

Institution: University of Sheffield

Unit of Assessment: 3A - Allied Health Professions, Dentistry, Nursing and Pharmacy: Dentistry

Title of case study: Advocating the use of Powered Toothbrushes

1. Summary of the impact

Our research showed that powered rotation oscillation toothbrushes were superior to manual toothbrushes for the removal of plaque and reduction of gingivitis. This information has had impacts on national public policy, on commerce and on society.

1. The findings were used by the Department of Health in its evidence-based guidelines for preventing oral disease, which is NHS policy on preventive dentistry in England and Wales.
2. The research has also been used in worldwide marketing by Procter and Gamble (the manufacturers of the leading brand of powered rotation-oscillation toothbrush), and by another manufacturer as part of its marketing strategy for a new toothbrush.
3. Finally, as a result of this work there have been critical reviews of the research and of the toothbrushes in the media that have enabled more informed consumer choice for oral hygiene.

2. Underpinning research

There have been many evaluations of powered toothbrushes stretching back to the 1960s. The methods and findings of these studies have been inconsistent, leaving dental teams worldwide and policy makers on dental prevention unable to provide valid advice to dentists and to the public.

Since 2003, Professors Peter Robinson and Chris Deery (School of Clinical Dentistry, University of Sheffield) have been principle investigators working with a dental practitioner and academics at Birmingham, Manchester and Bristol universities conducting a series of Cochrane systematic reviews (R1, R2, R3) to identify and synthesise the evidence on the effectiveness of powered toothbrushes as used in normal conditions by people in their own homes.

The research has identified that powered toothbrushes with a rotation oscillation action (where the toothbrush head spins one third of a turn in one direction and back again) were superior to manual toothbrushes for the removal of plaque and reduction of gingivitis (R1,R2). This superiority is consistent across patient groups and no other designs of powered toothbrushes were shown to offer these advantages.

A third study (R3) investigated comparisons of the different designs of powered toothbrush against each other and further supported the use of powered rotation oscillation toothbrushes.

These Cochrane reviews remain the most highly cited reviews by the Cochrane Oral Health group and when secondary published in the Journal of Dentistry was the most frequently downloaded paper in that journal (R4). The research was also secondary published by other peer-reviewed journals in the US, Australia and China (E.g. R5).

Further, the research highlighted methodological problems in research evaluating powered toothbrushes and we were able to provide guidance on the conduct of future clinical trials (R6).

3. References to the research

- R1. Henue M, Deacon S, Deery C, Robinson PG, Worthington H, Walmsley D, Shaw W. Manual versus powered toothbrushing for oral health. *Cochrane Database Syst Rev*. 2003;(1):CD002281.
- R2. Robinson PG, Deacon SA, Deery C, Heanue M, Walmsley AD, Worthington HV, Glennly AM, Shaw WC. Manual versus powered toothbrushing for oral health. *The Cochrane Database of Systematic Reviews* 2005, Issue 2. Art. No.: CD002281.pub2.
10.1002/14651858.CD002281.pub2

Impact case study (REF3b)

- R3. Deacon SA, Glenny AM, Deery C, Robinson PG, Heanue M, Walmsley AD, Shaw WC. Different powered toothbrushes for plaque control and gingival health. *Cochrane Database Syst Rev*. 2010 Dec 8;12:CD004971.
- R4. Henue M, Deacon S, Deery C, Robinson PG, Worthington H, Walmsley D, Shaw W. Manual versus powered toothbrushing for oral health. *Journal of Dentistry*. 2004; 32: 197-211.
- R5. Niederman R, ADA Council on Scientific Affairs, ADA Division of Science, Journal of the American Dental Association. Manual versus powered toothbrushes: the Cochrane review. *Journal of the American Dental Association*. 2003;134:1240-4.
- R6. Robinson PG, Walmsley AD, Henue M, Deacon S, Deery C, Glenny AM, Worthington H, Shaw W. Quality of trials in a systematic review of powered toothbrushes: Suggestions for future clinical trials. *J Periodontol* 2006;77:1944-53, doi: [10.1902/jop.2006.050349](https://doi.org/10.1902/jop.2006.050349)

4. Details of the impact

Context for impact

The impacts arise because the research is topical, having direct relevance to professional and public behaviour and to commercial interest. For example, one quarter of adults (26%) with natural teeth in England and Wales use a powered toothbrush, the UK toothbrush market is valued at £201 million and powered brushes account for almost half of this market. These patterns will be replicated in many other countries.

The impact of our research falls into three categories: on public health policy, on commerce and on society.

Impact on national public health policy

The research has been incorporated into national clinical and public health guidelines across England and Wales. Dental teams may now recommend powered rotation oscillation toothbrushes with confidence. Their use is incorporated into the guidance of the Department of Health / British Association for the Study of Community Dentistry toolkit for dental prevention *Delivering Better Oral Health* (S1). This document forms Department of Health policy on preventive dentistry in England and is implemented almost universally across the NHS. In this way, policy underpinned by Sheffield has been sent to all 23,000 NHS dentists in England and Wales. *Delivering Better Oral Health* is named in nearly all local NHS prevention strategies and has been used as a standard in many criterion-based audits of NHS dentistry including those conducted in Somerset, South and West England, Hounslow and Manchester (S2).

