Collaboration and Teamwork

DENTAL HYGIENIST-LED CHRONIC DISEASE MANAGEMENT SYSTEM TO CONTROL EARLY CHILDHOOD CARIES

Man Wai Ng \(^{a,b}\), and Zameera Fida \(^{c,d}\)

Editor’s Note
Dental hygienists are seen by these pediatric dentist co-authors as the optimal professionals to lead young patients and their families through the collaborative care needed for the chronic disease management of dental caries. Metrics collected in future years will assess viability of this approach.

ABSTRACT
Management of the complex chronic disease of early childhood caries requires a system of coordinated health care interventions which can be led by a dental hygienist and where patient self-care efforts are paramount.

Background and purpose
Even after receiving costly surgical treatment under general anesthesia in the operating room, many children develop new and recurrent caries after only 6-12 months, a sequela that can be prevented. This article describes the chronic disease management (CDM) of dental caries, a science-based approach that can prevent and control caries.

Methods
In this article, we (1) introduce the concept of CDM of dental caries, (2) provide evidence that CDM improves oral health outcomes, and (3) propose a dental hygienist-led team-based oral health care approach to CDM. Although we will be describing the CDM approach for early childhood caries, CDM of caries is applicable in children, adolescents, and adults.

Conclusions
Early childhood caries disease control requires meaningful engagement of patients and parents by the oral health care team to assist them with making behavioral changes in the unique context of their families and communities. The traditional dentist/hygienist/assistant model needs to evolve to a collaborative partnership between care providers and patients/families. This partnership will be focused on systematic risk assessment and behaviorally based management of the disease itself, with sensitivity toward the familial environment. Early pilot study results demonstrate reductions in the rates of new caries, dental pain, and referral to the operating room compared with baseline rates. Dental hygienists are the appropriate team members to lead this approach because of their expertise in behavior change and prevention.

INTRODUCTION
Spencer is a 2-year-old healthy child with early childhood caries (ECC). His caregiver is advised to discontinue allowing Spencer to sleep with a nursing bottle containing milk and to begin brushing his teeth with fluoride toothpaste. Because

Keywords: Chronic disease management of caries, Early childhood caries, Dental hygienist led team-based oral health care
Spencer is age-appropriately uncooperative for dental treatment, he is recommended to receive restorative treatment under general anesthesia in an operating room (OR) setting.

Nine months after receiving OR treatment, Spencer returns with pain, recurrent caries, and also new caries on his previously unerupted second primary molars. Spencer is still sleeping with a nursing bottle and drinks juice frequently. His mother states that she cannot brush his teeth because he does not let her. Because Spencer is still uncooperative, he is recommended to undergo a second OR visit for dental treatment. Figure 1 shows the intraoral radiographs of Spencer taken during his first and second OR visits.

For children like Spencer, even after receiving costly surgical treatment in the OR, many develop new and recurrent caries after 6-12 months.1-4 As dental caries is a chronic disease that is largely preventable and can be controlled, we are convinced that there can be a better outcome for patients like Spencer. Until recently, the standard of care of the dental profession once carious lesions manifest has been to rely primarily on surgical and restorative treatment.5 Chronic disease management (CDM) of dental caries is a science-based approach we have tested in clinical practice that can prevent and manage caries. Although there has been a shift in dentistry toward a preventive approach to caries management, disease prevention and management are not yet systematically applied in dental education or clinical practice.

The purposes of this article are to (1) introduce the concept of CDM of dental caries, (2) share evidence that CDM improves oral health outcomes, and (3) propose a dental hygienist-led team-based oral health care approach to CDM. Although we will be describing the CDM approach for ECC, CDM of caries is applicable in children, adolescents, and adults.

