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Quality Improvement in Practice Leading to Remineralization

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ABSTRACT Implementing quality improvement into private practice can be challenging for many reasons, mainly due to a lack of support in systems. This article describes how one pediatric practice used the environment of a collaborative to integrate quality improvement drivers within the practice in an effort to manage dental caries disease. The success of these efforts was documented and assessed through practice-level metrics via run charts and is visible at the patient level by clinically remineralized lesions.

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Quality improvement (QI) and performance measures are hallmarks of many fields in health care. However, these measures have yet to be fully implemented in clinical dental practice. QI can appear more applicable for safety net clinics, however, the science of QI can be applied in any practice setting. The concept of quality improvement is often misinterpreted in dentistry because the terminology has not been well defined, diagnostic codes are not widely used and measurement of outcomes presents a challenge.[1] Difficulties exist in the development and use of valid, reliable, feasible and usable measures.[2] Dentists' perception of quality is usually the technical excellence of restorations, however, quality improvement is not necessarily improving margins and aesthetics, which aren't related to long-term treatment outcomes.[3] Quality improvement is the measure of success in treating a disease by implementing data-driven changes.[4] Too often, dentists believe restorations are synonymous with the treatment of dental caries disease when, in fact, a restoration merely replaces caries-affected structures.[5]

Value-based reimbursement and "pay for performance" (P4P) are attempts to link reimbursement to the quality of care provided. These new payment philosophies have gained momentum in medicine, and it is reasonable to expect they may eventually become a common payment mechanism in dentistry as well.[1] The implementation of quality measures into practice allows providers to prepare for this paradigm shift from volume-based to value-based reimbursement.[1] Most often, these topics are discussed in the context of their performance in a community-based clinical site rather than in private

practice. A small number of dentists have begun to use quality improvement as a vehicle for transforming their care delivery to measure the reduction in dental disease. QI data allow clinicians to better understand their processes and the overall health of the population they treat, but at the patient level the science of quality improvement leads to visible remineralization of caries lesions and the prevention of new caries lesions.

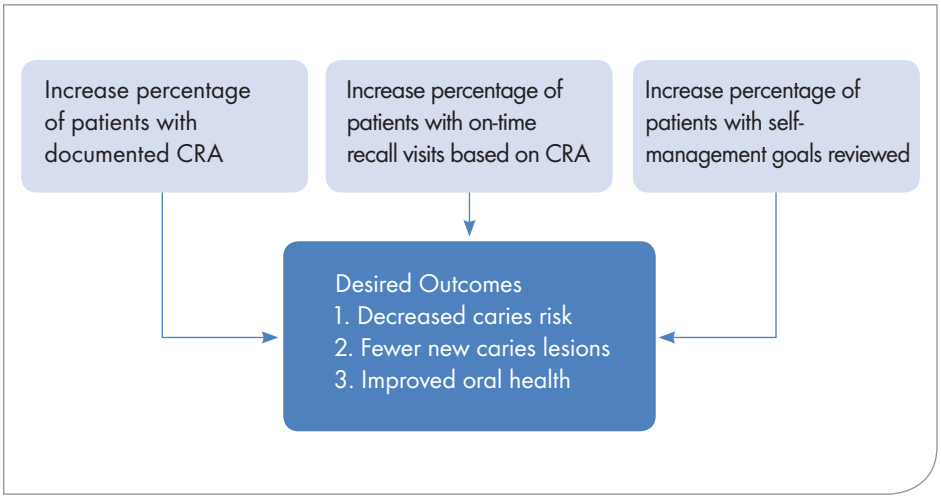

FIGURE 1. Process and outcomes of caries management.

How Should Dentists Measure Quality?

In 2008, the American Dental Association (ADA) established the Dental Quality Alliance (DQA) to standardize measurement and reporting in order to better understand how quality can impact and drive oral health.[2] According to the DQA, "dentistry needs a cost-effective measurement system that can be easily implemented on a routine basis in small practices, measures factors under the control of the practitioner and yields meaningful information that can be acted upon for improvement."[2]

QI is broadly defined as "the combined and unceasing efforts of everyone — health care professionals, patients and their families, researchers, payers, planners and educators — to make changes leading to improved patient outcomes (health), system performance (care) and professional development (learning)."[6] Measurement establishes reference points from which we can standardize something for comparison.[7] Correct measurement ensures that any changes made to a clinical system lead to an improvement in health.[7]

