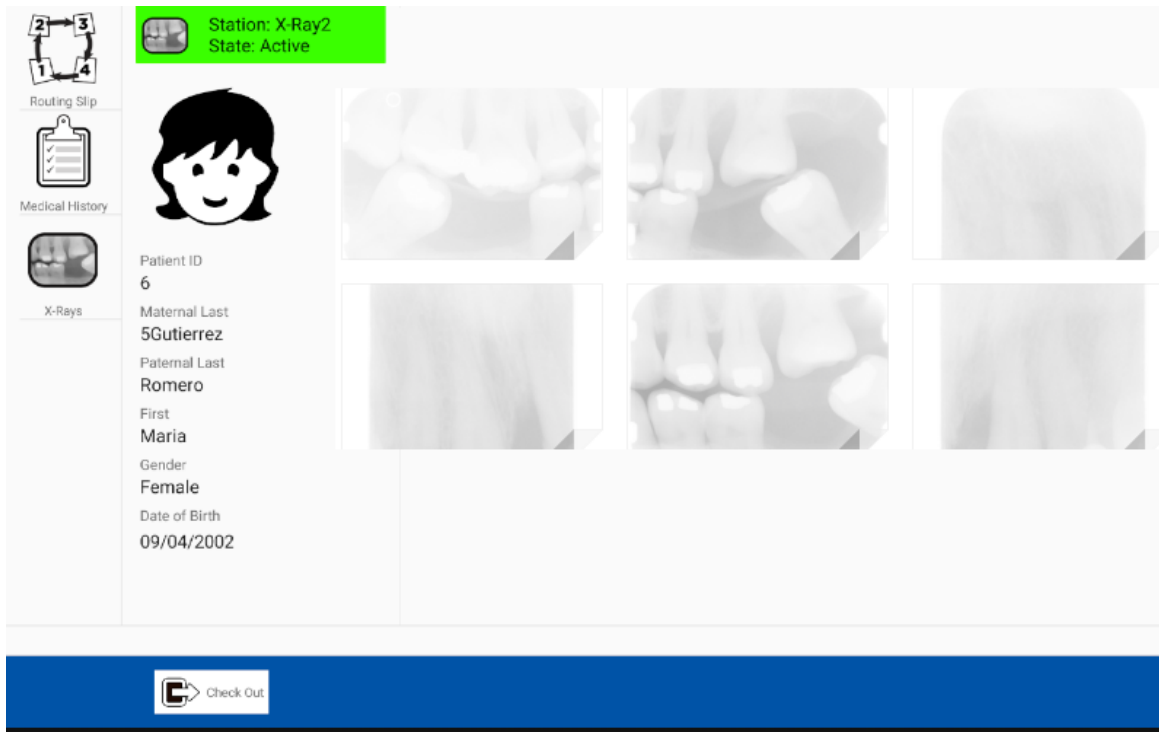


Figure 2.3.2 Patient X-Rays for the Selected Clinic

Clicking on an X-Ray will display it. In Figure 2.3.3, the image is shown in its original form.

