Institution: University of Aberdeen

Unit of Assessment: 2 - Public Heath, Health Services and Primary Care

Title of case study: Aberdeen research prompts change in dental policy benefiting thousands of Scottish children

1. Summary of the impact

University of Aberdeen research directly led to a change in the Scottish Dental Contract which has doubled the number of children receiving fissure sealants. The University of Aberdeen's Health Services Research Unit (HSRU) conducted a randomised trial looking at the effectiveness of a strategy to improve adoption of fissure sealants - known to reduce decay in children's teeth but which were rarely administered. The trial examined a fee-for-service intervention in primary dental care where each dentist received £6.80 per tooth sealed. It demonstrated that fee payment was associated with an increase in fissure sealant placement in dental primary care. This led to a change in the Scottish Dental Contract which now includes a fee-for-service for the placement in fissure sealants in children over 11 years old. From 2008, guidance documents from the NHS Department of Health and the Scottish Dental Clinical Effectiveness Programme have recommended placement of fissure sealants on children above 11-years-old. These guidance documents are provided to some 10,000 dentists throughout the UK. Since the introduction of the fee, over 37,000 children per year in Scotland have received fissure sealants. This is double the number of children receiving sealants compared to before the policy change and equates to some 150,000 children receiving the sealants since January 2008.

The claimed impact, as defined by REF guidance, is therefore on *public policy and services*; *practitioners and professional services*; *society* and *economically*.

2. Underpinning research

In the 1990s, a key focus of research at the University of Aberdeen's HSRU was the development of strategies to improve the implementation of research findings. Through its Aberdeen Centre for Implementation Research it provided international guidance on which strategies were most effective for improving implementation of research findings [1]. It also undertook research into specific trial methodology (especially cluster randomised trials) and methods for designing and conducting innovative national evaluations [2]. With this strong reputation for innovation, clinical collaborators routinely approached HSRU with possible clinical questions and HSRU led the translation into robust study designs. This trial related to dental fissure sealants placement is one such example of this practice.

Dental decay is very common in childhood. By age 15, 50% of UK children have experienced decay in their first permanent molars. Dental decay is closely linked to social deprivation and, in Scotland, 69% of five year olds in the least affluent areas have caries. Methods of prevention are well-known and placement of fissure sealants has been shown to reduce decay in children's teeth by up to 86% at 12 months. Adoption in Scotland was poor, however, with only 15% of 11-year-olds having any first molars sealed prior to 2005.

Reasons suggested for the poor adoption of the sealant method by dentists included lack of financial reimbursement for placing sealants on children over 11-years-old and dentists' lack of knowledge of the evidence base for the treatments in older children. To address this adoption problem, methodologists at the University of Aberdeen's HSRU worked with clinical colleagues at the University of Dundee, to design a national cluster randomised trial (the ERUPT trial) to test these implementation strategies. Aberdeen researchers led on the design and implementation of the trial interventions (HSRU researchers were the recognised international experts in implementation research interventions and had developed the evidence base [1]) and on the design and analysis of the trial (HSRU researchers were also the international experts in cluster trial methodology [2]).

University of Aberdeen researchers engaged directly in the ERUPT trial were:

- Craig Ramsay, Senior Statistician, Aberdeen Centre for Implementation Research
- Jeremy Grimshaw, Director, Aberdeen Centre for Implementation Research
- Graeme MacLennan, Statistician, HSRU,

together with clinical input from Jan Clarkson and Nigel Pitts, Dental Health Services Research Unit, Dundee.

Additional University of Aberdeen researchers who were integral to the development of the evidence base and the cluster trial methodology underpinning the ERUPT trial were:

- Ruth Thomas, Research Assistant, HSRU (implementation evidence base)
- Liz Shirran, Research Assistant, HSRU (implementation evidence base)
- Marion Campbell, Senior Statistician, HSRU (methodology of cluster trials for implementation research)
- Jill Mollison, Statistician, Department of Public Health (methodology of cluster trials for implementation research)

The ERUPT trial [3] was completed in 2005 and continues to be the largest randomised trial internationally of a fee-for-service intervention in primary dental care. Some 140 dentists and 2833 high risk of caries children were randomised for the dentists to receive either a fee for fissure sealant placement (each dentist received £6.80 per tooth sealed) or training in evidence-based practice. The trial demonstrated that placement of fissure sealants increased by 10% (when a small fee-for-service was offered). There was no effect of the education intervention. The economic evaluation conducted as part of the study clearly demonstrated that the fee-for-service was a cost-effective intervention.