According to the National Quality Forum (NQF), measures to improve health care can be broken down into the following five categories:

1. Structural measures reflect the conditions under which providers provide care.
2. Process measures reveal whether steps proven to benefit patients are followed correctly.
3. Outcome measures quantify the actual result of care (typically the most relevant and desired measure to change for providers).
4. Patient-experience measures record patients' perspectives on their care.
5. Composite measures combine the result of multiple performance measures to provide a more comprehensive picture of quality care.[7]

A critical first step in the quality improvement process is establishing what practice information can and should be measured to ensure that care (performance) is providing optimal health to patients (outcomes).[4] Because most clinicians are not required to use diagnostic codes, the information available within the electronic dental record is not optimized. However, CDT codes do provide some basic data that allow a small number of process measures and outcome measures to be calculated, which can help drive caries risk reductions leading to fewer caries lesions and remineralization of existing lesions (**FIGURE 1**).

Disease Management With Quality Improvement in the Private Practice

In March 2015, the DentaQuest Institute initiated the Dental Caries Management (DCM) Collaborative, which focused on developing and testing a chronic disease management protocol for children and adolescents in a variety of clinical settings.[8] Providers were recruited from across the U. S. to participate in the collaborative with the aim of improving the caries risk of their patient population using evidence-based QI drivers. Drivers are the factors or components of a system that influence the achievement of the aim.[9] When practices identify and measure drivers, practice systems can be modified for further improvements in patient oral health.

The collaborative created an opportunity for clinicians to rethink their clinical systems in such a way that led to more patient-centered care through the paradigm of caries management by risk assessment (CAMBRA). Rather than focusing on how to intervene in the caries process through increased use of specific therapeutics, clinicians were challenged to personalize the caries risk assessment process using the techniques of effective communication to modify patient behaviors. Patients and their parents became their own champions of disease management and took ownership of their caries disease.

TABLE

Caries Disease Management Strategy

	Low Risk	Moderate Risk	High Risk
Clinical findings	No caries lesions All lesions are remineralized (arrested lesions)	No active caries lesions Caries lesions exhibit signs of remineralization Risk factors present and/or inadequate	Active caries lesions (demineralization and/or cavitated lesions) No signs of remineralization Areas of plaque stagnation
Fluoride varnish	6–12 months	3–6 months	1–3 months
Restorative treatment	Maintain sealants as needed	Place/repair/replace sealants on at-risk surfaces ITR maintained	Place/repair/replace sealants on at-risk surfaces or initial lesions ITR placed and maintained Restorations to restore form and function while eliminating infection
Recare interval	6–12 months	3–6 months	1–3 months
Self-management goals	Twice-daily brushing with fluoride toothpaste Interproximal hygiene Appropriate goals to balance risk factors as needed	Twice-daily brushing with fluoride toothpaste Interproximal hygiene Additional sources of fluoride (SnF, NaF, CPP-ACFP) Xylitol (toothpaste, gum, wipes, etc.) Adjuncts: Arginine, Glylic, nHAP	Twice-daily brushing with fluoride toothpaste Interproximal hygiene Additional sources of fluoride (SnF, NaF, CPP-ACFP) Xylitol (toothpaste, gum, wipes, etc.) SDF application to arrest lesions

Rather than assigning a specific therapeutic intervention to the patient, clinicians focused on explaining the disease process and asking the patients and parents to select a goal. Through risk-based recare intervals, new goals were established with the intent of eliminating risk factors or balancing risk factors with protective factors (**TABLE**). By charting and tracking caries lesions with the ADA Caries Classification System,[10] caries lesion progression or arrest could be measured over time and recorded at the patient level.

During the collaborative, a pediatric practice in Southern California was successful in measuring the caries risk reduction of their patient population while also documenting individual caries risk reduction visible as remineralization with oral photography.

The practice generated population-level data regarding caries risk assessment and setting self-management goals using a combination of CDT codes and self-created dummy codes. By evaluating the data monthly with run charts, the practice was able to measure the effect of new disease management processes within the clinical system (**FIGURES 2–4**). This allowed for definitive discussions regarding the frequency of processes like caries risk assessment rather than the anecdotal "hunch" that caries risk assessment was occurring with every patient at every visit.

