

**Recommended Guidelines for Surveillance of**

**Non-Traumatic Dental Care in Emergency Departments (Updated September 2017)**

**Primary Author:** Michael C. Manz, DDS, MPH, DrPH, ASTDD Surveillance Consultant

**Work Group:**

* Emanuel Alcala, MA, Research Analyst, Central Valley Health Policy Institute, California State University, Fresno
* Krishna Aravamudhan, BDS, MS, Director, Council on Dental Benefit Programs, ADA Practice Institute
* Marlene Bengiamin, PhD, Research Director, Central Valley Health Policy Institute, California State University, Fresno
* John Capitman, PhD, Executive Director, Executive Director, Central Valley Health Policy Institute, Professor of Public Health, California State University, Fresno
* Donna Carden, MD, FACEP, Professor, Department of Emergency Medicine, College of Medicine, University of Florida
* Amber Costantino, MA, Research Analyst, Central Valley Health Policy Institute, California State University, Fresno
* Mary Foley, MPH, Executive Director, Medicaid/Medicare/CHIP Services Dental Association
* Donald Hayes, MD, MPH, CDC-Assigned Epidemiologist, Hawaii Department of Health
* Renee Joskow, DDS, MPH, FAGD, U.S. Public Health Service, Senior Dental Advisor, HRSA
* Rich Manski, DDS, MBA, PhD, Professor and Chief, Dental Public Health, University of Maryland School of Dentistry
* Lynn Mouden, DDS, MPH, Chief Dental Officer, U.S. Centers for Medicare and Medicaid Services
* Junhie Oh, BDS, MPH, Oral Health Epidemiologist/Evaluator, Rhode Island Department of Health
* Kathy Phipps, DrPH, ASTDD Data and Oral Health Surveillance Coordinator
* Eli Schwarz, DDS, MPH, PhD, FHKAM, FCDSHK, FACD, FRACDS, Professor and Chair, Department of Community Dentistry, Oregon Health and Science University
* Scott L. Tomar, DMD, MPH, DrPH, Professor & Chair, Department of Community Dentistry & Behavioral Science, University of Florida College of Dentistry
* David A. Williams, DDS, MS, MPH, FACD, Manager, Oral Health Programs, Carroll County (MD) Health Department

**Supported by:** DentaQuest Foundation

**Acknowledgments:** Beverly Isman, RDH, MPH, ELS and Christine Wood, BS for their careful review and editing.

Association of State and Territorial Dental Directors

3858 Cashill Blvd., Reno, NV 89509

# Table of Contents

Introduction 3

ASTDD ED Project and Purpose of this Document 3

Executive Summary – Phase 1 Report 4

Recommendations – Phase 1 Report 6

Methods for Project Phase 2 7

Target Populations/Outcomes of Interest/Predictor Variables/Data Sources and Codes 8

Target Populations 8

International Studies 8

National and Local Level 8

State Level 9

Outcomes of Interest 10

ED Utilization for Dental Care and NTDC Care—Counts and Rates 10

Other Care Related Outcomes 11

Trends or Changes in Dental ED Utilization 11

Recommended and Optional State ED Oral/Dental Care Surveillance Outcomes 11

Predictive Factors 13

Demographics and Other Patient Factors 13

Access Issues/Policy Changes 14

Recommended/Optional State ED Oral/Dental Care Surveillance Stratification Factors 14

Data Sources/Available Data Elements/Diagnosis-Procedure Codes Studied 16

Data Sets/Sources and Available Data Elements 16

Diagnosis-Procedure Codes Investigated 20

Dataset Development and Analyses 27

Ongoing Challenges to ED Oral/NTDC Care Surveillance 27

Summary and Conclusions 28

Communications Plan 28

Appendices 29

Appendix 1: State Emergency Department Databases (SEDD) 29

Appendix 2: The Nationwide Emergency Department Sample (NEDS) 31

Appendix 3: Oral/Dental Related ICD-9 Codes 34

Appendix 4: Sample SAS Code for SEDD Oral Data Analysis 40

Appendix 5: Recommended and Optional ED Oral Care Surveillance Analysis Grid 46

Appendix 6: Communication Plan for ED Oral Care Project 49

# Introduction

Dental care, and in particular care for non-traumatic dental conditions (NTDCs), provided in emergency departments has been identified as both an indication of lack of access to the traditional primary care dental system, and an expensive and mostly ineffective alternative source of care. EDs generally provide only palliative care for oral problems (e.g., antibiotics and pain medication), addressing the symptoms, but not the cause of the problems. This results in patients often returning to EDs multiple times for the same problem. This situation leads to high costs to patients, insurance companies, and taxpayers.

Many investigators have drawn the conclusion, particularly at the state level, that policies supporting increased access to dental care in dental offices or clinics would result in significant cost savings and better oral health outcomes. While many states have started assessing data on dental related ED visits, there currently is no standardized protocol for collection and analysis of these data. Therefore, data interpretation and comparability of data between studies are in question. Concerns with lack of standardized methods include sources of the data, data content, analysis methods, and the way the data are reported. The lack of standardization impacts the ability of local, state, and national policy makers to address the problem. The premise of this project is that development of a standardized protocol for the collection, analysis, and reporting of ED data will allow local, state, and national policy makers to make better informed policy decisions that will result in more efficient use of scarce resources and promote better quality of life for individuals with improved access to “dental homes.” The bases for the methods provided in this document are findings from the first phase of this project reported in the document,“Methods in Assessing Non-Traumatic Dental Care in Emergency Departments.” The Executive Summary and Recommendations from that report are included in this document.

# ASTDD ED Project and Purpose of this Document

The Association of State and Territorial Dental Directors (ASTDD) was funded by the DentaQuest Foundation beginning in 2015 to conduct this project. Phase 1 of the project was to develop a report from a literature review of research methods, data collection, analysis, and reporting in past studies of ED oral health care. The Phase 1 report has been used to guide Phase 2 of the project. ASTDD formed an advisory committee and workgroup for both phases. Some workgroup members continued through both phases, and some members with additional expertise or different perspectives on the issue were added for the second phase. All workgroup members provided input to the second phase to develop a standardized protocol and guidelines for the collection, analysis, and reporting of oral health ED data. The recommended methods from this project are intended to be used by states to contribute valid standardized data to national data repositories such as the National Oral Health Surveillance System (NOHSS).

To inform planning and development for this project, ASTDD initially convened conference calls with state oral health program directors, stakeholder organizations and individuals with an interest in the topic. Participants included the Centers for Disease Control and Prevention (CDC), Medicaid/Medicare/CHIP Services Dental Association, PEW Center on the States, Dental Quality Alliance, American Dental Association, state oral health program directors, and researchers studying ED dental care. Past surveillance and research activity on ED dental care, shortcomings of these activities, and available data were discussed. There was agreement on the need for standardization of methods contributing to best practices development for surveillance and intervention.

The two phases of this project address two DentaQuest Oral Health 2020 goals: 1) “Comprehensive national oral health measurement system” (target is “**A comprehensive national and state oral health measurement system is in place.”) and 2)** “Mandatory inclusion of an adult dental benefit in publicly funded health insurance” (target is “By 2020, at least 30 states have a comprehensive Medicaid adult dental benefit and no states that currently have a Medicaid adult dental benefit roll back or eliminate that coverage.”). It also addresses Health People 2020 Objective OH-16, “Increase the number of states and the District of Columbia that have an oral and craniofacial health surveillance system,” as monitoring data on use of EDs for oral problems would be a component of surveillance of oral health and of the dental care system.

The overall project therefore, 1) describes ED dental care data and methods used to collect and report such data in the summarized findings from the literature review, and 2) introduces recommended data collection, analysis, and reporting protocol and guidelines. ASTDD will provide technical assistance to states for implementing the standardized ED oral health data methods protocol for collection, analysis, and reporting, along with the oral health surveillance technical assistance it already provides. Data from ED oral health data surveillance activities can be used to advocate for policy changes such as establishment of comprehensive adult Medicaid benefits and creation of ED diversion programs that will result in a reduction of dental related ED visits and better dental care and oral health outcomes for state populations.

The Executive Summary and Recommendations from the Phase 1 report, “Methods in Assessing Non-Traumatic Dental Care in Emergency Departments,” are included here to orient the reader to the development of guidelines presented later in this Phase 2 report.

# Executive Summary – Phase 1 Report

## Background

Access to dental care continues as a major topic of interest among health organizations, state departments of health, state oral health programs, and the public. This includes the use of hospital emergency departments (EDs) for dental care. Though some ED usage for dental care due to oral trauma can be expected, particularly for oral trauma occurring during non-business hours and over weekends when many primary dental care offices and clinics are not open, a large proportion of oral problems presenting at EDs are not a result of trauma. These non-traumatic dental conditions (NTDCs) can be treated more effectively, or prevented altogether, through regular dental care in a primary dental care setting. Many investigators are exploring potential cost savings and improvements in quality of life through interventions designed to prevent or divert people from using EDs for oral problems, especially for NTDCs.

As with most public health problems, the first steps in addressing the issue are to confirm its existence and quantify its extent. Problems arise, however, when datasets and methods vary, resulting in a muddied picture of the problem’s extent, distribution, and causal or predictive factors.

## Purpose of the Report

The DentaQuest Foundation funded the Association of State and Territorial Dental Directors from December 1, 2014 through November 30, 2015 to search the scientific literature and online sources for reports on the use of EDs for dental care. The intended purpose of this project is to fully explore the extent of variation in the different aspects of research conducted, including target populations, outcomes of interest, predictive factors investigated, data sources used, and specific research methods employed including the diagnostic codes used in defining ED dental care. This report presents the findings of the investigation, summarizes the positive and negative aspects of the findings, and provides recommendations on the conduct of future research. Specifically, standardization of methodology, to the extent possible, is recommended to provide for consistency in data collection, analysis, and reporting, and to aid in the collection of data for state and national surveillance of ED dental care. Standardized surveillance of the use of EDs for NTDCs would support national tracking and provide states with actionable data to plan and implement effective interventions.

## Research Methods

Information on ED dental care investigations was gathered and thoroughly evaluated. Searches of the scientific literature in published scientific journals and posted internet reports focusing on government or organization websites was conducted. The scientific literature search involved multiple searches in PubMed using different combinations of terms to discover studies related to different aspects of dental care provided in emergency settings. An ongoing search was also established through an account with “My NCBI,” the National Center for Biotechnology Information ([NCBI](http://www.ncbi.nlm.nih.gov/)) at the US National Library of Medicine ([NLM](http://www.nlm.nih.gov/)). This provided a comprehensive listing of the most recent publications through October, 2015.

The search for online publications involved Google searching. The searches included both general and more specific search code, with more specific searches limited to online posting on government and organization websites, filtering out general opinion and other non-scientific postings on the subject.

The resulting collection of studies from these searches was then systematically reviewed to determine the specific population and research design aspects for each study. Findings were summarized and methods compared to explore similarities and differences. Findings were evaluated to form conclusions and recommendations for future research and investigation.

## Summary of Findings

1. Investigations varied widely in terms of target populations of interest. Target populations ranged from national, state, and local levels down to a single hospital or ED. Some target populations were further defined by limiting the study population to those with specific demographic or other characteristics, or by specific aspects of patient care processes or outcomes.
2. Investigation outcomes of interest varied widely, including general access to dental care and ED use, counts and rates of ED general dental and NTDC usage, rates of ED return visits, rates of hospital admission for dental conditions, and trends or changes in rates of ED utilization for dental care.
3. Predictive factors investigated varied widely. Though some basic demographic and insurance status predictors were commonly investigated, other factors included urban/rural status and other environmental factors, psychological factors, other concurrent conditions, and changes in insurance coverage or policy (e.g., adult Medicaid coverage).
4. Data sources for investigations varied widely, though some national and state data systems were commonly used. Some studies (e.g., local hospital studies) used different sources of data but had similar variable content in the datasets.
5. Specific sets of diagnosis codes used to define dental care, or more specifically, NTDCs, varied. Few investigators used exactly the same sets of codes. Some investigators used similar codes with slight variations, while other investigators used very different sets of codes to define the same dental care category (e.g., NTDCs).
6. While there have been many investigations of the use of EDs for dental care that explored different aspects of the issue, the variation in studies and the methods employed have resulted in inconsistent data that often are not comparable. This does not allow for effective standardized surveillance of ED dental care at the state and local levels.
7. Standardized research protocols, including data collection, analysis, and reporting methods need to be developed and promoted, particularly at the state level, to ensure reliable comparable data sufficient for tracking and comparing state trends.

## Recommendations Summary

* Specifically define study populations of interest, assess usability of data sources, and follow good investigation protocol in assessing ED dental care and planning interventions.
* Develop sets of codes and analysis methods, including important predictive factors that will most appropriately answer research questions with the underlying motivation of standardizing methods to the extent possible to allow for comparison to other studies on other populations.
* Encourage specific research on ED use for NTDCs, which includes the majority of unnecessary visits and costs and could most effectively be addressed in the primary dental care setting.
* Develop and promote standardized sets of codes and analysis methods providing appropriate basic ED dental use data for state oral health surveillance systems and for state data submission to a national data repository for tracking national ED dental care, allowing for comparability across states. Additional optional data analyses can be conducted by states as desired.

# Recommendations from Phase 1 Report

## General Recommendations

* Thoroughly define specific study populations to determine the presence and extent of the problem and for whom effective interventions can be implemented.
* Assess data sources to determine if the required information for the study population and research question(s) of interest are included.
* Establish whether a problem exists and quantify the size of the problem as the first stage of any study of predictive factors or interventions.
* Identify and promote research of specific risk or predictive factors that will aid in determining what types of interventions might be most effectively implemented or best targeted.
* Develop sets of codes and analysis methods that will most appropriately answer research questions with the underlying motivation of standardizing methods to the extent possible to allow for comparison to other studies on other populations.
* Promote specific code sets and guidelines for analysis methods for commonly used datasets in determining NTDC or general dental ED visit count and proportion outcomes to establish the extent of the problem, and to standardize basic data collection for surveillance.
* Encourage inclusion of commonly identified, associated predictive factors that will help determine effective intervention strategies and promote basic levels of consistency across studies, while also accounting for possible confounding effects in studies of additional predictive factors.
* Encourage specific research on ED use for NTDCs, which includes the majority of unnecessary visits and costs, and could most effectively be addressed in the primary dental care setting.

## Recommendations Specific to States

* Thoroughly define whether the research or surveillance is for the entire state population or for a specific state sub-population of interest to determine the presence and extent of the problem, and for whom effective interventions could be implemented.
* Assess data sources to determine if the required information for the target population and research question(s) of interest are included. If the state is part of the SEDD system, there should be some consistency in data with other states in SEDD. If the state is not in the SEDD system, research should determine if there is a sufficient data source to investigate ED dental care and how consistent the data source is with SEDD?
* Establish whether a problem exists and quantify the size of the problem as a first stage of any investigation of predictive factors or interventions; this should be a part of state level oral health surveillance.
* Identify and promote research on use of specific risk or predictive factors that will aid in determining what types of interventions might be most effectively implemented or best targeted.
* Develop standardized sets of codes and analysis methods providing appropriate basic ED dental use data for state oral health surveillance systems and for state data submission to a national data repository for tracking national ED dental care, allowing for comparability across states. Additional optional data analyses can be conducted by states as desired.
* Promote standardized sets of codes and guidelines for analysis methods for commonly used state level datasets in determining NTDC and general dental ED visit data as part of standardized state and national oral health surveillance systems. Specifically explore further use of Medicaid data for tracking ED dental care in this population.
* Encourage inclusion of commonly identified associated predictive factors that will help determine effective intervention strategies and promote basic levels of consistency across studies, while also accounting for possible confounding effects in studies of additional predictive factors.
* Encourage specific research on ED use for NTDCs, which includes the majority of unnecessary visits and costs, and could most effectively be addressed with state and local level interventions, and data used to promote support and resources for such intervention programs.

# Methods for Project Phase 2

The development of guidelines for ED oral care surveillance has been based on evaluation of past methods summarized in the Phase 1 report. The thorough literature search of past research and studies focused on the following aspects: 1) target populations, 2) outcomes of interest to the investigations, 3) predictive factors investigated, 4) data sources used, and 5) analysis methods and diagnosis codes employed. These are the key aspects considered in development of the ED oral care surveillance guidelines. The following sections will address guidelines and specific protocols as appropriate for each aspect of ED oral care surveillance.

Based on findings from the first phase of the project, the workgroup was formed for the second phase. Initial contacts and conference calls were conducted to discuss the purpose and goals for the project. Work proceeded on outcomes for the different aspects of ED oral care surveillance, materials were distributed, and a face to face meeting was held in Washington, D.C. Members discussed materials and provided input toward the final products and outcomes for the project. This document contains the components and guidance developed for use in ED oral care surveillance.

# Target Populations/Outcomes of Interest/Predictor Variables/Data Sources and Codes

As addressed in the Phase 1 report, investigators have different motivations when conducting surveillance vs. conducting research studies to address hypotheses, with numerous research questions posed. Researchers may be interested in specific unique populations, specific predictive factors directly impacting access to dental care, or effects of changes in policy. Because of these differences, there has been great variation in target populations studied, data sources and elements used, and the statistical methods employed. When conducting surveillance, there is a need for standardization of methods for comparisons between populations and for trend assessment over time within a population. While the Phase 1 report summarized the variation in these factors among published research and studies, Phase 2 of this project addresses and recommends standardized methods and protocols for surveillance, particularly focusing on state level surveillance. While, these standardized methods and protocols can potentially be used for any investigation of any target population, the primary goal is to provide uniform surveillance methods for states, resulting in uniform nationwide state level surveillance activity.

The following sections will address each component of research/surveillance, including target population, outcome of interest, predictive factors, data sources used to address the research question, and data and analysis methods employed, and provide suggested guidance for conducting state level surveillance of ED dental care.

**Target Populations**

### International Studies

### Though this report will focus on assessing research on dental care in the ED within the United States, such research is not limited to the United States. The Phase 1 report summarized the array of work that has been published from other countries. A perception of the problems of people seeking dental care from EDs is not unique to the United States. The guidelines presented from this project may have some generalizable use in other countries, but differences in health systems, insurance systems, and datasets will likely limit the applicability of many of the specific protocols presented.

### National and Local Level

### Within the United States, many researchers have assessed the ED dental care issue at the national level using nationally representative datasets with data elements to assess aspects of ED dental care, and more specifically, NTDCs. Different studies have used national datasets including the Nationwide Emergency Department Sample (NEDS) dataset of the Healthcare Cost and Utilization Project (HCUP), the Medical Expenditure Panel Survey (MEPS), and the National Hospital Ambulatory Medical Care Survey (NHAMCS). National subpopulations also have been investigated using these same datasets, for example limiting investigations to working-age adults, children, or very specific subpopulations such as sickle cell disease patients or people with Autism Spectrum disorders. Other investigators have focused on national surveys specifically designed to address national subpopulations, for example the National Survey of Children’s Health, a national survey limited to children.