Dentistry’s current approach to caries
With roots deep in surgical traditions, the dental profession continues to primarily address dental caries as an acute surgical problem that requires restoration and repair.6 Although restorative treatment repairs tooth structure, it does not address the underlying disease process.7 If the responsible risk factors are not adequately addressed, new and recurrent caries will likely develop.8 A more effective approach may be one that relies on patient-specific prevention and focused management of the disease in addition to repairing or restoring carious tooth structure.9-11 CDM is such an approach which has been demonstrated in early studies to be effective in improving outcomes in children.12,14

In this article, we describe how active and engaged dental hygienists working within a collaborative care team can transform a contemporary dental practice toward incorporating CDM into everyday workflows.

What is CDM?
CDM of dental caries is separate and distinct from prevention and restorative treatment. CDM has been defined as a system of coordinated health care interventions in which patient self-care efforts are significant. Based on the assumption that patients have the most important role in the care of their chronic health conditions, CDM aims to promote a sense of responsibility on the part of the patient, parent, or caregiver for his or her own health.

CDM differs from a traditional approach whereby care providers tell patients what changes to make. Instead, it calls for a partnership or a close collaboration between an informed and engaged patient and/or parent and a proactive health care provider ideally in a culturally and linguistically appropriate manner. As dental caries is a chronic disease that is significantly influenced by social and behavioral factors, effective management requires customized patient self-management of etiologic factors. An important role of the professional team is to provide coaching and support to the patient and family to make the necessary lifestyle changes, such as in oral hygiene practices, dietary habits, and fluoride use. This personalized approach to patient care is the essence of the CDM model.

Figure 1. Spencer: intraoral radiographs taken in the operating room at ages 2 and 3 years.
ECC collaborative and CDM protocol

Beginning in 2008, the DentaQuest Institute has supported multiple phases of a learning collaborative modeled after the Breakthrough Series by the Institute for Healthcare Improvement.15 The ECC Collaborative has trained clinical providers and team members in more than 40 dental and oral health care practices across the United States to test and implement a CDM protocol to address ECC using quality improvement methods.16 The authors of this article have been involved in the ECC Collaborative as care providers, change champions in their own dental practice, and faculty in the Collaborative.

Figure 2 and Table 1 show the most recent ECC CDM clinical protocol for the ECC Collaborative. The ECC Collaborative CDM protocol includes 7 components: (1) caries risk assessment (CRA), (2) effective communication, (3) self-management goal setting, (4) caries charting, (5) fluoride and other remineralizing strategies, (6) restorative treatment as needed and desired by patient/family, and (7) recare interval based on risk. The ECC CDM protocol along with its rationale and promising results from phases 1 and 2 of the ECC Collaborative will not be described in great detail here as they have been published elsewhere.12-14

### Components 1-3: CRA, effective communication, and self-management goal setting

Regularly assessing each patient’s risk for caries and providing support and coaching to control risk factors are the cornerstones of the ECC CDM protocol. In practice, a full or abbreviated CRA is performed at each visit informally or preferably, by using a structured form. This form is used to guide the query about the patient’s diet and oral hygiene habits, to assess the patient’s changing balance of risk and protective factors and efforts with meeting self-management goals. Structured CRA forms are available from the American Dental Association,17 the American Academy of Pediatric Dentistry,18 and Caries Management by Risk Assessment (CAMBRA)19,20 and other groups. Figure 3 shows a CAMBRA CRA form for ages 0-5 year olds.

With permission, the etiology of the caries process is explained to the patient or caregiver, followed by coaching the patients (or their parents) about the risk and protective factors and efforts with meeting self-management goals. Effective self-management support uses a collaborative approach, with providers and patients working together to

