Dental Caries in Underserved Communities in New York in 2018 by Ruaa Jannan Farhat

New York University Professor Julia Keefer
“Years ago, it had occurred to me that Darwin and Nietzsche agreed on one thing: the defining characteristic of the organism is striving.”
— Paul Kalanithi, When Breath Becomes Air

Dental caries has been a plague on human dentition for thousands of years. Attempts to explain its etiology have varied greatly among civilizations with the Sumerians in 5000BC blaming “tooth worms,” Pierre Fauchard using microscopy to claim no evidence of such worms, all the way to Keyes and Fitzgerald using hamsters as animal models to demonstrate the etiologic role of streptococci in dental caries. We currently understand dental caries as a multifactorial disease requiring a susceptible host (the tooth surface), a substrate (fermentable carbohydrates), and oral bacteria. As a multifactorial disease, it requires a multidisciplinary approach in its control. We can instruct our patients in how to become a less susceptible host through proper oral hygiene, we can provide dietary counseling specific to each patient and their lifestyles, and in the future, we may develop more efficient methods for altering oral bacteria. There is a constant struggle between what is considered our healthy microbiome and the microbiome of disease, both striving to be the victor organism. The problem I will address is the current prevalence and incidence of dental caries among underprivileged school aged children in New York City. I have decided to focus on the underprivileged as they are disproportionately affected by dental caries when compared to children from a higher socioeconomic status. They are not only more likely to present with visible dental caries, they are more likely to suffer from dental abscesses and subsequent loss of teeth resulting from dental caries. This is a fact that can be researched, investigated and proven by conducting surveys in pediatric dental clinics as well as emergency clinics. I understand that deciding to focus on underprivileged children may be viewed as controversial by some, since children whose caretakers fall under a higher socioeconomic category are also affected by dental caries. However, I believe that it is important to view the issue at its most extreme. Dental caries may predominately affect low income children, and it may also affect children on the other end of the spectrum, but one of these groups is without a doubt better equipped to handle an emergency situation should it arise. The less privileged as well as recent immigrants are more likely to avoid pursuing medical treatment for financial reasons, are less likely to understand the implications of postponing care, and most importantly, are more likely to postpone care until the situation has become urgent. At its best dental caries is a nuisance that may lead to lost days at school or work, but at its worst it is fatal. In New York City with our abundance of resources and our advanced understanding of how to manage this disease, no child should ever have to suffer from the serious complications of dental caries, and I truly believe the children most at risk of this are those less fortunate.

Throughout this research paper I will explain the different methods of controlling dental caries through prevention as well as intervention. In order to properly explain the various methods of control it is important to understand the etiology of the disease as well as its different stages of progressions. What will be explained is that the different preventive and interceptive methods that can be employed to control dental caries depend on the extent of the decay. The treatment options and approaches by a clinician are primarily guided by the classification of a cavity. The dental cavity classification system that will be used in this paper is the American Dental Association’s
Caries Classification System, the ADA-CCS. As shown in Figure 1, the ADA-CCS provides a system which ranges from clinically unaffected tooth structure to extensively cavitated advanced lesions.

<table>
<thead>
<tr>
<th>Clinical Presentation</th>
<th>Initial</th>
<th>Moderate</th>
<th>Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>No clinically detectable lesion.</td>
<td>Visible signs of enamel breakdown or signs the dentin is moderately demineralized.</td>
<td>Enamel is fully cavitated and dentin is exposed. Dentin lesion is deeply/ severely demineralized.</td>
<td></td>
</tr>
<tr>
<td>No clinically detectable lesion. Dental hard tissue appears normal in color, translucency, and gloss.</td>
<td>Visually noncavitated</td>
<td>Established, early cavitated, shallow cavitation, microwarning</td>
<td>Spread/dissemintated, late cavitated, deep cavitation</td>
</tr>
<tr>
<td>Other Labels</td>
<td>Infected Dentin</td>
<td>Appearance of Occlusal Surfaces (Pit and Fissure)</td>
<td>Accessible Smooth Surfaces, Including Cervical and Root</td>
</tr>
<tr>
<td>None</td>
<td>None</td>
<td>ICDAS 0</td>
<td>E0° or E0° - No radiolucency</td>
</tr>
<tr>
<td>Unlikely</td>
<td>ICDAS 1</td>
<td>ICDAS 1</td>
<td>E1° or RRA1° - Radiolucency may extend to the dentinoenamel junction or outer one-third of the dentin. Note: radiographs are not reliable for mild occusal lesions.</td>
</tr>
<tr>
<td>Possible</td>
<td>ICDAS 2</td>
<td>ICDAS 2</td>
<td>E2° or RRA2° - Radiolucency may extend into the middle one-third of the dentin.</td>
</tr>
<tr>
<td>Present</td>
<td>ICDAS 3</td>
<td>ICDAS 3</td>
<td>D1° or RRA3° - Radiolucency extends into the inner one-third of the dentin.</td>
</tr>
<tr>
<td>ICDAS 4</td>
<td>ICDAS 4</td>
<td>D2° or RRA4°</td>
<td></td>
</tr>
<tr>
<td>ICDAS 5</td>
<td>ICDAS 5</td>
<td>D3° or RRA5°</td>
<td></td>
</tr>
<tr>
<td>ICDAS 6</td>
<td>ICDAS 6</td>
<td>D4° or RRA6°</td>
<td></td>
</tr>
</tbody>
</table>

For an oral health care provider, it is critical to have a thorough understanding of the classification of dental caries because it is the single most important factor in deciding the treatment options for a patients’ lesion. Due to the significance of this classification, I would like to outline certain aspects of the ADA-CCS which are clinically relevant and often serve as the cut-off point between preventative and interceptive therapy.

The primary deciding factor between a non-invasive and invasive approach to the treatment of dental caries is whether or not the lesion has cavitated. This is either evaluated visibly for the occlusal surfaces of teeth, or radiographically for lesions which occur approximally. Once a lesion has cavitated, there is currently no definitive treatment option other than an invasive surgical intervention. This intervention may be a simple dental restoration where the dental caries is removed and replaced with a restorative material, it may be endodontic therapy where the pulp tissue is removed, or in extreme cases it may be extraction. The goal of dental public health professionals is reducing the number of lesions which become cavitated. Once a lesion requires surgical therapy the patient must be seen by a dentist and the cost of treatment increases exponentially. In dentistry, an ounce of prevention is worth a pound of treatment. Limiting the progression of a carious lesion to a point where remineralization of affected structure is a viable treatment option and allows the opportunity for treatment that is non-invasive, extremely affordable, and practical in a non-clinical setting.
In order to understand the methods currently employed for remineralization therapy, it is important to have a comprehensive understanding of dental caries. Dental caries is not a mysterious disease, its etiology is very well understood from both a microbiological and practical perspective. The bacteria involved have been studied and classified, factors that increase or decrease their self-sustainability have been outlined in countless dental textbooks, and definitive methods of preventing dental caries are well known to oral health care providers. There is no mystery in the cause of the disease but there is some mystery in its prevalence. The majority of diseases which health professionals have such a comprehensive understanding on have either been eradicated or are currently being vaccinated against. Since we cannot vaccinate against the ingestion of sugar, and cannot selectively attack the bacterial culprits, the disease must be treated through other means. Ideally, educating our patients in oral health care would be enough to stop them from succumbing to dental caries, but we know this is not sufficient. It is important to develop a set of tools and regimens not only to prevent dental caries, but to treat it as well.