Patient-Centered Risk Reduction Leads to Remineralization

One patient, a high-caries-risk 6-year-old male, presented with initial active caries lesions on teeth Nos. 8 and 9. The initial caries risk assessment revealed a lack of routine effective oral hygiene, a cariogenic diet with frequent in-between-meal snacking on fermentable carbohydrate-rich foods and a misunderstanding of caries disease by the patient and parent.

Nutritional counseling and oral hygiene instruction were provided using effective communication and motivational interviewing techniques (while also engaging the parent). At the end of the first appointment, the patient elected to improve his oral hygiene at home and concentrate on areas in need of remineralization.

At the second visit, a visible improvement in gingival health was noted and the patient was congratulated for improving his oral hygiene. The patient was encouraged to set a new goal and he selected spitting out toothpaste foam after brushing, but not rinsing his mouth with water. This goal was especially important in order to increase the patient's exposure to low levels of fluoride, thus encouraging remineralization.[11]

During the second appointment, the patient's mother was interested in other ways to improve her son's oral health and asked about xylitol. She was receptive to providing xylitol gum while in the car and set her own goal of encouraging xylitol gum chewing during their daily travel.

At the third visit, the patient reported he didn't like the feeling of toothpaste on his teeth and had

abandoned the effort of leaving toothpaste foam residue in his mouth (he reverted to rinsing his mouth with water after nightly brushing, thus removing an essential ion for remineralization). Rather than attempting to correct the patient's lack of follow-through, motivational interviewing techniques were employed and the patient elected to try using fluoride mouthwash after brushing.

When asked about how successful the family was with chewing xylitol gum in the car, the son indicated they had run out of gum. Privately, the mother explained that she had to abandon the goal of encouraging her son's gum chewing because it made the car messy and her hand was always sticky after holding previously chewed gum. She agreed to continue chewing gum in the car when she was alone because she enjoyed it and understood it helped her own health. In actuality, the mother's continued use of xylitol gum could be considered as yet another protective factor for the family's overall oral health.[12]

At the following visit, the patient's oral hygiene remained improved and upon celebrating his clean teeth, he admitted it was hard to remember to use fluoride mouthwash after brushing. He also reported it was hard to find a flavor of mouthwash that he liked. Rather than impressing upon the patient that he needed to continue the practice of using fluoride mouthwash, motivational interviewing techniques were used while introducing the concept of trying a new "special toothpaste." The patient expressed his concern about taste and texture and was worried about rinsing his mouth after brushing. He agreed to taste test the "special toothpaste" in the office and after tasting a topical

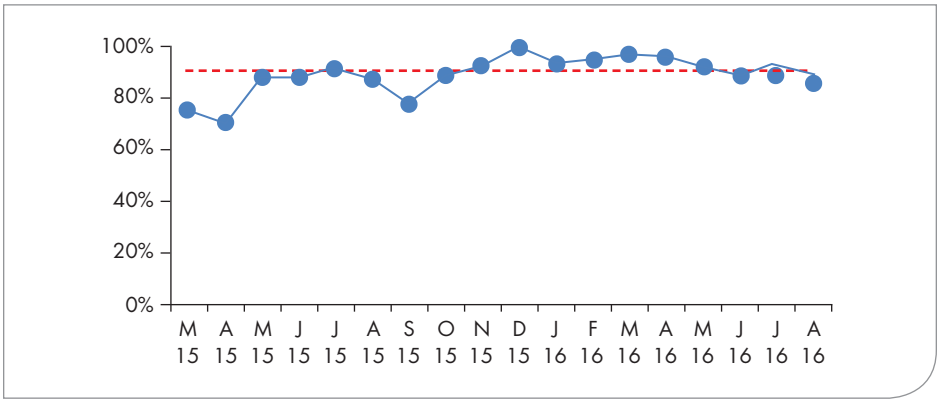

FIGURE 2. Run chart of process measure demonstrating percentage of patients with caries risk assessed.

