Independent Analysis: Efficacy of Sealants Used in a Public Health Program

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Abstract

Purpose: This short report details part of the findings of a larger, multiphasic research study considering Quality of Care (QoC) and Quality of Life (QoL) for socioeconomic and underserved rural populations accessing dental health care through a Public Health Department. Improving oral health for families that are socioeconomically disadvantaged, with cultural disparities, or lacking access to care was the goal of this project. The purpose of this project was documenting effectiveness of oral health care when dental hygienists working through local area health departments, as an alternative delivery model, provide quality educational and preventive care services.

Clinical Outcomes: Over a 6 year period, 1,511 sealants were placed. Simple clinical practices using 4-handed dentistry and strict isolation techniques led to achieving a 95% or higher cumulative sealant retention rate. Dental caries was averted for 858 individuals over a 3 year period (2006 to 2009). Using a consultation-referral model, 463 individuals received restorative care. Results from this short report document clinical care practices for populations in rural communities with limited access to care while improving oral health outcomes.

Conclusion: The clinical findings in this short report illustrate the successes of an oral health care program offered by a dental hygienist working collaboratively through a Community Public Health Department. Sealant retention, averted dental caries and restorative care provided using a consultative-referral model all illustrate clinical quality of care achieved when employing alternative care models outside the realm of traditional in office procedures.

Keywords: quality of life, quality of care, outcomes, health disparities, prevention, education, allied health, dental hygiene, dental sealants

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Introduction

Sealants are recognized as a preventive tool for averting dental caries.[1-3] Multiple studies have validated sealant efficacy, cost/benefit ratios and need for preventing the most common chronic disease in children – dental caries.[4-15] When sealants are used as part of a public health program, they can reduce the number of lost school days and cost of health care, while improving Quality of Life (QoL).[9,11-22] This short report details part of the findings of a larger, multiphasic research study considering Quality of Care (QoC) and QoL for socioeconomic and underserved rural populations accessing dental health care through a Public Health Department Program.[23]

Caries continue to be the most significant public dental health problem in the U.S.[2,3,9,11-16,19-21,24-31] Lack of access to oral care and being socioeconomically disadvantaged plagues the population described in this short report.[3,9,11-14,17] A childhood of dental issues can lead to a lifetime of oral health problems, if early interventions are not implemented.[1-21,24-31] Relatively low cost easy solutions, including sealant programs, can result in fewer missed school days, while reducing both active disease and pain.[3,9,13,21] The burden from long-term effects of dental disease on the entire health care system can be reduced using preventive sealant programs.[1-4,7-15,18,22,25-31]

Methods and Materials

The Price County Public Health Department offers dental hygiene services to clients. Services provided are educational, preventive and treatment oriented. Populations include un-served and underserved clients in rural communities ranging from prenatal to geriatric care programming. All program participants and families are educated about nutrition, dental caries prevention, brushing, flossing and fluoride use as part of these programs. Oral screenings are conducted, followed by preventive treatment using a combination of fluoride and sealants based on need. This short report focused on illustrating outcomes associated with sealant use as part of a public health program. The consultative-referral model for clinical service and care is evidence based, and protocols are strictly followed

Table I: Preventive Outcomes

Year	Children Given Sealants in Program	Retention Percent 1 year check	Averted Dental caries	Restorative Referrals Made
2004	314	97.90%	N/A	153
2005	286	96.90%	N/A	83
2006	259	95.00%	367	68
2007	216	97.00%	184	65
2008	236	96.00%	184	57
2009	200	98.3%	123	37
Total	1511	96.85%	858	463

by participating clinicians.[23,32] State service protocols were developed based on Caries Management by Risk Assessment (CAMBRA) and the Association of State and Territorial Dental Directors (ASTDD).[33-36] When restorative care is required, a consultative-referral model is used.[23,32] Sealant programs, and their resultant preventive outcomes, are not new. This short report documents the outcomes of the sealant component of the overall preventive public health program offered in Price County.

Four–Handed Dentistry/Isolation

Maintaining isolation during any dental procedure can be challenging. Using mobile equipment, lack of consistent air/water pressure during connections, lack of trained personnel providing assistance during procedures or uncooperative patients can cause retention rates to decline.[37] Clinicians involved collectively averaged over 10 years of experience placing sealants as part of this program. Four-handed dental procedures using strict isolation including dental dams, coupled with strict adherence to manufacturer's recommendations during sealant placement were used, which may have significantly impacted sealant retention.[37] Dental hygienists new to working for the program completed training and calibration prior to actively participating in providing clinical care. Training and calibration included assessment, use of screening tools, isolation, placement, retention checks and documentation as per service protocols.[23,32] Strict isolation, training and using 4-handed dentistry techniques were factors that may have positively influenced the reported clinical outcomes found in Table I.