**Understanding the Community**

The New York University College of Dentistry Pediatric Clinic asks on the patient intake form two questions which are relevant to this discussion; “is the child a recent immigrant?” and, “is the child’s caretaker considered to be from a low socioeconomic status?” From my own personal experience at the clinic, I can provide anecdotal evidence that those children who were either recent immigrants, or of low socioeconomic status presented with higher incidences of dental caries as well as a higher number of advanced lesions. In order to accurately assess the claim that these children are truly at an increased risk of dental caries, the results of their responses to these intake questions could be compared to the treatment plans formulated following their dental examination. By using the intake forms, no additional time or effort is required from the patient’s family which eliminates one potential obstacle. The patient’s privacy could also be protected since none of their personal health information is required to relate the responses to these two questions and their treatment plans. The treatment plans themselves are conducted in steps, a dental student or pediatric resident performs the initial examination and formulates an initial treatment plan based on their findings. These findings are then presented and thoroughly reviewed by a pediatric dentist who either confirms or modifies aspects of treatment. I believe having the treatment plan confirmed by two separate professionals would also serve to increase the internal validity of the survey. Most importantly, since all these steps are taken for each and every patient of the clinic, no additional effort is required which should increase the likelihood of patient and guardian acceptance. This research would help prove that it is the unfortunate in our society who are predisposed to dental caries and who are more likely to benefit from an aggressive preventative and educational campaign. Following the completion of this research, I would also like to interview members of the pediatric dentistry team in order to assess their opinions and gain their expert advice on how to best modify my proposed plan.

Unfortunately for many individuals, dental care has become a luxury. The lack of dental insurance combined with an inability to afford regular dental care leads many to forgo dental treatment unless they need it. This is a major obstacle in combatting dental caries, a disease which can remain asymptomatic for years before a patient begins to experience any symptoms. The disease process can continue on slowly eroding the dentition with the patient being none the wiser. Once symptoms begin to appear, they can progress rapidly until a point where patients are forced to check
themselves in for emergency care, a delayed and expensive response to a preventable problem. Once the disease has reached this point, the cost of treatment rises exponentially, especially in cases where general anesthesia is now required (Kanellis 2). With our increased understanding and knowledge, the number of dental related problems requiring emergency room visits should be decreasing, but in New York state, the number of young children increased 32% from 2004 to 2008 (Pettinato 7). This places a tremendous burden directly on our patients who are forced to miss school and work, and on our government funded dental programs which now must pay, on average, 10 times more for treatment than the cost of preventive care delivered in a dentist’s office (Pettinato 3).

**Dietary Modifications**

Gluttony, hedonism and a generation raised on instant gratification. Three barriers between an individual and a healthy lifestyle. Busy lifestyles and the need for convenient sources of food lead us to the unhealthy eating habits that accommodate our way of life. While the detrimental effects of a poor diet are well known a diet free of fast food and sugary snacks does not fit in the daily regimen of some individuals. As health care practitioners, it is important to not only convey the importance of a healthy diet and how it effects all facets of our health but to also help our patients towards theirs goals in any way possible. The most important and most effective intervention we can provide is education. After years of schooling and being surrounded by others who are of like mind and who are receiving the same instruction it is easy to forget that the knowledge we have gained that is common amongst our peers, is not necessarily common knowledge. An example from an oral health perspective is that it can be considered common knowledge that sugar leads to cavities. It is not common knowledge that the total amount of sugar ingested is not the most important factor when assessing the risk of developing caries. Oral health care professionals understand that it is the frequency of ingestion that matters more than the absolute amount of sugar. With this knowledge, we can explain to the patient that it is not necessary for them to completely eliminate sugar from their diet to control dental caries, but that it would be beneficial for them to consume their sugary snacks in less time. This differentiation allows us to find a compromise with our patients who may find it impossible to switch to a sugar free diet. These compromises are key to building a sustainable health regimen that does not interfere with other aspects of our patients’ lives.

Tailoring my solution to address this community directly requires an in-depth analysis of their thoughts and values. It is important to try to understand what barriers to care our patients face. Even in the low-income community, it may not be a solely financial impediment. Many of the parents and caretakers who will be seen may have obligations and responsibilities they believe preempt dental care. For those living paycheck to paycheck it may seem impossible to afford dental treatment, and for those with insurance it may be impossible to take the time off work. Examining the fast-paced no break lifestyle of our patients can help us understand why many of them face issues with dental diseases. The temptation of a sugary snack while working late, the convenience of a quick meal when hurrying home after a long day, and the social nature of sipping at sweet coffee drinks, or eating ice cream with loved ones is often enough to overwhelm the desire for oral health. An oral health professionals, responsibility is to educate the patient in ways to maintain their health while accommodating their lifestyles. The lifestyle of our patients often dictates their diet and their hygiene habits, changing these lifestyles may not be an option. Taking the time and
An effort to understand our patient’s lifestyles can help us create tailor-made intervention plans for them based on their current lifestyle habits. One of the tools often used for this is the 24-hour dietary recall shown below. The patient is asked to report everything they have eaten and the approximate time they ate over the last day. Expanding this idea and having patients keep a journal for one week of their daily eating habits would be an indispensable tool in guiding them towards a healthier lifestyle. Incorporating this into our outreaches would require assistance by the guardians of the patients. I would like to provide 24-hour recall forms for each child as well as a cariogenic index food guide highlighting high risk dietary items.

<table>
<thead>
<tr>
<th>Meal/Snack</th>
<th>Food Eaten &amp; Time Eaten</th>
<th>Beverage</th>
<th>Where &amp; With Whom</th>
<th>Notes (feelings, hunger, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Indicate time of day)</td>
<td>(don’t forget type of bread &amp; condiments eaten if applicable)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“[When] you treat a disease, you win [or] you lose. [When] you treat a person, I guarantee you, you’ll win, no matter what the outcome.”
—Patch Adams

New York University’s College of dentistry offers every dental specialty under one roof. Patients are referred between each department effortlessly, and all departments have access to the same electronic medical and treatment history record. The increasing specialization of health care professionals comes with both advantages and drawbacks. Seeing a specialist affords patients a practitioner with more experience, who can make better diagnoses with less mistakes. On the other hand, this requires patients to be seen by multiple providers, requiring more of their time and more fees. Another flaw we may be seeing with increased specialization relates to the health care provider only handling the patients concerns or needs that are within said specialty. This compartmentalization of the patient rather than viewing the patient as a whole can occur from simply falling into bad habit, or due to the lack of communication among healthcare providers in different fields. Addressing dental caries as a team requires a coordinated effort between dentists, dental hygienists, nurses, registered dieticians and even teachers. Each professional has a role to play, and each profession has a specific skillset that can be used.

**The Topical Effects of Dietary Intake**

Nutrients have topical & systemic effects that can be primary or secondary factors in the development of dental caries. The caries process includes a constant and cyclic repetition of demineralization and remineralization. The pH of the oral cavity is normally neutral, with a range of about 6.2-7.0. Upon the intake of fermentable carbohydrates (this includes all sugars, natural or processed, and cooked or processed starches), the plaque biofilm pH immediately begins to drop as the bacteria within the plaque matrix carbohydrates are metabolized, producing acidic byproducts. Enamel begins to dissociate or dissolve at a pH of between 4.5 and 5.5. The more frequent the intake of these fermentable carbohydrates, the more resulting damage to hard tooth structures. It takes between one and two hours before homeostasis is reestablished following each exposure. This is why it is more important to decrease the frequency of consuming these fermentable carbohydrates, rather than the total amount.

