'MI'opia or 20/20 vision?

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OPINION

IN BRIEF

- Defines the philosophy and aims of 'MI' dental care and how this may be perceived by the profession and public.
- Highlights the critical importance of MI dentistry underpinning best practice for oral/dental care in the future.
- Discusses the barriers to implementation of MI care and the possible solutions to help practitioners appreciate all aspects of the developing profession and its relationship with the public.

Changes in the outlook on management of oral health and dental disease have developed over decades for both dental professionals and the public but now is the time for these changes to be implemented in practice. Minimum intervention is concerned with preventing disease rather than restoring teeth and attitudes towards remuneration and financial rewards for restorative operative intervention need to be addressed if dentistry is to reflect these new ideas of best practice.

INTRODUCTION

The practice of managing dental disease in the field of conservative/operative dentistry has evolved over recent decades. Many of the principles, operative technologies and restorative materials taught in the past in dental schools around the UK and globally have all developed significantly and nowadays require an alternative modern-day skill set to be appreciated fully and used effectively in the correct clinical circumstances. Patient attitudes have also changed with regard to their expectations of modern dental care and the desired outcomes with respect to the management of dental disease. Therefore, dental professionals can no longer rest on their laurels and cannot afford to rely on outdated principles and techniques not relevant to contemporary dental practice. Clinicians need to embrace these evolutions in ideologies, technologies and materials as in other aspects of healthcare and even society in general.

More specifically regarding dental disease, it must be accepted and understood that the traditional mechanistic process of preparing cavities and placing restorations does not cure dental caries. The cure, or rather the control of the disease process, originates from longer term preventive actions of the patient guided and assisted by the dental team. There has been a long-term 'disconnect' between the scientific evidence base in cariology and caries prevention and planning conventional operative intervention in clinical practice. Repairing tissue defects/damage caused by the caries process of course plays a part in disease management but should not be the focal aspect of care. The problem is that the profession and the public have been indoctrinated in this belief thanks to the traditional model of restorative operative intervention (reinforced by traditional undergraduate dental education) coupled to the fee-per-item remuneration systems that have prevailed in the UK and other countries for many years. It must be recognised, however, that there are significant numbers of dental practices in the UK and elsewhere that have already embraced the change to a more preventive focus, choosing non-operative options wherever possible.[1]

Now is the time to change (for those who have not already done so). Are we being short-sighted or does the profession have a focused vision for the future service it will provide?

'MI' DENTISTRY

The term MI dentistry is gaining popularity once again but what does this term actually mean to the profession or the public? Drilling with 'small' instruments? Even earlier operative interventions to 'treat' disease? A licence to leave caries behind – 'supervised neglect'? A strategy developed to defend the anti-amalgam brigade? These are some of the gross misconceptions and inaccuracies that help confuse the issue and are often used by sceptics who oppose the underlying principles of the MI philosophy.

Minimum(al) intervention care (MI)

This is the oral physician's holistic team-care approach to help maintain long-term oral health with preventive patient-centred care plans combined with the dutiful management of patients' expectations. The patient (and profession) must understand that dental caries is a lifestyle-related disease that is ultimately their own responsibility to control with the aid of the dental profession. All members of the dental team should be involved including the nurse (trained oral health educator), hygienist, therapist, reception staff and practice manager, all offering and reinforcing the same take-home message of long-term preventive care instigated by the dentist for the individual patient. The overlapping and interlinked phases of the minimum intervention care plan can be seen in Figure 1.[2,3]

Minimally invasive dentistry (MID)

This is included in Figure 1 as part of the overall minimum intervention care plan. There have been significant advances in the understanding of histopathological alterations that may or may not occur progressively in carious dental tissues,