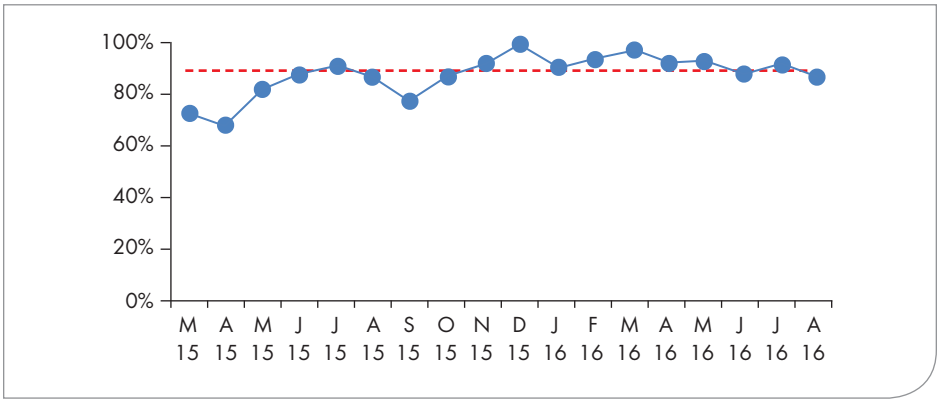

FIGURE 3. Run chart of process measure demonstrating percentage of patients with self-management goals.

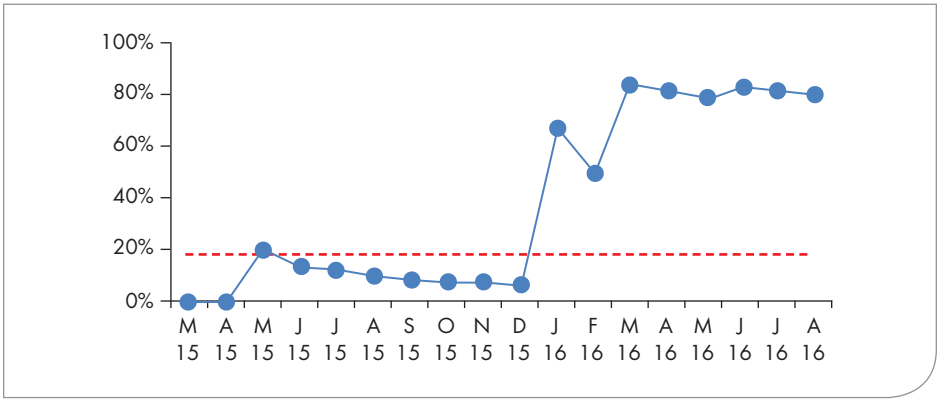

FIGURE 4. Run chart of outcome measure demonstrating percentage of patients with caries risk reduced.

casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) cream with fluoride, he agreed to use it at home. The instructions for use were modified such that the patient would apply the cream to his teeth with his finger and then use his toothbrush to move it around to all the surfaces.

At subsequent visits, the patient proudly reported his success using "my toothpaste." The initial lesions noted at his first appointment demonstrated increased luster and translucency, which were interpreted as remineralization[10] and clinical evidence that the patient's caries risk had decreased (**FIGURES 5** and **6**).

FIGURE 5. Initial presentation of a 6-year-old patient with high caries risk. Note the initial caries lesions present on the mesial of No. 8 and distal of No. 9.

FIGURE 6. The same patient returned 21 months later at recare with the initial caries lesions appearing inactive and remineralized.

The patient began orthodontic treatment with an orthodontist who was receptive to monitoring the initial lesions on the maxillary central incisors and encouraging the patient's continued use of CPP-ACP with fluoride. The pediatric dentist and orthodontist remained engaged with the patient and parent, supporting continued goal setting to improve diet and taking clinical photos whenever possible.

It is often said that changing patient behavior with motivational interviewing is "less like wrestling and more like dancing" with a patient. In the case of this 6-year-old patient, the experience was patient-centered and successful, likely because the changes were not forced upon the individual. Rather, he experienced the chance to explore alternatives when he was unsuccessful and everyone involved in his care was motivated to find a risk-reduction strategy that he could easily implement.

Conclusion

The practice of dentistry is gradually adopting quality improvement. There is still a need for a cost-effective measurement system that can be easily implemented on a routine basis in small dental practices.[2] Despite the challenges of adopting measurement, clinicians across the country are embracing quality improvement and witnessing an improvement in the oral health of individuals and practice populations. However, each practice will continue to face unique challenges specific to their own environment as they seek improved efficiencies while also striving to deliver patient-centered care. With the help of organizations such as the Dental Quality Alliance, the dental profession is making positive progress toward a paradigm shift in practice. More experience is required before a robust adoption of quality improvement is embraced, and the mindset of how dental diseases are treated needs to be considered as well. Nevertheless, innovative oral health care providers have the ability to improve oral health, document and report their outcomes and lead colleagues toward a new model of oral health care. ■

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