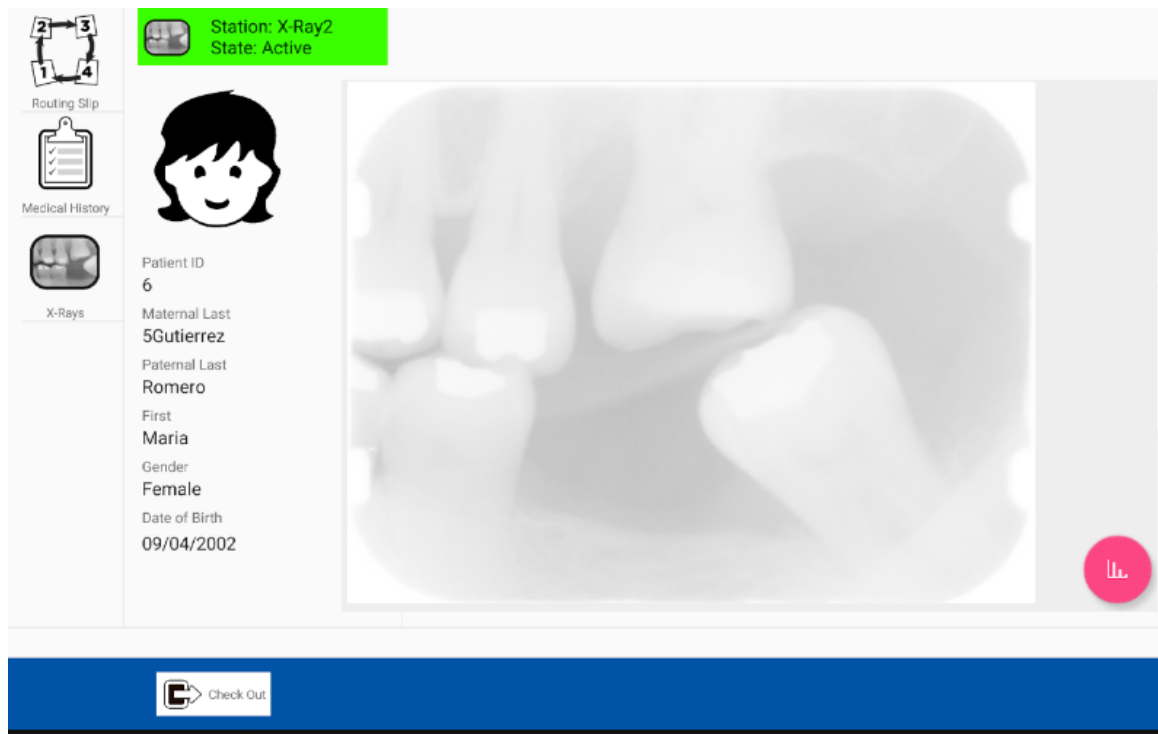


Figure 2.3.3 Viewing an X-Ray

The pink button on the lower right corner, if pressed, will perform a histogram equalization enhancement on the image in order to improve its contrast. This is shown in Figure 2.3.4.

