

Can Audit and Feedback Reduce Antibiotic Prescribing in Dentistry?

Antimicrobial resistance is a serious threat to global public health and patient safety. Nine percent of all antibiotics dispensed in community pharmacy in Scotland are prescribed by primary care dentists.

Audit and Feedback (A&F) is a common strategy used to promote the implementation of evidence based practice. There is evidence to demonstrate that A&F may lead to improvements in healthcare professionals' drug prescribing behaviour.

The RAPID trial, conducted as part of NHS Education for Scotland's Translation Research in a Dental Setting (TRiADS) programme, used national, routinely collected dental prescribing and treatment data to compare the effectiveness of individualised A&F strategies for the translation into practice of Scottish Dental Clinical Effectiveness Programme (SDCEP) recommendations on antibiotic prescribing in the primary care dental service in Scotland.

Key Points

- **Inappropriate use of antibiotics is a major contributor to the spread of antimicrobial resistance.**
- **Despite the widespread usage of the SDCEP Drug Prescribing for Dentistry guidance, the total number of antibiotics prescribed by dentists in Scotland increased steadily up to 2013.**
- **This trial provides a robust evaluation of the impact of A&F on antibiotic prescribing in real world dental practice.**
- **The results demonstrate that the provision of A&F resulted in a significant 6% reduction in antibiotic prescribing rates per 100 claims for NHS treatment.**
- **Extrapolated to all dentists in Scotland this represents a reduction of approximately 20,000 antibiotic items over 12 months.**
- **The reduction was greatest for dentists who were high prescribers at 12%.**
- **A&F that includes a text-based behaviour change message and a health board comparator is likely to have the greatest effect.**
- **Consideration should be given to incorporating the A&F intervention found to be most effective with embedded testing and evaluation of 'added value' interventions into routine service delivery as part of the Quality Agenda.**

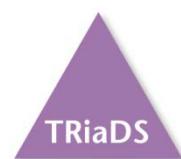
This summary presents:

Key findings from the RAPID cluster randomised controlled trial conducted in NHS general dental practices in Scotland during May 2013 – April 2014.



SDCEP (Scottish Dental Clinical Effectiveness Programme)

has a national remit to provide user-friendly, evidence based, clinical guidance in priority areas for dental healthcare in Scotland.



TRiADS (Translation Research in a Dental Setting)

is a multi-disciplinary research collaboration that works in partnership with SDCEP to increase the implementation of SDCEP guidance through the development and evaluation of scientifically informed interventions for change.

Background

Antimicrobial resistance is an increasingly serious threat to global public health and patient safety.¹ Unnecessary use of antibiotics is a major contributor to the spread of antimicrobial resistance.² Despite clear clinical guidance³, evidence suggests that dentists often prescribe antibiotics in the absence of systemic involvement when not clinically indicated.^{4,5}

Overuse of antimicrobials has resulted in many agents becoming relatively ineffective for simple infections due to emerging bacterial resistance².

In Scotland, dentists prescribe 9% of all antibiotics dispensed in community pharmacy.⁶ National guidance to improve primary care dental prescribing was first published and distributed to all dentists in Scotland by SDCEP in April 2008.³ Evaluation of its impact, using routinely collected dental prescribing data, demonstrated little change in dentists' prescribing of antibiotics and a steady increase in the total number of dental antibiotic items prescribed between 2008 and 2013.

The RAPiD (Reducing Antibiotic Prescribing in Dentistry) trial used national, routinely collected healthcare data to compare the effectiveness of individualised A&F strategies for the translation into practice of SDCEP recommendations on antibiotic prescribing.⁷

The Question

The research question addressed was: In comparison to current practice, does the provision of individualised A&F at differing time intervals, with or without a health board comparator, with or without a text-based behaviour change intervention lead to a reduction in antibiotic prescribing rates in dental primary care in Scotland?

Methods

RAPiD was a 12 month cluster randomised controlled trial conducted in NHS General Dental Practices across Scotland (page 5).

795 practices were randomly allocated to the control group (no A&F) or to one of eight groups receiving different types of individualised A&F:

- A&F ± text-based behaviour change intervention
- A&F ± health board comparator
- A&F at 0 and 6 months ± at 9 months

The text-based behaviour change intervention distilled and reiterated the 'behavioural instructions' within the SDCEP guidance.

The health board comparator provided a graphical representation of the average prescribing rate of all dentists in a health board. An example A&F chart is provided on page 6.