The reason our oral cavities are able to recover from this process which many of us call an “acid attack,” is that our saliva acts as a natural buffer. In addition to bringing the overall pH back up, the saliva contains minerals such as calcium, phosphorus, and fluoride which can intercept a forming cavity by the topical reuptake of these ions back into the tooth structure. This regeneration, also known as remineralization, is only beneficial up until cavitation of the tooth occurs. At this point, the tooth structure must be surgically restored. Conversely, a diet rich in fatty acids can inhibit the growth of unwanted oral microorganisms, reduce retention of food to tooth surfaces, and coat the tooth surfaces, preventing penetration of acid to the enamel. Consumption of fluoridated water will incorporate fluoride ions into the biofilm which in turn can be absorbed into the structure in the event of an acid attack.
The Systemic Effects of Dietary Intake

Although less often discussed, the systemic effects of dietary intake also play a role in oral health, especially during development. A deficiency in naturally occurring fluoride, especially in the development stages, can lead to compromised enamel and in turn, a higher risk of dental caries. In more serious cases, this deficiency can lead to a systemic effect of osteoporosis (Kleerekoper 2). In Table 1 [Sheeta 1] includes more nutrient deficiencies and their consequential result on oral structures.

<table>
<thead>
<tr>
<th>Malnutrition</th>
<th>Effect on oral structures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein/calorie</td>
<td>Delayed tooth eruption, Reduced tooth size Decreased enamel solubility, Salivary gland dysfunction.</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>Decreased epithelial tissue development, Impaired tooth formation, Enamel hypoplasia.</td>
</tr>
<tr>
<td>Vitamin D/Calcium phosphorus</td>
<td>Lowered plasma calcium, Hypomineralization Compromised tooth integrity, Delayed eruption pattern Absence of lamina dura, Abnormal alveolar bone patterns.</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>Irregular dentin formation, Dental pulp alterations Bleeding gums, Delayed wound healing, Defective collagen formation.</td>
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Table 1. Effect of nutritional deficiencies on oral structures

The Registered Dietician’s Role in Oral Disease Prevention

It has been established that a multifactorial approach must be taken to attain and maintain optimal oral health. While dental hygienists are versed in nutritional studies and its role in the process of caries development, many patients require a more in-depth and continuous process of care. Integration of registered dieticians into the dental setting would allow patients access to a new source of knowledge and information as well as another caring health care provider. Currently at the college of dentistry, a nutritionist is available for patients who require a dietary consult and analysis. Many patients benefit greatly from having a sit down with a nutritionist who goes over their diet and provides insight as well as feedback. For the adult patient, the nutritionist is available by appointment, but for the pediatric population at the school, often times there is a nutritionist on the clinic floor approaching parents and patients directly and offering their services. For a patient population where time is of the utmost importance, having a nutritionist available immediately makes a big difference. I would like to incorporate a nutritionist on hand at all dental outreaches. Having a nutritionist explain the detrimental effects of a poor diet not only on the dentition but on a patient’s overall health would be a huge motivating factor.

The importance of a balanced and nutritious diet for overall health is understood by the medical community as well as most patients. Many patients (and professionals alike) have, at the very least, a rudimentary understanding of what is and what is not healthy eating. The issue faced by most is incorporating healthy eating into their lifestyle. Providing patients access to a registered nutritionist would be a valuable resource not only for their oral health but for their overall wellbeing. Patients would have the ability to have their questions answered accurately and would also be exposed to guidelines to maintaining healthy eating habits for themselves and those under their care. In regard to the underprivileged youth, the majority of their diet is likely not under their control. Schoolchildren have their meals prepared for them either by their educational institution or by their caregivers at home. While it would be beneficial to also educate the children we are treating, I would like to focus my nutritional information on the children’s caregivers and
educators. In order to gather information directly from a trained nutritionist I arranged for a skype interview with a nutritionist from my home city. Linda Shawar is a nutritionist as well as a kindergarten teacher in Edmonton Alberta and was willing to answer some of my questions regarding barriers parents may face when trying to feed their children a healthy diet. I tried to use my interview with Mrs. Shawar to gather some tips for maintaining a healthy lifestyle, to dispel some myths surrounding nutritious snacks, and to ask how she felt a nutritionist would be beneficial to these children. My interview with Mrs. Shawar strengthened my opinion that a nutritionist is a valuable asset to have as a member of our outreach team. Educating our patients on the value and importance of a balanced diet brings them a step closer to overall health. While the focus of my outreach is reducing dental caries in the underprivileged community these go hand in hand. Ideally, we will be able to improve the children’s overall health while having a significant impact on the prevalence of dental caries.

The Use of Fluoride Varnish

An elegant solution is one which is effective and requires minimal effort on the part of the patient. An agent which gives nature an edge in combatting disease. In dental terminology nature is our bodies’ constant cycle of remineralizing areas effected by dental caries, the edge we can give it is through the use of fluoride treatment. We treat the patient and the symptoms but we are allowing nature to cure the disease. The use of this technique along with educating our patients on the importance of proper dental care is the key to reducing the deleterious effect dental caries has on society in the near future.

The advancements modern society has made in understanding the challenges and illnesses which plague us have been astronomical in the last fifty years. For many diseases, we are able to isolate the exact etiologic factors responsible for their initiation and progression. The risk factors and protective mediators have been isolated down to a microscopic level. Because of these advancements we have been able to conclusively prove that fluoride is a safe and efficacious agent that can be used against dental caries. Fluoride has been administered to the public through various modes of delivery but the most effective has been community water fluoridation. According to the Centers for Disease Control and Prevention, “the fluoridation of water has been one of the ten great public health achievements of the 20th century” (ADA 1). The benefits of fluoride, both topically and systemically have been researched extensively and proven to be of use in improving patients’ oral health. The American Dental Association states that community water fluoridation alone reduced the incidence of tooth decay in both children and adults by “20-40%.” (ADA 1) This does not include the benefits of alternative sources of fluoride such as dentifrices and oral rinses. Unfortunately, even with the vast amount of evidence and consensus among oral health professionals, fluoride use is met by resistance by some members of the public. Despite the successful use of fluoride during the last century, many patients are still concerned about its safety, hence the controversy surrounding its use. Because of the benefits of fluoride, as well its near ubiquitous use it is important for all members of the oral health community to not only be well informed on the risks and research regarding fluoride use, but also to ensure that the benefits are properly explained to patients.

In order to properly explain fluoride use to our patients, it is important to understand the underlying mechanism with which fluoride ions are incorporated into dentition. Fluoride intake
during development is directly incorporated into the enamel lattice starting at the dentinoenamel junction in the form of fluorapatite. This mechanism of fluoride uptake is extremely beneficial for those who receive community water fluoridation or fluoride supplements during development. However even as a clinician practicing in New York we will be exposed to many patients whom may have grown up without fluoridated water or fluoride supplements. Luckily our teeth are constantly in a state of demineralization and remineralization, this fluctuation allows fluoride to benefit even those with a fully erupted and developed dentition. During remineralization fluoride ions are incorporated into enamel through the substitution of hydroxyl ions to form fluorapatite. Fluorapatite incorporation leads to an enamel matrix which is now more resistant to acid attack and dissolution.