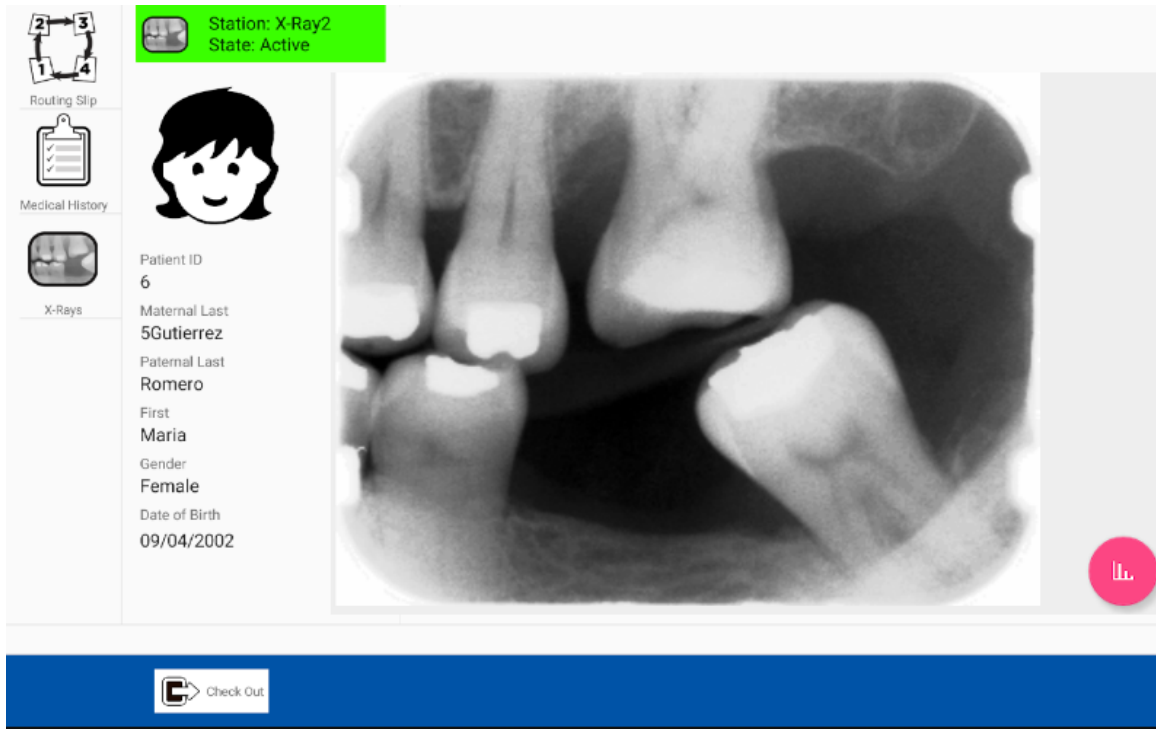


Figure 2.3.4 Contrast Enhancement via Histogram Equalization

Finally, the user can “pinch-zoom” with his or her fingers to zoom in, zoom out, and scroll the X-Ray image. This is depicted in Figure 2.3.5

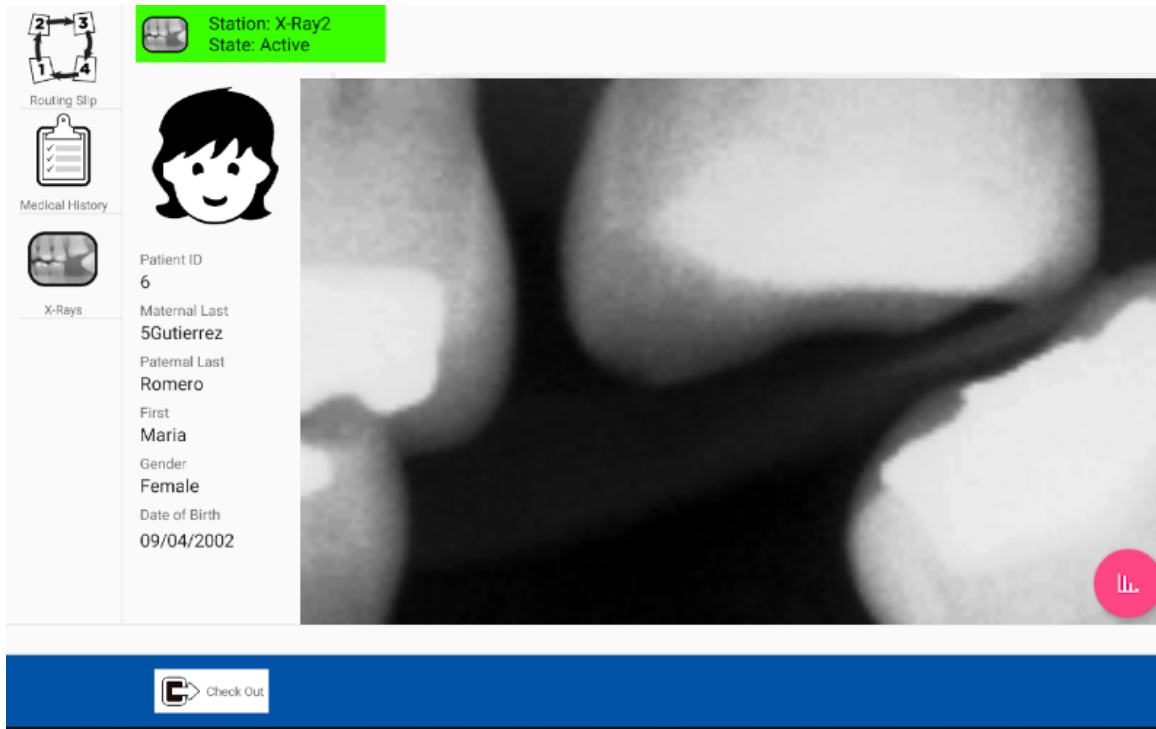


Figure 2.3.5 Pinch-Zoom of the Displayed X-Ray

When the screen is displaying a full X-Ray (as in **Figures 2.3.3 – 2.3.5**), the user can navigate the X-Rays by flicking the displayed image to the left or to the right.