Many investigators have selected a specific local population to research. Sometimes this will simply involve a specific convenience population (e.g. those presenting at the ED of a hospital) for simple assessments such as characterizing users and multiple users of the ED for oral care, or assessing barriers to oral care such as the impact of insurance coverage to those presenting at EDs for NTDCs. Other studies have focused on factors such as prescribing guidelines or drug seeking behavior.

Some of these studies were conducted by patient interview. Many studies have used data from hospitals/hospital systems in a community or metropolitan area. Somewhat more comprehensive studies include an entire geographic or demographic subpopulation of a state. Combinations of geographic areas and demographic subpopulations can also define a target population to track changes in health care access, for example enrollees or new enrollees in regional health insurance programs for low-income, uninsured residents.

Furthermore, variables can be used in defining target sub-populations for patient characteristics related to health care processes or outcomes. For example, some study populations are defined by outcomes of the ED for oral care visit, e.g. ED visit resulting in patient discharge; ED visit resulting either in discharge or hospital admission; or ED visit resulting in hospital admission. Subject demographics believed to be related to ED use for NTDCs often are investigated. Combinations of these factors have been used, for example, people covered by Medicaid who had been admitted to hospitals due to NTDCs.

The recommendations from this project can be used as general guidelines for assessing and conducting surveillance of ED dental care at a national or local level. However, the primary aim of ASTDD is to aid states, and specifically state oral health programs (SOHPs), in effectively improving the oral health of their state populations. State oral health surveillance systems are essential for providing accurate and reliable data for assessing aspects of oral health, contributing to effective program planning to address oral health related problems. Therefore, while the provided guidelines can generally be used, they are specifically intended to address ED oral care surveillance at the state level.

### State Level

### Many investigations have assessed ED visits for dental care at the state level to determine the extent of the problem and to use the information for planning intervention strategies or for advocating for state level policy change. The target population may be all people in the state, or a subpopulation of the state (e.g., children), and may simply seek to determine people in the state with ED visits specifically for dental care, or more specifically, for NTDCs. Rates and predictors of ED use for NTDCs have also been investigated.

Basic ED oral care usage can be assessed through hospital administrative data, such as emergency department discharge datasets. Studies sometimes have supplemented administrative data with interviews of ED dental users and community stakeholders, looking at such factors as insurance mix and Medicaid eligibility/ enrollment. Other studies used telephone interviews of statewide representative samples of people who had sought care for oral problems at EDs. Other state level subpopulations included members of specific healthcare plans to assess changes in accessing dental care and EDs for health care before and after healthcare plan enrollment. Examples of state level healthcare plans investigated include plans for those with low income, WIC nutrition programs among those with Medicaid, and children participating in a food stamp program. State level changes in healthcare plans have also been studied, for example, rates and trends of ED dental visits before and after state elimination of dental benefits within a plan. State level investigation has also included analysis of data from different states to make comparisons. Between state comparisons require consistency in methods of data collection and analysis. Examples of data sources by target population level are summarized in Table 1.

**Table 1: Examples of Data Sources for Different Target Population Levels**

|  |  |
| --- | --- |
| Target Population | Data Source |
| National | National Emergency Department Sample (NEDS) |
| National | Medical Expenditure Panel Survey (MEPS) |
| National | National Hospital Ambulatory Medical Care Survey (NHAMCS) |
| State | State Emergency Department Databases (SEDD) |
| State | Non-SEDD Individual State ED Discharge Data |
| Local | Individual Hospital ED data |
| Local | Community Data from Hospital EDs |
| Local | County Data from Hospital EDs |
| Special sub-population | Pediatric or Adults Only Subset of a Dataset |
| Special sub-population | Medicaid Data (or other low income related data) |
| Special sub-population | Race/Ethnicity Subset of Dataset |

## Outcomes of Interest

### ED Utilization for Dental Care and NTDC Care – Counts and Rates

As with other aspects of ED dental care research, the specific outcomes investigated in published research vary widely. While some studies assess issues such as oral health status and access to care in relation to ED visits in general or ED visits for dental problems, the focus of this project is specific outcomes related to oral care provided in EDs. Basic outcomes specifically related to ED utilization for oral/dental care generally, or more specifically for NTDCs, include simple assessments of counts of ED visits for dental care or NTDCs, proportions of populations using EDs for dental care or NTDCs (e.g., in the past year), rates of ED visits among the populations (e.g., visits per 100,000 population), proportions of total ED visits that are for dental care or NTDCs, costs or charges associated with ED visits for dental care or NTDCs, and trends of any of these measures over time. ED oral/dental visits can be categorized by type of visit, such as visits for any dental condition or complaint, visits for oral/dental conditions not involving trauma (NTDC), visits for dental diagnoses considered to have low severity (treatable in dental offices during normal business hours), visits associated with caries diagnoses, or visits associated with a chief complaint of toothache. ED waiting times for care of NTDCs has also been an outcome of interest.

### Other Outcomes Related to ED Utilization for Dental Care

An outcome of great interest has been the rate of same subject return visits to EDs for the same oral problem (if that can be determined), which has an obvious direct impact on total ED related costs for NTDCs. Some investigations have defined “high users” based on the number of patient ED visits in a given period of time. High users are of interest in terms of primary and secondary dental diagnoses, charges/costs, use of multiple hospitals and subject characteristics. Factors influencing return visits of high users will be addressed in the Predictive Factors section.

Another outcome is dental related ED visits that for a small proportion of patients result in hospital admission, an outcome that can be studied among specified subpopulations as well. The typically high charges/costs associated with these hospital admissions also may be of interest.

### Other Care Related Outcomes

Many investigations have explored the actual care received for NTDCs in EDs. Virtually all formal and informal reports find that in EDs where no dental personnel or dental clinics are present, care primarily is prescriptions for pain and antibiotics. Some studies have focused on dental related ED prescriptions, and more specifically on antibiotics and analgesics, including opioid, non-opioid, and combination analgesics. Drug seeking behavior (DSB) has been a related important topic of interest, given that DSB can result in oral pain given as the chief complaint, skewing the picture of true oral care in EDs. Efforts to curb ESB can be associated with lower rates of oral related ED visits.

Another outcome of interest is whether those presenting at an ED with NTDCs had follow-up care with a dentist. Where possible, investigations may assess whether subsequent dental office visits took place, how much time had passed since the ED visit, and what type of treatment was provided at the dental office.

### Trends or Changes in Dental ED Utilization

In addition to point in time outcomes, there is interest in changes between two points in time or trends in ED use for oral conditions over time. This interest often is associated with factors such as the effects of enrollment in a new or established insurance plan or program, implementation of a program to divert patients with dental complaints to an urgent dental care clinic, or changes after health care reform or after elimination of Medicaid dental benefits for adults. The same outcomes mentioned previously can be measured at different points in time to assess such changes or trends.

### Recommended and Optional State ED Oral/Dental Care Surveillance Outcomes

With the aim of promoting a standardized state level framework for state to use in evaluating and documenting the ED usage for oral care, the multitude of potential outcomes was assessed and a basic standard set of outcomes developed for state level ED oral care surveillance. These basic population statistics should provide a good picture of ED oral care for a given state. The data necessary to generate statistics for these outcomes should be readily available for most states. Data from SEDD can be used by most states, and many states not participating in SEDD will have state ED discharge databases similar to SEDD.

Most states participate in SEDD, but those states not participating usually still collect data in a similar format to data provided to the SEDD surveillance network. SEDD or equivalent state data are likely the most readily available data for states and SOHPs to access for surveillance activities related to ED oral/NTDC care. Specific guidelines and protocols provided in this report for SEDD data should have general applicability to non-SEDD state ED discharge data. More detailed information on SEDD is provided later in this document and in Appendix 1.

Table 2 summarizes the recommended outcomes for state ED oral care surveillance and provides the State Emergency Department Datasets variables that can be used to generate these outcome measures. These recommended measures all assess ED care for NTDCs, which is the category or oral care that is generally accepted as ideally being addressed in the primary dental care system. While trauma related oral conditions might be expected to present in the ED, NTDCs would not, and is the area of oral ED care that states would desire to address through various forms of intervention. Further details in specifically defining NTDCs are presented later in this report.

Recommended indicators (refer to Table 2 for additional detail):

1. ED visit for NTDC based on ***first listed*** diagnosis
2. ED visit for NTDC based on ***any listed*** diagnosis
3. ED visit for NTDC based on ***first listed reason for visit***
4. ED visit for NTDC based on ***any listed reason for visit***
5. ED visit for NTDC based on ***any listed diagnosis and/or any listed reason for visit (most inclusive).***

Recommended reporting: for each of the five recommended indicators, ASTDD suggests that states report, at a minimum:

* + Count – number of ED visits associated with specific outcome in a given year
  + Rate per 100,000 population using [Census Bureau population estimates](https://www2.census.gov/programs-surveys/popest/tables/2010-2016/state/totals/nst-est2016-01.xlsx)
    - Count divided by population multiplied by 100,000
  + Rate per 10,000 ED visits
    - Count divided by total ED visits multiplied by 10,000
  + Total charges associated with each indicator (use SEDD variable – TOTCHG. Generally, TOTCHG does not include professional fees and non-covered charges. Refer to SEDD’s [state specific notes](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=totchg) for additional detail.)

**Table 2: Recommended Outcomes and Associated SEDD Variables to Assess**

|  |  |  |  |
| --- | --- | --- | --- |
| Indicator | SEDD Data Element, ICD-9 | SEDD Data Element, ICD-10 | Comments/Notes |
| 1. NTDC 1st diagnosis | DX1 | I10\_DX1 | Include 1st listed diagnosis only |
| 1. NTDC any diagnosis | DXn | I10\_DXn | Include all listed diagnoses |
| 1. NTDC 1st reason visit | DX\_Visit\_Reason1 | I10\_Visit\_Reason1 | Include 1st listed reason only |
| 1. NTDC any reason visit | DX\_Visit\_Reasonn | I10\_Visit\_Reasonn | Include all listed reasons |
| 1. NTDC any diagnosis/visit | DXn & DX\_Visit\_Reasonn | I10\_DXn & I10\_Visit\_Reasonn | Include all listed diagnoses & reasons |

States may wish to do analyses of ED discharge data to explore additional outcomes. Table 3 summarizes optional outcomes developed for state ED oral care surveillance and provides the State Emergency Department Datasets variables that can be used to generate these outcome measures. These measures address two additional ED oral care definitions. Any oral diagnosis includes all diagnoses for oral/dental conditions, including those related to trauma. Caries/Periodontal/Prevention (CPP) diagnoses include a subset of NTDC diagnoses that are considered to be related to caries, periodontal disease, or prevention procedures that are routinely provided in primary care general dental practices or clinics, and exclude procedures that would more likely be addressed by specialists. More details on defining these outcomes are provided later in this report.

**Table 3: Optional Outcomes and Associated SEDD Variables to Assess**

|  |  |  |  |
| --- | --- | --- | --- |
| Optional Indicator | SEDD Data Element, ICD-9 | SEDD Data Element, ICD-10 | Comments/Notes |
| 1. CPP 1st diagnosis | DX1 | I10\_DX1 | Include 1st listed diagnosis only |
| 1. CPP any diagnosis | DXn | I10\_DXn | Include all listed diagnoses |
| 1. CPP 1st reason visit | DX\_Visit\_Reason1 | I10\_Visit\_Reason1 | Include 1st listed reason only |
| 1. CPP any reason visit | DX\_Visit\_Reasonn | I10\_Visit\_Reasonn | Include all listed reasons |
| 1. CPP any diagnosis/visit | DXn & DX\_Visit\_Reasonn | I10\_DXn & I10\_Visit\_Reasonn | Include all listed diagnoses & reasons |
| 1. Any oral 1st diagnosis | DX1 | I10\_DX1 | Include 1st listed diagnosis only |
| 1. Any oral any diagnosis | DXn | I10\_DXn | Include all listed diagnoses |
| 1. Any oral 1st reason visit | DX\_Visit\_Reason1 | I10\_Visit\_Reason1 | Include 1st listed reason only |
| 1. Any oral any reason visit | DX\_Visit\_Reasonn | I10\_Visit\_Reasonn | Include all listed reasons |
| 1. Any oral any diagnosis/visit | DXn & DX\_Visit\_Reasonn | I10\_DXn & I10\_Visit\_Reasonn | Include all listed diagnoses & reasons |

States my wish to conduct additional analyses to those described. Other potential analyses that may be possible to conduct with SEDD or other similar state ED discharge data, State Inpatient Databases (SID), or other health/insurance databases are summarized in Table 4.

**Table 4: Additional Optional Analyses if Data Available**

|  |
| --- |
| Outcome |
| Prevalence or count oral/NTDC ED visit resulting in admission, overall and by condition (e.g. caries) |
| Prevalence or count oral NTDC ED visit before/after comparisons, e.g. diversion program |
| Rates oral/NTDC visits compared to rates total or other condition ED visits |
| Proportion oral/NTDC visits of total ED visits |
| Rates palliative vs. other treatment |
| Proportion of ED oral/NTDC visits with follow-up dental care (possible for Medicaid, may be possible for other medical/dental insurers) |
| Trends or changes in general for above outcomes and in comparisons to other conditions  (e.g. back pain) |
| Return visits by same patient (where trackable using SEDD variables VisitLink and DaysToEvent)  Frequencies and associated costs |
| Return visits for same condition (where trackable)  Frequencies and associated costs |
| High users (as determined by number of ED visits)  Frequencies and associated costs |
| High users by oral condition or by medications vs. Rx  Frequencies and associated costs |

## Predictive Factors

Many investigators in past studies and reports have explored the associations of various predictive factors with ED dental utilization outcomes. The following sections roughly categorize potential predictive factors to use in ED oral care surveillance.

### Demographics and Other Patient Factors

Basic demographic and patient factors are commonly evaluated with ED oral care as they are with almost all health related outcomes. Common demographic factors to consider are: age; sex; race/ethnicity; family or household income; education (or maternal educational level); marital status; employment; urban/rural status; insurance type and insurance instability; physical, economic, and psychological factors; being foreign born; and health literacy level. Personal access related variables, which could include having insurance, might also include: insurance type; having reported a dental problem as the reason for the ED visit; use of EDs for other reasons; patient-reported severity of pain; participating in WIC vs. those who are not; not having a routine dental checkup/cleaning in the last three years; and special health care needs. Some of these factors are related to access to care, which is discussed further below.

A variation on assessing predictive factors involves assessing factors specifically associated with hospital admission for NTDCs. Hospital admission has been assessed in association with age, gender, the number of complex chronic conditions, being non-white, being publicly insured, having lower income, having intellectual and developmental disabilities (IDDs), and having a dental infection or other specific health conditions.

In addition to evaluating demographics, area or community factors have also been investigated. Examples include differences by urban/rural residence status, residence zip code level measures of poverty, effects of metropolitan residence status, census level variables, local dentist supply, and community level variables of income, education level, and primary language spoken in homes.

### Access Issues/Policy Changes

One primary access factor investigated is dental insurance. Having insurance is often included with other subject level demographic factors as mentioned previously, and can include designation of private or public insurance or the actual primary payer. Other factors may include the duration of NTDC symptoms, the specific diagnosis, and barriers to dental care with private practice dentists. Having a dental home has been a specific predictor of interest.

Other studies investigate access in terms of population level, community level, or area level predictors. Some of these factors have been mentioned previously: urban/rural residence, hospital population insurance mix, DHPSA designation for county of residence, the Urban Influence Code (a measure for rurality), low-income population to dentist ratio, and state Medicaid policies. A more basic access barrier is lack of available dental care, including lack of community dental facilities and dental facilities’ business hours related to time of day and day of week.

Many publications address magnitude and changes in ED dental care related to changes in policy, particularly those for dental insurance coverage. Examples include expansion of Children’s Health Insurance Program (CHIP) coverage, state health care reform, and changes or elimination of adult dental benefits from Medicaid or other insurance plans. Changes in coverage status or new enrollment in programs could be assessed for effects. Other potential policy changes related to patient care include new drug policies or providing medications to patients vs. only providing prescriptions. Intervention programs specifically designed to curb ED use for NTDCs have been assessed. Similarly, changes after new neighborhood health centers open might be of interest.

A previously mentioned confounding factor of ED utilization is patients reporting dental pain to obtain prescriptions for opioids, i.e. drug seeking behavior (DSB). DSB impacts on reported ED dental care utilization must be considered.

### Recommended/Optional State ED Oral/Dental Care Surveillance Stratification Factors

While many of these factors may be of interest, data to assess them may not be readily available. Some variables may be available from census data if linkage is possible to ED data. For the purposes of ED oral care surveillance that states are readily able to accomplish, recommendations focus on variables typically available in SEDD data. Table 5 summarizes recommended explanatory variables to include in surveillance of ED oral/NTDC care.

Recommended reporting stratification variables (refer to Table 5 for additional detail):

States, at a minimum, should report overall estimates plus estimates stratified by:

* + Age (< 20, 20-44, 45-64, 65+)
    - State population estimates by age group are available from the U.S. Census
  + Primary payer (Medicare, Medicaid, private insurance, uninsured, other)
    - NOTE: Information on the number of individuals with each payer type is not readily available. Because of this, it may not be possible to generate rate per 100,000 population.
  + Race/ethnicity if available (white, black, Hispanic, Asian/Pacific Islander, Native American, other)
    - NOTE: The SEDD coding for race does not align with the U.S. Census coding for race. Because of this, it is not possible to generate rate per 100,000 population.

**Table 5: Recommended stratification factors with SEDD data element names**

|  |  |  |
| --- | --- | --- |
| Description | SEDD Data Element | Comments/Notes |
| Age | AGE or AGEGROUP | Most states report age while some may only report by age group. |
| Primary payer | PAY1 | To ensure uniformity across states, PAY1 combines detailed categories into more general groups. Refer to SEDD’s [state specific notes](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pay1) for additional detail. |
| Race/ethnicity  (if available) | RACE | HCUP coding includes race/ethnicity in one data element (RACE). If the state supplied race and ethnicity in separate data elements, ethnicity takes precedence over race in setting the HCUP value for race. Race is not available for all states. Refer to SEDD’s [state specific notes](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=race) . |

States may want to assess additional factors that may be associated with ED oral care. There are additional potential stratification variables in SEDD that states can use in stratified analysis. Table 6 summarizes optional explanatory variables that can be included in surveillance of ED oral/NTDC care.

