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ADVANCING THROUGH INNOVATION

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Utilizing graphic organizers to actively learn pediatric dental and oncology concepts

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1 | PROBLEM

Advanced training programs including pediatric dental residencies require students to apply fundamental concepts of dentistry in order to learn new, challenging concepts such as the management of oncology patients. Proper management of children's oral health during cancer treatment is critically important to ensure optimal systemic health and requires interprofessional collaboration.[1] However, learning new concepts can be difficult without prior, foundational knowledge. Furthermore, specialty programs require residents to learn immense amounts of material which poses a further challenge in retaining knowledge. Thus, it is critically important for teaching programs to not only provide opportunities for students to activate prior knowledge but also instruct in a manner that encourages reflective learning, which helps students retain knowledge and learn new concepts more effectively.

2 | SOLUTION

Graphic organizers, specifically K-W-L (Know, Want, Learn) charts, were incorporated into the collaborative learning activities between pediatric dentists and oncologists at the University of California, San Francisco pediatric dental residency program. Graphic organizers give opportunity for students to identify and connect the main ideas from a lesson, further enhancing the recall and retention of information.[2] This paper will highlight a particular graphic organizer called a K-W-L chart, which activates students' prior knowledge of a certain subject and promotes reflective learning. All tiers of education utilize K-W-L charts, including health professional students who require learning immense amounts of knowledge and strong critical thinking skills.[3] Seven pediatric dental residents were shown an example of a completed K-W-L chart and each was instructed to complete one soon after the oncology collaboration. By asking participants "*What do you already know*" and "*What do you want to learn*," instructors provide opportunities to activate prior knowledge and set goals, respectively. In addition, by asking the final question of "*What have you learned*," instructors allow for reflective learning to take place. These three design principles of activating prior knowledge, setting goals, and reflection create an active learning environment that encourages student engagement and increases motivation.[4] Finally, by implementing this activity, students better comprehend the importance of what they are learning instead of rote memorization, which is common when instructors expect large amounts of material to be learned.

3 | RESULTS

One student's K-W-L chart is shown, illustrating basic, prior knowledge that pediatric dentists play an important role in managing oncology patients (Figure 1). This resident set goals by showing the desire to learn clinical

K-W-L Chart: Pediatric Dentistry and Oncology Collaboration at University of California, San Francisco Pediatric Dentistry		
K What I **K**now	W What I **W**ant to Learn	L What I **L**earned
"I know very little about the relationship between oncology and pediatric dentistry, but understand that as pediatric dentists we have an important role to play in caring for these patients."	*"I want to know key signs, clinical symptoms, and radiographic findings that would alert us to suspect various cancers. I would also want to know important information to keep in mind when a patient has undergone cancer therapy, how that affects their dental treatment, and if there are any contraindications to treatment, especially after radiation therapy."*	*"The most important lesson was management of mucositis. I learned that magic mouthwash may cause patients to lose their gag reflex. The oncologist explained that older patients can dab magic mouthwash on mucositis lesions to ensure that the medication goes where intended."*

FIGURE 1 Pediatric dental resident's submitted K-W-L Chart.

