

Final Report: Development and Dissemination of Oral Health Risk Assessment and Referral (PORRT) Guidelines, Grant No. H47MC08654, Health Resources and Services Administration, Bureau of Maternal and Child Health.

Purpose of the PORRT Initiative

The *PORRT Initiative* was designed to build on the successful components of the statewide, physician-based *Into the Mouths of Babes* program and the pilot *Carolina Dental Home Project* (2006-09). In *Carolina Dental Home* we demonstrated that structured checklists for identification of oral health risk factors can be successfully introduced into medical practice, resulting in increased referral for dental caries detected in its earliest stages. The overall goal of the *PORRT Initiative* was to increase the number of NC children enrolled in the Medicaid Program who have a dental home by one year of age through dissemination of risk assessment and referral guidelines for physicians.

The *PORRT Initiative* had three primary objectives:

1. To refine and further pilot test the *Carolina Dental Home*-developed, priority oral risk assessment and referral tool (i.e., PORRT) using steps recommended in the literature, and develop a more comprehensive document to support its use.
2. To develop an educational intervention for pediatricians and family physicians to be used in the statewide dissemination and implementation of PORRT guidelines and provide that training to those practices already participating in *IMB*.
3. To conduct an evaluation of the extent to which the educational intervention in the use of PORRT guidelines affects physicians' oral health referral performance.

This final report describes the activities we accomplished within each of these objectives. We also provide an overall assessment of what we learned in completing the activities funded through this grant award and our perspective of the significance of our efforts. We also provide a brief discussion of our continuing efforts now that the project funds have expired.

As with many projects implemented in the 'real world' where healthcare is dramatically and rapidly changing, we have not followed precisely the plan outline in the original proposal. Rather, we have tried to be flexible and take advantage of opportunities that we felt would yield better results for program experimentation, implementation and outcomes. Soon after starting our HRSA project, NC was awarded one of the 10 state Quality Demonstration Grants funded through the Children's Health Insurance Program Reauthorization Act of 2009 (CHIPRA). The NC Division of Medical Assistance (DMA) and the Office of Rural Health and Community Care (ORHCC) received funds to work on three of the five categories specified in the Congressional statute for the National CHIPRA Quality Demonstration Program. The grant project activities in NC as identified in the statute were to: (Section A) experiment with and evaluate the use of new and existing measures of quality for children; (Section C) evaluate provider-based models to improve the delivery of care; and (Section D) demonstrate the impact of model pediatric EHRs. Through the CHIPRA grant, NC is working with pediatric and family practices within Community Care of North Carolina to build on a strong public-private partnership that has documented successes in quality improvement, efficiency and cost-effectiveness of care for more than 14 years (*NC Med J.* 2009;70:266-9).

NC leadership was interested in using the CHIPRA grant to further CMS's Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) goals in oral health. These goals include improving access to, utilization of, and reporting of oral health services to which children are entitled under EPSDT, goals very similar to the *PORRT Initiative*. Each component of the NC CHIPRA grant (i.e., performance measurement, provider-based models, and pediatric EHRs) offers opportunities for addressing the goals and objectives outlined in the *PORRT Initiative*. Because of the overlap in project goals and the commitment of the medical community to including oral health in the broader CHIPRA Quality Demonstration Grant activities, we chose to incorporate the *PORRT Initiative* into that activity. This collaboration provided the *PORRT Initiative* with human resources knowledgeable and experienced in quality improvement in medical offices; resources devoted to oral health that we otherwise would not have had; access to a large, statewide network of medical providers committed to serving high-risk pediatric populations; and the opportunity to incorporate oral health into ongoing quality improvements for pediatric health care and thus increase the likelihood that our efforts would be sustained beyond the grant. This enhanced, expanded and integrated initiative was renamed *Connecting the Docs* to reflect the original intent of the PORRT screening and referral tool we were promoting, and the importance of medical-dental collaboration in today's healthcare environment. The oral health goals of *Connecting the Docs* are to reduce the incidence of dental caries through:

1. Increasing oral health risk assessments by primary care providers through use of an oral health risk assessment and referral tool (i.e., PORRT);
2. Increasing dental fluoride varnish rates; and
3. Engaging primary care providers to increase families' awareness of the dental home and linking children to a home (recommended at age 1, required by age 3).

