

Institution: University of Dundee
Unit of Assessment: UoA3 Allied Health Professions, Dentistry, Nursing and Pharmacy
Title of case study: Knowledge into Action: Increasing the translation and use of research evidence in dental practice
1. Summary of the impact

This programme of research has, through producing national guidance and improving understanding of professional behaviour, enabled delivery of evidence based practice by dental practitioners in primary care. Its impacts include:

- International clinical recommendations focusing on fundamental issues such as caries management, dental prescribing (antibiotics) and oral care for patients with cancer (production of systematic reviews and guidelines).
- Involvement of dentists and patients in understanding and valuing the importance of research and building capacity for future research (research culture).
- Policy change in education and service to improve patient safety (decontamination) and promote better oral health and public wellbeing (caries).

2. Underpinning research

The Cochrane Oral Health Group (COHG) is acknowledged to be the most reliable source of up-to-date systematic reviews to inform better healthcare; **Clarkson** (Co-Director, Dental Health Services Research Unit) is its joint lead. These reviews underpin guidance development worldwide and inform government research priorities. Around 10% of the current 153 reviews have Dundee Dental School authors: these include the most accessed COHG review, on preventing mucositis in patients with cancer [i], which is ranked 20th out of the 6,544 reviews in the Cochrane library. The delivery of priority reviews is important for the impact of Cochrane and the COHG is proactive in conducting and updating reviews to meet the needs of national guideline producers [ii].

The University of Dundee hosts the Scottish Dental Clinical Effectiveness Programme (SDCEP) and the Scottish Dental Practice Based Research Network (SDPBRN), both led by **Clarkson**. SDCEP is responsible for the production of national dental guidance in Scotland and includes an embedded, government-funded evidence to practice evaluative framework initiative, Translation Research in a Dental Setting (TRiADS) [iii]. SDPBRN engages dental health professionals and their patients in research to generate evidence and improve health [iv]. Together these initiatives represent a unique collaborative partnership between the University and NHS Education for Scotland with researchers employed by both organisations.

We have adopted a multifaceted approach that includes evidence synthesis and dissemination (COHG & SDCEP), as well as research to understand and change professional behaviour (SDPBRN & TRiADS). This includes a suite of studies conducted to understand the determinants of professional behaviour change. Early work by **Clarkson** (University of Dundee 1998- date), Pitts (University of Dundee 1985-2012), and Bonetti (University of Dundee 1999-date) included two multicentre randomised controlled trials. One involved 63 general dental practices and investigated the impact of training and audit on compliance with Scottish Intercollegiate Guidelines Network (SIGN) and National Institute for Health and Care Excellence (NICE) Third Molar guidelines [v]. The Evidence from Research Used in Preventive Treatment (“ERUPT”) trial involved 148 general dental practices and compared the effect of remuneration and education on the implementation of fissure sealants in SIGN guidelines for over 3000 of their child patients [vi]. Both trials demonstrated that psychological theory predicted behaviour and behaviour change in the dental setting and could be used to anticipate the need for and design of interventions to overcome the evidence-practice gap.

The research described above contributed to the policy decision to establish SDCEP in 2005 as the national guidance programme for dentistry. Internationally, SDCEP is the only guidance

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programme incorporating a research framework. **Clarkson** has established an international multi-professional team (TRiADS) that works in partnership with the guidance development groups and employs an integrated knowledge translation process that collaborates with and engages stakeholders (patients, practitioners, guidance developers, policy-makers, educational providers) throughout the entire research process [iii]. TRiADS supports the whole process of guidance development and includes research to inform the focus and implementability of SDCEP guidance and measure post publication impact.