Why Audit & Feedback?

TRiADS determines the need for and design of implementation strategies to translate guidance recommendations into practice.

For drug prescribing, A&F defined as 'any summary of clinical performance of healthcare over a specified period of time'⁸ aimed at changing health professional behaviour has consistently demonstrated small to moderate sized effects.

This trial provides the opportunity to better understand how and when audit and feedback works best by robustly evaluating its impact on antibiotic prescribing by primary care dentists.

Prescribing Rates

Prescribing rates were calculated by linking data from the PRISMS (prescribing) and MIDAS (NHS dental treatment claims) databases.

For each individual dentist, the prescribing rate was calculated as the monthly number of antibiotic items dispensed divided by the mean monthly number of claims (multiplied by 100).

Health Board rates were similarly calculated based on total antibiotic items prescribed and total number of treatment claims within each board.

Outcomes Measured

Primary outcome - the total number of antibiotic items dispensed per 100 courses of NHS treatment claims over the 12 months from May 2013 to April 2014.

Secondary outcomes - measures included: the total defined daily doses (DDDs) of antibiotics dispensed per 100 courses of NHS treatment claims; the total number/DDDs of Amoxicillin 3g items dispensed per 100 courses of NHS treatment claims; and the total number/DDDs of 'second-line' antibiotic items dispensed per 100 courses of NHS treatment claims.

Trial Protocol

Full details of the trial design, the development of the interventions and the process evaluation can be found in the published protocol, available at:

<http://www.implementationscience.com/content/9/1/50>

Process Evaluation

To explore dentists' experiences of and response to the individualised A&F interventions and to facilitate understanding of the processes associated with antibiotic prescribing in dentistry, a concurrent theoretically informed process evaluation using the Consolidated Framework for Implementation Research (CFIR)⁹ and the Theoretical Domains Framework (TDF)¹⁰ from health psychology was conducted.

The CFIR facilitates an understanding of contextual factors and the TDF an understanding of individual factors that influence professional behaviour change.

Summary of Findings

Primary Outcome

Analysis of the primary outcome demonstrated a significant 6% reduction in the antibiotic prescribing rate of dentists in the A&F intervention group, compared to control group dentists. Extrapolated to all dentists in Scotland this represents a reduction of approximately 20,000 antibiotic items over 12 months.

Intervention components: The prescribing rate of dentists who received A&F plus a text-based behaviour change intervention was 6% lower than dentists who did not receive this intervention with their A&F. For dentists who were provided with a health board comparator as part of their A&F, a 4% reduction in the prescribing rate was observed compared to dentists who did not receive the comparator. No significant difference was observed between dentists who received the feedback at 0 and 6 months and those who received feedback at 0, 6 and 9 months.

Subgroup analyses: Analyses exploring any effect moderation by pre-intervention levels of prescribing demonstrated a 12% reduction in prescribing from baseline by high prescribers who received A&F compared to high prescribers who did not receive A&F.

Secondary Outcomes

The total DDDs prescribed by dentists receiving A&F significantly reduced from 41 per 100 claims to 37 per 100 claims. This represents a 7% reduction in total DDDs in dentists receiving A&F relative to dentists who did not.

No other statistically significant differences were observed for the remaining secondary outcomes though the general trend was a reduction in prescribing across all the outcomes in dentists receiving A&F in comparison to dentists who did not receive A&F.

Process Evaluation

In general, dentists reacted positively to receiving their individualised A&F although views varied according to the type of A&F received. The findings supported the results from the statistical analyses in relation to a preference for a comparator and the inclusion of guidance or instruction as given in the text-based behaviour change intervention. Dentists expressed no strong preference to receive feedback more often than twice a year.

As a direct result of receiving the A&F intervention, some dentists had initiated discussions with colleagues to review and agree prescribing patterns, whilst others had made decisions to delay treatment with antibiotics. Suggestions such as a more localised comparator, breakdown by antibiotic and the inclusion of patient data were proposed as ways in which the intervention could be modified or improved.

Detailed findings from the process evaluation are being used by TRiADS to develop interventions designed to add value and impact to the A&F interventions evaluated in this trial and will be reported in a separate publication.