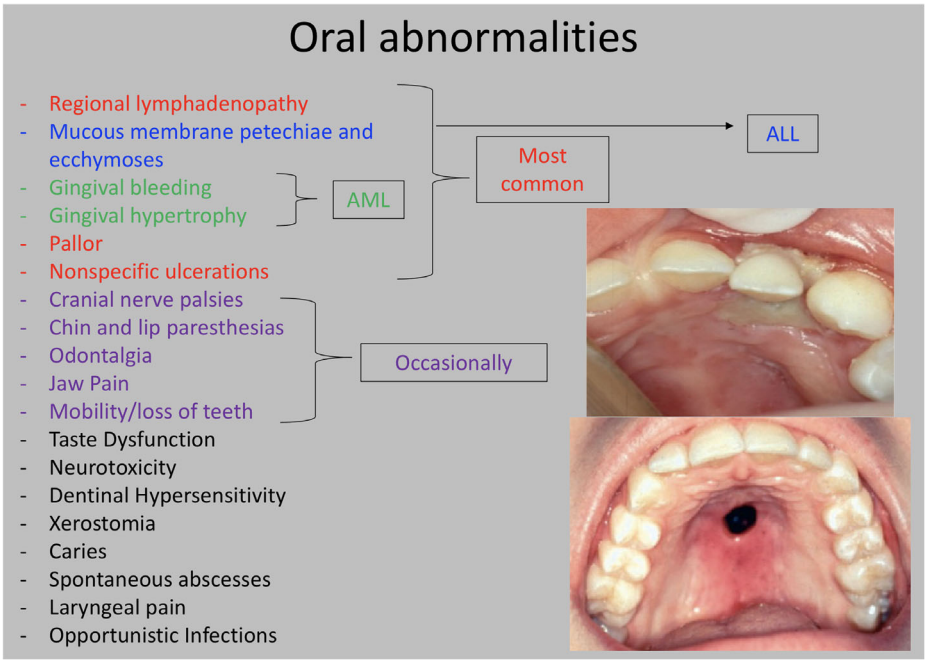

FIGURE 2 Oral abnormalities in patients with acute lymphoblastic leukemia (ALL) and acute monoblastic leukemia (AML). Illustrations show opportunistic infections in young patients with cancer. From Pediatric Dentistry:Infancy through Adolescence (6th edition, p. 155), Nowak et al., Copyright 2019 by Elsevier. Reprinted with permission.

symptoms and radiographic signs that manifest in cancer patients along with specific timelines and contraindications of dental treatment during cancer therapy (Figure 2). In addition, this individual reflected upon learning about the management of mucositis (Figure 3). As observed, K-W-L charts present simple and low-cost, yet powerful methods to assess students' prior knowledge, determine new topics which future cohorts may find beneficial, and ultimately, instill lifelong learning habits. Furthermore, this educational tool develops a more active approach to

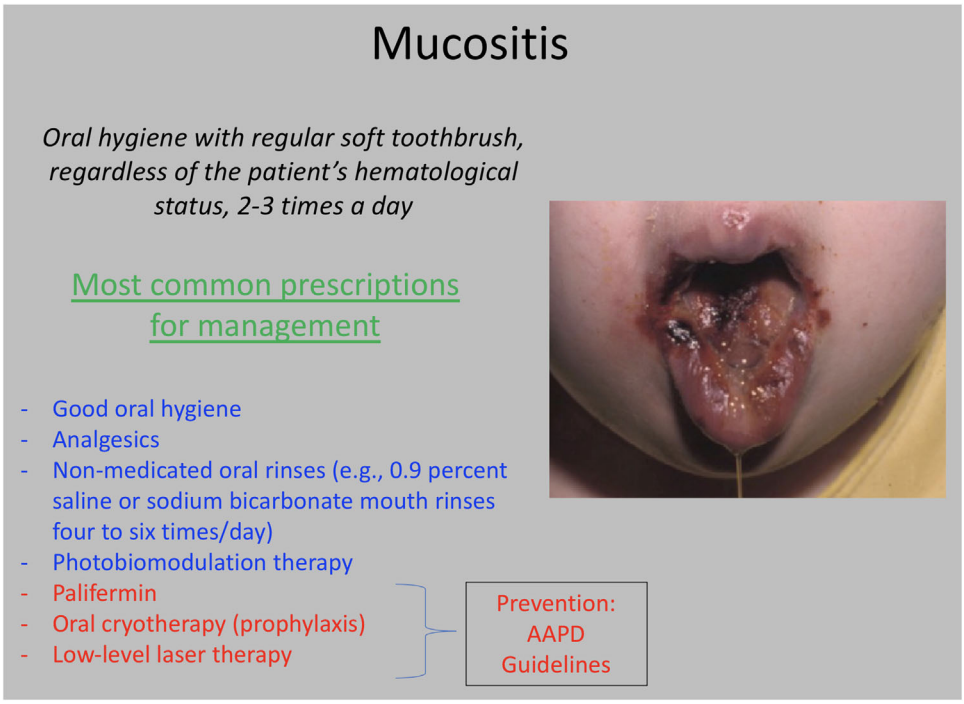

FIGURE 3 Oral management of mucositis as recommended by American Academy of Pediatric Dentistry (AAPD) guidelines. Illustration shows mucositis caused by chemotherapy in a young patient. From Pediatric Dentistry: Infancy through Adolescence (6th edition, p. 156), Nowak et al., Copyright 2019 by Elsevier. Reprinted with permission.

learning which when integrated with interprofessional collaborations, can produce greater achievements in learning and more determined student attitudes.[5]

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