**Table 6: Optional stratification factors with SEDD data element names**

|  |  |  |
| --- | --- | --- |
| Factors/Analyses | SEDD Data Element Name | Notes/Comments |
| Sex | [FEMALE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=female) |  |
| Marital status | [MARITALSTATUSUB04](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=maritalstatusub04) |  |
| Geographic location | [ZIP](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=zip) or [ZIP3](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=zip3) | Patient zip code can be used to define geographic locations |
| Homelessness | [Homeless](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=homeless) | Not available for all states. |
| Weekend admission | [AWEEKEND](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=aweekend) | Indicates whether ED visit occurred on a weekend, when dental offices/clinics might not be expected to be open. |
| Income | [ZIPINC\_QRTL](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=zipinc_qrtl) | ZIPINC\_QRTL provides a quartile classification of the estimated median household income of residents in the patient's ZIP Code. The quartiles are identified by values of 1 to 4, indicating the poorest to wealthiest populations. These values are derived from ZIP Code-demographic data obtained from Claritas. Because these estimates are updated annually, the value ranges for the ZIPINC\_QRTL categories vary by year. |
| Revisit by same patient | [VisitLink](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=visitlink) & [DaysToEvent](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=daystoevent) | The VisitLink data element is one of two data elements that are supplemental information created for HCUP States for which there are encrypted person identifiers. The visit linkage variable (VisitLink) can be used in tandem with the timing variable (DaysToEvent) to study multiple hospital visits for the same patient across hospitals and time while adhering to strict privacy regulations. Not available for all states. |
| Trends over time |  | Generate indicators for multiple years to determine if ED visits due to NTDC have increased, decreased or remained the same. |

# Data Sources/Available Data Elements/Diagnosis-Procedure Codes Studied

## Data Sets/Sources and Available Data Elements

Data sources for investigating dental care provided in EDs are numerous. A full summary of many data sources at different population levels was presented in the Phase 1 report. State oral health programs will usually obtain and use state level data to elucidate a problem, implement interventions, or have others influence policymakers to address a problem. Because the focus of this report is state level surveillance of ED dental/NTDC care, information on state level data, and in particular, the State Emergency Department Datasets (SEDD) is a focus of this report. States may also be interested in comparing data from their state to national data, with the logical data source for national data being the Nationwide Emergency Department Sample (NEDS).

The Nationwide Emergency Department Sample (NEDS) includes data sampled from a family of state inpatient (SID) and state emergency department (SEDD) databases including software developed by the Healthcare Cost and Utilization Project (HCUP). NEDS is a stratified sample of about 20% of U.S. hospital EDs and contains data from 950 hospitals in 30 states. NEDS data can be used to generate national and regional estimates of ED use. Further information on NEDS can be found in Appendix 2.

State ED data may vary in availability and content of datasets. SEDD provides data that are generally available and consistent across states, allowing for comparisons among states. The State Emergency Department Databases (SEDD) are part of the family of databases including software developed by the Healthcare Cost and Utilization Project (HCUP). SEDD files include data on emergency visits at hospital emergency departments that do not result in hospitalization. Data on patients admitted to a hospital after an ED visit are included in the State Inpatient Databases (SID). SEDD files include all ED patients regardless of payer, and include clinical and non-clinical data. Thirty-five states currently participate in SEDD. Table 7 provides a complete listing of SEDD variables that may be in the state SEDD file. The two example state columns for Iowa and Kentucky show for each state the SEDD variables that the state dataset contains. In the electronic version of this document, variable names are linked to the complete definition and description of each variable. Further information on SEDD can be found in Appendix 1.

**Table 7: SEDD Variables and Availability by State - Sample**

| Data Element | IA | KY |
| --- | --- | --- |
| [AGE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=age) | y | y |
| [AGEDAY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=ageday) | y | y |
| [AGEGROUP](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=agegroup) | - | - |
| [AGEMONTH](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=agemonth) | y | y |
| [AHAID](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=ahaid) | y | y |
| [AHOUR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=ahour) | - | - |
| [AMONTH](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=amonth) | y | y |
| [APC](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=apc) | - | - |
| [ATYPE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=atype) | y | y |
| [AWEEKEND](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=aweekend) | y | y |
| [AYEAR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=ayear) | y | y |
| [BILLTYPE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=billtype) | - | y |
| [BMONTH](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=bmonth) | y | y |
| [BODYSYSTEMn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=bodysystemn) | y | y |
| [BYEAR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=byear) | y | y |
| [CHARGE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=charge) | y | y |
| [CHGn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=chgn) | - | - |
| [CHRONn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=chronn) | y | y |
| [COMMUNITY\_NONREHAB\_NONLTAC](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=community_nonrehab_nonltac) | y | y |
| [CPTCCSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cptccsn) | y | y |
| [CPTDAYn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cptdayn) | y | y |
| [CPTHCPCS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cpthcpcs) | y | y |
| [CPTM1\_n](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cptm1_n) | y | y |
| [CPTM2\_n](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cptm2_n) | y | y |
| [CPTMod1](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cptmod1) | y | y |
| [CPTMod2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cptmod2) | y | y |
| [CPTn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=cptn) | y | y |
| [DHOUR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dhour) | - | - |
| [DIED](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=died) | y | y |
| [DISPUB04](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dispub04) | y | y |
| [DISPUNIFORM](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dispuniform) | y | y |
| [DISP\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=disp_x) | y | y |
| [DMONTH](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dmonth) | y | y |
| [DNR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dnr) | - | - |
| [DQTR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dqtr) | y | y |
| [DSHOSPID](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dshospid) | y | y |
| [DURATION](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=duration) | - | - |
| [DXCCSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dxccsn) | y | y |
| [DXMCCSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dxmccsn) | y | y |
| [DXPOAn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dxpoan) | - | - |
| [DXVER](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dxver) | y | y |
| [DX\_Visit\_Reasonn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dx_visit_reasonn) | y | y |
| [DXn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=dxn) | y | y |
| [DaysToEvent](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=daystoevent) | y | - |
| [ECODEn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=ecoden) | y | y |
| [E\_CCSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=e_ccsn) | y | y |
| [E\_MCCSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=e_mccsn) | y | y |
| [E\_POAn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=e_poan) | - | - |
| [FEMALE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=female) | y | y |
| [HCUP\_ED](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hcup_ed) | y | y |
| [HCUP\_OS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hcup_os) | y | y |
| [HFIPSSTCO](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hfipsstco) | y | y |
| [HISPANIC\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hispanic_x) | y | y |
| [HOSPBRTH](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hospbrth) | y | y |
| [HOSPID](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hospid) | y | y |
| [HOSPST](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hospst) | y | y |
| [HOSP\_NPI](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=hosp_npi) | - | y |
| [Homeless](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=homeless) | - | - |
| [INJURY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury) | y | y |
| [INJURY\_CUT](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_cut) | y | y |
| [INJURY\_DROWN](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_drown) | y | y |
| [INJURY\_FALL](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_fall) | y | y |
| [INJURY\_FIRE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_fire) | y | y |
| [INJURY\_FIREARM](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_firearm) | y | y |
| [INJURY\_MACHINERY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_machinery) | y | y |
| [INJURY\_MVT](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_mvt) | y | y |
| [INJURY\_NATURE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_nature) | y | y |
| [INJURY\_POISON](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_poison) | y | y |
| [INJURY\_STRUCK](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_struck) | y | y |
| [INJURY\_SUFFOCATION](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=injury_suffocation) | y | y |
| [INTENT\_ASSAULT](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=intent_assault) | y | y |
| [INTENT\_SELF\_HARM](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=intent_self_harm) | y | y |
| [INTENT\_UNINTENTIONAL](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=intent_unintentional) | y | y |
| [KEY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=key) | y | y |
| [LOS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=los) | y | y |
| [LOS\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=los_x) | y | y |
| [MARITALSTATUSUB04](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=maritalstatusub04) | - | - |
| [MARITALSTATUS\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=maritalstatus_x) | - | - |
| [MDBOARD1](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdboard1) | - | - |
| [MDBOARD2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdboard2) | - | - |
| [MDNUM1\_R](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdnum1_r) | y | - |
| [MDNUM2\_R](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdnum2_r) | y | - |
| [MDNUM3\_R](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdnum3_r) | y | - |
| [MDNUM4\_R](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdnum4_r) | - | - |
| [MDNUMTYPE1](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdnumtype1) | - | - |
| [MDNUMTYPE2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdnumtype2) | - | - |
| [MDSPEC1](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdspec1) | - | - |
| [MDSPEC2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mdspec2) | - | - |
| [MEDINCSTQ](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=medincstq) | y | y |
| [MOMNUM\_R](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=momnum_r) | - | - |
| [MRN\_R](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=mrn_r) | y | - |
| [MULTINJURY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=multinjury) | y | y |
| [NCHRONIC](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=nchronic) | y | y |
| [NCPT](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=ncpt) | y | y |
| [NDX](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=ndx) | y | y |
| [NECODE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=necode) | y | y |
| [NEOMAT](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=neomat) | y | y |
| [NPR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=npr) | - | - |
| [NREVCD](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=nrevcd) | - | - |
| [OBSERVATION](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=observation) | - | - |
| [OFFSITE\_ED\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=offsite_ed_x) | - | - |
| [OPservice](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=opservice) | y | y |
| [ORPROC](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=orproc) | - | - |
| [OS\_TIME](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=os_time) | y | y |
| [PAY1](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pay1) | y | y |
| [PAY1\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pay1_x) | y | y |
| [PAY2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pay2) | y | y |
| [PAY2\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pay2_x) | y | y |
| [PAY3](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pay3) | y | y |
| [PAY3\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pay3_x) | y | y |
| [PAYER1\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=payer1_x) | - | - |
| [PAYER2\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=payer2_x) | - | - |
| [PCLASSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pclassn) | - | - |
| [PL\_CBSA](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pl_cbsa) | y | y |
| [PL\_NCHS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pl_nchs) | y | y |
| [PL\_RUCC](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pl_rucc) | y | y |
| [PL\_UIC](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pl_uic) | y | y |
| [PL\_UR\_CAT4](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pl_ur_cat4) | y | y |
| [POA\_Disch\_Edit1](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=poa_disch_edit1) | - | - |
| [POA\_Disch\_Edit2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=poa_disch_edit2) | - | - |
| [POA\_Hosp\_Edit1](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=poa_hosp_edit1) | - | - |
| [POA\_Hosp\_Edit2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=poa_hosp_edit2) | - | - |
| [POA\_Hosp\_Edit3](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=poa_hosp_edit3) | - | - |
| [POA\_Hosp\_Edit3\_Value](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=poa_hosp_edit3_value) | - | - |
| [PRCCSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=prccsn) | - | - |
| [PRDAYn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=prdayn) | - | - |
| [PRMCCSn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=prmccsn) | - | - |
| [PRMONTHn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=prmonthn) | - | - |
| [PROCTYPE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=proctype) | y | y |
| [PRVER](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=prver) | - | - |
| [PRYEARn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pryearn) | - | - |
| [PRn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=prn) | - | - |
| [PSTATE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pstate) | y | y |
| [PSTCO](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pstco) | y | y |
| [PSTCO2](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pstco2) | y | y |
| [PointOfOriginUB04](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pointoforiginub04) | y | y |
| [PointOfOrigin\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=pointoforigin_x) | y | y |
| [PrimLang](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=primlang) | - | - |
| [RACE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=race) | y | y |
| [RACE\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=race_x) | y | y |
| [READMIT](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=readmit) | - | - |
| [REVCDn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=revcdn) | - | - |
| [REVCHGn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=revchgn) | - | - |
| [REVCODE](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=revcode) | y | y |
| [SERVDAY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=servday) | y | y |
| [SPLIT\_IPED](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=split_iped) | - | - |
| [STATE\_AS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=state_as) | y | y |
| [STATE\_ED](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=state_ed) | y | y |
| [STATE\_OS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=state_os) | y | y |
| [TOTCHG](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=totchg) | y | y |
| [TOTCHG\_X](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=totchg_x) | y | y |
| [TOWN](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=town) | - | - |
| [UNITS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=units) | y | y |
| [UNITn](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=unitn) | - | - |
| [U\_BLOOD](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_blood) | y | y |
| [U\_CATH](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_cath) | y | y |
| [U\_CCU](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_ccu) | y | y |
| [U\_CHESTXRAY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_chestxray) | y | y |
| [U\_CTSCAN](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_ctscan) | y | y |
| [U\_DIALYSIS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_dialysis) | y | y |
| [U\_ECHO](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_echo) | y | y |
| [U\_ED](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_ed) | y | y |
| [U\_EEG](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_eeg) | y | y |
| [U\_EKG](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_ekg) | y | y |
| [U\_EPO](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_epo) | y | y |
| [U\_ICU](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_icu) | y | y |
| [U\_LITHOTRIPSY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_lithotripsy) | y | y |
| [U\_MHSA](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_mhsa) | y | y |
| [U\_MRT](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_mrt) | y | y |
| [U\_NEWBN2L](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_newbn2l) | y | y |
| [U\_NEWBN3L](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_newbn3l) | y | y |
| [U\_NEWBN4L](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_newbn4l) | y | y |
| [U\_NUCMED](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_nucmed) | y | y |
| [U\_OBSERVATION](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_observation) | y | y |
| [U\_OCCTHERAPY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_occtherapy) | y | y |
| [U\_ORGANACQ](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_organacq) | y | y |
| [U\_OTHIMPLANTS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_othimplants) | y | y |
| [U\_PACEMAKER](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_pacemaker) | y | y |
| [U\_PHYTHERAPY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_phytherapy) | y | y |
| [U\_RADTHERAPY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_radtherapy) | y | y |
| [U\_RESPTHERAPY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_resptherapy) | y | y |
| [U\_SPEECHTHERAPY](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_speechtherapy) | y | y |
| [U\_STRESS](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_stress) | y | y |
| [U\_ULTRASOUND](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=u_ultrasound) | y | y |
| [VisitLink](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=visitlink) | y | - |
| [YEAR](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=year) | y | y |
| [ZIP](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=zip) | y | y |
| [ZIP3](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=zip3) | y | - |
| [ZIPINC\_QRTL](https://www.hcup-us.ahrq.gov/db/vars/sedddistnote.jsp?var=zipinc_qrtl) | y | y |

As stated earlier, states that don’t participate in SEDD may still maintain and make available their own ED databases, and ED dental care data for states not participating in SEDD may be available through these state hospital discharge datasets. Guidelines and methods provided in this report can be used with non-SEDD data to the extent that these state databases have similar structure and content to SEDD.

A side note on ED oral care surveillance data sources is that Medicaid data availability presents an opportunity for investigating ED access and dental care in the primary care sector as medical and dental data for Medicaid subjects can be linked. For example, follow-up dental care subsequent to ED visits for dental problems can be explored. When using state Medicaid data, issues related to Medicaid data analysis must be addressed, including changes in eligibility affecting numerator and denominator determination in calculation of rates, and the use of procedure codes instead of diagnostic codes in dental insurance data. The obvious primary drawback to use of Medicaid data for state level surveillance is that the data are only for the Medicaid sub-population of the state.

## Diagnosis-Procedure Codes Investigated

ICD-9 diagnosis codes used in analysis provide for direct comparisons between research studies to the extent that the same set of codes is used to define the same outcome. Unfortunately, this has not typically been the case in past published research, as highlighted in the Phase 1 report. There have been definite variations in the codes used by researchers. One major difference is whether there is interest in all dentally related condition or procedure, or if there is interest in a subset of dental conditions/procedures, with different study definitions employing different sets of codes (more or less restricted). Some past studies seeking to investigate any dental related care have used the entire range of ICD-9 codes 520-529.9. Others have used a broader range of dental/oral related codes to capture ED visits related to additional oral problems such as oral injuries/trauma or TMJ problems, and any conditions related to the teeth, jaws, head, face, and neck.

Researchers who are interested in access to EDs for specific dental conditions that are readily prevented or definitively treated through regular traditional dental care, have used a subset of dental codes. This category includes more specific definitions of NTDCs presenting in EDs, which is the primary focus of recommendations in this report. Investigators interested in NTDCs have limited their research to specific ICD codes determined to identify NTDCs. Though often similar, the exact sets of codes employed in analyses often have not been the same. Investigators interested in more specific types of diagnoses make use of a subset of NTDC related ICD-9 codes. Examples may be codes limited to dental infections or dental caries. The wide array of ICD-9 code set definitions is covered thoroughly in the Stage 1 report. Past ED oral care research has almost always involved use of the ICD-9 coding system. A fairly exhaustive range of dental/oral related ICD 9 codes and their descriptions are presented in Appendix 3.

The somewhat recent development and implementation of the ICD-10 coding system (2015) will result in using ICD-10 codes in most research going forward. Comparing studies and study definitions between studies using the two versions, or assessing trends across the ICD transition period requires translation of ICD-9 to ICD-10 codes. To develop recommended sets of codes for different ED oral/NTDC care definitions, we first had to address this transition to the new ICD-10 coding system. A crosswalk table was developed for translation of all oral/dental related ICD-9 codes to corresponding ICD-10 codes. Once this crosswalk table was completed, codes to define specific indicator definitions described in the Outcomes of Interest section of this report were considered, with input from the project workgroup. Specific sets of codes to define NTDC and CPP indicators (described previously) were determined.

Comparisons of ICD-9 and ICD-10 codes and ED oral indicator definitions are displayed in Table 8. ICD-10 descriptions are provided in the fourth column wherever they differ at all from the wording of the ICD-9 description (first column). In some cases, ICD-10 codes were either collapsed or expanded from ICD-9 codes. The final two columns of the table show the sets of recommended codes to define NTDC and the more restricted subset of codes defining CPP, which includes conditions that are commonly and readily treated in dental offices or clinics. Table 8 only shows the codes defining NTDC and the subset defining CPP. An accompanying Excel version of this crosswalk table is available and can be accessed via the ASTDD link, [click here](https://www.astdd.org/docs/ed-project-icd9-icd-10-conversion-table-july-6-2017.xlsx). This Excel file is an expanded version of Table 8 and includes all oral/dental related ICD-9 and corresponding ICD-10 codes, with columns to indicate codes defining NTDC and CPP. This Excel file is made available to states or other interested parties in addition to Table 8 for easier implementation in ED oral/NTDC care surveillance and data analysis activities.