At the completion of the trial in 2005, a dissemination conference was organised by the trial team to which service providers, national decision makers (such as the British Dental Association) and policy-makers including the Deputy Chief Dental Officer who was responsible for recommending any changes to the Scottish Dental Contract were invited. After the conference, the Deputy Chief Dental Officer recommended a change to the contract informed by the findings of the trial. The Scottish Dental Contract was amended in Nov 2005 to include a fee-for-service for the placement of fissure sealants in children over 11-years-old.

From 2008, guidance documents from the NHS Department of Health (England) and the Scottish Dental Clinical Effectiveness Programme have recommended placement of fissure sealants on children above 11-years-old. These guidance documents are provided to some 10,000 dentists throughout the UK.

3. References to the research

Research outputs

[1] Grimshaw JM, Thomas RE, MacLennan GS, Fraser C, Ramsay CR, Vale L, Whitty P, Eccles MP, Matowe L, Shirran L, Wensing M, Dijkstra R, Donaldson C. (2004). Effectiveness and efficiency of guideline dissemination and implementation strategies. *Health Technol Assess* 8(6):1-72.

This research, led from the University of Aberdeen's HSRU was, and continues to be, the most comprehensive review of guideline dissemination and implementation strategies ever undertaken and has been cited 1743 times, Google Scholar at 12/8/13. It underpinned the choice of implementation strategy for the ERUPT trial.

[2] Campbell MK, Mollison JM, Grimshaw JM (2001). Cluster trials in implementation research: estimation of intracluster correlation coefficients and sample size. *Statistics in Medicine* 2001; 20: 391-399.

This paper is an example of the methodological advances being developed by HSRU researchers at the time in the field of implementation research, around the development of cluster trial methods in the field. The developments in this paper informed the design of the

ERUPT trial discussed in this case study.

[3] Clarkson JE, Turner S, Grimshaw JM, Ramsay CR, Johnston M, Scott A, Bonetti D, Tilley CJ, Maclennan G, Ibbetson R, MacPherson L, Pitts NB. (2008). Changing clinicians' behavior: a randomized controlled trial of fees and education. *J Dent Res*; 87(7):640-4.
This paper reports the ERUPT trial referred to in this case study. It continues to be the largest trial ever undertaken of a fee-for-service intervention in primary dental care.

Key grant funding associated with the research

The project was conducted by a Chief Scientist Office (Scottish Government) grant led by Jan Clarkson of the University of Dundee as clinical lead with Craig Ramsay (HSRU, University of Aberdeen) as methodological lead. Details shown below:

Title: *The effect of remuneration and education on the implementation of research evidence to reduce inequalities in oral health. Chief Scientist Office,* Dec 2001 to Nov 2005, £382,473.

The research outputs and research grant award underwent rigorous independent external peer review by the funding bodies.

4. Details of the impact

Initial impact occurred when the randomised trial ended in 2005. The study led to a direct change in the Scottish Dental Contract in Nov 2005 with a new fee-for-service for preventative sealant application on child molars introduced. The revised contract stated…

"5.2 Fissure Sealants

Lewis Macdonald, Deputy Minister for Health's, letter of 29 November advised that, from 1 April 2006, a new item of service fee would be introduced for the application of fissure sealants as a primary preventive measure to pits and fissures in each permanent molar tooth." [a]

Since its introduction, over 37,000 children per year in Scotland have received fissure sealants. This is double the number of children receiving sealants compared to before the policy change and equates to some 150,000 children receiving the sealants from January 2008 [b,c]

From 2008, guidance documents from the NHS Department of Health (England and Wales) [d] and the Scottish Dental Clinical Effectiveness Programme [e] have recommended placement of fissure sealants on children above 11-years-old. These guidance documents are provided to some 10,000 dentists throughout the UK.