| Caries risk assessment | • Performed in full or abbreviated format during each visit  
• Children who have at least one tooth with demineralization or cavitation lesion is an ECC patient |
| Effective communication | • With permission, explain the caries process to parent; and use structured communication strategies such as  
  o Fixing the cavities does not fix the problem  
  o Without a change in diet and home care, new cavities and broken filling will result  
  o Change is hard and won’t happen over night |
| Self-management goal setting | • Engage and coach parent to select one or two goals to work on until the next visit  
• Goals may include more frequent tooth brushing, topical fluoride use and specific diet modification strategies |
| Caries charting | • Use a charting system, such as ICDAS or ADA Caries charting system to:  
  o Document caries by tooth, surface and activity  
  o Monitor disease improvement or progression |
| Fluorides and other remineralization strategies | • Topical fluorides, including over-the-counter toothpaste, stannous fluoride, xylitol, and/or calcium phosphate products can be offered |
| Restorative treatment | • Full range of treatment options can be presented based on each patient’s needs and parent’s desires, including  
  o Conventional treatment (incl. use of pharmacologic management)  
  o Interim therapeutic restorations for caries control and sealants |
| Risk-based recare intervals | Patients are recommended to return in:  
• 1-3 months (if high risk)  
• 3-6 months (if moderate risk)  
• 6-12 months (if low risk)  
At the recare/disease management visit, perform:  
• Caries risk assessment  
• Self-management goal setting  
• Exam and charting  
• X-rays if indicated  
• Fluoride varnish |

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**Figure 2.** ECC chronic disease management clinical protocol*

[Dental hygienist image and table for ECC CDM protocol]

*DentaQuest Institute
Definition: Caries 

Because caries may progress and arrest at the same time in the same individual, caries may be present on the surface that is brushed away or wiped away. To properly visualize the surfaces of the teeth, any plaque present on the surface is brushed or wiped away. Demineralized enamel surfaces, which appear as chalky white spots, are important to document and follow closely over time. Caries activity is determined by visual assessment and also through a tactile examination using a balled explorer or by gently sliding a sharp explorer over the exposed dentin.

Recognizing that change is hard to achieve, no more than 1 or 2 self-management goals are typically selected to work on until the next visit. Self-management goals may include more frequent toothbrushing, using remineralization strategies and topical fluorides at home and diet modification.

Component 4: caries charting

Because caries may progress and arrest at the same time in different locations of the dentition, performing a clinical examination and charting carious lesions are important to monitor caries presence, progression, and activity by tooth and surface. Using a system such as the American Dental Association Classification System or a modified system (Figures 6 and 7) allows for tracking of information important for determining disease diagnosis, caries risk status, and appropriate clinical treatment planning.

To properly visualize the surfaces of the teeth, any plaque present on the surface is brushed or wiped away. Demineralized enamel surfaces, which appear as chalky white spots, are important to document and follow closely over time. Caries activity is determined by visual assessment and also through a tactile examination using a balled explorer or by gently sliding a sharp explorer over the exposed dentin.

Anecdotally, the ECC Collaborative has found this component of the protocol, though valuable, to be most difficult to implement by the teams. The additional time required to chart caries by tooth and surface, which is separate and distinct from the restorative treatment plan, along with the lack of ease to do so are barriers.

Component 5: fluorides and other remineralization strategies

The use of fluoride for caries prevention and management is both safe and effective. In children determined to be high caries risk, brushing with a small quantity of 1000 ppm of fluoridated toothpaste 2 or more times each day by an adult caregiver is recommended. Young children should receive assistance with toothbrushing as soon as the first tooth erupts from an adult caregiver.

A smear of 1000-ppm fluoride toothpaste or 0.4% stannous fluoride may be applied to cavitated or deminerallized tooth surfaces to assist with remineralization of the carious surfaces with instructions to defer eating, drinking, or rinsing for

Table 1. ECC risk-based chronic disease management protocol.