**Table 8. ICD-9 / ICD-10 Crosswalk Table with Recommended Code Sets to Define Non-Traumatic Dental Conditions (NTDC) and Caries/Periodontal/Preventive Conditions (CPP)**

**ICD-9 to ICD-10 Translation Website:** http://www.icd10codesearch.com/

| ICD- 9 Description | ICD-9 Code | ICD-10 Code | ICD-10 Description (if different) | NTDC | CPP |
| --- | --- | --- | --- | --- | --- |
| Anodontia | 5200 | K000 |  | NTDC |  |
| Supernumerary teeth | 5201 | K001 |  | NTDC |  |
| Abnormalities of size and form of teeth | 5202 | K002 |  | NTDC |  |
| Mottled teeth | 5203 | K003 |  | NTDC |  |
| Disturbances of tooth formation | 5204 | K004 |  | NTDC |  |
| Hereditary disturbances in tooth structure, not elsewhere classified | 5205 | K005 |  | NTDC |  |
| Disturbances in tooth eruption | 5206 | K006 | Disturbances in tooth eruption | NTDC |  |
| Disturbances in tooth eruption | 5206 | K010 | Embedded teeth | NTDC |  |
| Disturbances in tooth eruption | 5206 | K011 | Impacted teeth | NTDC |  |
| Teething syndrome | 5207 | K007 | Teething syndrome | NTDC |  |
| Other specified disorders of tooth development and eruption | 5208 | K008 | Other specified disorders of tooth development | NTDC |  |
| Unspecified disorder of tooth development and eruption | 5209 | K009 | Disorder of tooth development, unspecified | NTDC |  |
| Dental caries, unspecified | 52100 | K029 | Dental caries, unspecified | NTDC | CPP |
| Dental caries limited to enamel | 52101 | K0261 | Dental caries on smooth surface limited to enamel | NTDC | CPP |
| Dental caries extending into dentine | 52102 | K0262 | Dental caries on smooth surface penetrating into dentine | NTDC | CPP |
| Dental caries extending into pulp | 52103 | K0263 | Dental caries on smooth surface penetrating into pulp | NTDC | CPP |
| Arrested dental caries | 52104 | K023 | Arrested dental caries | NTDC | CPP |
| Odontoclasia | 52105 | K0389 | Other specified diseases of hard tissues of teeth | NTDC | CPP |
| Dental caries pit and fissure | 52106 | K0251 | Dental caries pit and fissure surface limited to enamel | NTDC | CPP |
| Dental caries of smooth surface | 52107 | K0261 | Dental caries on smooth surface limited to enamel | NTDC | CPP |
| Dental caries of smooth surface | 52107 | K0262 | Dental caries on smooth surface penetrating into dentine | NTDC | CPP |
| Dental caries of smooth surface | 52107 | K0263 | Dental caries on smooth surface penetrating into pulp | NTDC | CPP |
| Dental caries of root surface | 52108 | K027 | Dental root caries | NTDC | CPP |
| Other dental caries | 52109 | K029 | Dental caries, unspecified | NTDC | CPP |
| Excessive dental attrition, unspecified | 52110 | K030 | Excessive attrition of teeth | NTDC |  |
| Excessive attrition, limited to enamel | 52111 | K030 | Excessive attrition of teeth | NTDC |  |
| Excessive attrition, extending into dentine | 52112 | K030 | Excessive attrition of teeth | NTDC |  |
| Excessive attrition, extending into pulp | 52113 | K030 | Excessive attrition of teeth | NTDC |  |
| Excessive attrition, localized | 52114 | K030 | Excessive attrition of teeth | NTDC |  |
| Excessive attrition, generalized | 52115 | K030 | Excessive attrition of teeth | NTDC |  |
| Abrasion of teeth, unspecified | 52120 | K031 | Abrasion of teeth | NTDC |  |
| Abrasion, limited to enamel | 52121 | K031 | Abrasion of teeth | NTDC |  |
| Abrasion, extending into dentine | 52122 | K031 | Abrasion of teeth | NTDC |  |
| Abrasion, extending into pulp | 52123 | K031 | Abrasion of teeth | NTDC |  |
| Abrasion, localized | 52124 | K031 | Abrasion of teeth | NTDC |  |
| Abrasion, generalized | 52125 | K031 | Abrasion of teeth | NTDC |  |
| Erosion, unspecified | 52130 | K032 | Erosion of teeth | NTDC |  |
| Erosion, limited to enamel | 52131 | K032 | Erosion of teeth | NTDC |  |
| Erosion, extending into dentine | 52132 | K032 | Erosion of teeth | NTDC |  |
| Erosion, extending into pulp | 52133 | K032 | Erosion of teeth | NTDC |  |
| Erosion, localized | 52134 | K032 | Erosion of teeth | NTDC |  |
| Erosion, generalized | 52135 | K032 | Erosion of teeth | NTDC |  |
| Pathological resorption, unspecified | 52140 | K033 | Pathological resorption of teeth | NTDC |  |
| Pathological resorption, internal | 52141 | K033 | Pathological resorption of teeth | NTDC |  |
| Pathological resorption, external | 52142 | K033 | Pathological resorption of teeth | NTDC |  |
| Other pathological resorption | 52149 | K033 | Pathological resorption of teeth | NTDC |  |
| Hypercementosis | 5215 | K034 |  | NTDC |  |
| Ankylosis of teeth | 5216 | K035 |  | NTDC |  |
| Intrinsic posteruptive color changes of teeth | 5217 | K037 | Intrinsic posteruptive color changes of hard tissues of teeth | NTDC |  |
| Cracked tooth | 52181 | K0381 |  | NTDC | CPP |
| Other specific diseases of hard tissues of teeth | 52189 | K0389 |  | NTDC | CPP |
| Unspecified disease of hard tissues of teeth | 5219 | K039 | Disease of hard tissues of teeth, unspecified | NTDC | CPP |
| Pulpitis | 5220 | K040 |  | NTDC | CPP |
| Necrosis of the pulp | 5221 | K041 |  | NTDC | CPP |
| Pulp degeneration | 5222 | K042 |  | NTDC | CPP |
| Abnormal hard tissue formation in pulp | 5223 | K043 |  | NTDC |  |
| Acute apical periodontitis of pulpal origin | 5224 | K044 |  | NTDC | CPP |
| Periapical abscess without sinus | 5225 | K047 |  | NTDC | CPP |
| Chronic apical periodontitis | 5226 | K045 |  | NTDC | CPP |
| Periapical abscess with sinus | 5227 | K046 |  | NTDC | CPP |
| Radicular cyst | 5228 | K048 |  | NTDC |  |
| Other and unspecified diseases of pulp and periapical tissues | 5229 | K0490 | Unspecified diseases of pulp and periapical tissues | NTDC | CPP |
| Other and unspecified diseases of pulp and periapical tissues | 5229 | K0499 | Other diseases of pulp and periapical tissues | NTDC | CPP |
| Acute gingivitis, plaque induced | 52300 | K0500 |  | NTDC | CPP |
| Acute gingivitis, non-plaque induced | 52301 | K0501 |  | NTDC | CPP |
| Chronic gingivitis, plaque induced | 52310 | K0510 |  | NTDC | CPP |
| Chronic gingivitis, non-plaque induced | 52311 | K0511 |  | NTDC | CPP |
| Gingival recession, unspecified | 52320 | K060 | Gingival recession | NTDC | CPP |
| Gingival recession, minimal | 52321 | K060 | Gingival recession | NTDC | CPP |
| Gingival recession, moderate | 52322 | K060 | Gingival recession | NTDC | CPP |
| Gingival recession, severe | 52323 | K060 | Gingival recession | NTDC | CPP |
| Gingival recession, localized | 52324 | K060 | Gingival recession | NTDC | CPP |
| Gingival recession, generalized | 52325 | K060 | Gingival recession | NTDC | CPP |
| Aggressive periodontitis, unspecified | 52330 | K0520 |  | NTDC | CPP |
| Aggressive periodontitis, localized | 52331 | K0521 |  | NTDC | CPP |
| Aggressive periodontitis, generalized | 52332 | K0522 |  | NTDC | CPP |
| Acute periodontitis | 52333 | K0520 |  | NTDC | CPP |
| Chronic periodontitis, unspecified | 52340 | K0530 |  | NTDC | CPP |
| Chronic periodontitis, localized | 52341 | K0531 |  | NTDC | CPP |
| Chronic periodontitis, generalized | 52342 | K0532 |  | NTDC | CPP |
| Periodontosis | 5235 | K0540 |  | NTDC | CPP |
| Accretions on teeth | 5236 | K036 | Deposits (accretions) on teeth | NTDC | CPP |
| Other specified periodontal diseases | 5238 | K055 | Other periodontal diseases | NTDC | CPP |
| Other specified periodontal diseases | 5238 | K061 | Gingival enlargement | NTDC | CPP |
| Unspecified gingival and periodontal disease | 5239 | K056 | Periodontal disease, unspecified | NTDC | CPP |
| Major anomalies of jaw size, unspecified anomaly | 52400 | M2600 | Unspecified anomaly of jaw size | NTDC |  |
| Major anomalies of jaw size, maxillary hyperplasia | 52401 | M2601 | Maxillary hyperplasia | NTDC |  |
| Major anomalies of jaw size, | 52402 | M2603 | Mandibular hyperplasia | NTDC |  |
| Major anomalies of jaw size, maxillary hypoplasia | 52403 | M2602 | Maxillary hypoplasia | NTDC |  |
| Major anomalies of jaw size, mandibular hypoplasia | 52404 | M2604 | Mandibular hypoplasia | NTDC |  |
| Major anomalies of jaw size, macrogenia | 52405 | M2605 | Macrogenia | NTDC |  |
| Major anomalies of jaw size, microgenia | 52406 | M2606 | Microgenia | NTDC |  |
| Excessive tuberosity of jaw | 52407 | M2607 |  | NTDC |  |
| Major anomalies of jaw size, other specified anomaly | 52409 | M2609 | Other specified anomalies of jaw size | NTDC |  |
| Anomalies of relationship of jaw to cranial base, unspecified anomaly | 52410 | M2610 | Unspecified anomaly of relationship of jaw-cranial base relationship | NTDC |  |
| Anomalies of relationship of jaw to cranial base, maxillary asymmetry | 52411 | M2611 | Maxillary asymmetry | NTDC |  |
| Anomalies of relationship of jaw to cranial base, other jaw asymmetry | 52412 | M2612 | Other jaw asymmetry | NTDC |  |
| Anomalies of relationship of jaw to cranial base, other specified anomaly | 52419 | M2619 | Other specified anomalies of jaw-cranial base relationship | NTDC |  |
| Unspecified anomaly of dental arch relationship | 52420 | M2620 |  | NTDC |  |
| Malocclusion, Angle's class I | 52421 | M26211 |  | NTDC |  |
| Malocclusion, Angle's class II | 52422 | M26212 |  | NTDC |  |
| Malocclusion, Angle's class III | 52423 | M26213 |  | NTDC |  |
| Open anterior occlusal relationship | 52424 | M26220 |  | NTDC |  |
| Open posterior occlusal relationship | 52425 | M26221 |  | NTDC |  |
| Excessive horizontal overlap | 52426 | M2623 |  | NTDC |  |
| Reverse articulation | 52427 | M2624 |  | NTDC |  |
| Anomalies of interarch distance | 52428 | M2625 |  | NTDC |  |
| Other anomalies of dental arch relationship | 52429 | M2629 |  | NTDC |  |
| Unspecified anomaly of tooth position of fully erupted teeth | 52430 | M2630 | Unspecified anomaly of tooth position of fully erupted tooth or teeth | NTDC |  |
| Crowding of teeth | 52431 | M2631 | Crowding of fully erupted teeth | NTDC |  |
| Excessive spacing of teeth | 52432 | M2632 | Excessive spacing of fully erupted teeth | NTDC |  |
| Horizontal displacement of teeth | 52433 | M2633 | Horizontal displacement of fully erupted tooth or teeth | NTDC |  |
| Vertical displacement of teeth | 52434 | M2634 | Vertical displacement of fully erupted tooth or teeth | NTDC |  |
| Rotation of tooth/teeth | 52435 | M2635 | Rotation of fully erupted tooth or teeth | NTDC |  |
| Insufficient interocclusal distance of teeth (ridge) | 52436 | M2636 | Insufficient interocclusal distance of fully erupted teeth (ridge) | NTDC |  |
| Excessive interocclusal distance of teeth | 52437 | M2637 | Excessive interocclusal distance of fully erupted teeth | NTDC |  |
| Other anomalies of tooth position | 52439 | M2639 | Other anomalies of tooth position of fully erupted tooth or teeth | NTDC |  |
| Malocclusion, unspecified | 5244 | M264 |  | NTDC |  |
| Dentofacial functional abnormality, unspecified | 52450 | M2650 | Dentofacial functional abnormalities, unspecified | NTDC |  |
| Abnormal jaw closure | 52451 | M2651 |  | NTDC |  |
| Limited mandibular range of motion | 52452 | M2652 |  | NTDC |  |
| Deviation in opening and closing of the mandible | 52453 | M2653 |  | NTDC |  |
| Insufficient anterior guidance | 52454 | M2654 |  | NTDC |  |
| Centric occlusion maximum intercuspation discrepancy | 52455 | M2655 |  | NTDC |  |
| Non-working side interference | 52456 | M2656 |  | NTDC |  |
| Lack of posterior occlusal support | 52457 | M2657 |  | NTDC |  |
| Other dentofacial functional abnormalities | 52459 | M2659 |  | NTDC |  |
| Temporomandibular joint disorders, unspecified | 52460 | M2660 | Temporomandibular joint disorder, unspecified | NTDC |  |
| Temporomandibular joint disorders, unspecified | 52460 | M2669 | Other specified disorders of temporomandibular joint | NTDC |  |
| Temporomandibular joint disorders, adhesions and ankylosis (bony or fibrous) | 52461 | M2661 | Adhesions and ankylosis of temporomandibular joint | NTDC |  |
| Temporomandibular joint disorders, arthralgia of temporomandibular joint | 52462 | M2662 | Arthralgia of temporomandibular joint | NTDC |  |
| Temporomandibular joint disorders, articular disc disorder (reducing or non-reducing) | 52463 | M2663 | Articular disc disorder of temporomandibular joint | NTDC |  |
| Temporomandibular joint sounds on opening and/or closing the jaw | 52464 | M2669 | Other specified disorders of temporomandibular joint | NTDC |  |
| Other specified temporomandibular joint disorders | 52469 | M2669 | Other specified disorders of temporomandibular joint | NTDC |  |
| Dental alveolar anomalies, unspecified alveolar anomaly | 52470 | M2670 | Unspecified alveolar anomaly | NTDC |  |
| Alveolar maxillary hyperplasia | 52471 | M2671 |  | NTDC |  |
| Alveolar mandibular hyperplasia | 52472 | M2672 |  | NTDC |  |
| Alveolar maxillary hypoplasia | 52473 | M2673 |  | NTDC |  |
| Alveolar mandibular hypoplasia | 52474 | M2674 |  | NTDC |  |
| Vertical displacement of alveolus and teeth | 52475 | M2679 | Other specified alveolar anomaly | NTDC |  |
| Occlusal plane deviation | 52476 | M2679 | Other specified alveolar anomaly | NTDC |  |
| Other specified alveolar anomaly | 52479 | M2679 | Other specified alveolar anomaly | NTDC |  |
| Anterior soft tissue impingement | 52481 | M2681 |  | NTDC |  |
| Posterior soft tissue impingement | 52482 | M2682 |  | NTDC |  |
| Other specified dentofacial anomalies | 52489 | M264 | Malocclusion, unspecified | NTDC |  |
| Other specified dentofacial anomalies | 52489 | M2689 | Other dentofacial anomalies | NTDC |  |
| Unspecified dentofacial anomalies | 5249 | M269 | Dentofacial anomaly, unspecified | NTDC |  |
| Exfoliation of teeth due to systemic causes | 5250 | K080 |  | NTDC |  |
| Acquired absence of teeth, unspecified | 52510 | K08109 | Complete loss of teeth, unspecified cause, unspecified class | NTDC |  |
| Loss of teeth due to periodontal disease | 52512 | K08429 | Partial loss of teeth due to periodontal diseases, unspecified class | NTDC | CPP |
| Loss of teeth due to caries | 52513 | K08439 | Partial loss of teeth due to caries unspecified class | NTDC | CPP |
| Other loss of teeth | 52519 | K08499 | Partial loss of teeth due to other unspecified cause, unspecified class | NTDC | CPP |
| Unspecified atrophy of edentulous alveolar ridge | 52520 | K0820 |  | NTDC |  |
| Minimal atrophy of the mandible | 52521 | K0821 |  | NTDC |  |
| Moderate atrophy of the mandible | 52522 | K0822 |  | NTDC |  |
| Severe atrophy of the mandible | 52523 | K0823 |  | NTDC |  |
| Minimal atrophy of the maxilla | 52524 | K0824 |  | NTDC |  |
| Moderate atrophy of the maxilla | 52525 | K0825 |  | NTDC |  |
| Severe atrophy of the maxilla | 52526 | K0826 |  | NTDC |  |
| Retained dental root | 5253 | K083 |  | NTDC |  |
| Complete edentulism, unspecified | 52540 | K08109 | Complete loss of teeth, unspecified cause, unspecified class | NTDC |  |
| Complete edentulism, class I | 52541 | K08101 | Complete loss of teeth, unspecified cause, class I | NTDC |  |
| Complete edentulism, class II | 52542 | K08102 | Complete loss of teeth, unspecified cause, class II | NTDC |  |
| Complete edentulism, class III | 52543 | K08103 | Complete loss of teeth, unspecified cause, class III | NTDC |  |
| Complete edentulism, class IV | 52544 | K08104 | Complete loss of teeth, unspecified cause, class IV | NTDC |  |
| Partial edentulism, unspecified | 52550 | K08409 | Partial loss of teeth, unspecified cause, unspecified class | NTDC | CPP |
| Partial edentulism, class I | 52551 | K08401 | Partial loss of teeth, unspecified cause, class I | NTDC | CPP |
| Partial edentulism, class II | 52552 | K08402 | Partial loss of teeth, unspecified cause, class II | NTDC | CPP |
| Partial edentulism, class III | 52553 | K08403 | Partial loss of teeth, unspecified cause, class III | NTDC | CPP |
| Partial edentulism, class IV | 52554 | K08404 | Partial loss of teeth, unspecified cause, class IV | NTDC | CPP |
| Unspecified unsatisfactory restoration of tooth | 52560 | K0850 | Unsatisfactory restoration of tooth, unspecified | NTDC | CPP |
| Open restoration margins | 52561 | K0851 | Open restoration margins of tooth | NTDC | CPP |
| Unrepairable overhanging of dental restorative materials | 52562 | K0852 |  | NTDC | CPP |
| Fractured dental restorative material without loss of material | 52563 | K08530 |  | NTDC | CPP |
| Fractured dental restorative material with loss of material | 52564 | K08531 |  | NTDC | CPP |
| Contour of existing restoration of tooth biologically incompatible with oral health | 52565 | K0854 |  | NTDC | CPP |
| Allergy to existing dental restorative material | 52566 | K0855 |  | NTDC | CPP |
| Poor aesthetics of existing restoration | 52567 | K0856 | Poor aesthetic of existing restoration of tooth | NTDC | CPP |
| Other unsatisfactory restoration of existing tooth | 52569 | K0859 | Other unsatisfactory restoration of tooth | NTDC | CPP |
| Osseointegration failure of dental implant | 52571 | M2761 |  | NTDC | CPP |
| Post-osseointegration biological failure of dental implant | 52572 | M2762 |  | NTDC | CPP |
| Post-osseointegration mechanical failure of dental implant | 52573 | M2763 |  | NTDC | CPP |
| Other endosseous dental implant failure | 52579 | M2769 |  | NTDC | CPP |
| Other specified disorders of the teeth and supporting structures | 5258 | K088 | Other specified disorders of teeth and supporting structures | NTDC | CPP |
| Other specified disorders of the teeth and supporting structures |  | M2679 | Other specified alveolar anomalies | NTDC |  |
| Unspecified disorder of the teeth and supporting structures | 5259 | K089 | Disorder of teeth and supporting structures, unspecified | NTDC | CPP |
| Developmental odontogenic cysts | 5260 | K090 |  | NTDC |  |
| Fissural cysts of jaw | 5261 | K091 | Developmental (nonodotogenic) cysts of oral region | NTDC |  |
| Other cysts of jaws | 5262 | M2749 |  | NTDC |  |
| Central giant cell (reparative) granuloma | 5263 | M271 | Giant cell granuloma, central | NTDC |  |
| Inflammatory conditions of jaw | 5264 | M272 |  | NTDC |  |
| Alveolitis of jaw | 5265 | M273 |  | NTDC |  |
| Perforation of root canal space | 52661 | M2751 | Perforation of root canal space due to endodontic treatment | NTDC | CPP |
| Endodontic overfill | 52662 | M2752 |  | NTDC | CPP |
| Endodontic underfill | 52663 | M2753 |  | NTDC | CPP |
| Other periradicular pathology associated with previous endodontic treatment | 52669 | M2759 |  | NTDC | CPP |
| Exostosis of jaw | 52681 | M278 | Other specified diseases of jaws | NTDC |  |
| Other specified diseases of the jaws | 52689 | M278 | Other specified diseases of jaws | NTDC |  |
| Unspecified disease of the jaws | 5269 | M279 | Disease of the jaws, unspecified | NTDC |  |
| Atrophy of salivary gland | 5270 | K110 |  | NTDC |  |
| Hypertrophy of salivary gland | 5271 | K111 |  | NTDC |  |
| Sialoadenitis | 5272 | K1120 | Sialoadenitis, unspecified | NTDC |  |
| Abscess of salivary gland | 5273 | K113 |  | NTDC |  |
| Fistula of salivary gland | 5274 | K114 |  | NTDC |  |
| Sialolithiasis | 5275 | K115 |  | NTDC |  |
| Mucocele of salivary gland | 5276 | K116 |  | NTDC |  |
| Disturbance of salivary secretion | 5277 | K117 | Disturbances of salivary secretion | NTDC |  |
| Disturbance of salivary secretion | 5277 | R682 | Dry mouth, unspecified | NTDC |  |
| Other specified diseases of the salivary glands | 5278 | K118 | Other diseases of salivary glands | NTDC |  |
| Unspecified disease of the salivary glands | 5279 | K119 | Disease of the salivary glands, unspecified | NTDC |  |
| Stomatitis and mucositis, unspecified | 52800 | K122 | Cellulitis and abscess of mouth | NTDC |  |
| Stomatitis and mucositis, unspecified | 52800 | K1230 | Oral mucositis (ulcerative), unspecified | NTDC |  |
| Mucositis (ulcerative) due to antineoplastic therapy | 52801 | K1231 | Oral mucositis (ulcerative) due to antineoplastic therapy | NTDC |  |
| Mucositis (ulcerative) due to antineoplastic therapy | 52801 | K1233 | Oral mucositis (ulcerative) due to radiation | NTDC |  |
| Mucositis (ulcerative) due to other drugs | 52802 | K1232 | Oral mucositis (ulcerative) due to other drugs | NTDC |  |
| Other stomatitis and mucositis (ulcerative) | 52809 | K121 | Other forms of stomatitis | NTDC |  |
| Other stomatitis and mucositis (ulcerative) | 52809 | K1239 | Other oral mucositis (ulcerative) | NTDC |  |
| Cancrum oris | 5281 | A690 | Necrotizing ulcerative stomatitis | NTDC |  |
| Oral aphthae | 5282 | K120 | Recurrent oral aphthae | NTDC |  |
| Cellulitis and abscess of oral soft tissues | 5283 | K122 | Cellulitis and abscess of mouth | NTDC |  |
| Cysts of oral soft tissues | 5284 | K098 | Other cysts of oral region, not elsewhere classified | NTDC |  |
| Diseases of lips | 5285 | K130 |  | NTDC |  |
| Leukoplakia of oral mucosa, including tongue | 5286 | K1321 |  | NTDC |  |
| Minimal keratinized residual ridge mucosa | 52871 | K1322 |  | NTDC |  |
| Excessive keratinized residual ridge mucosa | 52872 | K1323 |  | NTDC |  |
| Other disturbances of oral epithelium, including tongue | 52879 | K1329 |  | NTDC |  |
| Oral submucosal fibrosis, including of tongue | 5288 | K135 | Oral submucosal fibrosis | NTDC |  |
| Other and unspecified diseases of the oral soft tissues | 5289 | K1370 | Unspecified lesions of oral mucosa | NTDC |  |
| Other and unspecified diseases of the oral soft tissues | 5289 | K1379 | Other lesions of oral mucosa | NTDC |  |
| Glossitis | 5290 | K140 |  | NTDC |  |
| Geographic tongue | 5291 | K141 |  | NTDC |  |
| Median rhomboid glossitis | 5292 | K142 |  | NTDC |  |
| Hypertrophy of tongue papillae | 5293 | K143 |  | NTDC |  |
| Atrophy of tongue papillae | 5294 | K144 |  | NTDC |  |
| Plicated tongue | 5295 | K145 |  | NTDC |  |
| Glossodynia | 5296 | K146 |  | NTDC |  |
| Other specified conditions of the tongue | 5298 | K148 | Other diseases of the tongue | NTDC |  |
| Unspecified condition of the tongue | 5299 | K149 | Disease of tongue, unspecified | NTDC |  |
| Jaw pain | 78492 | R6884 |  | NTDC | CPP |
| Nonspecific abnormal findings in saliva | 7924 | R859 | Unspecified abnormal finding in specimens from digestive organs and abdominal cavity | NTDC |  |
| Fitting and adjustment of dental prosthetic device | V523 | Z463 | Encounter for fitting and adjustment of dental prosthetic device | NTDC | CPP |
| Fitting and adjustment of orthodontic devices | V534 | Z464 | Encounter for fitting and adjustment of orthodontic device | NTDC | CPP |
| Orthodontics aftercare | V585 | Z464 | Encounter for fitting and adjustment of orthodontic device | NTDC | CPP |
| Dental examination | V722 | Z0120 | Encounter for dental examination and cleaning without abnormal findings | NTDC | CPP |
| Dental examination | V723 | Z0121 | Encounter for dental examination and cleaning with abnormal findings | NTDC | CPP |