This work was also pivotal to demonstrating that a significant gap exists between known evidence-based practice and the implementation of that practice in dental primary care. In November 2008, it led to the setting up of an innovative programmatic approach to knowledge translation research in Scottish Dentistry (led jointly by Craig Ramsay, HSRU as principal investigator for methodology, and the Scottish Dental Clinical Effectiveness Programme) that informs some 1000 dental services practitioners, policy makers and patients on how best to translate national recommendations into routine clinical activities. The initial randomised study now provides an exemplar for how translational research in a dental setting can be performed and forms part of the protocol [f] for the Translation Research in a Dental Setting (TRiaDS) initiative (*http://www.sdpbrn.org.uk/index.aspx?o=2688*). As well as influencing practitioner services the TRiaDS programme impacts on the broader research community through knowledge transfer initiatives such as running national conferences (*http://www.sdpbrn.org.uk/index.aspx?o=3113).*

The claimed impact, as defined by REF guidance, is therefore on *public policy and services*; *practitioners and professional services*; *society* and *economically*.

5. Sources to corroborate the impact

[a] Amendments to the statement of dental remuneration. *Scottish Executive Health Department*, 2006.
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&ved=0CCoQFjAA&url=http%3A%2F%2Fwww.scottishdental.org%2Findex.aspx%3Fo%3D1495&ei=7u9GUs65IKWy7Aa16IC4Aw&usg=AFQjCNH9VwiBWn0e-Ka8cvt31_DjX0q9Ww&bvm=bv.53217764,d.ZGU
This reference highlights the change in the Dental Contract to account for remuneration of fissure sealants on child molars.

[b] National Dental Inspection Programme of Scotland. *Scottish Dental Epidemiology Co-ordinating Committee*, 2005.
http://www.scottishdental.org/index.aspx?o=2153&record=73
Data on fissure sealant use are collected and reported at a national level on an annual basis. This report details the level of sealant use prior to 2005.

[c] National Dental Inspection Programme of Scotland. *Scottish Dental Epidemiology Co-ordinating Committee*, 2011.
http://www.isdscotland.org/Health-Topics/Dental-Care/Publications/2011-11-29/2011-11-29-NDIP-Report.pdf
As with reference [b] above this report details the increased level of fissure sealant use in 2011.

[d] NHS Department of Health. Delivering Better Oral Health: An evidence-based toolkit for prevention, April 2009.
http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&ved=0CCoQFjAA&url=http%3A%2F%2Fwww.oralhealthplatform.eu%2Fsites%2Fdefault%2Ffiles%2Ffield%2Fdocument%2FNHS_Delivering%2520Better%2520Oral%2520health.pdf&ei=mPFGUvLZHMee7AaPsYGYDw&usg=AFQjCNFOePeTk5uyxKOs84dHBpLyEQ9Enw&bvm=bv.53217764,d.ZGU
This guidance document demonstrates that fissure sealant replacement in 11 years olds was being recommended as optimal practice for dentists in England and Wales.

[e] Scottish Dental Clinical Effectiveness Programme. Prevention and management of dental caries in children, April 2010.
http://www.sdcep.org.uk/index.aspx?o=2866
Similar to reference [d] above, this guidance document demonstrates that fissure sealant replacement in 11 years olds was being recommended as optimal practice for dentists in Scotland.

[f] Clarkson JE, Ramsay CR, Eccles MP, *et al*. (2010). The translation research in a dental setting (TRiaDS) programme protocol. *Implementation Science*; 5: 57.
http://www.implementationscience.com/content/pdf/1748-5908-5-57.pdf
This paper describes the TRiaDS programme and references the ERUPT study as an exemplar of a rigorous implementation study in dentistry.

[g] Testimonial from Postgraduate Dental Dean for Scotland
Letter from Postgraduate Dental Dean for Scotland (till 2011), confirming the ERUPT trial directly contributed to the decision to change in remuneration for dentists in Scotland in respect of placement of preventative fissure sealants and the impact it has had on the thousands of children who have now benefited from this policy.