Activities and Accomplishments Related to Objective 1: (Refinement of PORRT Form and Development of Related Guidelines).

- Conducted a systematic review of risk factors for ECC to help inform PORRT development.
 - Searched PubMed, Embase, Lilacs, Scielo databases for case control and cohort studies published 1966 through 2011.
 - Found strong evidence for some risk factors that support PORRT risk factors and related guidelines.
- Final version of PORRT form to be used in *Connecting the Docs* was developed and tested in *Carolina Dental Home* practices.
 - Version 6 of PORRT was distributed to 11 physicians in 3 medical practices in a 3-county area participating in the *Carolina Dental Home* project.
 - PORRT forms for more than 5,000 medical encounters were completed and analyzed to determine prevalence of risk factors and referral activities (Long et al., 2012).
- Development and testing of referral guidelines based on use of PORRT form and other information.

- Used information collected as part of the *Carolina Dental Home* project to develop referral guidelines [See Adjacent Chart].

- Our analysis of risk factors and clinical status captured by the PORRT forms for about 5,000 visits for patients less than 42 months of age suggest that ~5% need to see a pediatric dentist based on cavitation

Guidelines for Priority Dental Referral of Pediatric Patients 6 to 42 Months of Age

Manage in Medical Office	Refer to Dentist	Refer to Dentist Specializing in Infant and Toddler Oral Care
<3 behavioral risk factors [†] No decay or other conditions No health concerns	≥3 behavioral risk factors [†] , or White spots (early stage disease), or Enamel defects, or Other dental concerns	Cavitation (advanced disease), or Special health care needs

†Behavioral Risk Factors

- Does not brush with fluoridated toothpaste at least once a day
- Does not drink fluoridated water
- Drinks sweetened beverages or eats sugary snacks between meals
- Sleeps with bottle or sippy cup containing something other than water
- Family history of dental disease

Notes:

- Management in the medical office includes parent counseling, fluoride varnish application and ongoing screening and risk assessment.
- According to AAP guidelines (2008) all children should have an oral health risk assessment and screening by a dentist starting at 6 months of age. Refer every child to a dentist by 12 months if you know dentists in your community who will see them.
- The risk-based referral guidelines displayed here are to be applied in communities where there are not enough dentists and all children cannot be referred by one year of age. The **Priority Oral Health Risk Assessment and Referral Tool (PORRT)** can be used to implement these guidelines.
- These risk-based referral guidelines are intended for use with low-income (Medicaid) children <42 months of age; the number of risk factors might need to be adjusted for other populations.
- All children should be referred at 3 years of age if they do not already have a dental home.

References:
American Academy of Pediatrics, Section on Pediatric Dentistry and Oral Health. Preventive oral health intervention for pediatricians. *Pediatrics*. 2008;122(6):1387-94.

 **Connecting the Docs
for Children's Oral Health**

- and special health care needs; ~20% need to see a general dentist based on non-cavitated lesions or ≥3 risk factors, and ~75% can remain with the pediatrician up to three years of age based on having no disease and <3 risk factors when dental workforce shortages exist in a community.
- Obtained feedback from meeting with dentists and physicians in which we discussed how findings of systematic review and risk factors identified in their use of PORRT would affect need for referral (i.e., number of children that would not need referral and the number who would need referrals to pediatric and general dentists) and whether it would be practical for them to follow these guidelines.
- Conducted qualitative interviews with physicians to understand referral practices and barriers to help inform guidelines.
- Conclusions from development and pilot testing of PORRT and referral guidelines.
 - Without training in use of risk assessment and referral guidelines, medical providers under-refer.
 - With training, providers increased referral for dental caries in the early stages, but not for advanced disease.
 - Providers still under-refer patients with elevated risk but no obvious disease because they are reluctant to refer if the patient has behavioral risk factors only and if they anticipate lack of follow through by the parent.
 - Some parents do not engage practice and community resources such as case coordinators that support the effective use of dental care by the referred child.
 - However, once the support system is engaged by parents, referral is moderately effective.
 - The Referral Guidelines and PORRT form are useful tools to improve referrals by non-dental providers.