<table>
<thead>
<tr>
<th>Existing risk category</th>
<th>New clinical findings</th>
<th>Fluoride varnish interval</th>
<th>Sample self-management goals</th>
<th>Restorative treatment</th>
<th>CDM return interval</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>No disease indicators of caries; or</td>
<td>6-12 mo</td>
<td>Twice daily brushing with F toothpaste;</td>
<td>Sealants ITR Conventional restorative</td>
<td>6-12 mo</td>
<td>Xylitol gum or candies or wipes Calcium phosphate paste</td>
</tr>
<tr>
<td></td>
<td>Completely remineralized (arrested) carious lesions</td>
<td></td>
<td>Stannous fluoride on cavitated lesions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>No disease indicators but has risk factors; and/or inadequate protective factors; Disease indicators present with some remineralization</td>
<td>3-6 mo</td>
<td>Twice or more daily brushing with F toothpaste; Stannous fluoride on cavitated lesions; Dietary changes</td>
<td>Sealants ITR Conventional restorative</td>
<td>3-6 mo</td>
<td>Xylitol gum or candies or wipes Calcium phosphate paste</td>
</tr>
<tr>
<td>High</td>
<td>Active caries (disease indicators present)</td>
<td>1-3 mo</td>
<td>Twice or more daily brushing with F toothpaste; Stannous fluoride on cavitated lesions; Dietary changes</td>
<td>ITR Sealants Conventional restorative Sedation/GA</td>
<td>1-3 mo</td>
<td>Xylitol gum or candies Calcium phosphate paste</td>
</tr>
<tr>
<td></td>
<td>No remineralization occurring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heavy plaque</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ITR, interim therapeutic restoration; GA, general anesthesia.

a Brush with a smear of 1000-ppm F toothpaste.
b Apply a smear of 1000-ppm stannous fluoride to cavitated lesions.
c Examples of disease indicators include demineralization, cavitated lesions, existing restorations, enamel defects, deep pits and fissures.
d Examples of risk factors include patient/maternal/family history of decay, plaque on teeth, frequent snacks of sugars/cooked starch/sugared beverages.
e Examples of protective factors include fluoride exposure (topical and/or systemic), xylitol.
30 minutes after. Xylitol products and casein phosphate products are also available to assist in controlling the caries process at home.

**Figure 3.** CAMBRA caries risk assessment form for ages 0-5 years.

![CAMBRA caries risk assessment form](image)

Professional fluoride treatment should be offered based on caries risk status. Children at increased caries risk should receive a professional topical fluoride treatment.
varnish) at least every 6 months. High-risk children should receive fluoride varnish every 3-6 months and moderate-risk children, a minimum of every 6 months. Low-risk children may not receive additional benefit from topical fluoride treatments in addition to what they receive from fluoridated drinking water and toothpaste. Children with ECC, who have demineralized enamel or cavitated carious lesions, may benefit from receiving professional topical fluoride applications more frequently than every 3 months to assist in controlling the caries process.

Component 6: restorative treatment (including sealants, interim therapeutic restorations (ITRs), and conventional restorative treatment as needed and desired by patient/family)

Tooth surfaces with deep pits or fissures, of children who are at high caries risk, would benefit from a bonded or glass

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**Figure 4.** Sample self-management goals handout.

![Sample self-management goals handout](image.png)

Source: Adapted from Figure 4 Self-management goals on page 759 in Pediatric Dental Care: Prevention and Management Protocols Based on Caries Risk Assessment, authored by Ramos-Gomez FJ et al., in the CDA Journal, Vol 38, Issue 10, October 2010, with permission.
ionomer sealant. Typically, sealants are placed on permanent molars, but primary molars may also benefit from sealant placement, especially if there are already incipient lesions present or if decay has already manifested on other primary molars with similar pit and fissure anatomy.

If destruction of tooth structure by the caries process is minimal, arrest of the decay might be possible with remineralization strategies. Restorative treatment may be deferred if the disease can be stabilized. If the decay has progressed into dentin or caries arrest has not been achieved, ITRs may be performed to achieve caries control. The ITR procedure involves removing the decay using hand or rotary instruments with caution to avoid pulp exposure. After preparation, the tooth is restored with a fluoride-releasing glass ionomer restorative material. It is important for the parent to understand that this approach is caries control rather than permanent restoration (see Byrd, in this issue).

When significant tooth structure has been destroyed by the caries process, restorative treatment is performed to restore function or improve esthetics. Owing to the high occurrence of recurrent decay and the significant costs of general anesthesia, long-term success of restorative treatment for ECC depends on an effective management of the disease, along with the appropriate use of restorative technique and materials for the primary dentition. A child who shows improved caries risk status and caries activity may receive more conservative restorative treatment. However, a child demonstrating no improvement of caries risk status or continuing progression of caries activity may benefit from more aggressive care to reduce new and recurrent decay in susceptible tooth surfaces, such as with the use of full-coverage stainless steel crowns.