Retention Rates

The success of sealant retention was determined through an examination of patients at both 1 and 2 year intervals post-placement. Researchers did not have access to 2 year retention check data. Visual and tactile examinations were employed using mirrors and explorers for determining if sealant materials were retained in occlusal grooves. The basic screening survey tool from the ASTDD was used as part of clinical protocol for sealant placement and retention.[32-36] This tool is also used for consistent statewide reporting in other counties with public dental health programs. If sealant material was present in grooves, the sealant was considered retained. Partial occlusal sealants were considered retained, and repaired if necessary. Sealant retention rates exceeded 95% for each of 5 years reported (Table I).

Averted Dental Caries

A complex algorithm developed by Epidemiologists at the Centers for Disease Control (CDC) exists for assessing and calculating averted dental caries when data is reported for public dental health programs.[38] Researchers at the CDC consider an 85% retention rate a standard benchmark for QoC outcomes.[33] The findings for this program far exceed the established benchmark (Table I). The CDC algorithm requires 2 years of data before averted dental caries can be calculated, thus, no findings were reported for 2004 and 2005. Sealant retention checks had not been conducted for calculating averted dental caries rates in 2009 as data had not yet been collected for analysis. Follow-up data for 2009 were gathered and included for the purpose of completeness in this short report. Dental caries were averted for 858 children during a 3 year period from 2006 to 2009 as illustrated in Table I.

Referrals for Restorative Care

The Price County Public Health Department's dental hygienist uses a consultative-referral model for patients requiring restorative care.[23,32] Referrals for restorative care are made by the dental hygienist to Federally Qualified Health Clinics (FQHC) and Community Health Centers (CHC) and/or private dentists for restorative dental services and case management.[23,32] FQHCs, CHCs and private offices report back to the public health department if individuals are seen and treated. Four hundred and sixty-three referrals were made for restorative care in the service community using this model over a 6 year period. The need for re-

storative care declined over time. Findings are stated in Table I.

Discussion

Some children are at risk for developing dental caries. The findings illustrated in this short report document some important but simple actions that can be used by dental hygienists working in public and community health settings that may improve oral health care outcomes. Using 4-handed dentistry, strict isolation techniques and participant calibration training while following evidence based protocols may have significantly improved retention rates for dental sealants as illustrated in this public health program If contamination occurs during procedures, it is important to recognize, re-isolate and retreat a surface for improved retention per manufacturers and standard clinical practice guidelines.[37] Findings from this short report illustrate following how simple clinical care practices discussed here may significantly impact sealant retention and resultant oral health care outcomes.

According to the Surgeon General, disease burden continues plaguing underserved, minority and socioeconomically disadvantaged populations.[12,15] Where dental caries can be averted in theory, it is harder to do so in practice. Families with children that are socioeconomically disadvantaged, or have difficulty accessing care because they are demographically at a distance from a provider are at greater risk of developing dental caries.[2,3,9,11-14,17]

Several recommendations for ongoing research related to how QoC impacting QoL and much broader than the information included in this short report are made here. Further evaluation of impacts of educational and preventive treatment specifically for socioeconomically disadvantaged, racial and ethnic minority groups should be conducted.[9,13-15,28] Validating efficacy of treatment for children of socioeconomically disadvantaged, racial and ethnic minority groups is necessary. Evaluating risk assessment tools and preventive interventions is also required.[17,24-26] Studies of effectiveness of primary care providers employing formal risk assessment tools for assessing dental caries would be beneficial.[2] Risk assessment tools are available, but their effectiveness has not been measured.[2,17,24-26]

Sealants only prevent dental caries in buccal and lingual pits and on occlusal surfaces. Outcomes data about averted dental caries from the CDC[38] does not include interproximal lesions that develop if children and families have poor oral hygiene, dietary habits or developmental structural tooth defects.[2,3,9,11-14,17]

Caries prevention when using fluoride varnish applications in primary care settings such as Community Public Health Departments should also be analyzed. Further clinical scientific investigation regarding other potential treatments for preventing dental caries, including xylitol, chlorhexidine varnishes or povidone-iodine solutions should be investigated.[46-48]

Early childhood dental caries causes pain, impaired growth, missed school days and negative effects on QoL.[2,3,9,11-14,17,44] In turn, these impacts can affect self-esteem, appearance, speech and school performance.[3,13-15,17] Over 50 million school hours are lost yearly because of childhood dental issues.[9,13,21] Individuals and families in underserved rural communities that are demographically isolated and socioeconomically disadvantaged often have difficulty accessing care. The service model employed by the Price County Public Health Department provides educational, preventive and restorative clinical care services for patients and families through consultation-referral, potentially impacting their QoL.[32]

Community based outcomes for prevention and treatment of dental caries including results from sealant programs at a epidemiologic population level must continue.[2,38] Where the data in this short report notes averted and declining rates of dental caries over time, findings may also be attributed to the success of employing a consultative-referral model as a bridge for accessing restorative care in rural, demographically isolated communities.[32,39-48] Findings from all these investigations can support healthier communities and healthier citizens for the 21st century.

Conclusion

The clinical findings in this short report illustrate the successes of an oral health care program offered by a dental hygienist working collaboratively through a Community Public Health Department. Sealant retention, averted dental caries rates, and restorative care provided using a consultative-referral model all illustrate effectiveness of clinical quality of care when employing alternative care models and systems outside the realm of traditional in office procedures.

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