![Figure 1. The uptake of fluoride and incorporation as fluorapatite.](image)

One of the biggest reservations the public has regarding fluoride revolves around the safety of its consumption. A systematic review commissioned by the Australian National Health and Medical Research Council, which drew from seventy-seven non-duplicate citations, found that other than potential dental fluorosis, there was no association with adverse effects and water fluoridation. The review specifically analyzed the incidences of fracture, osteoporosis, and cancer in relation to community fluoride levels. Of these three major adverse outcomes, none was found to be associated with fluoride consumption. Regarding fractures the review states, “optimal fluoridation levels may lower overall fracture risk vs no fluoridation.” (Yeung 42). The review also examined general adverse effects and was unable to find a single association between water fluoridation and any adverse events. Systemic reviews such as this are valuable tools when it comes to educating patients. These are the highest levels of evidence available and allow clinicians to assure those under their care that the current research supports the statement that optimal levels of water fluoridation are safe as well as beneficial for consumption.

To properly inform the public regarding fluoride consumption, it is important to explain the risk of fluorosis, its prevalence, and the effect it may have on an individual’s dentition. One of the most severe supposed side effects of fluorosis is the proposed decrease in intelligence of children and adolescents raised in areas with high levels of fluoride. While this has been disproven by multiple studies, the rumour is continuously used by those who advocate for the removal of fluoride from community water sources. A recent study conducted in New Zealand compared over
1000 participants controlling for potential confounding factors such as sex, socioeconomic status, breastfeeding, and birth weight. The study concluded that there was “no statistically significant difference in IQ between participants who had or had not resided in areas with community water fluoridation, used fluoride toothpaste, or used fluoride tablets.” (Broadbent 2). However as clinicians it is important to be able to explain to patients why it is possible other research articles state that there is a link between lower levels of intelligence and areas with high levels of fluoride. These claims are often made by researchers who have failed to control for confounding variables such as socioeconomic status and access to structured education. These are factors which are associated with lower levels of intelligence regardless of fluoride consumption. While this is what many may consider the most extreme potential side effect of fluoridation, it is not the most common and is not scientifically evident. Many patients have valid concerns regarding the displeasing aesthetic appearance of dental fluorosis.

As show in Figure 2, The manifestation of dental fluorosis can be aesthetically displeasing to patients and in the past there have been limited options to completely resolve this issue without expensive fixed prosthodontic work, such as ceramic veneers. Another method of treatment was through bleaching however this had limitations in efficacy from an aesthetic perspective and commonly caused “gingival irritation, tooth sensitivity, and sometimes even reversible pulpitis.” (Gugnani 178). However recent developments in treatment options have given clinicians the ability to improve a patient’s aesthetic appearance relating to dental fluorosis. A recent development in the use of resin infiltrate to treat fluorosis was noted to have had an “immediate improvement in esthetics.” (Gugnani 178). While the fluorosis stains are not completely eliminated the resin infiltrate treatment affords clinicians an alternative treatment to dental fluorosis which is minimally invasive. This introduces a treatment option for patients who are still developing, patients who are averse to aggressive prosthodontic treatment, as well as patients who may not be able to afford the price tag associated with ceramics. The development of an alternative treatment provides dental professionals who advocate for fluoride use another talking point and a strong defense when debating the possible side effects fluoride may have. The use of resin infiltrate to treat caries has also been gaining traction in the dental community. It is described as a nonsurgical and conservative treatment option for clinicians to remineralize caries which have not yet penetrated the dentinoenamel junction.

Figure 2. Brown fluorosis stains before and after being treated with resin infiltrate.
For patients to accept fluoride as a therapeutic agent, it is the responsibility of the dental professional to educate and inform all those under their care. This begins with an evidence based approach to treatment and an explanation to the patient, in layman’s terms, why the treatment being suggested is in their best interest. It is also crucial that patients are educated about the current risks and benefits of fluoride as currently understood and supported by the most recent research available. With patients accepting fluoride as a valid and effective agent for prevention of demineralization as well as an effective tool for remineralizing incipient lesions; combined with appropriate treatment for any side effects caused by fluoride, the public perception of fluoride can be improved.

The Importance of Oral Hygiene Instruction

While barriers to health can include a lack of access to care the easiest barrier to solve is one that is solely in the hands of the patient. For many diseases and disorders the patient does not hold the ability to control them completely without professional assistance, for dental caries this is not the case. A proper home care regimen and well-informed patient can almost completely eliminate the disease. Educating our patients on the steps they can take which do not require any added expense on their part while informing them that financial stability and success is not necessary for the preventative portion of dental care can serve as a powerful motivator for them to modify their dietary and oral health habits. This can also motivate them to bring themselves to a stage in their oral health where they can be brought back to a standard recall schedule. For dental caries the most obvious solution that does not hold a heavy financial burden is appropriate homecare and dietary counseling, that is why I would like to focus heavily on oral hygiene instruction and educating patients and parents alike.

This approach to dental care has been taken before. Almost all dental schools send their dental students and dental hygiene students out on outreaches to screen the less fortunate and provide complimentary fluoride treatment. When they are sent out to see school children they even do their best to provide oral hygiene instruction through the use of props and puppets. Even these minor treatments and cursory oral hygiene instructions have been an immense help to the students who are seen annually. The students who show positive clinical findings are sent home with a paper informing their parents that immediate dental treatment is needed. I would like to address this problem similarly but with some changes. Implementation of lessons taught during these projects into daily practice would be an easy and indispensable addition. Further enforcement of oral home care would help developing children to better adapt these habits into their daily lives, in and out of school, regardless of whether or not oral hygiene reinforcement exists in the home. After lunch, teachers could escort the class to the bathroom and supervise as the children brush and floss. In older grades, a five to ten-minute lunch extension could be given for students to brush before class. Students spend a large part of their day at school and are heavily influenced by their teachers. Having an authority figure constantly reminding them how important oral hygiene can help replace the lack of instruction some children are given from parents. The other benefit of having this instruction given through an institution is it allows for standardization.
As part of my community outreach initiative I would like to provide all educators in the New York City area with educational aids and instructive tools for their classrooms. I will be creating three separate brochures for oral hygiene instruction, one for children up to the age of 5, one for children aged 5-14, and one for adolescents and adults. Having separate brochures will allow me to give specific instructions based on the developmental status of my patients. Other than oral hygiene instructions I will also be including signs and symptoms teachers and parents should be aware of. These brochures can serve as a simple and effective method to distribute information to teachers who in turn can help educate their students.

The location of my outreaches will continue to be elementary schools in the New York City area focusing predominantly in neighborhoods with a lower median income. One week before each outreach a newsletter will be sent home with the students inviting family members and caregivers to attend if possible. The outreaches will begin with an introduction to dental caries tailored to the target age group, followed by a distribution of brochures for caregivers. We will then have an oral hygiene instruction presentation also tailored to the target age group and finally a dental screening for each child present. Similarly, to the current outreaches our findings from the dental screenings will be recorded and sent home with the students, what I would like to change is what is done immediately at the time of the outreach. I believe incorporating interventional treatment at the time of the outreach with no additional cost or time commitment from the caregivers would make an immense difference in the overall oral health of the students.