# Dataset Development and Analyses

Data and analysis code are required to conduct ED oral care surveillance and generate the recommended ED oral surveillance indicators. For states that don’t participate in SEDD, the existence and availability of ED data will need to be determined. As mentioned before, similarities of non-SEDD state data with SEDD data will allow for general use of recommendations and methods presented in this report. For SEDD states, data and resources for analysis are available online. Appendix 1 contains the detailed overview webpage of SEDD and has links to other SEDD webpages, including the links to data purchasing and data documentation and resources. Among the SEDD data resources are downloadable files for loading SEDD datasets into SAS, SPSS, and Stata.

Once the data are loaded, generating the indicators recommended in the report requires specific code. SAS sample code for generating recommended indicators is provided in Appendix 4. Instructions for setting up and using the code are included in the appendix. The code itself can be cut and pasted from Appendix 4 into SAS and modified as needed to meet the specific needs and desires of each state.

To guide analysis, an analysis grid was developed laying out the recommended and optional indicators and stratified analysis, and includes the SEDD variable names to use in generating the indicator output. The analysis grid is in Appendix 5. Further support can be sought from ASTDD. All of the information on recommended ED oral care indicators, their definitions, and conducting the data analysis to generate the indicators is summarized and available in the document, [*Guidance on Assessing Emergency Department Data for Non-Traumatic Dental Conditions*](https://www.astdd.org/docs/ed-data-analysis-guidance-july-6-2017.docx).

Note: the ICD-9 and ICD-10 recommended code blocks are included in Appendix 4. The Oral/Dental ICD-9/ICD-10 Conversion Crosswalk Table Excel file is available to see corresponding ICD-9 and ICD-10 codes and their definitions, [click here](https://www.astdd.org/docs/ed-project-icd9-icd-10-conversion-table-july-6-2017.xlsx). This Excel file can also be used for creating different sets of codes for analysis if states choose to do analyses beyond the recommended and optional analyses presented.

# Ongoing Challenges to ED Oral/NTDC Care Surveillance

The problematic aspects of research methods addressing ED use for oral problems in past research has primarily related to the inconsistencies of methods across studies. Research by nature is intended to address new research question in different target populations with different outcomes and predictors of interest. Likewise in investigations of ED oral/NTDC care, methodology will vary depending on the factors of interest to the researchers, including: definitions of ED treatments, predictors of ED use, and factors related to potentially effective intervention strategies. Surveillance on the other hand, is effective when conducted in a uniform standardized way across different populations and over time.

Another problematic aspect of research addressed in the Phase 1 report has been coding at the EDs. The lack of oral/dental training and knowledge among medical professionals providing care in EDs has been problematic in both accurate diagnosis of oral conditions and accurate use of the diagnosis codes. Likewise, physicians are not properly trained to provide the appropriate treatment for the oral problems underlying the presenting symptoms. The resulting care usually involves providing prescriptions for pain medications and/or antibiotics, along with advice to see a dentist. Coding for oral/dental conditions by physicians often relies on heavy use of codes such as “dental disorder unspecified” (ICD-9 code 525.9, also related codes 521.8, 521.9, and 525.8). Such codes are not very informative, but more specific dental codes used may often be inaccurate. The problem of inaccurate and imprecise ICD-9 dental code use by physicians is not easily addressed.

Furthermore, many available datasets employ the use of unique identifiers associated with an ED visit, not a specific person. So repeat visits by a person cannot be identified or linked, and the extent of repeat visits to EDs for the same oral problem cannot be quantified. This is a major shortcoming, as repeat visits may represent a substantial portion of unnecessary treatment and costs that would potentially not occur if there was a source of regular definitive dental care.

Related to this lack of patient identity is the inability to link medical and ED data for a given patient to dental claims data. This precludes the ability to assess whether oral problems presenting in EDs have been addressed in the primary care dental setting. Furthermore, the utility of linked medical and dental data is limited by the long-standing use of treatment codes rather than diagnostic codes in dentistry. Initiatives for developing and implementing dental diagnostic codes are in process, but likely won’t be widely implemented for some time. Also, the development of electronic health and dental records, with increased potential for linking, is also progressing.

# Summary/Conclusions

The variation in past ED oral/NTDC investigative methods has limited the consistency and comparability of data. The use of standardized methods and protocols developed from this project will provide for more uniform and comparable ED oral/NTDC surveillance data for basic surveillance activities conducted by states.

# Communications Plan

To promote the use of standardized state level ED oral care surveillance, the methods and recommendations from this project need to be disseminated with accompanying communication to encourage usage. A communication plan has been developed to guide these efforts. This communication plan is included in Appendix 6.

**Appendix 1: State Emergency Department Databases (SEDD)**

Copied from: <https://www.hcup-us.ahrq.gov/seddoverview.jsp>

**Overview of the State Emergency Department Databases (SEDD)**

The State Emergency Department Databases (SEDD) are part of the family of databases and software tools developed for the [Healthcare Cost and Utilization Project (HCUP)](https://www.hcup-us.ahrq.gov/overview.jsp). The SEDD capture emergency visits at hospital-affiliated emergency departments (EDs) that do not result in hospitalization. Information about patients initially seen in the ED and then admitted to the hospital is included in the State Inpatient Databases (SID). The SEDD files include all patients, regardless of payer, providing a unique view of ED care in a State or in a defined market over time.

Developed through a Federal-State-Industry partnership sponsored by the [Agency for Healthcare Research and Quality (AHRQ)](http://www.ahrq.gov/), HCUP data inform decision making at the national, State, and community levels.   
  
This page provides an overview of the SEDD. For more details, see [SEDD Database Documentation](https://www.hcup-us.ahrq.gov/db/state/sedddbdocumentation.jsp) and the Introduction to the SEDD ([PDF](https://www.hcup-us.ahrq.gov/db/state/sedddist/Introduction_to_SEDD.pdf) file, 163 KB; [HTML](https://www.hcup-us.ahrq.gov/db/state/sedddist/SEDD_Introduction.jsp))

**About the SEDD**

The SEDD capture discharge information on all ED visits in a given State that do not result in an admission. States make their SEDD files available for purchase through the [HCUP Central Distributor](https://www.hcup-us.ahrq.gov/tech_assist/centdist.jsp). See [Availability of HCUP Data](https://www.hcup-us.ahrq.gov/db/availability_public.jsp) for a list of State database participation and availability by year.

[Thirty-five](http://www.hcup-us.ahrq.gov/partners.jsp?SEDD) States currently participate in the SEDD:

* The SEDD contain the ED encounter abstracts in participating States, translated into a uniform format to facilitate multi-State comparisons and analyses.
* All of the databases include abstracts from hospital-affiliated ED sites. Composition and completeness of data files may vary from State to State.
* The SEDD contain a core set of clinical and nonclinical information on all patients, including individuals covered by Medicare, Medicaid, or private insurance, as well as those who are uninsured.
* In addition to the core set of uniform data elements common to all SEDD, some State data include other elements, such as the patient's race.

Free [HCUP Tools & Software](https://www.hcup-us.ahrq.gov/tools_software.jsp) are also available to identify preventable hospitalizations, estimate costs, assess quality of care and patient safety, categorize diagnoses and procedures, and identify comorbidities.   
  
Additional information on the SEDD may be found in the Introduction to the SEDD ([PDF](https://www.hcup-us.ahrq.gov/db/state/sedddist/Introduction_to_SEDD.pdf) file, 163 KB; [HTML](https://www.hcup-us.ahrq.gov/db/state/sedddist/SEDD_Introduction.jsp)).

**SEDD Data Elements**

The SEDD contain clinical and resource-use information that is included in a typical discharge abstract, with safeguards to protect the privacy of individual patients, physicians, and hospitals (as required by data sources). The SEDD contain more than 100 clinical and non-clinical variables included in a hospital discharge abstract, such as:

* All-listed diagnoses and procedures
* Patient demographics characteristics (e.g., sex, age, and, for some States, race)
* Expected payment source
* Total charges
* Hospital identifiers that permit linkage to hospital inpatient databases, such as the AHRQ-sponsored [State Inpatient Databases (SID)](https://www.hcup-us.ahrq.gov/sidoverview.jsp), and to the American Hospital Association Annual Survey File

Elements included in the SEDD are not always available for all States, including the hospital county identifiers or HCUP's [Revisit Variables](https://www.hcup-us.ahrq.gov/toolssoftware/revisit/revisit.jsp). Please see the [Availability of Data Elements by Year](https://www.hcup-us.ahrq.gov/db/state/sedddist/sedddist_ddeavailbyyear.jsp).

**SEDD File Structure**

The SEDD are calendar year files based on discharge date for all data years except 2015. Because of the transition to ICD-10-CM/PCS on October 1, 2015, the 2015 SEDD are split into two parts. Nine months of the 2015 data with ICD-9-CM codes (discharges from Jan 1, 2015 - September 30, 2015) are in one set of files labeled Q1Q3. Three months of 2015 data with ICD-10-CM/PCS codes (discharges from October 1, 2015 - December 31, 2015) are in a separate set of files labeled Q4. More information about the changes to the HCUP databases for ICD-10-CM/PCS and use of data across the two coding system may be found on the HCUP-US Web site under [ICD-10-CM/PCS Resources](https://www.hcup-us.ahrq.gov/datainnovations/icd10_resources.jsp).

**SEDD Areas of Research and HCUP Publications**

The SEDD combined with SID discharges that originate in the ED are well suited for research that requires complete enumeration of hospital-based EDs within market areas or States. The SEDD promote comparative studies of health care services and support health care policy research on a variety of topics, including:

* Injury surveillance
* Access to health care in a changing health care marketplace
* Trends and correlations between ED use and environmental events
* Emerging infections
* Occurrence of nonfatal, preventable illness
* Community assessment and planning

The SEDD are used in a variety of publications:

* [HCUP Statistical Briefs](https://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp) highlight a variety of health topics.
* Use the [HCUP Publications Search Tool](https://www.hcup-us.ahrq.gov/reports/pubsearch/pubsearch.jsp) to find publications using the SEDD.
* Review featured publications on the [HCUP Research Spotlights](https://www.hcup-us.ahrq.gov/reports/spotlights.jsp) page.
* Read publications by the winners of the [HCUP Outstanding Article of the Year Awards](https://www.hcup-us.ahrq.gov/news/awards_archive.jsp).

**Purchase the SEDD**

SEDD releases beginning in data year 1999 are available for purchase through the [HCUP Central Distributor](https://www.hcup-us.ahrq.gov/tech_assist/centdist.jsp). Costs vary by State and data year.

All HCUP data users, including data purchasers and collaborators, must complete the online [HCUP Data Use Agreement Training Tool](https://www.hcup-us.ahrq.gov/tech_assist/dua.jsp), and must read and sign the Data Use Agreement for State Databases ([PDF](https://www.hcup-us.ahrq.gov/team/StateDUA.pdf) file, 53 KB; [HTML](https://www.hcup-us.ahrq.gov/team/StateDUA.jsp)). The SEDD are available for purchase online through the [HCUP Central Distributor](https://www.hcup-us.ahrq.gov/tech_assist/centdist.jsp).

Questions regarding purchasing databases can be directed to the HCUP Central Distributor:

E-mail: [HCUPDistributor@AHRQ.gov](mailto:HCUPDistributor@AHRQ.gov)   
Telephone: (866) 556-4287 (toll free)

Fax: (866) 792-5313 (toll free)

**SEDD Hardware and Software Requirements**

The SEDD data set comes in ASCII format and can be run on desktop computers with a DVD drive. To load and analyze the SEDD, you will need the following:

* A DVD drive
* A hard drive with one to four gigabytes of space available, depending on the SID being used
* SAS®, SPSS®, or similar analysis software

The data set comes with full documentation. SEDD documentation and tools, including programs for loading the ASCII file into SAS or SPSS, are also available on the [SEDD Database Documentation](https://www.hcup-us.ahrq.gov/db/state/sedddbdocumentation.jsp) page.