When caries arrest is achieved, restorative treatment may be deferred, especially in a child unable to cooperate for restorative treatment. However, close follow-up and preventive care based on caries risk are essential to safeguard from disease relapse. Seeing a child more frequently for preventive care over time has been found to be helpful to reduce a child’s fears and to build trust between the care provider and the child, allowing for restorative treatment to be completed with greater ease in the clinical setting, at a later time.

Component 7: recare intervals
Patients are recommended to return for recare frequency based on their caries risk (1-3 months for high risk;
3-6 months for moderate risk; and 6-12 months for low risk) and the desires of their parent. During the disease management recare visits, a clinical examination and CRA are performed, and self-management goals are reassessed.

In high- and moderate-risk patients, where self-management goals have been agreed on, follow-up recall or CDM visits provide opportunities to determine the current caries risk status, perform a clinical examination to reevaluate disease diagnosis, reassess self-management activities, and provide ongoing coaching. During the initial visit, if heavy plaque and gingival inflammation are present, it may not be possible to complete an accurate examination, especially in an uncooperative young child or a child with special health care needs. A follow-up visit 1-3 months later allows for a more accurate assessment of demineralized enamel, remineralized enamel, and pit and fissure caries, as well as for fluoride varnish to be applied.

Recare visits may be scheduled with the dental hygienist. Dental hygiene visits by their nature are focused on promoting healthy behaviors and preventing and controlling disease, along with disease diagnosis. Continuity-of-care visits are opportunities to monitor disease progression and self-management behaviors on the part of the patient or parent. Therefore, the dental hygienist, through continuity-of-care visits with patients, has the best opportunity to build trust and provide coaching, role modeling, positive reinforcement, and social rewards. Whenever possible, the CDM activities are coordinated with return visit intervals based on the most recent caries risk status in conjunction with the restorative care needed (Table 1).

Box 1 and Figure 8 describe and show an example of successful CDM interactions by a dental hygienist with 2 year old Abby, who has ECC, and her mother.

**EVIDENCE SUPPORTING CDM OF ECC**

Phase I of the ECC Collaborative from 2008 to 2010 that took place at 2 hospital-based dental care practices, found that, after 30 months, children with ECC in the intervention group experienced lower rates of new cavitated carious lesions, pain, and referrals for restorative treatment in the OR compared with baseline historical controls with ECC (Table 2). In addition, structured interviews completed with

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**Figure 6.** The International Caries Detection and Assessment System (ICDAS) and alternative charting systems. The codes D1, D1.5, and D2 describe enamel or dentin changes, breakdown, or cavitation: D1 = enamel change, D1.5 = enamel breakdown, and D2 = decay extending into dentin. The codes A, B, and C describe caries activity: A = completely arrested (inactive caries; may appear shiny or dark brown/black; feels hard); B = becoming inactive (may feel leathery or harder); and C = active caries (feels soft).
some parents in the intervention group found that most believed the CDM approach to be helpful for their children. Almost all parents appreciated being given information as to why their children may have developed ECC.13

A follow-up phase 2 of the ECC Collaborative continued with 5 additional sites across the United States. After 18 months, fewer CDM children experienced new cavitation, pain, and referrals to the OR for restorative treatment compared with baseline historical controls (Table 3).12 The teams found that quality improvement methods facilitated adoption of the CDM approach and resulted in improved care to patients and better outcomes overall.

COLLABORATIVE TEAM-BASED CARE

The typical oral health care team includes dentists, dental hygienists, and dental assistants. Dental hygienists are ideally suited to facilitate team-based CDM care because they are considered experts in preventive oral health care. Dental hygienists provide patient education and oral health promotion while facilitating continuity of patient care and fostering relationship and trust building with patients and parents.