Activities and Accomplishments related to Objective 2: (Development of Educational Intervention for Dissemination of PORRT Guidelines).

- Update of IMB curriculum, development of educational materials for training in use of PORRT Guidelines, dissemination and testing their use in CHIPRA C (new provider-based models) practices.
 - NC CHIPRA C consists of eight networks and twenty-six practices (Cohort I-12 practices, Cohort II – 14 practices) that are participating in a Learning Collaborative in order to enhance their Medical Home Model for children with special health care needs (CSHCN) with a focus on social-emotional, developmental and behavioral, and mental health. After CHIPRA was funded, oral health was added.
 - CHIPRA C practices have learned to use tools such as the AAP Mental Health Toolkit, Motivational Interviewing, Common Factors Approach and valid screening tools for children ages 0-20. Instruction in the use of oral health risk assessment tools fits very well into the scheme of CHIPRA C. Even though use of oral health risk assessment tools is competing for primary care providers' attention, we saw it as a unique opportunity to further test the PORRT in practices most likely to implement an oral health risk assessment and referral tool.
 - The PORRT educational session for CHIPRA C Cohort I (12 medical practices) was developed from *Carolina Dental Home* educational materials.
 - Presentation content in PORRT was expanded with assistance from CHIPRA Oral Health Advisory Workgroup.
 - The educational session was presented as a webinar available to all practices in Cohort I in September 2011.
 - Five Cohort I medical practices participated in an on-site follow-up educational session by the trainer.
 - CHIPRA Part C staff assisted in quality improvement activity and follow-up with Cohort practices implementing the PORRT.
 - The PORRT educational session (webinar) was further refined and provided for CHIPRA C Cohort II (14 medical practices) in December 2012.
 - Three Cohort II medical practices participated in an on-site follow-up educational session by the trainer or a CHIPRA C Quality Improvement Specialists (QIS)
- Development of educational materials to support *Connecting the Docs* and statewide dissemination of PORRT Guidelines.
 - A Toolkit including printed materials and two DVDs to support *Into the Mouths of Babes* (IMB) and enhanced screening, risk assessment and referrals (i.e., PORRT) was created for use in the statewide intervention. The DVD to support the use of PORRT was created with two champion providers from Carolina Dental Home as spokespersons. This duo Live activity is approved for up to 1.00 Prescribed credit by the American Academy of Family Physicians with AMA equivalency in 2013. The two sets of materials packaged as one toolkit entitled "Connecting the Docs" contain the following:
 - Five Minutes for a Lifetime of Good Dental Health: this toolkit includes:
 - A ten minute instructive DVD on how to do a risk assessment and referral
 - PORRT form