**Appendix 2: The National Emergency Department Sample**

Copied from: <https://www.hcup-us.ahrq.gov/nedsoverview.jsp>.

**Overview of the Nationwide Emergency Department Sample (NEDS)**

The Nationwide Emergency Department Sample (NEDS) is part of a family of databases and software tools developed for the [Healthcare Cost and Utilization Project (HCUP)](https://www.hcup-us.ahrq.gov/overview.jsp). The NEDS is the largest all-payer emergency department (ED) database in the United States, yielding national estimates of hospital-based ED visits. Unweighted, it contains data from approximately 30 million ED visits each year. Weighted, it estimates roughly 135 million ED visits.

Developed through a Federal-State-Industry partnership sponsored by the [Agency for Healthcare Research and Quality](http://www.ahrq.gov/), HCUP data inform decisionmaking at the national, State, and community levels.

This page provides an overview of the NEDS. For more details, see [NEDS Database Documentation](https://www.hcup-us.ahrq.gov/db/nation/neds/nedsdbdocumentation.jsp) and the Introduction to the NEDS, 2014 ([PDF](https://www.hcup-us.ahrq.gov/db/nation/neds/NEDS2014Introduction.pdf) file, 684 KB).

Contents:

* [About the NEDS](https://www.hcup-us.ahrq.gov/nedsoverview.jsp#about)
* [NEDS Data Elements](https://www.hcup-us.ahrq.gov/nedsoverview.jsp#data)
* [NEDS Areas of Research and HCUP Publications](https://www.hcup-us.ahrq.gov/nedsoverview.jsp#research)
* [Purchase the NEDS](https://www.hcup-us.ahrq.gov/nedsoverview.jsp#purchase)
* [NEDS Hardware and Software Requirements](https://www.hcup-us.ahrq.gov/nedsoverview.jsp#hardware)

**About the NEDS**

Sampled from the [State Inpatient Databases (SID)](https://www.hcup-us.ahrq.gov/sidoverview.jsp) and [State Emergency Department Databases (SEDD)](https://www.hcup-us.ahrq.gov/seddoverview.jsp), HCUP's NEDS can be used to create national and regional estimates of ED care. The SID contain information on patients initially seen in the ED and then admitted to the same hospital. The SEDD capture information on ED visits that do not result in an admission (i.e., treat-and-release visits and transfers to another hospital).   
  
NEDS data are available from 2006 through 2014, which allows researchers to analyze trends over time. Key features of the most recent NEDS database year (2014) include:

* A large sample size, which provides sufficient data for analysis across hospital types and the study of relatively uncommon disorders and procedures
* Discharge data for ED visits from 945 hospitals located in 33 States and the District of Columbia, approximating a 20-percent stratified sample of U.S. hospital-based EDs
* Demographic data such as hospital and patient characteristics, geographic area, and the nature of ED visits (e.g., common reasons for ED visits, including injuries)
* ED charge information for 84 percent of patients, including individuals covered by Medicare, Medicaid, or private insurance, as well as those who are uninsured
* Children's hospitals with trauma centers, which are classified with adult and pediatric trauma centers in the current versions of the NEDS.

**NEDS Data Elements**

The NEDS contains clinical and resource-use information that is included in a typical discharge abstract, with safeguards to protect the privacy of individual patients, physicians, and hospitals (as required by data sources). The NEDS is composed of more than 100 clinical and nonclinical variables for each hospital stay. These include:

* International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis and external cause of injury codes
* ICD-9-CM and Current Procedural Terminology, Fourth Edition (CPT®-4) procedure codes
* Identification of injury-related ED visits including mechanism, intent, and severity of injury
* Admission and discharge status
* Patient demographics characteristics (e.g., sex, age, urban-rural designation of residence, national quartile of median household income for patient's ZIP Code)
* Expected payment source
* Total ED charges (for ED visits) and total hospital charges (for inpatient stays for ED visits that result in admission)
* Hospital characteristics (e.g., region, trauma center indicator, urban-rural location, teaching status)

**NEDS Areas of Research and HCUP Publications**

As a uniform, multi-State database, the NEDS promotes comparative studies of health care services and supports health care policy and research on a variety of topics, including:

* Use of and charges for ED services
* Medical treatment effectiveness
* Quality of ED care
* Impact of health policy changes
* Access to care
* Utilization of health services by special populations

The NEDS is used in a variety of publications:

* [HCUP Statistical Briefs](https://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp) highlight a variety of health topics.
* Use the [HCUP Publications Search Tool](https://www.hcup-us.ahrq.gov/reports/pubsearch/pubsearch.jsp) to find publications using the NEDS.
* Review featured publications on the [HCUP Research Spotlights](https://www.hcup-us.ahrq.gov/reports/spotlights.jsp) page.
* Read publications by the winners of the [HCUP Outstanding Article of the Year Awards](https://www.hcup-us.ahrq.gov/news/awards_archive.jsp).

**Purchase the NEDS**

NEDS releases for data years 2006 through 2014 are available for purchase through the [HCUP Central Distributor](https://www.hcup-us.ahrq.gov/tech_assist/centdist.jsp).   
  
All HCUP data users, including data purchasers and collaborators, must complete the online [HCUP Data Use Agreement Training Tool](https://www.hcup-us.ahrq.gov/tech_assist/dua.jsp), and must read and sign the Data Use Agreement for Nationwide Databases ([PDF](https://www.hcup-us.ahrq.gov/team/NationwideDUA.pdf) file, 54 KB; [HTML](https://www.hcup-us.ahrq.gov/team/NationwideDUA.jsp)).

The NEDS are available for purchase online through the [HCUP Central Distributor](https://www.hcup-us.ahrq.gov/tech_assist/centdist.jsp).

Questions regarding purchasing databases can be directed to the HCUP Central Distributor:

E-mail: [HCUPDistributor@AHRQ.gov](mailto:HCUPDistributor@AHRQ.gov)   
Telephone: (866) 556-4287 (toll free)

Fax: (866) 792-5313 (toll free)

**NEDS Hardware and Software Requirements**

The NEDS data set is extremely large. The data are distributed as comma-separated value (CSV) files delivered via secure digital download from the Online HCUP Central Distributor. The files are compressed and encrypted with SecureZIP® from PKWARE.

To load and analyze the NEDS data on a computer, users will need the following:

* The password provided by the HCUP Central Distributor
* A hard drive with 60 to 100 gigabytes of space available
* A third-party zip utility such as ZIP Reader, Secure ZIP®, WinZip®, or Stuffit Expander®
* SAS®, SPSS®, Stata® or similar analysis software

The data set includes weights for producing national and regional estimates. NEDS documentation and tools, including programs for loading the CSV file into SAS, SPSS, or Stata, are also available on the [NEDS Database Documentation](https://www.hcup-us.ahrq.gov/db/nation/neds/nedsdbdocumentation.jsp) page.   
  
Please note the following based on the software you plan to use:

* In total, the CSV version of the NEDS is almost 19 gigabytes (GB).
* The NEDS files loaded into SAS are about 15 GB. Most SAS data steps will require twice the storage of the file, so that the input and output files can coexist. The largest use of space typically occurs during a sort, which requires work space approximately three times the size of the file. Thus, the NEDS files would require approximately 45 GB of available workspace to perform a sort.
* The NEDS files loaded into SPSS are about 30 GB.
* Because Stata loads the entire file into memory, it may not be possible to load every data element in the NEDS Core file into Stata. Stata users will need to maximize memory and use the "\_skip" option to select a subset of variables. More details are provided in the [Stata load programs](https://www.hcup-us.ahrq.gov/db/nation/neds/nedsstataloadprog.jsp).

With a file this size and without careful planning, space could easily become a problem in a multi-step program with the NEDS. It is not unusual to have several versions of a file marking different steps while preparing it for analysis and more versions for the actual analyses; therefore, users should be aware that the amount of space required can escalate rapidly.

**Appendix 3: Oral/Dental Related ICD 9 Codes**

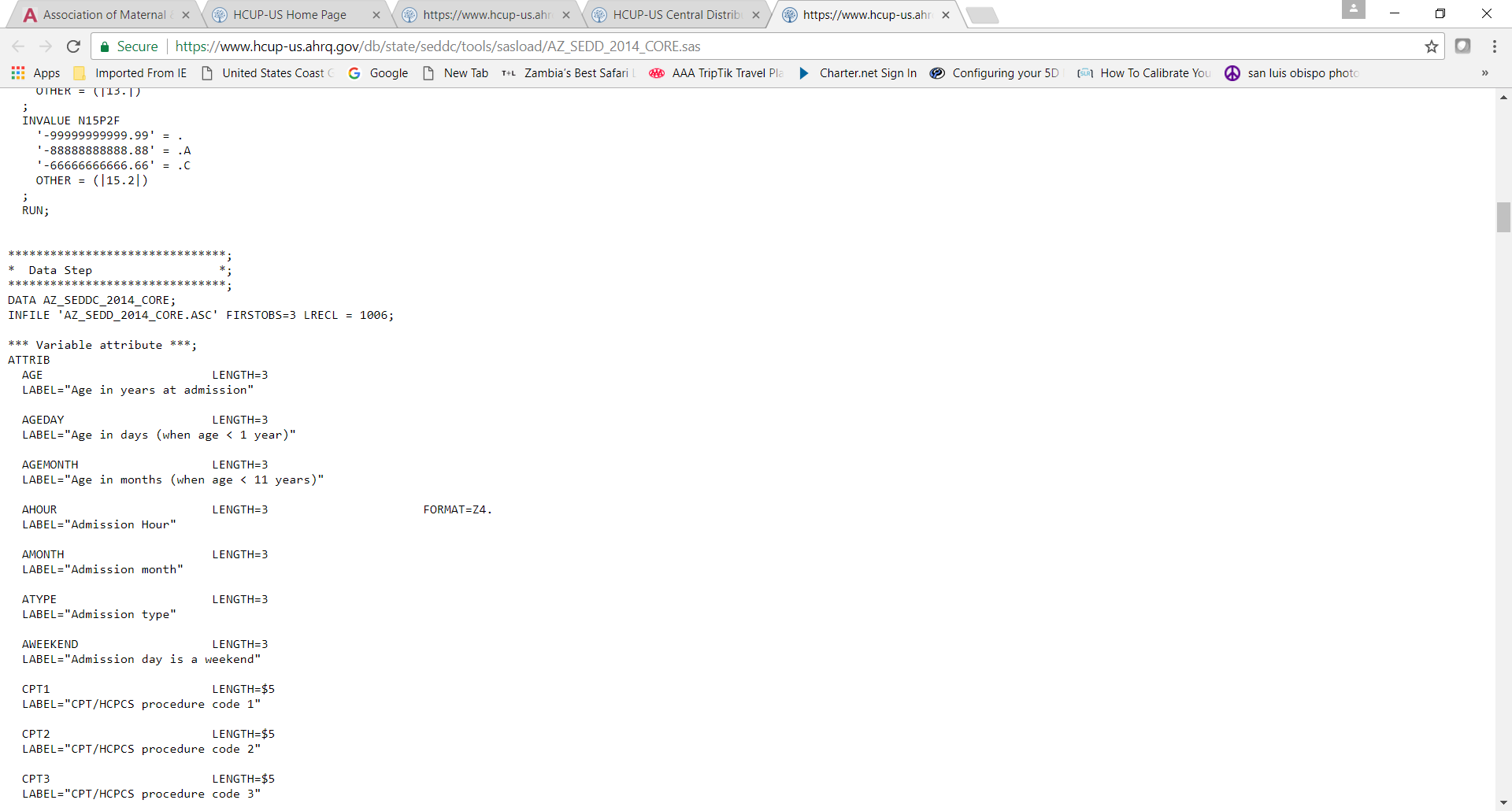
**Downloaded from:** [**https://www.cms.gov/Medicare/Coding/ICD9ProviderDiagnosticCodes/codes.html**](https://www.cms.gov/Medicare/Coding/ICD9ProviderDiagnosticCodes/codes.html)

**Codes in table do not include decimal after 3rd digit**

| ICD 9 Code | Description |
| --- | --- |
| 5200 | Anodontia |
| 5201 | Supernumerary teeth |
| 5202 | Abnormalities of size and form of teeth |
| 5203 | Mottled teeth |
| 5204 | Disturbances of tooth formation |
| 5205 | Hereditary disturbances in tooth structure, not elsewhere classified |
| 5206 | Disturbances in tooth eruption |
| 5207 | Teething syndrome |
| 5208 | Other specified disorders of tooth development and eruption |
| 5209 | Unspecified disorder of tooth development and eruption |
| 52100 | Dental caries, unspecified |
| 52101 | Dental caries limited to enamel |
| 52102 | Dental caries extending into dentine |
| 52103 | Dental caries extending into pulp |
| 52104 | Arrested dental caries |
| 52105 | Odontoclasia |
| 52106 | Dental caries pit and fissure |
| 52107 | Dental caries of smooth surface |
| 52108 | Dental caries of root surface |
| 52109 | Other dental caries |
| 52110 | Excessive attrition, unspecified |
| 52111 | Excessive attrition, limited to enamel |
| 52112 | Excessive attrition, extending into dentine |
| 52113 | Excessive attrition, extending into pulp |
| 52114 | Excessive attrition, localized |
| 52115 | Excessive attrition, generalized |
| 52120 | Abrasion, unspecified |
| 52121 | Abrasion, limited to enamel |
| 52122 | Abrasion, extending into dentine |
| 52123 | Abrasion, extending into pulp |
| 52124 | Abrasion, localized |
| 52125 | Abrasion, generalized |
| 52130 | Erosion, unspecified |
| 52131 | Erosion, limited to enamel |
| 52132 | Erosion, extending into dentine |
| 52133 | Erosion, extending into pulp |
| 52134 | Erosion, localized |
| 52135 | Erosion, generalized |
| 52140 | Pathological resorption, unspecified |
| 52141 | Pathological resorption, internal |
| 52142 | Pathological resorption, external |
| 52149 | Other pathological resorption |
| 5215 | Hypercementosis |
| 5216 | Ankylosis of teeth |
| 5217 | Intrinsic posteruptive color changes |
| 52181 | Cracked tooth |
| 52189 | Other specific diseases of hard tissues of teeth |
| 5219 | Unspecified disease of hard tissues of teeth |
| 5220 | Pulpitis |
| 5221 | Necrosis of the pulp |
| 5222 | Pulp degeneration |
| 5223 | Abnormal hard tissue formation in pulp |
| 5224 | Acute apical periodontitis of pulpal origin |
| 5225 | Periapical abscess without sinus |
| 5226 | Chronic apical periodontitis |
| 5227 | Periapical abscess with sinus |
| 5228 | Radicular cyst |
| 5229 | Other and unspecified diseases of pulp and periapical tissues |
| 52300 | Acute gingivitis, plaque induced |
| 52301 | Acute gingivitis, non-plaque induced |
| 52310 | Chronic gingivitis, plaque induced |
| 52311 | Chronic gingivitis, non-plaque induced |
| 52320 | Gingival recession, unspecified |
| 52321 | Gingival recession, minimal |
| 52322 | Gingival recession, moderate |
| 52323 | Gingival recession, severe |
| 52324 | Gingival recession, localized |
| 52325 | Gingival recession, generalized |
| 52330 | Aggressive periodontitis, unspecified |
| 52331 | Aggressive periodontitis, localized |
| 52332 | Aggressive periodontitis, generalized |
| 52333 | Acute periodontitis |
| 52340 | Chronic periodontitis, unspecified |
| 52341 | Chronic periodontitis, localized |
| 52342 | Chronic periodontitis, generalized |
| 5235 | Periodontosis |
| 5236 | Accretions on teeth |
| 5238 | Other specified periodontal diseases |
| 5239 | Unspecified gingival and periodontal disease |
| 52400 | Major anomalies of jaw size, unspecified anomaly |
| 52401 | Major anomalies of jaw size, maxillary hyperplasia |
| 52402 | Major anomalies of jaw size, mandibular hyperplasia |
| 52403 | Major anomalies of jaw size, maxillary hypoplasia |
| 52404 | Major anomalies of jaw size, mandibular hypoplasia |
| 52405 | Major anomalies of jaw size, macrogenia |
| 52406 | Major anomalies of jaw size, microgenia |
| 52407 | Excessive tuberosity of jaw |
| 52409 | Major anomalies of jaw size, other specified anomaly |
| 52410 | Anomalies of relationship of jaw to cranial base, unspecified anomaly |
| 52411 | Anomalies of relationship of jaw to cranial base, maxillary asymmetry |
| 52412 | Anomalies of relationship of jaw to cranial base, other jaw asymmetry |
| 52419 | Anomalies of relationship of jaw to cranial base, other specified anomaly |
| 52420 | Unspecified anomaly of dental arch relationship |
| 52421 | Malocclusion, Angle's class I |
| 52422 | Malocclusion, Angle's class II |
| 52423 | Malocclusion, Angle's class III |
| 52424 | Open anterior occlusal relationship |
| 52425 | Open posterior occlusal relationship |
| 52426 | Excessive horizontal overlap |
| 52427 | Reverse articulation |
| 52428 | Anomalies of interarch distance |
| 52429 | Other anomalies of dental arch relationship |
| 52430 | Unspecified anomaly of tooth position |
| 52431 | Crowding of teeth |
| 52432 | Excessive spacing of teeth |
| 52433 | Horizontal displacement of teeth |
| 52434 | Vertical displacement of teeth |
| 52435 | Rotation of tooth/teeth |
| 52436 | Insufficient interocclusal distance of teeth (ridge) |
| 52437 | Excessive interocclusal distance of teeth |
| 52439 | Other anomalies of tooth position |
| 5244 | Malocclusion, unspecified |
| 52450 | Dentofacial functional abnormality, unspecified |
| 52451 | Abnormal jaw closure |
| 52452 | Limited mandibular range of motion |
| 52453 | Deviation in opening and closing of the mandible |
| 52454 | Insufficient anterior guidance |
| 52455 | Centric occlusion maximum intercuspation discrepancy |
| 52456 | Non-working side interference |
| 52457 | Lack of posterior occlusal support |
| 52459 | Other dentofacial functional abnormalities |
| 52460 | Temporomandibular joint disorders, unspecified |
| 52461 | Temporomandibular joint disorders, adhesions and ankylosis (bony or fibrous) |
| 52462 | Temporomandibular joint disorders, arthralgia of temporomandibular joint |
| 52463 | Temporomandibular joint disorders, articular disc disorder (reducing or non-reducing) |
| 52464 | Temporomandibular joint sounds on opening and/or closing the jaw |
| 52469 | Other specified temporomandibular joint disorders |
| 52470 | Dental alveolar anomalies, unspecified alveolar anomaly |
| 52471 | Alveolar maxillary hyperplasia |
| 52472 | Alveolar mandibular hyperplasia |
| 52473 | Alveolar maxillary hypoplasia |
| 52474 | Alveolar mandibular hypoplasia |
| 52475 | Vertical displacement of alveolus and teeth |
| 52476 | Occlusal plane deviation |
| 52479 | Other specified alveolar anomaly |
| 52481 | Anterior soft tissue impingement |
| 52482 | Posterior soft tissue impingement |
| 52489 | Other specified dentofacial anomalies |
| 5249 | Unspecified dentofacial anomalies |
| 5250 | Exfoliation of teeth due to systemic causes |
| 52510 | Acquired absence of teeth, unspecified |
| 52511 | Loss of teeth due to trauma |
| 52512 | Loss of teeth due to periodontal disease |
| 52513 | Loss of teeth due to caries |
| 52519 | Other loss of teeth |
| 52520 | Unspecified atrophy of edentulous alveolar ridge |
| 52521 | Minimal atrophy of the mandible |
| 52522 | Moderate atrophy of the mandible |
| 52523 | Severe atrophy of the mandible |
| 52524 | Minimal atrophy of the maxilla |
| 52525 | Moderate atrophy of the maxilla |
| 52526 | Severe atrophy of the maxilla |
| 5253 | Retained dental root |
| 52540 | Complete edentulism, unspecified |
| 52541 | Complete edentulism, class I |
| 52542 | Complete edentulism, class II |
| 52543 | Complete edentulism, class III |
| 52544 | Complete edentulism, class IV |
| 52550 | Partial edentulism, unspecified |
| 52551 | Partial edentulism, class I |
| 52552 | Partial edentulism, class II |
| 52553 | Partial edentulism, class III |
| 52554 | Partial edentulism, class IV |
| 52560 | Unspecified unsatisfactory restoration of tooth |
| 52561 | Open restoration margins |
| 52562 | Unrepairable overhanging of dental restorative materials |
| 52563 | Fractured dental restorative material without loss of material |
| 52564 | Fractured dental restorative material with loss of material |
| 52565 | Contour of existing restoration of tooth biologically incompatible with oral health |
| 52566 | Allergy to existing dental restorative material |
| 52567 | Poor aesthetics of existing restoration |
| 52569 | Other unsatisfactory restoration of existing tooth |
| 52571 | Osseointegration failure of dental implant |
| 52572 | Post-osseointegration biological failure of dental implant |
| 52573 | Post-osseointegration mechanical failure of dental implant |
| 52579 | Other endosseous dental implant failure |
| 5258 | Other specified disorders of the teeth and supporting structures |
| 5259 | Unspecified disorder of the teeth and supporting structures |
| 5260 | Developmental odontogenic cysts |
| 5261 | Fissural cysts of jaw |
| 5262 | Other cysts of jaws |
| 5263 | Central giant cell (reparative) granuloma |
| 5264 | Inflammatory conditions of jaw |
| 5265 | Alveolitis of jaw |
| 52661 | Perforation of root canal space |
| 52662 | Endodontic overfill |
| 52663 | Endodontic underfill |
| 52669 | Other periradicular pathology associated with previous endodontic treatment |
| 52681 | Exostosis of jaw |
| 52689 | Other specified diseases of the jaws |
| 5269 | Unspecified disease of the jaws |
| 5270 | Atrophy of salivary gland |
| 5271 | Hypertrophy of salivary gland |
| 5272 | Sialoadenitis |
| 5273 | Abscess of salivary gland |
| 5274 | Fistula of salivary gland |
| 5275 | Sialolithiasis |
| 5276 | Mucocele of salivary gland |
| 5277 | Disturbance of salivary secretion |
| 5278 | Other specified diseases of the salivary glands |
| 5279 | Unspecified disease of the salivary glands |
| 52800 | Stomatitis and mucositis, unspecified |
| 52801 | Mucositis (ulcerative) due to antineoplastic therapy |
| 52802 | Mucositis (ulcerative) due to other drugs |
| 52809 | Other stomatitis and mucositis (ulcerative) |
| 5281 | Cancrum oris |
| 5282 | Oral aphthae |
| 5283 | Cellulitis and abscess of oral soft tissues |
| 5284 | Cysts of oral soft tissues |
| 5285 | Diseases of lips |
| 5286 | Leukoplakia of oral mucosa, including tongue |
| 52871 | Minimal keratinized residual ridge mucosa |
| 52872 | Excessive keratinized residual ridge mucosa |
| 52879 | Other disturbances of oral epithelium, including tongue |
| 5288 | Oral submucosal fibrosis, including of tongue |
| 5289 | Other and unspecified diseases of the oral soft tissues |
| 5290 | Glossitis |
| 5291 | Geographic tongue |
| 5292 | Median rhomboid glossitis |
| 5293 | Hypertrophy of tongue papillae |
| 5294 | Atrophy of tongue papillae |
| 5295 | Plicated tongue |
| 5296 | Glossodynia |
| 5298 | Other specified conditions of the tongue |
| 5299 | Unspecified condition of the tongue |
| 78492 | Jaw pain |
| 87343 | Open wound of lip, without mention of complication |
| 87344 | Open wound of jaw, without mention of complication |
| 87349 | Open wound of other and multiple sites of face, without mention of complication |
| 87350 | Open wound of face, unspecified site, complicated |
| 87351 | Open wound of cheek, complicated |
| 87352 | Open wound of forehead, complicated |
| 87353 | Open wound of lip, complicated |
| 87354 | Open wound of jaw, complicated |
| 87359 | Open wound of other and multiple sites of face, complicated |
| 87360 | Open wound of mouth, unspecified site, without mention of complication |
| 87361 | Open wound of buccal mucosa, without mention of complication |
| 87362 | Open wound of gum (alveolar process), without mention of complication |
| 87363 | Open wound of tooth (broken) (fractured) (due to trauma), without mention of complication |
| 87364 | Open wound of tongue and floor of mouth, without mention of complication |
| 87365 | Open wound of palate, without mention of complication |
| 87369 | Open wound of other and multiple sites of mouth, without mention of complication |
| 87370 | Open wound of mouth, unspecified site, complicated |
| 87371 | Open wound of buccal mucosa, complicated |
| 87372 | Open wound of gum (alveolar process), complicated |
| 87373 | Open wound of tooth (broken) (fractured) (due to trauma), complicated |
| 87374 | Open wound of tongue and floor of mouth, complicated |
| 87375 | Open wound of palate, complicated |
| 87379 | Open wound of other and multiple sites of mouth, complicated |
| V523 | Fitting and adjustment of dental prosthetic device |
| V534 | Fitting and adjustment of orthodontic devices |
| V585 | Orthodontics aftercare |
| V722 | Dental examination |