Figure 9 shows a flow diagram of the CDM protocol outlining the roles that members of the dental team may assume. In the CDM approach, the dental hygienist is pivotal in providing patient education, support, coaching, self-management goal setting, and documentation of findings from CRA. The previously noted 7 components of the CDM approach to ECC are opportunities for dental hygienists to assume active leadership roles. CDM of caries requires professionals to work collaboratively with the patient or family to address specific risk factors and provide education, but really focusing on behavioral change (using effective communication techniques such as motivational interviewing), introducing fluorides and other remineralizing agents, and recommending patients to return for disease management visits and fluoride varnish applications more often based on the patient’s caries risk. At the same time, a patient may present for restorative treatment, but the dentist or another staff should revisit caries risk factors and provide continued self-management support.

The collaborative care team approach should extend to the administrative staff, such as front desk/reception and billing staff, who can help provide clarification and reinforcement of oral health educational messages and self-management support. In a broader sense, the collaborative care team may also include primary medical care providers or specialty care providers for those patients with special health care needs. We are proposing a model of CDM for the primary oral health care dental practice, but we believe that CDM may also be appropriate for an interprofessional model of health care in general (see Braun and Cusick, in this issue).

Working in a collaborative partnership with parents and children with ECC, professionals and staff are able to increase
the motivation to set self-management goals and make seemingly simple but difficult behavioral changes, such as increasing brushing frequency, using fluoride toothpaste, reducing carbohydrate and/or sugar intake, and returning more often for CDM visits.

**Box 1. A patient example of a successful CDM process led by a dental hygienist.**

Visit 1: A 2-year-old Abby presents with her mother for a new infant oral health visit with Logan, dental hygienist. Logan performs a CRA and a knee-to-knee examination with Abby’s Mom. Pertinent findings from the CRA include (1) history of active caries in Mom, (2) patient sleeps with a nursing bottle containing milk, (3) patient brushes with a training nonfluoride toothpaste, (4) patient drinks apple juice 3 times per day, and (5) no reported pain. Pertinent clinical examination findings include (1) heavy plaque biofilm presence on buccal cervical gingival margins of the maxillary incisors, (2) demineralized enamel on the maxillary incisors and extensive breakdown of the maxillary left lateral incisor, and (3) a cavitated carious lesion just into dentin on a mandibular primary first molar.

With parental permission, Logan explains the etiology of the caries process and lets Abby’s Mom know that cavities can be prevented and stopped. But, without a change in the diet and/or oral hygiene, the cavities will get worse. Mom is asked what matters to her—which goals are most important to her, such as avoiding pain and infection, preventing cavities getting worse, or the appearance of the teeth.

Logan discusses with Mom possible restorative treatment options including restorative treatment with sedation or general anesthesia, interim therapeutic restoration (ITR) treatment of the lower left first molar at an upcoming visit, explaining to Mom that because the decay is just extended into dentin, restorative treatment can be deferred to avoid inflicting psychological trauma to Abby.

Logan helps Mom select 1 or 2 self-management activities to implement in the next month and asks if she would be willing and able to return with her child in 1 month for another visit and fluoride varnish application. Mom agrees to return in 1 month and to 2 goals: (1) to begin brushing with a smear of 0.4% stannous fluoride toothpaste (as demonstrated after breakfast and before bed and to wait 30 minutes before eating, drinking, or rinsing after) and (2) to switch completely to water in bottle to bed. Mom is advised to expect a couple of sleepless nights.

Visit 2: In 1 month, Abby and her Mom return for a follow-up visit with Logan, dental hygienist. Mom reports brushing with a smear of stannous fluoride toothpaste after breakfast and before bed and has switched to water in the bottle to bed. A knee-to-knee examination performed shows improved good plaque control and demineralized surfaces and cavitated lesions manifesting remineralization. Logan congratulates Mom on her efforts. Logan asks Mom what other strategies she could consider implementing next. Mom is willing to try to reduce the juice to 1-2 times and will give more water or milk. Mom agrees to defer restorative treatment and to return in 3 months. Because Abby has no pain and the caries lesions have not progressed, ITR for the molar is discussed as possible treatment at the next visit and to defer restorative treatment for the maxillary incisors. Fluoride varnish is applied.