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the balance between demineralisation and remineralisation, the bacterial population/distribution and their combined roles in the aetiology and progression of caries and the development of high quality adhesive, sealing and perhaps even 'healing' restorative materials. It is evident that caries does not need to be 'treated' as if it were gangrene with complete surgical excision (including an extensive healthy margin), the classic notion that has underpinned operative caries management protocols from the past. The chance to give carious tissues the opportunity to remineralise and, when continuing progression is observed, the use of a biologically selective approach to caries removal must now be the norm. This is opposed to the iatrogenic creation of standardised, over-prepared cavity shapes whose dimensions are dictated by the physico-mechanical properties of the materials used to restore them. Consideration must be given to the 'golden triangle' of minimally invasive operative caries management shown in Figure 2, where the three factors highlighted together will permit the successful implementation of minimally invasive dentistry in all patients.[3]

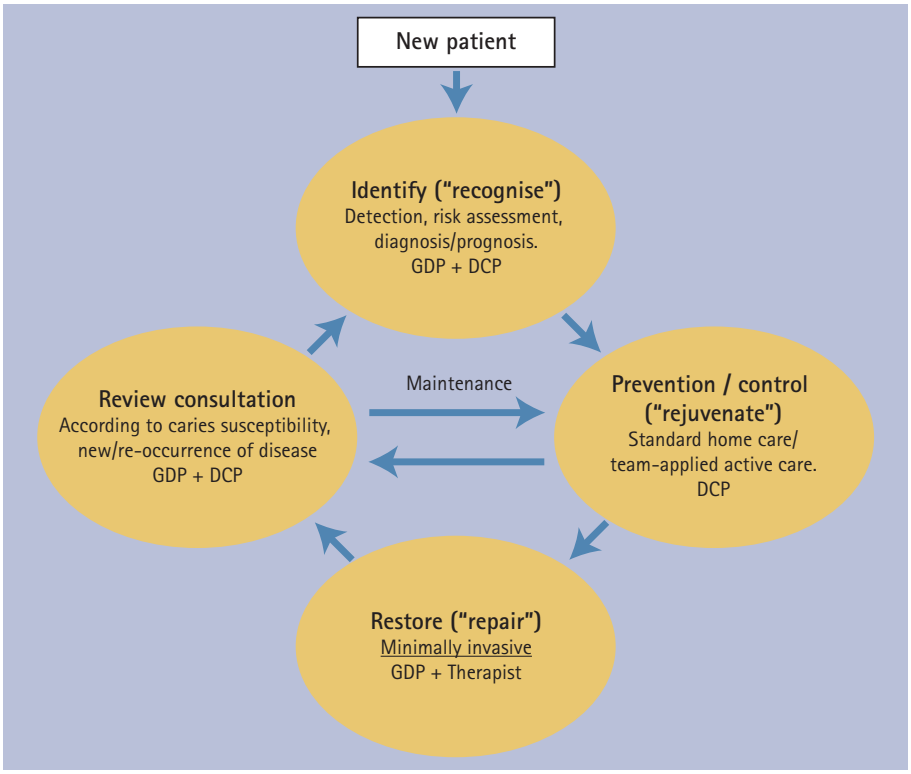

Fig. 1 The minimum intervention care planning cycle showing the four interlinking stages of patient assessment, diagnosis, non-operative prevention, minimally invasive operative intervention and review (recall). The arrows indicate the direction of patient flow through this cycle and within each bubble an indication is given of the members of the dental team who might be included (GDP = general dental practitioner; DCP = dental care professional, including oral health educator-trained nurses, hygienists, therapists, practice managers, reception staff)

BARRIERS TO MINIMUM INTERVENTION (MI) ORAL CARE

The above principles are all well and good in delivering preventive, tooth preserving, minimally invasive caries management, but there are two critical and uncontrollable factors whose interplay may affect adversely the successful outcome of 'real life' MI oral care: the dentist and the patient.