While it can’t be expected to have all the parents and caregivers present for the presentation and screenings I believe sending out a newsletter outlining what is planned would motivate many to attend. The letter could be simple and to the point and sent home with the children one week prior. As additional motivation children can be rewarded for bringing the letter back on screening day and trading it in for a small prize. An example of the letter could be:
Dear Parents or Guardian:

Oral hygiene is important for the overall health of your child. In an effort to assist your child in achieving and maintaining optimal oral health our team will be visiting their classroom on (Insert date and time here). During this visit we will be giving an interactive presentation on oral hygiene, a dental screening, and also providing some preventative treatments tailored to your child’s needs. All children will also receive goodie bags containing new toothbrushes, toothpastes, and floss. We invite you to attend this visit your presence would be more than welcome! If you are not able to attend this visit we will also be providing your children with brochures on how to properly maintain their teeth and would like to remind you of the following:

- It is important to have your child regularly screened by an oral health professional at least twice a year
- Having your child brush twice a day under supervision can help prevent them from getting cavities
- Limiting the number of times your child eats sugary snacks can limit the formation of cavities

We thank you for your time and look forward to seeing you!

Sincerely,

Pediatric Dental Health Team

Figure 3. Newsletter
This letter would then be translated into multiple languages to accommodate the needs of the community. Once we have the children and available parents motivated and in attendance we can complete the oral hygiene instruction depending on the age group present. For younger audiences, I have seen first-hand the positive response to puppets combined with voice modifications. For the older children who may understand the science behind bacteria and oral hygiene I believe the use of a disclosing tablet to show areas of plaque accumulation is more appropriate. If we continue to take proactive preventative and educational measures from a young age in tandem with professionals outside our field, we can help eliminate many personal patient factors that are considered barriers to care. These include: socioeconomic status, education, oral health literacy, attitude, knowledge, dental insurance coverage, and income. Those who have regular and efficient home care are almost completely eliminated from those who end up needing expensive restorative, endodontic, or prosthodontic work. Regular maintenance visits for this group are relatively inexpensive, beginning at about $100, and would only be needed 1-2 times per year. The oral hygiene aspect of the cleanings dental hygiene students give at New York University College of Dentistry’s clinic is always the most eye opening. Rarely have I ever encountered a patient who already knows how to manipulate floss. Some try to floss multiple contacts at once, running the floss through two contacts in the same arch. Some are unaware that the biting surfaces or tongue side of their teeth need to be brushed. Some proudly express their love for sugary snacks and beverages. This changes the appointment from a maintenance or cleaning appointment to a longer and in depth educational and demonstrative visit. With the inclusion of a dietician and public-school teachers to the current outreach programs, all of the aforementioned barriers can be addressed, and we can begin working on a new generation of patients with increased overall health awareness and understanding of basic oral hygiene maintenance. Following the oral hygiene instruction, we can move on to the dental screenings confident that our patients understand the importance of our work.

Health care professionals understand that the key to controlling a disease lies in patient education. A well-informed patient understands the impact their diet has on their cardiovascular disease. They understand the impact smoking has on their chronic obstructive pulmonary disease, and they understand the impact proper oral hygiene has on dental caries as well as periodontal disease. When communicating with our patients we devise creative terms and methods to convey our message as simply and effective as possible. The medium we use to convey this message is just as important as the information it contains. In a study published in the Journal of the Royal Society of Medicine it was found that memory for medical information was “poor and inaccurate” with regards to instructions on treatment. The study found that “written information is better remembered and leads to better treatment adherence” (Kessels 3). Educating immigrant communities in New York City means overcoming the obstacles of illiteracy, overcoming the language barriers, and finding a way to make caregivers understand the importance of what we are trying to accomplish.

Brochures are written up and available at the New York University College of Dentistry for periodontal disease, denture care, implant procedures, root canals, and the different types of coverage. What’s missing is a brochure that very clearly outlines the key points of oral hygiene in a manner that can be understood by patients of all educational backgrounds. I will be designing a
brochure that I believe will cover oral hygiene in the simplest terms. During my outreaches, I will be distributing these brochures along with the standard disposable toothbrush, toothpaste, and floss kit. If these brochures are written in an outgoing and non-intimidating style they will help us communicate with our target audience what their role is in controlling dental caries.

Simplicity was key in the design of my brochures. I was aiming for something that would keep the children’s attention while hitting the key points of oral hygiene. Using fun photos and simple phrases makes our message and instructions easier to digest. More importantly it makes our instructions easier to remember. An oral hygiene pamphlet can easily be filled front and back with pages of written instructions. The purpose of my brochure is not to provide the patients with everything that we know about proper oral hygiene, it is to simply get across the importance of brushing twice a day, flossing once a day, and not snacking too frequently. This is the design I have come up and the one I will use on my outreaches. The only changes I plan to make are translating the brochure into the dominant language of each community.

During my past outreaches, I was initially surprised at the lack of knowledge regarding proper oral hygiene. For those who grew up in the United States the fact that it is important to brush twice a day is not a new concept. For our immigrant communities, it can be. Even for those who may have been previously exposed to this advice a gentle reminder can only help.
Controlling dental caries is not possible without the modification of patient behavior and habits. The use of techniques like fluoride varnish and silver diamine fluoride are effective only as adjuncts. In my opinion, this is the most difficult aspect of patient management, but it is not one that can be given up on. It is part of the health care providers responsibility to pursue all possible routes and techniques of patient education. If we are able to convince our patients to simply begin brushing for two minutes twice a day it would be easier to slowly incorporate flossing and other oral hygiene techniques into their daily regimens. Clearly communicating these simple tips in a brochure is an effective method of passing along this information to caregivers of all education levels.

The use of new forms of media to keep oral hygiene instruction fun and exciting while on outreaches is a concept public health dentists spend a large amount of time focusing on. In terms of cost and efficiency it will be difficult in the near future to beat simple paper brochures and verbal instructions. With further development and reductions in price an alternative may be available within a few years. Many children and adolescents spend a large amount of time on their mobile devices. It would be simple to develop an oral hygiene app but I do not believe it would be very enticing for our patients. What I would like to see developed is a virtual reality oral hygiene education tool. Virtual reality has become a major force in elementary and middle schools across the united states. Its currently being used to teach math, take children on virtual field trips, and conduct virtual science experiments. The development of a virtual reality oral hygiene instruction application to be used during outreaches and in the waiting room at the dentist office would be an excellent addition to educate our patients in an interesting manner.

One of the struggles of putting together a community outreach plan is deciding what to include and what to leave out in the limited amount of time you have. The goal is to expose your patients and community to novel information and to do so in a manner that they will retain. Throughout the years I have spent on my own education I have found it difficult to pay attention to a lecturer who has not differentiated themselves in some way. With the availability of smartphones, video games and constantly updated social media it is not surprising that keeping a subject’s attention has become more difficult with time. In order to address this, I am proposing multiple techniques to convey my message in an interesting relatable manner to the schoolchildren. One of the techniques I will be implementing is the use of video games to keep my patients interested in the subject matter and to be used as a motivational tool for continuous homecare. I have teamed up with a very talented graphic design student to help me design parts of an application I would like to make available free of charge on both the apple and android platforms. The graphic design student’s name is Rebecca Chung and she also has experience with the development of mobile applications. We discussed what I was interested in doing via video conference and Rebecca graciously offered to provide me with a free sample of an introduction she thought I would like before either of us committed to the project.
Figure 4. Introduction for mobile application

I am extremely happy with the way the introduction works and also agree with her that the game mechanics should be simple enough to be understood by young schoolchildren but that a point system should be in place to keep their attention. An application like this is an incredible adjunct
considering the use of video games in educational settings has been proven to increase the recall of factual content (Mitchell 57).