- Guidelines for priority dental referral of pediatric patients 6 to 42 months of age
 - Into the Mouths of Babes: How to Do the Oral Preventive Procedure includes:
 - An eight minute instructive DVD on how to do an oral evaluation and apply fluoride varnish
 - Key counseling points for parents
 - Supply list
 - Medicaid coding list
 - Additional resources available on IMB website
- Statewide dissemination of PORRT Guidelines.
 - With CHIPRA funding and as part of CHIPRA A (quality performance measures), Pediatric Quality Improvement (QI) coordinators (also referred to as QI Specialists, QIS) were incorporated into each of 14 medical practice networks in the state. They have been trained by AHEC in QI and receive ongoing data and clinical training related to the CQM by the CHIPRA team each month. The QI coordinators are responsible for providing data, education and coaching to practices on Core Quality Measures (CQM) as well as additional pediatric QMAF measures. They also are working to coordinate pediatric teams in each of their networks (if none existed) in order to sustain pediatric initiatives that began with CHIPRA grant.
 - Two oral health quality performance measures (fluoride varnish and dental home) are among the 24 measures that CHIPRA staff are developing and tracking as part of Category A of the CHIPRA project. As we continued to work with the CHIPRA Project, it became apparent that we should change our original plans and collaborate with the CHIPRA QIS and their statewide efforts to promote quality of care in pediatric primary care practices. We saw this strategy as being particularly helpful because dental varnishing and referral to a dental home were aspects of quality improvement being promoted throughout North Carolina.
 - The CHIPRA Oral Health Advisory Workgroup recommended that all Quality Improvement Specialists (QIS) be trained in the use of the newly developed ‘Connecting the Docs for Children’s Oral Health’ AAFP/AMA approved CME course toolkits. They in turn would work with individual practices under the quality control of the dental hygienist who up to this point had provided all the training. This statewide roll out of the PORRT would replace the originally planned randomized controlled trial.
 - Two, 2-hour ‘train the trainer’ sessions were offered by the NC Oral Health Section-based trainer in January 2013.
 - All 14 CHIPRA A QISs completed one of the training sessions.
 - The initial training session conducted by QISs choosing to conduct their own training sessions with medical practices was observed by the trainer from the NC Oral Health Section.
 - As of November 20, 2013, CHIPRA Part A QIS provided 22 *Connecting the Docs* sessions.
 - The NC Oral Health Section based trainer continues to train medical practices, health departments, and community health centers, providing 30 *Connecting the Docs* sessions to date in 2013.
- Other Dissemination Strategies.

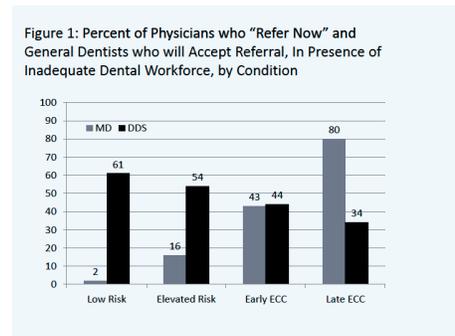
- Medical and dental ‘mixers’.
 - Oral Health Section and CHIPRA C staff organized a ‘mixer’ at the local hospital for pediatric medical providers from a large, 4 site practice and dentists from surrounding communities interested in providing dental homes for infants and toddlers (November 2012). Leadership from the CHIPRA Project, NC Oral Health Section, NC Medicaid, and the UNC School of Dentistry also attended. The PORRT was discussed as a means of ‘closing the loop’ of communication in this dental workforce shortage area. Several ‘new’ general dentists were identified as providing dental homes for young children as well as pediatric dentists outside of the immediate area offered support.
- Maintenance of Certification (MOC) for Family Physicians and Pediatricians.
 - The ‘Connecting the Docs for Children’s Oral Health’ toolkits will serve as the training materials for one of four activity sessions of the ‘Oral Health Screening and Dental Varnish in Primary Care’. This MOC activity was approved by the American Academy of Family Physicians and the American Academy of Pediatrics, submitted and funded by the CHIPRA Connect Project, and will begin in 2014.

Activities and Accomplishments Related to Objective 3: (Evaluation of Statewide Dissemination of PORRT Guidelines).