Do all dentists have the diagnostic and care planning skills to risk assess accurately and operatively intervene only when lesions are progressing actively? In such cases, do they have the technical skills and knowledge required to implement MI dentistry successfully? The term 'technique sensitivity' is used to describe the increased levels of technical difficulty in handling and placing adhesive restorations and achieving the exacting environments required that will permit a successful restorative outcome. This phrase is often used by those comparing modern adhesive techniques to the more traditional mechanistic procedures that result in unnecessary destruction of sound or repairable tooth tissue. It is true that contemporary adhesive operative techniques do require greater control of the materials and their environment, but these are skills that should be understood, learnt and honed rather than criticised simplistically as being unduly complex and too difficult to perform under current 'NHS conditions'. Manufacturers and the clinical academic profession are forever investing in

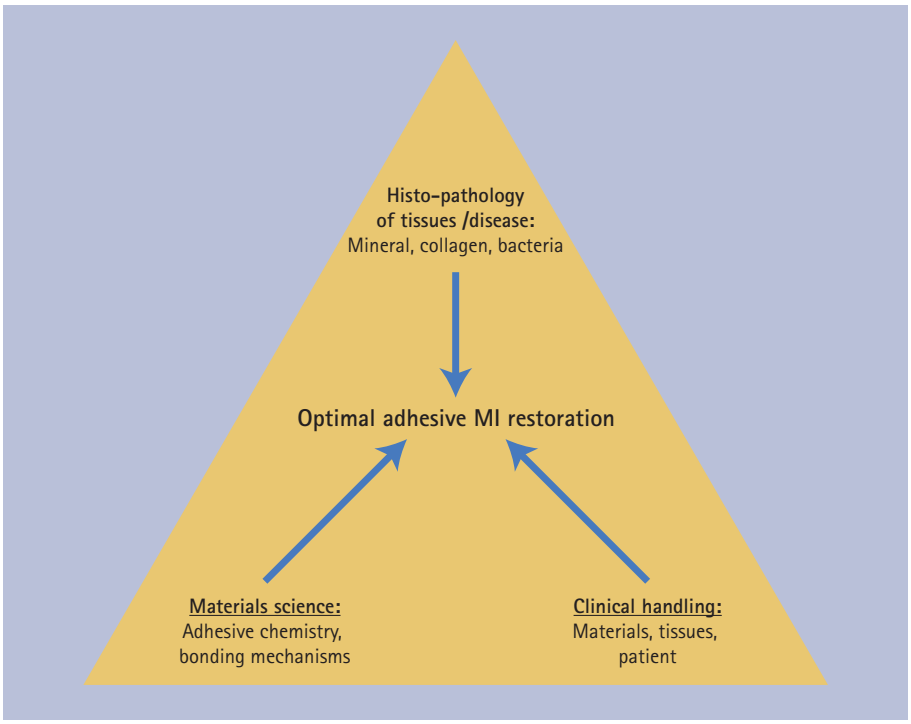

Fig. 2 The 'Golden Triangle' of minimally invasive operative caries management. A thorough understanding of the three interlinking factors will allow successful and reliable placement of adhesive restorations

research and development (R&D) to refine the properties of dental restoratives while reducing the perceived difficulty of their clinical handling characteristics. Evolution in dental materials science has created modern adhesive materials that complement the MI oral care philosophy. Using the above argument in IT for example, we should still be using Microsoft's Windows 3.1 PC operating system on our computers because it worked quickly, was simple and we were all 'trained' to use it! The training of new dental graduates reflects the MI philosophy change as education in minimally invasive operative skills takes precedent over the essentially mechanistic teachings of past curricula.

Another issue often raised by busy practitioners is that MI oral care is more time consuming and a less efficient use of their time and skills when treating a large volume of patients in practice. Again, how many of us would be satisfied with this reason in any other walk of life for not receiving the optimal care/service provision because of a lack of time taken with an individual service user? The appropriate amount of time must be offered to care appropriately for each patient and healthcare systems must embrace, encourage and reward this most fundamental of professional endeavours.

Of course, not all patients will take responsibility of their oral health issues as they may not perceive these as a priority in their lives at that particular time. Unfortunately, with regard to caries, the solution to their dental problems does not lie with the 'drilling and filling' of their teeth, so absolving them of any responsibility for their predicament. At best, this only postpones the problems but with potentially more severe medium to long-term consequences. Again, the real issue is one of patients accepting the consequences of their decisions/actions and the dental profession has a critical role in communicating these effectively to the patients and documenting carefully the outcomes of these discussions. Placing restorations to 'treat' caries in patients who will neither perform adequate oral hygiene nor heed or action any further preventive advice will lead invariably to a worsening clinical situation. Any restorations placed of whichever material will be compromised leading to their accelerated deterioration and further tissue loss, so increasing the long term burden on the healthcare system upon which the patient will eventually rely.