Relevance to Primary care Dental Services

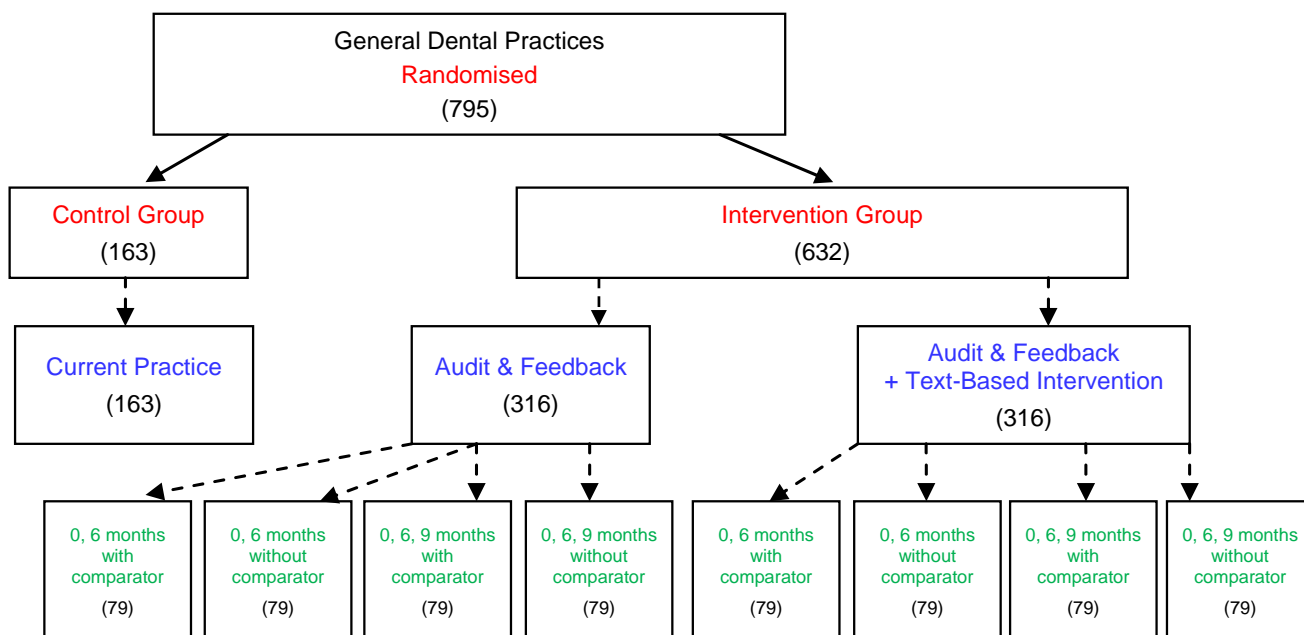
Although dental prescribing represents a relatively small percentage of all antibiotics dispensed in community pharmacy in Scotland, this does not mean that the contribution of primary care dentists to antimicrobial resistance is unimportant.

RAPiD demonstrated that antibiotic prescribing by dentists can be significantly reduced by the provision of individualised A&F using routinely collected healthcare data. This is a relatively straightforward public health and patient safety intervention that could help the dental profession address the increasing challenge of antimicrobial resistance. Monitoring data from the Scottish Antimicrobial Prescribing Group identified a 5.5% decrease in dentists' antimicrobial prescribing in 2013/14⁶ and the A&F interventions delivered by RAPiD trial contributed to this reversal of the steady increase in previous years.

If implemented nationally, delivery of RAPiD style A&F could provide a mechanism to test and evaluate a range of interventions to further improve dentists' antibiotic prescribing. The findings from the RAPiD trial's process evaluation provide a robust foundation on which to underpin the development of 'added value' interventions with a scientifically informed rationale for their use.

Currently, there is no means of delivering this type of A&F intervention on a consistent national basis across Scotland. Given the effectiveness of these interventions, consideration of their incorporation into routine service delivery with embedded testing and evaluation of 'added value' interventions as part of the Quality Agenda is proposed.