Visit 3: In 3 months, Abby and her Mom return for a follow-up visit with Logan, dental hygienist. A knee-to-knee examination finds good oral hygiene. The carious lesions on the maxillary incisors are arrested. The cavitated lesion on Abby’s lower left has become larger and feels soft to the explorer.

Mom reports brushing Abby’s teeth with a smear of stannous fluoride toothpaste before bed and sometimes in the morning. She has stopped the bottle to bed completely and is giving a cup of juice each day with more water and milk. She is giving fruit snacks occasionally to Abby.

Mom gives consent, and ITR is performed on the lower left molar and agrees to defer restorative treatment on the maxillary incisors. Because Abby has been returning for frequent visits, she has become more comfortable with the practice and the providers. She has become less anxious, and the ITR procedure was completed quickly and easily. Glass ionomer restoration is placed on the molar. Fluoride varnish is applied.

Logan coaches Mom on avoiding fruit snacks. Mom agrees to give more fruit, to try to brush Abby’s teeth after breakfast, and to return in 3 months for another follow-up visit.

**BARRIERS AND LIMITATIONS OF CDM**

CDM is actually not a new concept. Featherstone introduced the Caries Balance in 2000, and CRA tools have been available, such as through CAMBRA and the American Academy of Pediatric Dentistry. Why then is
there a gap from what we as dental practitioners actually do in practice to what we desire to do in terms of caries management? Some reasons include the time required to translate science into clinical practice (17 years on average), insurance reimbursement historically favoring surgical management of dental caries, lack of provider training, and lack of knowledge by and incentives for the public to seek risk-based preventive/disease management care. Although providers may be familiar with CRA and CDM approaches, they likely do not know how to operationalize them into day-to-day clinical care with patients. In addition, the current dental information systems (electronic dental records) do not easily allow for data measurement or tracking of the oral health status of patients.

Table 2. ECC Collaborative Phase I: comparison of rates of new cavitation, pain, and referral to OR between ECC patients and historical control patients.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Boston Children's Hospital</th>
<th>Saint Joseph Hospital</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>ECC (n = 403) %</td>
<td>Historical control</td>
</tr>
<tr>
<td>New cavitation</td>
<td>26.1</td>
<td>75.2</td>
</tr>
<tr>
<td>Pain</td>
<td>13.4</td>
<td>21.7</td>
</tr>
<tr>
<td>Referral to OR</td>
<td>10.9</td>
<td>20.9</td>
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</table>
CONCLUSIONS

The CDM model for caries is grounded in a scientific understanding of caries pathogenesis and caries as a chronic biobehavioral disease. Disease control requires meaningful engagement of patients and parents by the oral health care team in a collaborative partnership to assist them with making behavioral changes in the unique context of their families and communities. The traditional dentist/hygienist/assistant model needs to evolve to focus on systematic risk assessment and behaviorally based management of the disease itself, with sensitivity toward the familial environment. The dental hygienist is the appropriate team member.

Table 3. ECC Collaborative Phase II: comparison of rates of new cavitation, pain, and referral to OR between ECC patients and historical control patients.

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>ECC (n = 344) %</th>
<th>Historical control (n = 316) %</th>
<th>Percentage improvement %</th>
<th>Improvement range</th>
</tr>
</thead>
<tbody>
<tr>
<td>New cavitation</td>
<td>33</td>
<td>46</td>
<td>▼ 28</td>
<td>▲ 14- ▼ 71</td>
</tr>
<tr>
<td>Pain</td>
<td>8</td>
<td>11</td>
<td>▼ 27</td>
<td>▲ 80- ▼ 100</td>
</tr>
<tr>
<td>Referral to OR</td>
<td>14</td>
<td>22</td>
<td>▼ 36</td>
<td>0- ▼ 81</td>
</tr>
</tbody>
</table>

Figure 9. Flow diagram of the ECC chronic disease management protocol and the potential roles of dental team members.
to lead this approach because of their expertise in behavior change and prevention.

REFERENCES


SUGGESTED READING REFERENCES


