**Critically Appraised Topic (CAT)**

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| **Project Team:**  |
| **9B**  |
| **Project Team Participants:**  |
| **Emelia Karkazis** |
| **Clinical Question:** |
| **In patients with neuromuscular disorders, will traditional or customizable oral self care devices be more effective in the patient’s ability to achieve adequate hygiene?** |
| **PICO Format:** |
| **P:** |
| **Patients with neuromuscular disorders**  |
| **I:** |
| **Customizable oral hygiene devices**  |
| **C:** |
| **Traditional oral hygiene devices** |
| **O:** |
| **Achieving adequate oral hygiene**  |
| **PICO Formatted Question:** |
| **In patients with neuromuscular disorders, will customizable or traditional oral hygiene devices be more effective in the patient’s ability to achieve adequate oral hygiene?** |
| **Clinical Bottom Line:** |
| **How can a dental professional customize oral self care devices in patients with neuromuscular disorders?** |
| **Date(s) of Search:**  |
| **10/13/20** |
| **Database(s) Used:** |
| **Textbooks, PubMed** |
| **Search Strategy/Keywords:** |
| **I searched for systematic reviews, meta-analyses, randomized controlled trials, and clinical trials relevant to the topic of oral hygiene in patients with motor deficits.**  |
| **MESH terms used:** |
| **Neuromuscular disorders, toothbrush, oral health care, devices, dental hygiene, cerebral palsy, stroke, motor deficits, disability** |
| **Article(s) Cited:** |
| **Textbook:****Darby, M. L., Walsh, M. M., Bowen, D. M., & Pieren, J. A. (2015). Dental Hygiene: Theory and Practice (4th ed.). St. Louis, MO: Elsevier/Saunders.** **Article 1:****Ikeda T, Yoshizawa K, Takahashi K, Ishida C, Komai K, Kobayashi K, Sugiura S. Effectiveness of electric toothbrushing in patients with neuromuscular disability: A randomized observer-blind crossover trial. Spec Care Dentist. 2016 Jan;36(1):13-7. Doi: 10.1111/scd.12141. Epub 2015 Sep 21. PMID: 26390226.****Article 2:****Rai T, Ym K, Rao A, P AN, Natarajan S, Joseph RM. Evaluation of the effectiveness of a custom-made toothbrush in maintaining oral hygiene and gingival health in cerebral palsy patients. Spec Care Dentist. 2018 Nov;38(6):367-372. Doi: 10.1111/scd.12334. Epub 2018 Oct 23. PMID: 30350870****Article 3:****Soncini JA, Tsamtsouris A. Individually modified toothbrushes and improvement of oral hygiene and gingival health in cerebral palsy children. J Pedod. 1989 Summer;13(4):331-4. PMID: 2534698.** |
| **Study Design(s):** |
| **Textbook: N/A****Article 1: Randomized controlled trial** **Article 2: Randomized controlled trial** **Article 3: Randomized controlled trial**  |
| **Reason for Article Selection:** |
| **Textbook: I chose the textbook because it gave a good summary of what customized oral self care devices are and how they are used.** **Article #1: I chose this article because it measured the effectiveness of a manual tooth brush and a toothbrush with added vibration/oscillation to remove plaque in patients with neuromuscular disorders.** **Article #2: I chose this article because it measured the effectiveness of a regular toothbrush versus a custom made toothbrush in patients with cerebral palsy. Cerebral palsy is a common neurologic disorder that causes a wide range of neuromuscular deficits, which could be relevant.** **Article #3: I chose this article because it measured the effectiveness of a regular toothbrush versus an individually modified toothbrush in patients with cerebral palsy. Unlike article #2, this study also evaluated the level of patient efficacy/ability to learn and improve their technique with the custom device.**  |
| **Article(s) Synopsis:** |
| **Textbook:****The text gives a useful guide to how we can maximize the ability of patients with neuromuscular disabilities to achieve adequate oral hygiene. There are several variables that we must consider when selecting a device. These include range of motion, grip strength, and skill level. Range of motion may include the ability to reach the mouth with the arms or hands, bending of joints in arms or hands, or degree of mouth opening. Grip strength includes if they can grasp, the preciseness of their grasp, and the length of time they are able to grasp. Skill level refers to the actual process of manually removing plaque from the teeth, including each quadrant and surface. This also requires a sufficient understanding and motivation to do so.** **Once the patient’s abilities and limitations are identified, it is then possible to customize oral self care devices to meet their needs best. For patients who are unable to reach their mouth, a ruler could be attached to the toothbrush or a floss holder could be used. The toothbrush could also be bent under a flame to better adapt to the oral cavity. Toothbrush head size is also important – the patient may require a smaller head to be able to reach the posterior teeth. For patients with weak grip strength, some remedies may include using a larger handle or grips. It also may be useful to use a lighter or heavier weight depending on what is easier for the patient to handle. One especially suitable option could be a bike handle, since they are easy to find, inexpensive, and come in a variety of shapes, sizes, textures, and weights. A universal cuff may also be a good option to position the arm or wrist in a splinted position so that the patient can more easily clean their teeth. Other oral are aids available include the Plak-vac Oral Suction Brush or The Surround Toothbrush, which cleans all surfaces of each tooth at once.