RAPiD Trial Design



Randomised Controlled Trials

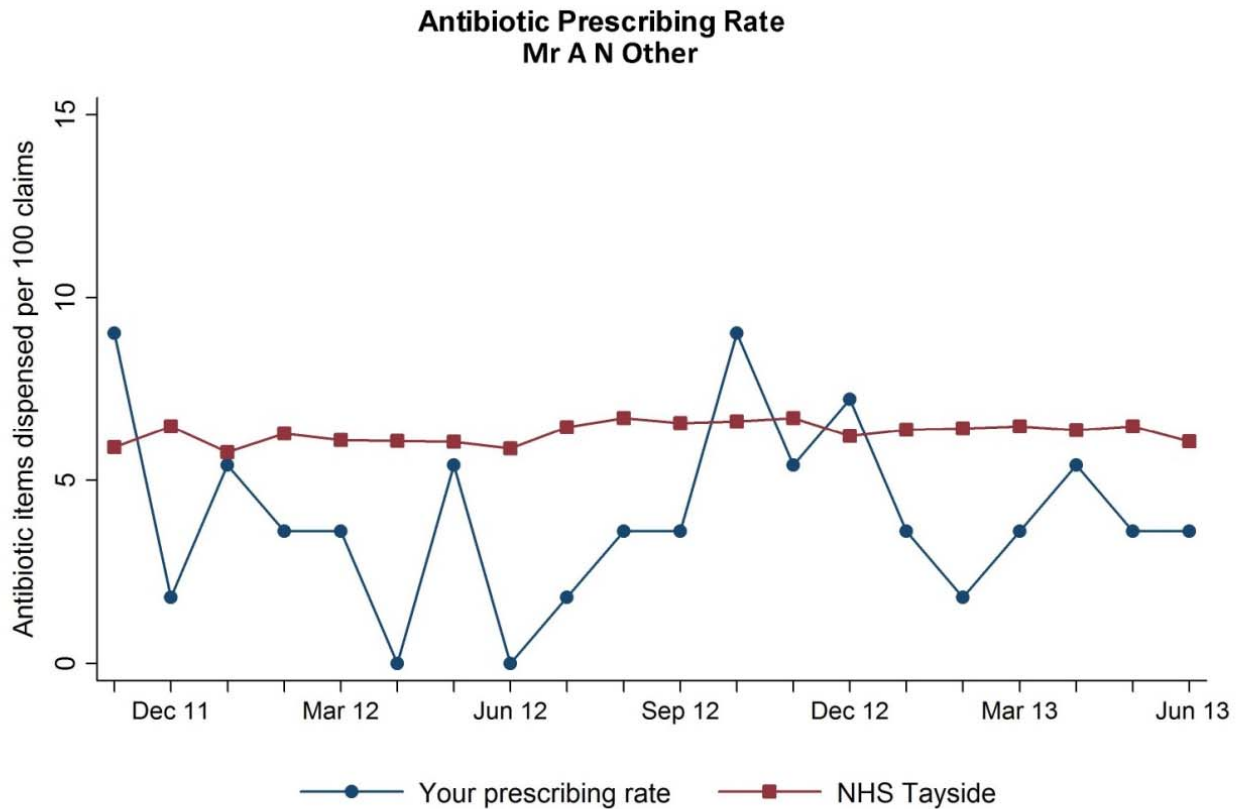
Randomised controlled trials are considered to be the most scientifically robust method for determining the efficacy or effectiveness of an intervention.

Random allocation of participants to receive or not to receive the intervention being evaluated reduces bias and minimises the potential confounding effects from known and unknown prognostic factors.

In this way it is possible to confidently attribute any significant effects to the intervention being evaluated.

In the RAPiD trial randomisation was stratified by single handed/multi handed practices and was carried out at the practice level to reduce potential intervention contamination across dentists working in the same practice.

Example Audit and Feedback Chart



Your prescribing rate is your monthly number of antibiotic items dispensed multiplied by 100 and divided by the average monthly number of claims made on your ordinary lists at this practice between November 2011 and June 2013. The health board rate is the overall ordinary list prescribing rate for current dentists in non-salaried practices in NHS Tayside. (Source: ISD Scotland. Data as at October 2013)

Prescribing courses of antibiotic treatment can encourage the development of antimicrobial resistance and therefore must be kept to a minimum.

As a first step in the treatment of bacterial infections, use local measures. For example, drain pus if present in dental abscesses by extraction of the tooth or through root canals, and attempt to drain any soft-tissue pus by incision.

This should be the first step even if patients request antibiotics and even when time is short.

Antibiotics are appropriate for oral infections where there is evidence of spreading infection, systemic involvement or persistent swelling despite local treatment.

Use antibiotics in conjunction with, and not as an alternative to, local measures.

If you would like to discuss any part of this feedback please contact: Dr Paula Elouafkaoui, Tel: 01382 740913, e-mail: TRiaDS@nes.scot.nhs.uk.

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