- Because of the integration of the *PORRT Initiative* into the CHIPRA Quality Demonstration Project, our evaluation has relied more heavily on the CHIPRA Quality Improvement Measures and the reporting system they have established for monitoring pediatric care than originally planned.
- CHIPRA has established the EPSDT Pediatric Profile in conjunction with NC Medicaid that provides rates for dental visits and fluoride varnishing along with other quality performance measures at the state, network and practice level each quarter by way of the CCNC’s Informatics Center.
- To provide information needed for planning and evaluation not available from Medicaid claims, the primary source for quality measures, we collected original data from primary care physicians (completed PORRT forms and self-completed questionnaires), general dentists, and pediatric dentists.
- Statewide survey of physicians providing well-child care.
 - Field tested questionnaire for use in survey with Cohort I of CHIPRA Part C. Questionnaires were completed by 53 (72.6%) of 72 physicians.
 - Survey of primary medical practices providing well-child care for Medicaid patients younger than 4 years of age.
 - Purpose: To determine: (1) oral health screening, risk assessment, and referral / follow-up practices of primary care physicians, (2) providers’ adherence to recommended guidelines; and (3) barriers to implementation of guidelines.
 - Sample frame: We defined our sample frame as all NC physicians providing well child care to children younger than 4 years of age enrolled in Medicaid/CHIP. Our sampling strategy was to randomly select one provider from each practice with at least one provider who met these criteria. This approach required us to identify: (1)

all practice sites with one or more providers meeting our criteria; and (2) all providers within those practices who provide well-child care. We excluded all community health clinics such as FQHCs and LHDs, and academic- / hospital-based clinics.

- **Sample selection method and results:** To enumerate our sample we used three data sources for information on physicians practicing in NC: (1) Medicaid billing files stratified according to numbers of well-child visits; (2) licensure files provided by the NC State Board of Medical Providers; and (3) the National Provider Identifier (NPI) file, required as part of the Health Insurance Portability and Accountability Act (HIPAA) Administrative Simplification Standard of 1998. The resulting list was supplemented with web-based practice-site searches. Telephone calls were made to each practice on our list to verify addresses, provider names, and provision of well-child care for Medicaid patients. We identified 432 practice sites and randomly selected one provider from each site from a total of about 1,300 physicians (average of about 3 providers per practice).
- **Results:** We obtained a response rate of approximately 40%. Major findings from our surveys of physicians suggest that they support oral health activities. But we also confirmed that adherence to recommended referral guidelines is not optimal on the part of physicians or dentists and requires continued efforts (see Figure 1 insert).

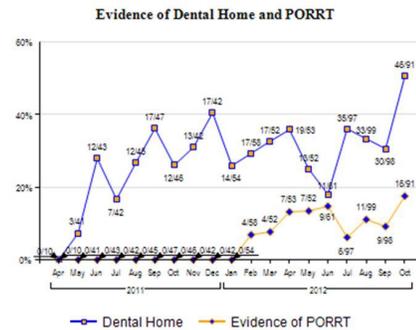


- Statewide survey of general and pediatric dentists.
 - **Purpose:** The purpose of this survey was to determine dentists' attitudes and practices regarding physician guidelines for infant and toddler oral health, particularly acceptance of referrals from physicians. Results of simultaneous assessments of physician and dentist referral practices can tell us if referral guidelines as we have specified them for this project have the dental workforce to support their effective implementation. (Long et al., In Press *Pediatr Dent*; Quinonez et al., Under Review in *JADA*)
 - **Sample and methods:** The survey was distributed to a random sample of 1,000 general dentists and all pediatric dentists (n=153) actively practicing in North Carolina. Response rates were 49.3% for general dentists and 67.3% for pediatric dentists.
 - **Results:** General dentists in NC generally are unaware of AAP guidelines on risk assessment and referral (only 32% are aware). As already referenced (Figure 1), there appears to be a mismatch between referral practices of primary care physicians and acceptance practices of dentists. In the presence of an undersupply of dentists, physicians tend to refer for disease and dentists want to accept those without disease.
- Outcomes from IMB and PORRT Guideline training and dissemination. Our monitoring system provides an evaluation of: (1) trends in IMB visits, (2) the proportion of well-child visits that have associated preventive dental services provided (screening and risk assessment, fluoride varnish application, parent counseling), (3) the percentage of patients younger than 3½ years of age receiving ≥3 or ≥4 fluoride varnish applications, (4) the

percentage of patients with evidence of a risk assessment in their charts, and (5) the percentage of 2- and 3-year-old children with a dental visit.