Using the application to periodically express oral hygiene instructions to the children provides an alternative medium increasing the likelihood that they will effectively be able to recall what we are trying to teach them. The introduction teaches the patients that it is the “sugar bugs” causing their teeth to become sick and that their toothbrush is an important tool used to keep them healthy. I would also like to incorporate a timer within the game that causes the teeth to slowly regress throughout the day if the children do not log in to brush them. This has the added benefit of working as a reminder to brush their own teeth. If possible I would like to incorporate the use of Bluetooth toothbrushes so that instead of brushing on the application, children will brush their own teeth to earn points in the game. Unfortunately considering the retail cost of Bluetooth toothbrushes I do not believe we will be able to implement them as a part of our program at this time. I do believe using that link between brushing their own teeth and having progress made in the game would be a powerful motivator and hope to find a way to make this cost effective through grants, stipends, or donations from manufacturers in the future.

In order to keep our patients and the school children intrigued throughout our presentation it is important to maintain an interactive environment. Our mobile application can help reinforce and maintain what we teach during our presentations but having a presentation that is memorable in itself would be incredibly educational. I would like the focus of the interactive aspect to be on the mechanical action of brushing and flossing. I believe the brochure, our mobile application, and other aspects of our presentation will be sufficient in explaining the basics of oral hygiene but from my experience patients may have difficulty with the brushing and flossing itself. I will be keeping our presentation interactive in two major ways through use of a plaque typodont such as the one seen in figure 1, and through the use of disclosing tablets intraorally.

Students will be given a toothbrush and asked to show how they brush at home using the typodont as the example. This will allow us to properly evaluate and assess not only their current level of understanding but also their current motor skills. While there are currently typodonts that allow the individual to brush and physically remove the buildup this is another addition that is currently cost prohibitive. An interesting idea would be the development of this typodont with a material similar to those used in magic-erase boards. The plaque could be drawn in quickly, the toothbrush could act as the eraser. These could be used to give instant feedback to the students and patients and be reused repeatedly. While

![Figure 5. Typodont learning aid](image-url)
these are not currently in production I do not believe they would be difficult to manufacture with materials already in use around the globe and hope to make that my next project.

Disclosing tablets on the other hand are readily available and a cost effective method to keep younger patients interested and entertained by our oral hygiene instructions. Disclosing tablets can be used upon initial presentation to highlight the problem areas for our patients as shown in Figure 6. This is an effective tool that we can use to highlight areas of concern to our patients and their caregivers in a fun way that they would be less likely to forget. After effective brushing and-

Figure 6. Plaque visualized by disclosing tablets

flossing we can reapply the disclosing tablets to show our patients the difference. If we educate them on the importance of removing plaque biofilm for their oral health, then show them how susceptible they themselves are as hosts they are more likely to understand the implications of proper oral hygiene.

**Asking the Experts**

*“An expert is one who knows more and more about less and less.”* – Nicholas M. Butler

The slightest spark of an idea is enough to trigger the desire to research a topic furiously and intently if it prods a curious mind in the right place. These sparks led to history’s great minds and researchers spending days, weeks, and lives devoting themselves to specific fields of research. This continuous and studious research has been critical to the development of the fields of engineering, medicine, economics, and literature just to name a few. With the vast amount of information and knowledge that exists in today’s world at our fingertips, it is simply not possible for even the most curious individual to explore it all thoroughly. I believe a key component to properly researching and developing an idea in a certain field is to find a likeminded individual who has already spent time working towards the same goal. An expert in your field of research is an invaluable resource. Even a casual conversation regarding your topic of interest can reveal information and insight that may have taken years of hard work and research to develop. Luckily I attend school surrounded by the respective experts of each dental specialty. For my research regarding the development of a program to assist economically challenged immigrant child with caries in New York City I decided to pay a visit to the pediatric department at New York University College of Dentistry.
Employing the help and assistance of the pediatric department would definitely take my work to the next level. The vast majority of pediatric dentists entered the profession to help their patients. Throughout my experience with them they have been more than willing to spend time educating me on what has been done before, what has worked, and what has not. They are a wealth of information regarding all aspects of pediatric dentist including preventative measures, dietary counseling, and silver diamine fluoride. Regarding silver diamine fluoride I recently spoke to one of the leading experts on its use, Dr. Neal Herman. Dr. Herman is a graduate of the New York University Pediatric Dentistry program and has dedicated much of his time to the public health and service-oriented outreach missions travelling as far as Ghana, India, Honduras, and the Philippines providing care and lecturing at local universities. He is considered by many to be a leading expert on pediatric and preventative treatment. I decided on asking my questions through casual conversation during downtime on the clinic floor rather than having a formal interview. I believe this allowed for a more relaxed and candid atmosphere. I asked Dr. Herman his thoughts on early childhood caries, fluoride varnish, and one of his areas of expertise; silver diamine fluoride and its current use in the dental community. I intend to use Dr. Herman’s answers and insights to adjust and adapt my current community outreach plan wherever applicable.

What I wanted to glean most from my interview with Dr. Herman is what had the biggest impact in his opinion on the communities he had visited and worked with. He explained that he thought what had the most effect depended on the community he was talking about. He gave an example of a dietary habit in certain Latin communities where children’s bottles and sippy cups were filled with cola. In those types of situations where there is a complete lack of understanding of the caries process by the guardians of pediatric patients it is education that will have the biggest impact. There is no reasonable amount of fluoride varnish that can be used if the patients are constantly exposing themselves to cariogenic carbohydrates. For these patients, it is critical to thoroughly and clearly explain the caries process, proper oral hygiene care, and the importance of their diet on overall health. One of the complications faced by my planning for the care of the communities across New York City is the diversity in languages. I have written a letter in English but this may not be understood or well received in communities where there is a low literacy rate. To combat this, I would like to have my letter translated into multiple languages and include a translated copy with each letter I send out depending on the predominant language of the community. From my experience, I have also found that the children of first generation immigrants tend to be bilingual and oftentimes act as translators for their parents. I would also like to impress on the children themselves the importance of our visits and what we are trying to accomplish who would then be able to effectively communicate with their guardians. In order to motivate the younger children to do so I believe some type of incentive is necessary and would like to reward children who bring back each letter signed by their guardian to ensure it was taken home and read. I outlined my plan to Dr. Herman who politely stated it was an excellent idea but emphasized that I would be faced with many challenges. He reiterated that while an improvement in oral hygiene and proper diet would be the most effective method of controlling dental caries it was also the most difficult. I pressed Dr. Herman to explain why he thought it was so difficult to change the habits of the communities who were most at risk for dental caries and early childhood tooth decay. His opinion was simply that some people do not value oral health as much as others. While I agree with Dr. Herman that certain communities may not place much importance on caring for their oral health I
do not believe that it should serve as an excuse for not attempting to educate them on how important it is for their wellbeing and the wellbeing of their children.