3. References to the research

- i. Worthington HV, **Clarkson** JE, Bryan G, Furness S, Glenny A-M, Littlewood A, McCabe MG, Meyer S, Khalid T (2011) Interventions for preventing oral mucositis for patients with cancer receiving treatment. *Cochrane Database of Systematic Reviews* 2011 Issue 4:CD000978 (DOI: 10.1002/14651858.CD000978.pub5).
- ii. Marinho VCC, Worthington HV, Walsh T and **Clarkson** JE (2013) Fluoride varnishes for preventing dental caries in children and adolescents. *Cochrane Database of Systematic Reviews* 2013 Issue 7:CD002279 (DOI: 10.1002/14651858.CD002279.pub2).
- iii. **Clarkson** JE, Ramsay CR, Eccles MP, Eldridge S, Grimshaw JM, Johnston M, Mitchie S, Treweek S, Walker A, Young L, Black I, Bonetti D, Cassie H, Francis JJ, MacKenzie G, Macpherson LM, McKee L, Pitts NB, Rennie JS, Stirling D, Tilley CJ, Torgerson S and Vale LD (2010) The translation research in a dental setting (TRiADS) programme protocol. *Implementation Science* **5**, 57 (DOI: 10.1186/1748-5908-5-57).
- iv. **Clarkson** JE, Young L, Ramsay CR, Bonner BC and Bonetti D (2009) How to influence patient oral hygiene behavior effectively. *J. Dent. Res.* **88**, 933-937 (DOI: 10.1177/0022034509345627).
- v. Bahrami M, Tilley CJ, Deery C, **Clarkson** JE, Pitts NB, Johnston M, Ricketts I, MacLennan G, Nugent ZJ, Bonetti D, Ramsay C (2004) Effectiveness of strategies to disseminate and implement clinical guidelines for the management of impacted and unerupted third molars in primary dental care, a cluster randomised controlled trial. *Brit. Dent. J.* **197**, 691-696 (DOI:10.1038/sj.bdj.4811858).
- vi. **Clarkson** JE, Turner S, Grimshaw J, Ramsay C, Johnston M, Scott A, Bonetti D, Tilley C, MacLennan G, Ibbetson R, Macpherson L, and Pitts NB (2008). Changing clinicians' behavior: A randomized controlled trial of fees and education. *J. Dent. Res.* **87**, 640-644 (DOI: 10.1177/154405910808700701).

Funding

- Consortium for Development and Education in Dental Primary Care including Chief Scientist Office funding. 2001-05. £306,503: Effect of Remuneration and Education on the Implementation of Evidence in Primary Care Dental Services. Cluster Randomized Control Trial in Dental Primary Care.
- Translational Research in a Dental Setting (TRiADS): Scottish Government Chief Dental Officer. 2007-10. £300,000: NHS Education for Scotland. 2010-12. £200,000: 2013-2015 £600,000: Total TRiADS funding since 2007 = £1.1 million.
- Centre for Disease Control, Atlanta. 2012. £580,000: Cochrane Oral Health Group.

4. Details of the impact

Systematic Reviews and Guidance

Systematic reviews from the COHG have been incorporated into national guidelines in the UK, US, Australasia, Europe, China and Canada. This group is ranked second of the 24 Cochrane Review Groups funded by the National Institute for Health Research and is recognised internationally for its productivity, quality and methodological rigor. The COHG reviews on oral consequences of cancer therapy have been cited in international guidelines including the UK Childhood Cancer Guidelines.

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Since dissemination there has been change in 70% of the UK Children Cancer and Leukaemia Group oncology centres [1].

Partnership working with national guideline development groups (SDCEP, United Kingdom Children's Cancer Study Group, SIGN, NICE, American Dental Association, US Centers for Disease Control (CDC)) has resulted in efficiencies and avoidance of duplication of effort. This includes the CDC Community Prevention Guidelines recently endorsed by the US Congress [2]. Guidelines require up-to-date synthesised evidence and for national groups the COHG agree to undertake or update reviews supporting improvement in the quality and efficiency of guideline development. A recent example was our update to the 2002 fluoride varnish review [ii] for the SIGN.

Clarkson is Director of SDCEP (<http://www.sdcep.org.uk/?o=2342>). In Scotland SDCEP guidance is used to improve patient care by all general dental practices, dental hospitals and education providers. It is increasingly being adopted beyond Scotland by national and local organisations. The 'Prevention and Management of Dental Caries in Children' Guidance is used as the standard for Childsmile, the Scottish national public health programme for caries prevention in children and has been translated into Polish [3], adopted in New Zealand [4], and included in other UK policy documents.

SDCEP Drug Prescribing Guidance [5] is used in all UK Dental Schools, is recommended for use in the NHS in Wales and was used by dentists in Wales as part of the 1000 Lives Plus antimicrobial prescribing audit. The SDCEP 'Prescribing App', which links directly to the Drug Prescribing Guidance, has been purchased 3000 times and is rated as a 5 star app by users (<https://itunes.apple.com/gb/app/sdcep-dental-prescribing/id509188306>). About 10% of sales have been outwith the UK. SDCEP 'Bisphosphonate Guidance' [6] is cited as advice in the British National Formulary for medical practitioners and measurement of its post publication impact demonstrated a change in dental practitioner behaviour and beliefs consistent with better management of these patients in primary care and a reduction in unnecessary referrals to secondary care. The 'Practice Support Manual' is used by all dental practices in Scotland to demonstrate quality assurance to Health Boards, NHS Education for Scotland and Healthcare Improvement Scotland [7].

Research Culture in Primary Care

SDPBRN, of which Clarkson is Director (<http://www.sdpbrn.org.uk/index.aspx?o=2369>), has generated a vibrant culture of research including a network of Rapid Evaluation Practitioners. This has contributed to Dundee's success in securing three Health Technology Assessment UK-wide randomised controlled trials involving 200 dental practices and 4000 patients, to address gaps in evidence demonstrated by COHG systematic reviews. TRiADS has been commissioned by government to conduct a randomised controlled trial involving all General Dental Practitioners in Scotland which is aimed at reducing dental antibiotic prescribing [8].