- IMB visits overall and as a percentage of well-child visits. We have maintained a count of these indicators since the start of the IMB program in 2000. During years included in the PORRT Initiative the number of IMB visits increased from 131,658 in 2009 to 137,865 in 2012, the most recent year for which we have statewide data, an increase of about 5%. Almost half (48.2%) of well child visits included IMB dental services in the most recent year available.
- The percentage of eligible patients with 3 or more fluoride varnish applications increased from 55% in the FY ending Sept 2011 to 57% in FY ending Sept 2012. The rate was 67% in the best performing network of CCNC practices.
- The percentage of eligible patients with 4 or more fluoride varnish applications increased from 40% in the FY ending Sept 2011 to 42% in 2012. The rate was 54% in the best performing network of CCNC practices.
- Chart audits provided assessments of evidence of a dental home and use of PORRT. Both of these indicators increased in this small sample of patients but were below optimal levels. For example, 49% (45 of 91) of charts provided evidence of a dental home in October 2012, and 18% (16 of 91) charts provided evidence of PORRT use. (See adjacent figure; http://www.nciom.org/wp-content/uploads/2012/11/Earls_3-22-13.pdf)
- The primary outcome we proposed for measuring referral practices was having a dental home as evidenced by a dental visit for 2- to 3-year olds. This rate did not change among CCNC network practices between 2011 (43%) and 2012 (44%) The best performing network was at 53% utilization.

Two Year Olds



Lessons (Re)Learned

1. Plan incremental steps to achieve an integrated system.

The foundation for *Connecting the Docs* (PORRT Initiative) began in 2000 with the *Into the Mouths of Babes* (IMB) Program in which NC Medicaid started reimbursing physicians to provide oral health services. Preventive services were well integrated into medical practices participating in IMB, but referrals of children were not being made to dentists at appropriate times. Pilot testing of strategies to improve referral, including a medical-dental, consensus-developed referral checklist (PORRT) with supporting guidelines was developed in *Carolina Dental Home*. The referral guidelines were refined in *Connecting the Docs* and disseminated broadly in the state to strengthen and enhance screening and risk assessment within medical practice, and to provide guidance on referrals, particularly in those communities where dental workforce shortages exist. We believe our objectives were achieved in this project because of the solid foundation provided by incremental implementation of these different initiatives.

2. Partnerships are important for long-term success.

Our partnership with the CHIPRA Quality Demonstration Project provided an excellent opportunity for the dental PORRT Initiative to be part of a large state and national demonstration program focusing on quality improvement in pediatric health care. Our goals and objectives for the PORRT Initiative were very similar to those of the CHIPRA project. Collaborating with CHIPRA provided the dental project with more than a 14-fold increase in resources (Quality Improvement Specialists) and access to experts in quality improvement strategies designed to increase screening and risk assessments in pediatric practice. The 24 quality improvement measures adopted by the NC CHIPRA project included three oral health measures (use of PORRT, fluoride varnish application, dental home), embedding us in a comprehensive system for quality improvement and monitoring.

The often used quote that “...we can go quickly alone or go far together...” applies to our partnership with CHIPRA. The collaboration led us to change our evaluation plans for the PORRT Initiative. Overall, however, we believe that the gains in scope and success of the implementation outweigh the potential for loss of rigor in the evidence for effectiveness of outcomes through a change in the evaluation design, particularly because we maintained the primary outcome—dental use—and many additional secondary outcomes. As discussed below, we have a strong foundation on which we can continue to build to improve children’s access to oral health care.

3. Education strategies directed toward implementation should include multiple approaches.

The CHIPRA partnership provided an opportunity to train medical providers and staff about the PORRT in both a webinar format and in individual practice settings. The webinars were conducted at lunch time, and were not well attended. But providers attending the webinars were the ones requesting follow-up training at their individual practice sites. We thus confirmed in this project that webinars are a good tool for generating interest in the PORRT and other oral health strategies among medical providers, but are not as successful as face-to-face training, practice in use of techniques and other skill development strategies.