In contrast to the communities who suffer from poor dietary habits there are immigrant communities who do not consume many sugary snacks and beverages in their respective diets but still suffer from early childhood caries. For these patients, it is still critical to educate them on proper oral hygiene habits but they can also greatly benefit from the use of topical fluoride treatment. This was shown by Kokoceva-Ivanovska et al who showed that “topical fluoride treatment has a positive effect on the index of oral hygiene”. Their study design was unique in that it measured the outcome topical fluoride treatment has on oral hygiene as measured by plaque levels, instead of the effect it has on caries. I believe taking the results of this study and assuming that not all recipients of the topical fluoride treatment altered their homecare routine gives validity to the practice of applying fluoride varnish to all at risk children regardless of current oral hygiene. I asked Dr. Herman if he thought there was any issue with this outreach design and he agreed that it would not only be the easiest and most efficient strategy but likely the most effective. Most importantly he also stated that as far as he knew there was no risk of applying fluoride atop dental plaque or uncleaned teeth, an important fact since incorporating a full dental prophylaxis prior to the administration of fluoride would be cost prohibitive and difficult to implement. According to an article published in the Journal of the American Dental Association while a dental prophylaxis “is useful in dentistry” there is enough evidence that this procedure can be eliminated as a routine procedure prior to any professional fluoride therapies. Obviously, a dental prophylaxis is still an important part of an overall health care regimen, but having the ability to apply fluoride varnish even without a prophylaxis greatly reduces the planning and regulatory work necessary for our outreaches.

While with Dr. Herman I took the opportunity to ask him specifically about silver diamine fluoride. This is a topic I had heard Dr. Herman lecture on numerous times, and one that I knew he was especially passionate about. I was particularly interested in Dr. Herman’s experience using silver diamine fluoride to arrest dental caries in otherwise hopeless teeth. With improved oral hygiene, we can prevent the initiation of dental caries, and with fluoride varnish we can help prevent its progression, assuming we are operating under ideal circumstances. Unfortunately, the oral cavity is not an area of ideal circumstances. The excitement surrounding silver diamine fluoride is backed by decades of research and clinical use in European and Asian countries. This is a therapeutic agent that can completely change public health dentistry (as well as private clinical dentistry) in the United States. I asked Dr. Herman if he had any concerns about the use of silver diamine fluoride since it was just recently approved for use by the food and drug administration. He stated again that silver has been used in one form or another for over one hundred and fifty years to arrest dental caries with no reports of significantly adverse effects. I then asked Dr. Herman what regimen he would suggest we use on our outreaches considering how relatively new it was. He suggested that it would be an excellent tool to take out in the field with us but that it requires delicate handling. Not only does it stain the dentition of carious lesions (which may be difficult to have guardians accept), it also stains almost anything it touches. When I suggested the use of silver diamine fluoride single dose packets he responded by saying that it was an excellent idea but one that considerably increased the cost of therapy. He also emphasized that its use in the field should be limited and overseen by a licensed dental hygienist or dentist. The major benefit of
silver diamine fluoride is buying young children time until they are mature enough to undergo treatment without pharmacologic aids. The carious process is halted so there is no further destruction of tooth structure and a greatly decreased risk of abscess development.

The Use of Silver Nitrate

While it has been proven through various animal models the elimination of sugar would eliminate dental caries it is important to apply these findings in a practical manner, the elimination of sugar is not feasible in modern society. Non-surgical definitive treatment of caries in the past has largely been focused around the use of fluoride to either prevent the initiation or the progression of a carious lesion. Recently the dental community has begun seeing a shift towards acceptance of a treatment which was first used over a hundred years ago, silver nitrate.

While it is true in most aspects of health Benjamin Franklin’s quote that “an ounce of prevention is worth more than a pound of cure” is especially applicable in dentistry. With proper homecare and regular dental visits the vast majority of dental emergencies can be avoided. The gold standard at this time for preventing dental caries is fluoride. Decades of research have proven its efficacy and safety, all oral health care providers are trained in its use and educated in its benefits. Silver diamine fluoride comes into play when the carious lesion has progressed to a point where the only option most dental providers would consider is surgical treatment.

The issue that arises in underserved and impoverished communities is the lack of access to dental care. Many are forced to neglect their oral health and defer treatment until it is an absolute dental emergency. Due to the nature of dental caries oftentimes once the lesion has become symptomatic the tooth involved requires more extensive treatment than a simple dental restoration, this can mean either a root canal or an extraction. While most would prefer to have a root canal done in order to save their tooth, it is a costly procedure. In many cases the root canal must then be followed by a permanent full coverage restoration which can easily double the cost of treatment. When faced with the decision from a financial point of view many patients decide to alleviate their symptoms through extraction.

With the use of the reformulated silver diamine fluoride a patient who has limited resources can be provided with what amounts to a cavity Band-Aid in the most severe cases, and a cavity cure if the lesion is caught early enough. This treatment is truly revolutionary in the United States but has had some difficulty gaining traction in the established dental community. In pediatric dentistry, the use of silver diamine fluoride is slowly changing the way treatment is rendered to children. Hospital visits for children due to acute abscesses have greatly decreased, and trips to the operating room to treat dental caries have also decreased. I would like to show through my research that the treatment of early childhood caries is achievable through this affordable alternative.

Following the oral hygiene instruction, we can move on to the dental screenings. This is when having the parents or caregivers in attendance would have the biggest impact for multiple reasons. One of the benefits would be being able to immediately show the guardian any positive findings of dental caries. Having a one on one discussion with them, and showing them specific areas of concern would definitely motivate them to pursue treatment. Additionally, if a child has their
guardian present and we detect active caries we can now request permission to use one of our interceptive treatments. While authorization for the use of fluoride varnish could be obtained through a permission slip sent home with the child I would be hesitant to employ the use of silver diamine fluoride without having an informed conversation with the parent. While both are safe to use under appropriate conditions the aesthetic side effect of silver diamine fluoride warrants additional time being taken to explain the process through visual aids.

![Figure 6. Dentition treated with SDF showing clinical appearance of arrested caries](image)

It becomes the duty of the provider at the time to explain to the caregiver that while the clinical appearance of arrested caries may be unattractive it is a temporary measure. The black staining can be removed at any time by a dental professional and replaced with a tooth-colored restoration. The main goal is to convince the parent of the benefits of arresting the disease process even if it means a temporarily unattractive outcome.

Understanding our patients begins with understanding where they come from. In order to guide and educate them it is crucial to approach the issues and problems they face from their perspective. These perspectives are often heavily shaped by the community our patients are a part of and heavily influenced by their surroundings. It is not possible to understand how to assist children in underserved communities without exposing yourself and being introduced into these neighborhoods. Public health work in New York City requires love, respect, and appreciation of all races, religions, and creeds. In an effort to understand where my patients were coming from, I decided to first spend some time walking around in a predominately Latin American community in the Bronx.

