



# *The use of silver diamine fluoride as a non-invasive treatment option for geriatric and palliative care patients*



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## Author information

<sup>1</sup>Toni graduated from UHI in 2022 and is now working as a dental therapist in Jersey, the Channel Islands, where she was born. Toni says: 'My passion within dentistry is periodontal disease and composite bonding. I have been on several courses since qualifying to learn as much possible and look forward to going on many more. Outside of dentistry I have been learning Spanish and I am currently on day 402 of a Duolingo streak; I have also been taking private lessons in the hope to become fluent. I am also currently training for my first Olympic distance triathlon this July.'

## Research question

The use of silver diamine fluoride (SDF) in palliative care and geriatric patients to manage carious lesions: does this treatment option reduce pain, infection, anxiety, and the time spent in the clinical environment?

## Introduction

Silver diamine fluoride (SDF) has been used within dentistry for over 80 years. The first record of it being used as a cariostatic agent was in Japan in 1969.<sup>1</sup> It is a colourless alkaline solution containing silver and fluoride, forming a complex with ammonia, and has been demonstrated to be effective in the management of dental caries.<sup>2</sup> The silver is antimicrobial; fluoride promotes remineralisation while the ammonia stabilises the solution.<sup>3</sup>

The combination of SDF affects tooth

tissue in several ways: desensitisation, carious lesion arrest by dentinal tubule blockage, bacterial death, and remineralisation of demineralised tooth. SDF reacts with calcium phosphate ions to produce fluorohydroxyapatite inhibiting demineralisation.<sup>4</sup>

The main disadvantage of using SDF is staining carious lesions black; however, it does not stain sound tooth tissue so this could have an additional use as a caries detection solution.<sup>1</sup>

## Methodology

A comprehensive and systematic search of publications was conducted on numerous databases. Mesh terms, Boolean operators and truncators were applied. Inclusion and exclusion criteria were utilised, resulting in five papers meeting the criteria. Papers were

then critically appraised using established critical appraisal tools demonstrating their validity.

### Results

Papers either compared SDF alone or alongside oral hygiene instruction and/or oral hygiene education. Two papers compared these comparators as well as different cariogenic preventative agents (Chlorhexidine, sodium fluoride, Xylitol, arginine, and high fluoride toothpaste). It has been consistently reported that SDF can arrest caries in the focused patient demographic. With the World Health Organisation recommending the need for new strategies in caries prevention within the elder community, SDF as a treatment could be revolutionary.<sup>5</sup>

the studies within this review did not answer the focused PICO outcomes (reduce, pain, infection, distress, anxiety, and chair time) it did demonstrate SDF is effective in preventing and arresting caries. It is reasonable to propose the focused outcomes could therefore be achieved; more studies to include such outcomes would be valuable.

### Recommendations

It would be beneficial for researchers to conduct randomised control trials to explore the effectiveness of SDF on carious lesions to include coronal caries. There is a wide range of patient demographics this treatment could benefit, including geriatric, palliative, long term care, disabled, learning disabilities, deprived, and those with mental illness.

this in mind, a recommendation for a root caries prevention programme to include SDF could be implemented as part of a public health project throughout the focused patient demographic, such as 'Caring for Smiles'. The treatment has been shown to be of low cost, with minimal need of equipment, and no running water required.

### Conclusion

Whilst reviewing the literature, both in the primary and permanent dentition, it was evident SDF has been clinically demonstrated to both arrest and prevent further carious lesions in the permanent dentition.<sup>8</sup> Therefore it has the potential to improve the quality of life of the focused patient demographic. SDF has been demonstrated to arrest root caries in the elderly population. Further high-quality studies need to be researched to corroborate the effectiveness of coronal caries and long-term success.

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### Appendices

Appendix 1 – PICO Question

P – Palliative and geriatric patients with caries in a care setting or with caring needs.

I – The use of SDF to prevent and arrest caries.

C – Routine care delivered according to current SDCEP guidance without SDF (2018).<sup>9</sup>

O – Reduced caries, arrested caries, pain prevention, reduced anxiety and distress, improved quality of life (QOL).

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**'The combination of SDF affects tooth tissue in several ways: desensitisation, carious lesion arrest by dentinal tubule blockage, bacterial death, and remineralisation of demineralised tooth.'**

### Discussion

As the focused patient demographic has a high possibility of presenting with hyposalivation, xerostomia, reduced mobility, and reduced dexterity, there is a need to consider if altering oral hygiene instruction reduces a true indication of results. Confounding variables and relationships between participants' physical ability and motivation also need consideration. Nevertheless, establishing the effectiveness of SDF on arresting carious lesions within this patient demographic could lead to a more favourable treatment when considering the focused outcomes within this PICO.

This population have multiple confounding factors inhibiting their oral health. While

Taking into consideration informed consent and contraindications utilising SDF would be advantageous, particularly during the pandemic times, due to it being a non-aerosol producing procedure.<sup>6</sup> The pandemic could also have a lasting psychological effect on elderly and vulnerable people: they may never want to return to a clinical setting again in their lifetime.

Further research into improving the aesthetics of SDF with a recommendation to investigate the effect of the bonding process when including lighter coloured materials such as glass ionomer over the SDF treated area.

BSPD (2020)<sup>7</sup> published guidance supported by high-quality research for use of SDF within paediatric dentistry. With

**‘SDF has the potential to improve  
the quality of life of the focused  
patient demographic.’**

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