4. Evidence of effectiveness is important.

Our evaluations of IMB have found that it increases access, decreases treatment needs, improves dental caries at a rate similar to preventive services provided by dentists, and results in fewer hospitalizations. Our evaluations also have identified practice-level barriers to implementation of IMB and related services, identified a problem with under-referral, particularly for children with behavioral risk factors but no disease. This project found that referral can be improved with training and other strategies such as checklists, guidelines, and medical-dental mixers.

5. Resources must be dedicated to solidifying the link between medical and dental homes.

The successful ‘mixer’ of physicians and dentists in one extended community undertaken as part of this project did not result in the expected increase in the number of young children with dental homes one year later, according to the CHIPRA A QIS assigned to the large pediatric medical practice participating in this activity. The *Carolina Dental Home* experience demonstrated that a coordinator who was dedicated to the logistics and working out the beginning ‘kinks’ of referral between physicians and dentists was required for

successful outcomes. *Connecting the Docs* did not have this support and likely affect referral activity and outcomes in this community.

6. Several barriers slow adoption/ implementation and need continuous, innovative solutions. We identified four primary barriers to the use of a screening and risk assessment tool in medical practice and adherence to referral guidelines. Three of these are attitudes or beliefs held by medical providers that are difficult to change. First, they have a misconception that there is a shortage of dentists who will see young children in all parts of the state, which is no longer the case in many areas of the state. Second, physicians are resistant to referring children younger than 3 years of age who have elevated risk for dental caries but do not yet show evidence of any disease. They believe that they are able to effectively counsel parents about these common behavioral risk factors. A third belief held by physicians is that parents are not interested in taking their child to the dentist as early as one year of age, and therefore counseling them to do so is an inefficient use of their time. The fourth and final barrier to adoption and implementation of referral guidelines is a set of factors related to the PORRT form itself. The two primary objections are that it takes too much time to complete and that it is not available in an electronic format.

Future Plans for Connecting the Docs

The Initiative funded through this grant has expanded beyond its original scope and provides a solid foundation for continued implementation of screening and risk assessment guidelines within medical practices in North Carolina. Oral health is well integrated into ongoing quality improvement efforts for pediatric practices in the state. We will continue activities started in *Connecting the Docs*, while considering what we have learned about what works and does not work in medical practice. Current plans are to:

- Continue dissemination and promotion of PORRT guidelines.
- Continue training of medical practices in use of PORRT and associated guidelines.
- Give priority to establishing a position in the Oral Health Section to coordinate linkages between medical and dental practices using the model that we found successful in the *Carolina Dental Home* project so that *Connecting the Docs* can be successfully implemented in more communities statewide.
- Work with the NC Dental Society leadership who are interested in helping to promote medical referrals to dentists using the PORRT Guidelines.
- Work with the NC CHIPRA project to include oral health indicators in the Children's Electronic Health Record (CEHR). NC and PA are the only states chosen to evaluate the impact of the CEHR. One vendor is including oral health performance measures in its model format.
- Continue to monitor quality improvement indicators (screening/ risk assessment rates, dental visits for 2-3 year olds, fluoride varnish rates).

Significance of Results

We continue to build on our initial findings about physician caries risk assessments and related referral activities. To summarize, we found that sufficient evidence exists to support the association of a number of modifiable risk factors with ECC in very young children. Our

experience with the PORRT form in which information on more than 5,000 infants and toddlers was recorded suggests that these risk factors can be obtained by physicians and their staff during well-child visits. Some of these consequential risk factors for ECC are highly prevalent in young children enrolled in Medicaid. We conclude, therefore, that knowledge of a child's future dental health care needs can and should be obtained by physicians using information on elevated risk for ECC collected at the well-child visit.