My expedition began on the 1 train at Columbus circle surrounded by tourists and weekend adventurers. From there I transferred to the #2 at 72nd street and Broadway heading towards Prospect avenue. As I rode the subway deeper and deeper into the Bronx I began to appreciate the difference a few minutes can make in New York City. Slowly the camera wielding tourists were replaced by locals carrying grocery bags. The cultural makeup of the passengers began to change as well until the vast majority of the riders appeared to be of either Latin-American or African-American origin. My decision to exit on Prospect Avenue was based on a recommendation from
some dental student colleagues who had been assigned on rotation at a community health centre called La Casa De Salud. La Casa De Salud is a Latino based community health centre that is focused on providing care to the underserved. Every Monday two dental students are assigned from NYU College of Dentistry to provide dental treatment under the supervision of their onsite dentist. However, for my purposes the health centre itself was not what I was interested in, they did not provide services to pediatric dental patients. What it did provide me with was a solid jumping off point to explore and get a feel for the area.

I was informed by colleagues who had been assigned there that the neighbourhood was safe to wander around in during the day and that it had a family atmosphere. Because of this predisposition I wasn’t expecting to encounter much trouble but I also wasn’t expecting what I did see. Littered throughout the streets were what I consider signs of poverty. Coming directly from the touristy area of Manhattan I was surprised that such a short commute led me to a street filled with cigarette butts, drug paraphernalia, and alcoholic beverage containers. Children walking along with their families gave none of this a second glance which is only expected assuming it had become second nature to them. Expecting to see an abundance of mom and pop restaurants I was surprised at the prevalence of fast food establishments present on nearly every corner. I was also surprised with how busy these fast food establishments were. The McDonald’s on the corner of the road had as many patrons as the next five smaller establishments combined. It is understandable that a convenient and more importantly an affordable meal would be a difficult temptation to resist in this type of community. The effect this constant exposure to addictive vices and poor nutrition is something that should be accounted for in any plan formulated to help the underserved in these communities. Most of our patients understand that eating a well-balanced meal is in their best interest, they know that smoking is detrimental to their health, and that proper oral hygiene is an important part of a healthy routine. Our plans to assist them must include more than informing them again of what they already know, they should include solid and concrete ideas that can be implemented in their established routines. One way to do this that is community specific is to look over the menus of the fast food establishments that are most frequently patronized by our patients. These may vary from community to community but I think covering the largest fast food chains and their menu’s is the most efficient method for helping our patients make informed choices. By providing a list of “approved options” our patients can improve their health without making any major alterations in their daily routines.

One of the greatest resources for advice on how to best serve our patients that we as clinicians often overlook is our patients themselves. Our patients understand the hurdles and barriers they face better than anyone else. Asking members of the community what they perceive to be their biggest obstacles is a valuable way to improve any community health plan. While on Prospect Avenue I had the opportunity to directly ask the individuals I was trying to help what they thought of my care plan. I entered the McDonald’s on the intersection, ordered my meal and sat in a booth. While eating my meal I looked around trying to decide who to best to have a conversation with and settled on a middle-aged woman Latina woman who had just sat down with two school-aged children. After I finished eating I walked over, introduced myself, and asked her if she would be ok if I asked her a few questions for a project I was working on. In the same spirit as everyone else I had the pleasure of encountering she was extremely pleasant and insisted I sit with them while they ate. I began by introducing my topic a little more and described it as an attempt to help people around New York with problems related to their teeth. I did not want to impose and take up too
much of Lena’s time but I believe our short conversation provided me with some valuable insight. The parents and caregivers of the young patients we are trying to help care for their children. They are more than willing to do what is within their power to help them but could use the assistance and knowledge we are able to provide through outreaches.

In New York City, the term economically challenged immigrant children encompasses many cultures from different ethnic groups. Different ethnic groups with different religious beliefs, different family structures, and different values. Ideally an individualized care plan would be made for each immigrant community and this is definitely something to strive for in the future. I believe that is a goal that can be accomplished by working alongside community leaders. What I intend to accomplish with my care plan is the establishment of a stepping stone for these individualized care plans to climb up. The solutions put forward to solve this worsening problem all have merit in theory but many require a complete overhaul of systems which have been in place for decades, unfortunately cutting through the bureaucratic red tape to achieve many of these reforms complicates the task exponentially. First and foremost, it is understood and accepted in most countries that medical care is a universal right owed to all and not only to the wealthy. The United States of America contrary to what many believe spends more caring for those who are unfortunate enough to not be able to care for themselves than any other country in the world. But this does not mean that the system is working. Many Americans still face the harsh reality of not being able to afford medical care, but not being eligible for government assistance. For these individuals, the choice is often made for them, they do not pursue care until absolutely necessary because they cannot pursue care until it is absolutely necessary. This does not suddenly change when looking at dental care. The same issues are present and then compounded by the fact that in most instances dental care does not fall under medical coverage. A patient spending hundreds of dollars a month on medical insurance may not be able to afford a separate policy for dental care. The macro solution of completely overhauling the way the government and insurance conglomerates have been running for decades would be an ambitious overhaul but I believe it would be foolish to believe it is something that can happen in the near future. The solution for our patients of today and the near future must be affordable. Putting the financial burdens aside what this also means for our patients is they are forced to experience symptoms that are often described as excruciating akin to the worst pain possible. They must be effective in reducing dental crisis with minimal intervention and they must not require a massive overhaul of the current systems in place. This is the turmoil and stress I am hoping can be avoided affordably and quickly through the adjustments in lifestyle, diet, and hygiene habits outlined throughout my plan.
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I. Introduction
   b. Analysis of the values and lifestyles of these immigrant communities including an assessment of the family structure, socioeconomic factors, and dietary habits of certain immigrant groups.
   c. The solution proposed will include oral hygiene instruction through the use of translated newsletters and in person workshops, the use of fluoride varnish to prevent and remineralize carious lesions, and the use of silver diamine fluoride to arrest advanced lesions preventing their progression to dental abscesses.

Claims of fact: Dental caries continues to predominately affect economically challenged immigrant children in New York City in 2018.

Claims of value: Reducing the prevalence of dental caries in these immigrant children is an important part of maintaining their overall health and is the responsibility of the medical community.

Claims of policy: We can reduce dental caries through community health outreaches by properly educating the children and their caregivers as well as through the use of fluoride and silver diamine fluoride treatment. This will include the use of a brochure to convey information effectively as well as the introduction of a mobile application.

Thesis Statement: Dental caries requires a host, a substrate, and oral bacteria. I will be addressing these three factors and various methods of control which can be used to decrease the prevalence of dental caries in New York City while also limiting its progression through non-surgical interceptive methods.

II. The classification of dental caries
   a. Explaining the ADA CCS classification of dental caries
   b. Outlining the clinical use of the ADA CCS classification

III. Oral Hygiene, Diet, and lifestyle
   a. The importance of oral Hygiene
   b. The importance of diet
   c. Understanding the implications our patients lifestyles have on care
   d. Outlining these instructions with a pamphlet translated to the language of the community.

IV. Economic Factors
   a. Explaining the issues patients face regarding cost of care
   b. Explaining the financial benefit of preventive care
V. Safety of fluoride and treatment of side effects

VI. Solutions through community health work
   a. Oral health instructions through community outreach events
   b. Fluoride varnish use as a preventative method administered during screenings
   c. Silver Diamine Fluoride selectively used as an interceptive method during screenings

VII. Gathering information from experts in each field as well as members of the target community
   a. Dr. Neal Herman, pediatric dentist
   b. Member of the community in the Bronx
   c. Mrs. Linda Shawar, educator and nutritionist