MI education

In order for MI oral care to be truly embedded as the underpinning care philosophy in the dental profession as a whole, it must be taught and promoted both at undergraduate and postgraduate level. In conjunction with communication/interviewing skills and appropriate medico-legal documentation, MI care is relevant to all specialities of dentistry, not just caries management in conservative dentistry. Comprehensive patient care where a student (or a pair of students as is often the case) is responsible for the individual patient's care for the duration of their training will allow them to see and learn from the benefits or the problems of the care plans they have devised and carried out for their patient. Indeed, this concept is certainly not new as many reading this article will have been trained this way in years gone by. Although some dental schools are embracing this education model to varying levels there are still those who follow the more 'traditional' approach of teaching mechanistic disease management operative skills primarily, with additional modular teaching of prevention, an inappropriate model for modern conservative dentistry. The traditional model promotes the perceived achievement of cutting the greatest number of cavities and placing restorations as the primary outcome measure of clinical competence (which it clearly is not), a point-collecting philosophy embedded into young dentists' psyche, which is then carried into dental practice where it is often further encouraged by the regulatory and remunerative systems in place. It is the responsibility of dental schools to equip future dentists and members of the oral healthcare team with the core MI skills, competencies and understanding to be able to care for the patients of the future whose needs will be different from those in the past. This means new and established dentists should understand the changes in oral healthcare perceptions from both the patients' and profession's point of view. These changes must be reflected and applied to modern, possibly unified under-/postgraduate dental curricula. Contemporary learning outcomes accompanied by rigorous longitudinal assessment are in need of development, rather than relying solely on the traditional educational formulae and examinations of the past.

Currently there are a proportion of practitioners working who may not have the confidence required to practice the appropriate skill sets for MI dentistry optimally and are in need of good quality postgraduate education and CPD. This can be delivered in a variety of modes including lectures, seminars and hands-on courses. However, the real value of practical take-home information gleaned from many of these courses is debatable and it is impossible to assess or verify their implementation.[4] In some cases, further coherent education in a practical setting is required so the skill sets learnt on one day can be implemented the next, assessed and refined accordingly. A new, innovative flexible-learning masters programme in advanced minimum intervention dentistry is under development at King's College London Dental Institute at Guy's Hospital, London, which will provide further postgraduate education in developing the team dental practice, MI business models, use of social media to interact with and relate to patients as well as the latest MI oral care philosophies and clinical techniques/materials, complemented with dental industry material and technological support.* It is hoped that this masters programme will also promote an MI practice-based research network to help provide the much needed physical 'real life' evidence to corroborate the philosophy.

Healthcare systems and MI

The NHS continues to fund a significant proportion of the dental care provided to the UK population. It provides a system to encourage the maintenance of health for the population, to distribute as fairly as possible the provision of dental services to the wider community within the constraints of ever more significant financial regulation, to remunerate the healthcare providers and help regulate them for the safety of patients. Remuneration models in the past have been based around numbers of patients treated/procedures carried out as this was a relatively quantifiable and

*For further information, search for 'KCL flexible learning' and look up 'forthcoming programmes'.

straightforward system of calculating outcomes and thus paying for and regulating services. However, this model was at risk of actively encouraging dentists to treat more patients perhaps unnecessarily and operate too invasively as these were the outcomes rewarded, to the ultimate detriment of the patients. NHS dental contracts have come and gone, with the latest currently under trial perhaps offering some hope that the system will begin to value non-operative disease control and prevention in the general population at least as equally as operative interventions. A risk assessment-based approach to disease prevention with a focus on quality and outcomes should be heralded as a step in the right direction. However, many caveats need to be heeded to ensure requirements are achievable and not impractical or too onerous to accomplish, so inhibiting rather than improving future dental service provision.