Our mail surveys of physicians and dentists have added important information about screening, risk assessment and referral behaviors and associated barriers in practice that can be used by those considering such initiatives in other states (see attached list of publications). We found that most all physicians can assign the correct risk classification for infants and toddlers. However, a large percentage are not adherent to referral guidelines. The percent who are adherent increased after training and when an adequate supply of dentists is available in the community. Our findings suggest that physicians base their referral decisions about dental care mostly on clinical presence of actual disease, and that their detection of modifiable risk factors in these patients is only weakly associated with referral activities. This finding, in particular, provides information on which to design similar projects. We have found that almost every child from low-income families seen in medical practices has at least one risk factor. So referring all children will not improve access to care in the presence of excess demand for dental care and would continue to overwhelm the system and lead to frustration on the part of providers and the public.

Provider training and quality improvement initiatives should be designed with these barriers in mind, which suggest the need to focus on referral of children at elevated risk or with incipient disease among other barriers. We also have demonstrated the need for multi-component educational interventions, which in most respects are time and resource intense. These results should have national implications for those working to establish and improve the linkage between medical and dental offices through referral practices.

Journal Publications

1. Rozier RG. Issue Brief Oral Health in North Carolina: Innovations, Opportunities, and Challenges. *North Carolina Medical Journal*. 2012;73(2):100-107.
2. King R, Rozier RG, Close K. Connecting the Docs: N.C. Physicians and Dentists Continue Partnership to Prevent Early Childhood Caries with the Priority Oral Health Risk Assessment and Referral Tool (PORRT). *North Carolina Dental Gazette*. 2012.34(3):26-27.
3. Long CM, Quinonez RB, Beil HA, Close K, Myers LP, Vann WF Jr, Rozier RG. Caries Risk Assessment and Dental Referrals by Pediatricians. *BMC Pediatrics*. 2012;12:49.
4. Long CM, Quinonez RB, Rozier RG, Kranz A, Lee JY. Barriers to Pediatricians' Adherence to AAP Oral Health Referral Guidelines: North Carolina General Dentists' Opinions. *Pediatric Dentistry*. (In Press)
5. Quinonez RB, Kranz A, Long CM, Rozier RG. Dentists' Opinions about Physicians Promoting Early Childhood Oral Health in the Medical Home. *Journal of the American Dental Association*. (Under Review)

Abstracts of Presentations

1. Myers LP, Rozier RG, King RS, Close KL. Carolina Dental Home: Linking Medical and Dental Practices. Pediatrics for the 21st Century—Oral Health in the 21st Century: Something to Smile About: Pediatricians' Role in Oral Health. October 10, 2008.
2. Rozier RG. The Role of Primary Care Medical Providers in Addressing Oral Health Disparities: Statewide Initiatives in North Carolina for Children Birth to 5 Years of Age. NIH Summit: The Science of Eliminating Health Disparities. National Center on Minority Health and Health Disparities. December 16-18, 2008.
3. Myers, LP, Rozier RG, King RS, Close K. Carolina Dental Home: Linking Medicaid and Dental Practices. Abstract No. 30. Tenth National Oral Health Conference, Portland, OR, April 21-23, 2009.
4. Myers L, Close K, Beil H, Rozier RG, Vann WF Jr., Casey M, King RS, Zeldin L. Effects of an Intervention to Improve Pediatricians' Dental Referrals of Young Children Enrolled in Medicaid. Abstract No. 17. Twelfth National Oral Health Conference, Pittsburgh, PA, April 11-13, 2011.
5. Close K, Myers L, Casey M, Quinonez R, Hom J, Rozier G. Adherence of Primary Care Medical Providers to Oral Health Screening and Referral Guidelines. Abstract No. 14 of Oral Presentations. Thirteenth National Oral Health Conference, Madison, WI, April 30-May 2, 2012.

6. Long CM, Quinonez RB, Rozier RG, Lee JV, Kranz A. The First Dental Visit: Knowledge, Attitudes, and Behaviors of North Carolina Dentists Regarding Physician Referral Guidelines. *Pediatric Dentistry*. 2012;34:162.