Policy Change for Patient Safety and Public Wellbeing

Policy change for patient safety resulted from the TRiADS randomised controlled trial investigating the value of theoretically-based, in-practice training for the implementation of best decontamination practice. A significant increase in the translation of guidance recommendations was recorded as a consequence, thus reducing the risk of healthcare acquired infection. This training is now embedded in NHS Education for Scotland's Dental Education Programme and the Health Boards' dental practice inspection criteria [7].

A policy change with an impact on public wellbeing occurred following the ERUPT trial, with the introduction of a fee for the provision of fissure sealants in Scotland [9]. Data from 2008/09 onwards indicate 37,000 claims representing 120,989 preventive fissure sealants placed per year at a cost of £930,000 annually. This represents provision of the most effective preventive treatment for dental caries in children, previously not provided. This treatment has contributed to an increase in Primary Seven children with no obvious decay in their first permanent molars from 61% in 2007 to 73% in 2013.

SDPBRN has demonstrated the value to government of dental practices participation in research and in future, SDPBRN research activity will contribute to the mandatory quality improvement

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activity for dental practices in Scotland [10]. The impact of this is not only on the dental practice team but also for patients who value and recognise the importance of research. Currently approximately 80% of eligible patients agree to participate in University of Dundee led dental research.

5. Sources to corroborate the impact

1. Craig JV, Gibson F, Glenny AM: Children's Cancer and Leukaemia Group and Paediatric Oncology Nurses Forum (CCLG–PONF) Mouth Care Group (2011) Audit to monitor the uptake of national mouth care guidelines for children and young people being treated for cancer. *Support Care Cancer* **19**, 1335-41 (DOI: 10.1007/s00520-010-0953-3).
2. Centers for Disease Control Community Guide (2013) Preventing Dental Caries: Community-Based Initiatives to Promote the Use of Dental Sealants. Task Force Finding and Rationale Statement. Evidence from the ERUPT trial helped inform the basis for this Centers for Disease Control guide; available at: <http://www.thecommunityguide.org/oral/supportingmaterials/RRcommunitysealants.html>.
3. SDCEP (2012) Scottish Dental Clinical Effectiveness Programme Prevention and Management of Dental Caries in Children. Dental Clinical Guidance. PART I Introduction. Overarching Principles. Assessing the Child: Szkocki kliniczny program opieki stomatologicznej zapobiegania i leczenia próchnicy zębów u dzieci. Poradnik stomatologii klinicznej. CZĘŚĆ I Wprowadzenie. Zasady ogólne. Badanie dziecka *J. Stoma* **65**, 1: 100-124. Polish translation of Prevention and Management of Dental Caries in Children guidance; available at: <https://discovery.dundee.ac.uk/admin/files/3217602/3. Clarkson SDCEP 2012.pdf>.
4. New Zealand version of Prevention and Management of Dental Caries in Children guidance; available at: <http://www.health.govt.nz/publication/prevention-and-management-dental-caries-children-guidance-brief>.
5. SDCEP (2011) Drug Prescribing For Dentistry: Dental Clinical Guidance, 2nd Edition (ISBN 978 1 905829 13 2); available at: <http://www.sdcep.org.uk/index.aspx?o=2334>.
6. SDCEP (2011) Oral Health Management of Patients Prescribed Bisphosphonates: Dental Clinical Guidance (ISBN 978 1 905829 12 5); available at: <http://www.sdcep.org.uk/?o=3017>.
7. Combined Practice Inspection Checklist. 2013. Available at: <http://www.scottishdental.org/index.aspx?o=7742> (evidence of recommended use of SDCEP guidance to prepare for inspection Pg. 1 and evidence of requirement to undergo NHS Education for Scotland in-practice decontamination training Pg. 12 Item 63).
8. SDPBRN on <http://www.scottishdental.org/>. TRiaDS projects prescribing summary indicating all GDPs in Scotland randomised in RAPID trial to reduce antibiotic prescribing (ISRCTN49204710). Available at: <http://www.sdpbrn.org.uk/index.aspx?o=3376>.
9. Letter of corroboration from Post Graduate Dental Dean for Scotland (2002 - 2011) corroborating both the policy impact of the ERUPT study on the introduction of a fee for preventive fissure sealants and the public wellbeing impact from placement of this preventive treatment.
10. Letter of corroboration from the Chief Dental Officer, Scottish Government, Health and Social Care Integration Directorate (Clinical Audit 9 July 2013). Evidence of change in policy to include participation in SDPBRN (practice based research) within dentists' mandatory quality improvement audit activities. Also evidence that the SDCEP Practice Support Manual will be included to support quality improvement audit activity.