**Appendix 4: Sample SAS Code for SEDD Analysis**

To assist states with the process of generating the ED-NTDC indicators, ASTDD is providing sample SAS code. If you are using SPSS or Stata you will need to modify the code accordingly. ***IMPORTANT:*** ***All states should review and revise the sample code to meet their individual needs.*** States may have multiple SEDD files for a given year, but the data needed for the recommended ED-NTDC indicators are in the core file. Following are instructions on how to load the core file into your statistical package.

* Go to the HCUP website: <https://www.hcup-us.ahrq.gov/db/state/sedddbdocumentation.jsp>
* **Scroll down to “File Specifications and Load Programs”.** Click on the load program link for the statistical software package you will be using (SAS, SPSS, Stata). This example uses SAS.
  + Select the state and year you want to download
  + For the database option select SEDD
  + Click “Find”
  + A set of load programs for your state and year will appear at the bottom of the page
  + Select “Core SAS load program” and save to your hard drive
* After saving the load program, insert the correct file address and name for your state “core.asc” file in the code line at the beginning of the Data Step
* Run the load program and the core.asc file will be loaded into SAS

**Sample SAS Code**

**NOTE:** Before using this code you should change the “set” file name to match the name and location of your data file. ***All states should review and revise the sample code to meet their individual needs.***

*\*Coding for recommended indicator #1, ED visit for NTDC based on* ***first listed diagnosis****. This coding is for* ***pre-2015*** *data sets with ICD-9 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included.*

data StateCore; set StateCore;

NTDC\_dx1=0; \*set variable to 0 and then change to 1 if first DX variable has an NTDC code;

If DX1 in ('5200', '5201', '5202', '5203', '5204', '5205', '5206', '5207', '5208', '5209', '52100', '52101',

'52102', '52103', '52104', '52105', '52106', '52107', '52108', '52109', '52110', '52111', '52112',

'52113', '52114', '52115', '52120', '52121' '52122', '52123', '52124', '52125', '52130', '52131',

'52132', '52133', '52134', '52135', '52140', '52141', '52142', '52149', '5215', '5216', '5217',

'52181', '52189', '5219', '5220', '5221', '5222', '5223', '5224', '5225', '5226', '5227', '5228',

'5229', '52300', '52301', '52310', '52311', '52320', '52321', '52322', '52323', '52324', '52325',

'52330', '52331', '52332', '52333', '52340', '52341', '52342', '5235', '5236', '5238', '5239',

'52400', '52401', '52402', '52403', '52404', '52405', '52406', '52407', '52409', '52410', '52411',

'52412', '52419', '52420', '52421', '52422', '52423', '52424', '52425', '52426', '52427', '52428',

'52429', '52430', '52431', '52432', '52433', '52434', '52435', '52436', '52437', '52439', '5244',

'52450', '52451', '52452', '52453', '52454', '52455', '52456', '52457', '52459', '52460', '52461',

'52462', '52463', '52464', '52469', '52470', '52471', '52472', '52473', '52474', '52475', '52476',

'52479', '52481', '52482', '52489', '5249', '5250', '52510', '52512', '52513', '52519', '52520',

'52521', '52522', '52523', '52524', '52525', '52526', '5253', '52540', '52541', '52542', '52543',

'52544', '52550', '52551', '52552', '52553', '52554', '52560', '52561', '52562', '52563', '52564',

'52565', '52566', '52567', '52569', '52571', '52572', '52573', '52579', '5258', '5259', '5260',

'5261', '5262', '5263', '5264', '5265', '52661', '52662', '52663', '52669', '52681', '52689',

'5269', '5270', '5271', '5272', '5273', '5274', '5275', '5276', '5277', '5278', '5279', '52800',

'52801', '52802', '52809', '5281', '5282', '5283', '5284', '5285', '5286', '52871', '52872',

'52879', '5288', '5289', '5290', '5291', '5292', '5293', '5294', '5295', '5296', '5298', '5299',

'78492', '7924', 'V523', 'V534', 'V585', 'V722', 'V723')

then NTDC\_dx1=1;

run;

*\*Coding for recommended indicator #1, ED visit for NTDC based on* ***first listed diagnosis****. This coding is for* ***post-2015*** *data sets with ICD-10 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included.*

data StateCore; set StateCore;

NTDC\_dx1=0; \*set variable to 0 and then change to 1 if first I10\_DX variable has an NTDC code;

If I10\_DX1 in ('A690', 'K000', 'K001', 'K002', 'K003', 'K004', 'K005', 'K006', 'K007', 'K008', 'K009', 'K010', 'K011',

'K023', 'K0251', 'K0261', 'K0262', 'K0263', 'K027', 'K029', 'K030', 'K031', 'K032', 'K033', 'K034',

'K035', 'K036', 'K037', 'K0381', 'K0389', 'K039', 'K040', 'K041', 'K042', 'K043', 'K044', 'K045', 'K046',

'K047', 'K048', 'K0490', 'K0499', 'K0500', 'K0501', 'K0510', 'K0511', 'K0520', 'K0521', 'K0522',

'K0530', 'K0531', 'K0532', 'K0540', 'K055', 'K056', 'K060', 'K061', 'K080', 'K08101', 'K08102',

'K08103', 'K08104', 'K08109', 'K0820', 'K0821', 'K0822', 'K0823', 'K0824', 'K0825', 'K0826', 'K083',

'K08401', 'K08402', 'K08403', 'K08404', 'K08409', 'K08429', 'K08439', 'K08499', 'K0850', 'K0851',

'K0852', 'K08530', 'K08531', 'K0854', 'K0855', 'K0856', 'K0859', 'K088', 'K089', 'K090', 'K091',

'K098', 'K110', 'K111', 'K1120', 'K113', 'K114', 'K115', 'K116', 'K117', 'K118', 'K119', 'K120', 'K121',

'K122', 'K1230', 'K1231', 'K1232', 'K1233', 'K1239', 'K130', 'K1321', 'K1322', 'K1323', 'K1329', 'K135',

'K1370', 'K1379', 'K140', 'K141', 'K142', 'K143', 'K144', 'K145', 'K146', 'K148', 'K149', 'M2600', 'M2601',

'M2602', 'M2603', 'M2604', 'M2605', 'M2606', 'M2607', 'M2609', 'M2610', 'M2611', 'M2612',

'M2619', 'M2620', 'M26211', 'M26212', 'M26213', 'M26220', 'M26221', 'M2623', 'M2624', 'M2625',

'M2629', 'M2630', 'M2631', 'M2632', 'M2633', 'M2634', 'M2635', 'M2636', 'M2637', 'M2639', 'M264',

'M2650', 'M2651', 'M2652', 'M2653', 'M2654', 'M2655', 'M2656', 'M2657', 'M2659', 'M2660', 'M2661',

'M2662', 'M2663', 'M2669', 'M2670', 'M2671', 'M2672', 'M2673', 'M2674', 'M2679', 'M2681', 'M2682',

'M2689', 'M269', 'M271', 'M272', 'M273', 'M2749', 'M2751', 'M2752', 'M2753', 'M2759', 'M2761',

'M2762', 'M2763', 'M2769', 'M278', 'M279', 'R682', 'R6884', 'R859', 'Z0120', 'Z0121', 'Z463', 'Z464')

then NTDC\_dx1=1;

run;

*\*Coding for recommended indicator #2, ED visit for NTDC based on* ***any listed diagnosis****. This coding is for* ***pre-2015*** *data sets with ICD-9 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included. NOTE: SEDD has variables for up to 25 diagnoses.*

data StateCore; set StateCore;

array DX{25} DX1--DX25;

NTDC\_dx\_any=0; \*set variable to 0 and then change to 1 if any DX variables have an NTDC code;

Do i=1 to 25;

if DX{i} in (***insert ICD-9 codes listed for recommended indicator #1***)

then NTDC\_dx\_any=1;

end;

run;

*\*Coding for recommended indicator #2, ED visit for NTDC based on* ***any listed diagnosis.*** *This coding is for* ***post-2015*** *data sets with ICD-10 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included. NOTE: SEDD has variables for up to 25 diagnoses.*

data StateCore; set StateCore;

array DX{25} I10\_DX1—I10\_DX25;

NTDC\_dx\_any=0; \*set variable to 0 and then change to 1 if any I10\_DX variables have an NTDC code;

Do i=1 to 25;

if DX{i} in (***insert ICD-10 codes listed for recommended indicator #1***)

then NTDC\_dx\_any=1;

end;

run;

*\*Coding for recommended indicator #3, ED visit for NTDC based on* ***first listed reason for visit****. This coding is for* ***pre-2015*** *data sets with ICD-9 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included.*

data StateCore; set StateCore;

NTDC\_RsnVis1=0;

If DX\_Visit\_Reason1 in (***insert ICD-9 codes listed for recommended indicator #1***)

then NTDC\_RsnVis1=1;

run;

*\*Coding for recommended indicator #3, ED visit for NTDC based on* ***first listed reason for visit****. This coding is for* ***post-2015*** *data sets with ICD-10 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included.*

data StateCore; set StateCore;

NTDC\_RsnVis1=0;

If I10\_Visit\_Reason1 in (***insert ICD-10 codes listed for recommended indicator #1***)

then NTDC\_RsnVis1=1;

run;

*\*Coding for recommended indicator #4, ED visit for NTDC based on* ***any listed reason for visit.*** *This coding is for* ***pre-2015*** *data sets with ICD-9 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included. NOTE: SEDD has variables for up to 3 reasons for visit.*

data StateCore; set StateCore;

array rsn{3} DX\_Visit\_Reason1--DX\_Visit\_Reason3;

NTDC\_RsnVis\_any=0; \*set variable to 0 and then change to 1 if any DX\_Visit\_ReasonN variables have an NTDC code;

Do i=1 to 3;

if rsn{i} in ( ***insert ICD-9 codes listed for recommended indicator #1***)

then NTDC\_RsnVis\_any=1;

end;

run;

*\*Coding for recommended indicator #4, ED visit for NTDC based on* ***any listed reason for visit.*** *This coding is for* ***post-2015*** *data sets with ICD-10 diagnostic codes. For 2015 datasets, both ICD-9 and ICD-10 codes should be included. NOTE: SEDD has variables for up to 3 reasons for visit.*

data StateCore; set StateCore;

array rsn{3} I10\_Visit\_Reason1—I10\_Visit\_Reason3;

NTDC\_RsnVis\_any=0; \*set variable to 0 and then change to 1 if any I10\_Visit\_ReasonN variables have an NTDC code;

Do i=1 to 3;

if rsn{i} in ( ***insert ICD-10 codes listed for recommended indicator #1***)

then NTDC\_RsnVis\_any=1;

end;

run;

*\*Coding for recommended indicator #5, ED visit for NTDC based on* ***any listed diagnosis and/or any listed reason***

***for visit.***

data StateCore; set StateCore;

NTDC\_DXorRsn=0;

if NTDC\_dx\_any=1 or NTDC\_RsnVis\_any=1 then NTDC\_DXorRsn=1;

run;

*\*To generate counts for the five indicators.*

proc freq data = StateCore;

tables NTDC\_dx1 NTDC\_dx\_any NTDC\_RsnVis1 NTDC\_RsnVis\_any NTDC\_DXorRsn;

run;

*\*To generate rate per 100,000 population. NOTE: This is* ***not*** *SAS code.*

(indicator count/population estimate) \* 100,000

Example: First diagnosis NTDC count is 36,188, state population estimate is 4,400,477

Rate of ED NTDC visits per 100,000 population = (36,188 / 4,400,477) \* 100,000 = 822.4 per 100,000 population

*\*To generate rate per 10,000 ED visits. NOTE: This is* ***not*** *SAS code.*

(indicator count / total ED visit count) \* 10,000

Example: First diagnosis NTDC count is 36,188, total ED visit count is 2,036,780

rate of ED NTDC per 10,000 ED visits = (36,188 / 2,036,780) \* 10,000 = 177.7 per 10,000 ED visits

*\*To generate total charges, use the following SAS code. The first diagnosis indicator is used in this example.*

proc means data=StateCore mean median min max stddev sum;

var totchg;

where NTDC\_dx1=1;

run;

*\*For recommended stratified analyses by age group, race/ethnicity, and primary payer, use variables AGE, PAY1, and RACE.*

data StateCore; set StateCore;

if age lt 20 then agecat=1;

if age ge 20 and age lt 45 then agecat=2;

if age ge 45 and age lt 65 then agecat=3;

if age ge 65 then agecat=4;

run;