Moreover, *Delivering Better Oral Health* is used as part of the currency of NHS dental contracts; it is cited as a standard to be adhered to as part of those contracts. It is also cited in the guidance on commissioning the NHS dental pathway as an integrated model of service delivery and as part of the rationale for the forthcoming contract (S3).

The review was also cited to support the use of powered toothbrushes in the Royal College of Surgeons guidelines for the oral management of oncology patients (S4) and four other standard nursing and dermatology texts (See S5 for an example).

Commercial impact

The Cochrane Reviews were used extensively by Procter and Gamble (P&G) in their global marketing strategy to gain competitive advantage. P&G used the reviews in their worldwide dental professional engagement because of their high quality and independence. Their professional engagement takes the form detail aids supplied to practices and in scientific exchange lectures given at dental schools and by key thought leaders (S6). P&G train their representatives extensively on the importance and relevance of the Cochrane Power Reviews.

The P&G Director of Global Professional and Scientific Relations has testified:

“Following the first Cochrane systematic review on Power versus manual tooth brushing, published in 2003, we used this information to convince dental professionals of the validity of our data as it had been independently and systematically reviewed. The subsequent Cochrane updates have led to a change in attitude regarding recommending power toothbrushes with an oscillating/rotating action. P&G has used the results of the Cochrane studies in more than twenty countries worldwide in dental professional advertising, as detail aids supplied to practices and in scientific exchange lectures provided at dental schools and by key thought leaders. We train our representatives extensively on the importance and relevance of the Cochrane Power Reviews.

“The consumer media in North America have used data from the Cochrane Collaboration to support endorsement of oscillating/rotating power toothbrushes, notably on CNN, NBC, Fox News and through Consumer Reports. These direct to consumer communications drive conversations between practitioners and their patients and lead to more specific product recommendations for oscillating/rotating power toothbrushes.

“While it is impossible to quantify the value of the Cochrane Review in terms of yearly product sales, it can be shared that the power toothbrush business for P&G is worth over 1 billion dollars in sales worldwide and over 50% of consumer sales follow recommendation from a dental professional” (S7).

Another company, Colgate, used the review ahead of the launch of their new ProClinical electric toothbrush to position it in the market. The product was the company’s first entry in the powered rechargeable toothbrush category. The launch of the toothbrush was accompanied by a strong marketing campaign, which was informed by our research. ProClinical’s share of the electric toothbrush market reached 7% just three months after launch (S8, S9).

Impacts on society

Impacts on society arise from critical reviews in the media. Commentaries on the first reviews received front page coverage in *The Washington Post*, *New York Times*, *The Observer* and *Daily Mail* (2005, outside the reference period for REF2014). The debate has continued with each update of the reviews being discussed in, for example, *Which? Which? Conversation, Choice* (The Australian version of *Which?*), *The Daily Mail*, *The Gadget Show* and in numerous other consumer publications etc. (S10). In this way the reviews have informed better consumer choice for oral hygiene.

5. Sources to corroborate the impact

- S1. The Department of Health 2009 report *Delivering Better Oral Health* corroborates the use of our research to evidence their recommendation to use a powered oscillating toothbrush (<http://tinyurl.com/mrhtllv>, p.46).
- S2. The South & West Local Assessment Panel Report corroborates the claim that *Delivering Better Oral Health* has been implemented across NHS dental practices, and that that implementation has been audited across 107 dental practices in South and West England alone (p.4).
- S3. The Department of Health 2012 report *NHS dental contract pilots - Care Pathway Review* corroborates that the advice given in *Delivering Better Oral Health* was part of the rationale for the approach of the pilot NHS dental contract (<http://tinyurl.com/p4zlw8o>, p.6).
- S4. The Royal College of Surgeons of England / The British Society for Disability and Oral Health. *The Oral Management of Oncology Patients Requiring Radiotherapy, Chemotherapy and / or Bone Marrow Transplantation*. Clinical Guidelines. Updated 2012

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- S5. Debnath AR. Professional Skills in Nursing: A Guide for the Common Foundation Programme (2009) corroborates the use of our research in guiding standard practice for the oral care of hospital patients.
- S6. An article on the Oral-B website corroborates their use of our research in their global marketing of powered toothbrushes (<http://tinyurl.com/7aw2anx>).
- S7. A statement from P&G corroborates that the research informed their marketing strategies.
- S8. The Colgate 2012 Annual Report *Innovation For Growth* corroborates the market share of the ProClinical toothbrush (<http://tinyurl.com/ozrpttc>).
- S9. A statement from Colgate corroborates that the research informed their marketing strategies.
- S10. An example of the debate stimulated by the research is an online article and associate public comments on the *Which? Conversation* website (<http://tinyurl.com/nq4sy8a>).