** **Achieving adequate oral hygiene in patients with neuromuscular disorders is likely more attainable with the use of customized adjuncts and devices. Each patient is different and may require different interventions; it may be necessary to try several methods before the best method is found. Giving your patient the tools to accomplish good home care is essential to help prevent dental disease in the future.** **Article #1: “Effectiveness of electric toothbrushing in patients with neuromuscular disability: A randomized observer-blind crossover trial”****This study’s purpose was to evaluate the oral hygiene in patients with neuromuscular disabilities using electric toothbrushes versus manual toothbrushes. 28 patients were evaluated for 4 weeks – data collection included plaque status, periodontal pocket depths, oral status, salivary bacterial count, and toothbrushing time. The results were that patients using the electric toothbrushes had significantly shallower periodontal pockets and lower plaque status. However, time spent brushing was significantly shorter for patients using electric toothbrushes. No significant differences came from oral status and salivary bacterial count. The study concluded that electric toothbrushing is beneficial overall to help maintain oral health in patients with neuromuscular disabilities.** **Article #2: “Evaluation of the effectiveness of a custom-made toothbrush in maintaining oral hygiene and gingival health in cerebral palsy patients”****This study’s purpose was to compare the efficacy of manual versus565 custom-made toothbrushes in patients with cerebral palsy, a common neurologic disorder that results in a wide range of neurologic deficits. 30 patients of ages 6-18 were divided into two groups (normal toothbrush versus customized toothbrush). Plaque index and modified gingival index were recorded for a baseline. Patients were instructed to use their toothbrushes twice per day for 3 weeks, at which PI and MGI were recorded again. The patients in the custom toothbrush group were also instructed to perform muscle exercises with the modified toothbrush head. The results were significant, favoring the custom toothbrushes as the most effective dental device in removing plaque and promoting gingival health. Patients using the regular brush experienced an 8.34% drop in plaque index and a 14.51% drop in modified gingival index. Patients using the custom toothbrushes experienced a 31.55% drop in plaque index and a 30.23% drop in modified gingival index. The study concluded that custom made toothbrushes increase a patient with cerebral palsy’s ability to achieve adequate oral hygiene.** **Article #3: “Individually modified toothbrushes and improvement of oral hygiene and gingival health in Cerebral Palsy children”****This study aimed to measure the effectiveness of regular toothbrushes and individually modified toothbrushes in children with motor deficits caused by cerebral palsy. 28 patients participated. The patients were monitored using either a regular or individually modified toothbrush at 4 separate dental visits. It was found that the individually modified toothbrushes showed a significant reduction in plaque after use. Measurement was done by evaluating the percentage of surfaces cleaned while brushing. Plaque index was recorded for each patient at 7, 21, and 35 days into the study. Lastly, the patients were evaluated for their efficacy of correctly using the modified toothbrushes, and the ability significantly improved at all visits. The study concluded that the individually modified toothbrush is an effective way to improve oral hygiene and gingival health in patients with cerebral palsy.**  |
| **Levels of Evidence:** (For Therapy/Prevention, Etiology/Harm) See <http://www.cebm.net/index.aspx?o=1025>[ ]  **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)[x]  **1b** – Individual RCT[ ]  **2a** – Systematic Review of Cohort Studies[ ]  **2b** – Individual Cohort Study[ ]  **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research[ ]  **4a** – Systematic Review of Case Control Studies[ ]  **4b** – Individual Case Control Study[ ]  **5** – Case Series, Case Reports[ ]  **6** – Expert Opinion without explicit critical appraisal, Narrative Review[ ]  **7** – Animal Research[ ]  **8** – In Vitro Research |
| **Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews**See article **J Evid Base Dent Pract 2007;147-150**[ ]  **A** – Consistent, good quality patient oriented evidence[x]  **B** – Inconsistent or limited quality patient oriented evidence[ ]  **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening |
| **Conclusion(s):** |
| **Based on the information I have found, there is limited evidence to support that utilizing custom oral hygiene devices will certainly improve manual biofilm control and promote gingival health in patients with multiple sclerosis. However, it is important to remember that each patient is different and may benefit from different oral health care strategies. Despite the limited available evidence, it is likely that adapting a manual toothbrush to meet the needs of a patient will help them to improve their efficiency and efficacy of cleaning their teeth at home. It seems rather clear that using a larger handle for a person who has weak grip or an elongated toothbrush shaft for a person with limited arm lifting/movement will allow them to do a better job at removing plaque. The most important aspect is to communicate with patients effectively to determine which methods of oral home care work best for them and to readily provide assistance and encouragement to keep improving.**  |