PROC FORMAT; \*to format primary payer, race, and new age category variables;

value agec 1='<20 years' 2='20-44 years' 3='45-64 years' 4='65 or more years';

value pay 1='Medicare' 2='Medicaid' 3='Private' 4='Self Pay' 5='No charge' 6='Other';

value rac 1='white' 2='black' 3='Hispanic' 4='Asian/PacIsl' 5='NatAmer' 6='Other';

value yn 0='No' 1='Yes';

run;

*\*Example - stratified analysis for NTDC first diagnosis indicator.*

proc freq data=StateCore;

tables agecat pay1 race;

where NTDC\_dx1=1;

format agecat agec. pay1 pay. race rac.;

run;

*\*Example - to compare NTDC=yes vs. NTDC=no stratified analysis for NTDC first diagnosis.*

proc freq data=StateCore;

tables NTDC\_dx1\*(agecat pay1 race);

format agecat agec. pay1 pay. race rac. NTDC\_dx1 yn.;

run;

*For the two optional indicators: 1) CPP (Caries, Periodontal, Preventive) and 2) any oral/dental conditions, do analyses as above with the following sets of codes*:

**CPP ICD-9 codes**

'52100', '52101', '52102', '52103', '52104', '52105', '52106', '52107', '52108', '52109', '52181', '52189',

'5219', '5220', '5221', '5222', '5224', '5225', '5226', '5227', '5229', '52300', '52301', '52310', '52311',

'52320', '52321', '52322', '52323', '52324', '52325', '52330', '52331', '52332', '52333', '52340', '52341',

'52342', '5235', '5236', '5238', '5239', '52512', '52513', '52519', '52550', '52551', '52552', '52553',

'52554', '52560', '52561', '52562', '52563', '52564', '52565', '52566', '52567', '52569', '52571', '52572',

'52573', '52579', '5258', '5259', '52661', '52662', '52663', '52669', '78492', 'V523', 'V534', 'V585', 'V722'

'V723'

**CPP ICD-9 codes**

'K029', 'K0261', 'K0262', 'K0263', 'K023', 'K0389', 'K0251', 'K0261', 'K027', 'K0381', 'K0389', 'K039', 'K040'

'K041', 'K042', 'K044', 'K047', 'K045', 'K046', 'K0490', 'K0499', 'K0500', 'K0501', 'K0510', 'K0511', 'K060',

'K0520', 'K0521', 'K0522', 'K0530', 'K0531', 'K0532', 'K0540', 'K036', 'K055', 'K061', 'K056', 'K08429',

'K08439', 'K08499', 'K08409', 'K08401', 'K08402', 'K08403', 'K08404', 'K0850', 'K0851', 'K0852', 'K08530',

'K08531', 'K0854', 'K0855', 'K0856', 'K0859', 'M2761', 'M2762', 'M2763', 'M2769', 'K088', 'K089', 'M2751',

'M2752', 'M2753', 'M2759', 'R6884', 'Z463', 'Z464', 'Z0120', 'Z0121'

**Any Oral Dental Condition ICD-9 codes**

'5200', '5201', '5202', '5203', '5204', '5205', '5206', '5207', '5208', '5209', '52100', '52101', '52102',

'52103', '52104', '52105', '52106', '52107', '52108', '52109', '52110', '52111', '52112', '52113', '52114',

'52115', '52120', '52121', '52122', '52123', '52124', '52125', '52130', '52131', '52132', '52133', '52134',

'52135', '52140', '52141', '52142', '52149', '5215', '5216', '5217', '52181', '52189', '5219', '5220', '5221',

'5222', '5223', '5224', '5225', '5226', '5227', '5228', '5229', '52300', '52301', '52310', '52311', '52320',

'52321', '52322', '52323', '52324', '52325', '52330', '52331', '52332', '52333', '52340', '52341', '52342',

'5235', '5236', '5238', '5239', '52400', '52401', '52402', '52403', '52404', '52405', '52406', '52407',

'52409', '52410', '52411', '52412', '52419', '52420', '52421', '52422', '52423', '52424', '52425', '52426',

'52427', '52428', '52429', '52430', '52431', '52432', '52433', '52434', '52435', '52436', '52437', '52439',

'5244', '52450', '52451', '52452', '52453', '52454', '52455', '52456', '52457', '52459', '52460', '52461',

'52462', '52463', '52464', '52469', '52470', '52471', '52472', '52473', '52474', '52475', '52476', '52479',

'52481', '52482', '52489', '5249', '5250', '52510', '52512', '52513', '52519', '52520', '52521', '52522',

'52523', '52524', '52525', '52526', '5253', '52540', '52541', '52542', '52543', '52544', '52550', '52551',

'52552', '52553', '52554', '52560', '52561', '52562', '52563', '52564', '52565', '52566', '52567', '52569',

'52571', '52572', '52573', '52579', '5258', '5259', '5260', '5261', '5262', '5263', '5264', '5265', '52661',

'52662', '52663', '52669', '52681', '52689', '5269', '5270', '5271', '5272', '5273', '5274', '5275', '5276',

'5277', '5278', '5279', '52800', '52801', '52802', '52809', '5281', '5282', '5283', '5284', '5285', '5286',

'52871', '52872', '52879', '5288', '5289', '5290', '5291', '5292', '5293', '5294', '5295', '5296', '5298', '5299',

'78492', '7924', 'V523', 'V534', 'V585', 'V722', 'V723', '52511', '8300', '8301', '8481', '87343', '87344',

'87349', '87350', '87351', '87352', '87353', '87354', '87359', '87360', '87361', '87362', '87363', '87364',

'87365', '87369', '87370', '87371', '87372', '87373', '87374', '87375', '87379'

**Any Oral Dental Condition ICD-10 codes**

'K000', 'K001', 'K002', 'K003' , 'K004', 'K005', 'K006', 'K010', 'K011', 'K007', 'K008', 'K009', 'K029', 'K0261',

'K0262', 'K0263', 'K023', 'K0389', 'K0251', 'K0261', 'K0262', 'K0263', 'K027', 'K029', 'K030', 'K031', 'K032',

'K033', 'K034', 'K035', 'K037', 'K0381', 'K0389', 'K039', 'K040', 'K041', 'K042', 'K043', 'K044', 'K047', 'K045',

'K046', 'K048', 'K0490', 'K0499', 'K0500', 'K0501', 'K0510', 'K0511', 'K060', 'K0520', 'K0521', 'K0522',

'K0530', 'K0531', 'K0532', 'K0540', 'K036', 'K055', 'K061', 'K056', 'M2600', 'M2601', 'M2603', 'M2602',

'M2604', 'M2605', 'M2606', 'M2607', 'M2609', 'M2610', 'M2611', 'M2612', 'M2619', 'M2620', 'M26211',

'M26212', 'M26213', 'M26220', 'M26221', 'M2623', 'M2624', 'M2625', 'M2629', 'M2630', 'M2631',

'M2632', 'M2633', 'M2634', 'M2635', 'M2636', 'M2637', 'M2639', 'M264', 'M2650', 'M2651', 'M2652',

'M2653', 'M2654', 'M2655', 'M2656', 'M2657', 'M2659', 'M2660', 'M2669', 'M2661', 'M2662', 'M2663',

'M2670', 'M2671', 'M2672', 'M2673', 'M2674', 'M2679', 'M2681', 'M2682', 'M264', 'M2689', 'M269',

'K080', 'K08109', 'K08429', 'K08439', 'K08499', 'K0820', 'K0821', 'K0822', 'K0823', 'K0824', 'K0825',

'K0826', 'K083', 'K08101', 'K08102', 'K08103', 'K08104', 'K08409', 'K08401', 'K08402', 'K08403', 'K08404',

'K0850', 'K0851', 'K0852', 'K08530', 'K08531', 'K0854', 'K0855', 'K0856', 'K0859', 'M2761', 'M2762',

'M2763', 'M2769', 'K088', 'K089', 'K090', 'K091', 'M2749', 'M271', 'M272', 'M273', 'M2751', 'M2752',

'M2753', 'M2759', 'M278', 'M279', 'K110', 'K111', 'K1120', 'K113', 'K114', 'K115', 'K116', 'K117', 'R682',

'K118', 'K119', 'K122', 'K1230', 'K1231', 'K1233', 'K1232', 'K121', 'K1239', 'A690', 'K120', 'K122', 'K098',

'K130', 'K1321', 'K1322', 'K1323', 'K1329', 'K135', 'K1370', 'K1379', 'K140', 'K141', 'K142', 'K143', 'K144',

'K145', 'K146', 'K148', 'K149', 'R6884', 'R859', 'Z463', 'Z464', 'Z464', 'Z0120', 'Z0121', 'K062', 'K08419',

'S030XXA', 'S01409A', 'S034XXA', 'S01501A', 'S01409A', 'S0180XA', 'S0993XA', 'S01429A', 'S0182XA',

'AS01521A', 'S01422A', 'S0182XA', 'S01502A', 'S01512A', 'S025XXA', 'S025XXB', 'S01512A', 'S01522A',

'S025XXA', 'S025XXB', 'S01522A'

**Appendix 5: Recommended and Optional ED Oral Care Surveillance Indicators Analysis Grid**

Based on ICD-9 and ICD-10 diagnostic codes, ASTDD has created three broad categories for ***ED visits due to oral conditions***: (1) non-traumatic dental conditions (NTDC); (2) caries, periodontal, and preventive conditions/procedures (CPP); and 3) any oral/dental related condition. NTDC includes caries, periodontal disease, erosion, occlusal anomalies, cysts, impacted teeth, teething, and all other non-traumatic conditions associated with the oral cavity. Any diagnoses that are deemed due to trauma are excluded from this definition. CPP includes only those conditions directly associated with dental caries, periodontal disease, or preventive procedures associated with these diseases that are routinely provided in the dental private practice or dental clinic setting. CPP would include diagnoses related to dental caries, gingival and periodontal conditions, loss of teeth (not due to trauma), endodontic conditions, and caries and periodontal related preventive procedures. The codes for NTDC are a subset of all oral/dental related codes, and the codes for CPP are a subset of the NTDC codes. Refer to the [ICD-9 / ICD-10 Conversion Table](https://www.astdd.org/docs/ed-project-icd9-icd-10-conversion-table-july-6-2017.xlsx) listing of all oral/dental related condition diagnoses (including trauma related), and the specific subsets of ICD-9 and ICD-10 codes defining NTDC and CPP conditions.

Analyzing an ED database will allow you to evaluate a multitude of oral health indicators. Because the total number of indicators can be overwhelming, ASTDD has developed a core or foundational set of indicators to include in a state ED-NTDC surveillance system. We also include optional indicators that states may want to evaluate in addition to the core set. We encourage states to expand their ED-NTDC surveillance to include some of these suggested optional indicators or other indicators that a state may determine to be of interest based on the needs and resources of the individual state.

|  |  |  |
| --- | --- | --- |
| Recommended Indicator | Recommended Reporting  *Count, Rate per 100,000 Population, Rate per 10,000 ED Visits, Charges (if available)* | SEDD Variables for Classifying NTDC  ICD-9 (ICD-10) |
| 1. ED visit for NTDC based on *first listed diagnosis* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX1 (I10\_DX1)  Include only the 1st DX |
| 1. ED visit for NTDC based on *any listed diagnosis* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DXn (I10\_DXn)  Include all listed DXs |
| 1. ED visit for NTDC based on *first listed reason for visit* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX\_Visit\_Reason1 (I10\_Visit\_Reason1)  Include only the 1st reason |
| 1. ED visit for NTDC based on *any listed reason for visit* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX\_Visit\_Reasonn (I10\_Visit\_Reasonn)  Include all listed reasons |
| 1. ED visit for NTDC based on *any listed diagnosis and/or any listed reason for visit (most inclusive)* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DXn (I10\_DXn)  DX\_Visit\_Reasonn (I10\_Visit\_Reasonn)  Include all listed DXs and all listed reasons |

|  |  |  |
| --- | --- | --- |
| Optional Indicator | Recommended Reporting  *Count, Rate per 100,000 Population, Rate per 10,000 ED Visits, Charges (if available)* | SEDD Variables for Classifying CPP and All Oral Conditions ICD-9 (ICD-10) |
| 1. ED visit for CPP based on *first listed diagnosis* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX1 (I10\_DX1)  Include only the 1st DX |
| 1. ED visit for CPP based on *any listed diagnosis* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DXn (I10\_DXn)  Include all listed DXs |
| 1. ED visit for CPP based on *first listed reason for visit* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX\_Visit\_Reason1 (I10\_Visit\_Reason1)  Include only the 1st reason |
| 1. ED visit for CPP based on *any listed reason for visit* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX\_Visit\_Reasonn (I10\_Visit\_Reasonn)  Include all listed reasons |
| 1. ED visit for CPP based on *any listed diagnosis and/or any listed reason for visit (most inclusive)* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DXn (I10\_DXn)  DX\_Visit\_Reasonn (I10\_Visit\_Reasonn)  Include all listed DXs and all listed reasons |
| 1. ED visit for any oral/dental condition based on *first listed diagnosis* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX1 (I10\_DX1)  Include only the 1st DX |
| 1. ED visit for any oral/dental condition based on *any listed diagnosis* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DXn (I10\_DXn)  Include all listed DXs |
| 1. ED visit for any oral/dental condition based on *first listed reason for visit* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX\_Visit\_Reason1 (I10\_Visit\_Reason1)  Include only the 1st reason |
| 1. ED visit for any oral/dental condition based on *any listed reason for visit* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DX\_Visit\_Reasonn (I10\_Visit\_Reasonn)  Include all listed reasons |
| 1. ED visit for any oral/dental condition based on *any listed diagnosis and/or any listed reason for visit (most inclusive)* | Overall, where possible stratified by age (< 1, 1-17, 18-44, 45-64, 65-84, 85+), primary payer (Medicare, Medicaid, private insurance, uninsured, other) and if available race/ethnicity | DXn (I10\_DXn)  DX\_Visit\_Reasonn (I10\_Visit\_Reasonn)  Include all listed DXs and all listed reasons |

|  |  |  |
| --- | --- | --- |
| Stratification Variables | Recommended Reporting  *Count, Rate per 100,000 Population, Rate per 10,000 ED Visits, Charges (if available)* | SEDD Variables for Classifying CPP and All Oral Conditions ICD-9 (ICD-10) |
| Recommended Stratification Variables (shown above) | Age, Primary Payer, Race/Ethnicity (if available) | AGE or AGEGROUP, PAY1, RACE |
| Optional Stratification Variables for Additional Analyses | Sex, Marital Status, Geographic Location (zip code), Homelessness, Weekend Admission, Income (community level), | FEMALE, MARITALSTATUSUB04, ZIP, Homeless, AWEEKEND, ZIPINC\_QRTL |

|  |  |  |
| --- | --- | --- |
| Other | Recommended Reporting  *Count, Rate per 100,000 Population, Rate per 10,000 ED Visits, Charges (if available)* | SEDD Variables for Classifying CPP and All Oral Conditions ICD-9 (ICD-10) |
| Additional SEDD Analyses to Consider | Patient Revisits for Same Condition (if states have variables)  Trend Analyses | VisitLink and DaysToEvent outcomes over multiple years (using year datasets for range of interest) |

SEDD data element for charges (if available): TOTCHG

US Census Bureau State Population Estimates for Years 2010 – 2016 – for calculating prevalence per 100,000 population:

https://www2.census.gov/programs-surveys/popest/tables/2010-2016/state/totals/nst-est2016-01.xlsx

Note: ZIP variable for subject zip code can be used to link to other data, e.g. urban/rural status (RUCA), DHPSA data, census data, etc.

**APPENDIX 6: COMMUNICATION PLAN: GOAL-SPECIFIC**

**Emergency Department Oral Care Surveillance Project**

|  |  |
| --- | --- |
| **Problem Statement** | As part of building a comprehensive national oral health measurement system, data are needed to monitor dental care, and more specifically non-traumatic (preventable) dental care (NTDC), provided in emergency departments(EDs). Past methods of collecting data and conducting research have used different data sources, to assess different target populations with varying research methods, outcomes of interest, predictive factors, and different definitions (different sets of codes) of dental care and NTDC. |
| **Goal** | To develop, disseminate, and promote use of standardized research, surveillance, and reporting protocols for ED dental care, with a focus on state level data and surveillance. Standardized methods will enable comparisons and trend tracking among states |
| **Target Audience(s)** | 1) State oral health programs; 2) state Medicaid agencies; 3) federal agencies and organizations addressing dental, medical, hospital and health care access issues; 4) third party payers; and others interested in surveillance efforts to establish levels of non-traumatic dental care being provided in emergency departments. |
| **Objectives** | 1. Develop an ICD-9/ICD-10 crosswalk file for dental code translation. 2. Develop uniform definitions for dental care and NTDC provided in EDs, including codes sets for both ICD-9 and ICD-10 coding systems. 3. Develop recommended primary surveillance outcome measures for ED dental care, and the methods for generating these outcome measures from common data sources. 4. Develop recommended protocol for predictive/control factors to use in assessment of ED dental care outcomes. |
| **Key Messages** | 1. Consistency in research protocol is important for nation-wide surveillance of ED dental care. 2. Consistency in research protocol will enable between-state comparisons and over-time trend analysis of ED dental care 3. Use of recommended protocols will contribute to efforts for standardized surveillance data repositories of state level oral health data. |
| **Planned Channels and Materials** | Post report and summary guideline documents to website; announce to ASTDD members/SOHPs and national partners via weekly digest with website link; presentations at NOHC and other meetings. |
| **Plan for Pre-testing Messages and Materials** | Materials are reviewed by a project workgroup of subject experts, as well as ASTDD staff and consultants. |
| **Planned Activities and Timelines** | Workgroup conference calls and an in-person meeting. Planning conference calls to be held in June/July 2016. The in-person meeting to be held in Washington D.C. in November, 2016. Protocol materials to be circulated among workgroup members by May, 2017. Final protocol documents to be completed by June, 2017. |
| **Evaluation Design, Methods and Measures** | # of ASTDD website hits; annual member and partner surveys and any targeted queries regarding use and changes in procedures and outcomes. If resources are available, a formal assessment and evaluation of use of the guideline methods and the impact of their use might be conducted in the future. |
| **Responsible Parties and Partnerships** | Michael Manz is the lead on the project. The project workgroup provides input and feedback in materials development. ASTDD staff and consultants provide input and editing for final documents. |
| **Budget/Resources Needed** | Consultant time, support materials, travel for in-person workgroup meeting. Funded by grant from DQF. |
| **Protocol for Review and Approval** | ASTDD staff and consultants will review for final development. ASTDD BOD provides final approval. DentaQuest will review and provide feedback as appropriate. |
| **Progress Notes: circulating materials to receive and incorporate feedback from expert workgroup.** | |