2.4 Free Form Notes

The chart for a patient should provide a single "free form" text area where notes may be added by the dentist.

The intent of this requirement is to provide the dentist or hygienist a place to record data which might not be directly attributable to the sections described earlier in this section.

The dentists and hygienists should be able to edit text previously entered in the free form area during the current examination.

The name of the person entering or editing a note, and the date, should be recorded along with the note.

Past free form notes should be available for review at subsequent clinics. Each free form note will be identified by the date it was initially created. Clicking on a listed free form note will cause it to be displayed on the screen. A previously edited free form note can be modified, but in doing so the free form note will retain the date of its first creation. Once created and saved, it is not expected that the free form note will be modified except to correct errors.

3. Return to Clinic

In version 1.0, dentists and hygienists will be able to specify return to clinic for the patient at the chair.

The monitor app is used by runners to identify which patients are registered for a clinic. It will identify, for a given clinic, which registered patients were designated as return to clinic for that clinic, so that they can be prioritized for routing to a dental chair.

4. Medical History

The registration app currently takes a medical history that is biased towards cleft patients. We will augment the registration app to provide a medical history that is more relevant to dental patients. Assertions made by patients (e.g., answering “Yes” to tooth pain), will be highlighted so as to be useful in making prioritization decisions by runners.

5. Printing

The application should allow for the printing of relevant patient data on a per-screen basis for all items described above.

All printed copies should be watermarked, or at best notated, on a per-page basis, to indicate the following

- this document contains sensitive, patient medical data
- disclosure of the content of this document is in violation of **Standard Official Mexicana NOM-024-SSA3-2010**
- this document should not be photocopied or duplicated in any form
- if found, please notify Thousand Smiles (include e-mail address and phone number)
- this document should be shredded immediately after use

The above disclaimer must be provided on each page of the document, in both Spanish and English language.

6. Other Nonfunctional Requirements

6.1 Performance Requirements

- The system should provide 99.9999% uptime during the clinic
- Search and access to the database should occur with a latency of no more than 5 seconds.

6.2 Safety Requirements

There are no specific safety requirements associated with this subsystem.

6.3 Security Requirements

We assume that the patient digital chart, and the surgery screening sub-system in particular, does not need to adhere to HIPAA requirements, and does not require HIPAA certification. **Standard Official Mexicana NOM-024-SSA3-2010, which establishes the functional objectives and functions, must observe the products of Systems of Electronic Filing to ensure the interoperability, processing, interpretation, confidentiality, safety and use of standards and catalogues of the electronic records health information. An English translation of this standard is available, see References, above, for a link.**

The system communication on the day of the clinic will occur locally and not leave the local network.

Users of the system will have accounts and must authenticate prior to using the digital chart. The user names and their passwords are unique to this system and are not the same used by the volunteer system; only a subset of our volunteers should be granted access to patient data. The database itself is physically and administratively separate from the volunteer database. Passwords will be encrypted on the system, and logging will be used to track account creation, login, and logoff activity.

6.4 Software Quality Attributes

There are no specific SQA attributes associated with this subsystem.

6.5 Business Rules

Access to the system during the clinic will be limited to authenticated users. There are no specific rules associated with who can authenticate.

Between clinics, database access will be restricted to the administrator of the system for purposes of backup and maintenance only. The patient data, and user account information, will not be accessible on the Internet except for purposes of backup and maintenance.

7. Other Requirements

No additional requirements have been identified for this subsystem as of now.

Appendix A: To Be Determined List

<Collect a numbered list of the TBD (to be determined) references that remain in the SRS so they can be tracked to closure.>