The MI dental practice

With the issues discussed above, it is evident that the dental practice business model that has been used by generations of practitioners since the advent of the NHS will have to evolve in order to be able to support the successful MI practice of the future. One of the major developments will be the use of dental care professionals (DCPs) effectively. As already emphasised, MI oral care relies on the interactive team-care approach to patient management rather than the solitary dentist attempting to be an expert in all aspects of dentistry. With the advent of specialisms, there has been active encouragement to ensure that clinicians with the correct skill sets are looking after the appropriate needs of patients. The general dentist must learn to use the skills of their team effectively – nurses with oral health education certification, hygienists, therapists and practice managers/reception staff must all be included to communicate effectively the same MI message. The dentist's role will be to coordinate patient-centred care and devolve various aspects of non-operative prevention and control to those whose time may be better spent working with the patient in this regard. Surgery time is a precious and costly commodity and this core business needs to be managed at a practice level. There are 'MI practices' that have sprung up around the country that are utilising this model successfully both financially as well as clinically. The role and significance of dental payment plan specialists, such as Denplan, will surely increase as the long-term patient-centred prevention of disease underpins their very existence.

It is also critical for the general dental practice team of the future to work more closely with industry partners. Manufacturers are channelling R&D resources to projects underpinned by the MI philosophy. Even though companies will by definition be driven by sales and profit figures (which is understandable and reasonable to a degree), there are many who appreciate also the academic, clinical and business importance of MI dental care. Many companies, including GC and P&G Oral B, have produced/supported open source clinical evidence-based literature as well as products to help understand and spread the MI message globally. These ventures should be encouraged when showing clear clinical academic rigour and transparency in their production and dissemination to both the profession and the public. There are also complementary initiatives to promote health-focused alliances to secure a 'cavity-free future' (see www.AllianceForACavityFreeFuture.org).

The public

Patient attitude towards the MI philosophy might be the largest and most difficult barrier to overcome and bringing the public on board has to be seen as a long-term aim. Healthcare messages are notoriously difficult to deliver effectively and behaviour change is subject to a number of well-documented challenges and barriers. There must be a drive to increase the priority of maintaining oral health in the general healthcare stakes while at the same time diluting the premise of many patients who believe it is the dental profession's responsibility to do this, rather than their own. We live in a society where many individuals prefer to devolve responsibility of their own actions to others when they can, a premise that conflicts with the overall minimum intervention general healthcare philosophy. Ultimately there is no simple panacea for all dental disease and a collective, concerted effort is required from the patients and the profession. The MI team network approach centred on the patient's long-term care must be emphasised along with the need for regular maintenance and review consultations to maintain the biologic success of treatments and continued good oral health. The profession needs to work with the government and other stakeholders in the long term to promote these views and a future vision.

MI evidence

Seeking the evidence for best clinical prevention and practice protocols is essential in order to maintain the highest possible moral and ethical standards when managing and treating patients. The development of the stratified systematic review and the use of meta-analytical statistics to help glean meaningful outcome data from past clinical research, although useful to a point, should be relied upon with some caution. The original definition of evidence-based medicine (and dentistry) included the following important statements:[5]

- '...integrating individual clinical expertise and best available external clinical evidence from systematic research'
- '...individual clinical expertise is the proficiency and judgment acquired through clinical experience and practice'
- 'Good dentists use both, but neither alone is good enough... external evidence may be inapplicable/ inappropriate for an individual patient.'

With much emphasis placed on systematic randomised controlled trials (RCTs) and the quality of systematic reviews (SR) of past research it is interesting to note that 'individual clinical expertise' mentioned originally with equal gravitas, seems to have been relegated somewhat from what is considered currently to be an acceptable level of evidence. The majority of 'systematic evidence' is naturally inconclusive at a practical, 'coal-face' level as well-controlled and validly constructed clinical trial research is often very difficult to execute, especially where it really counts, in busy dental practices.

As regards MI oral care, there is a relative paucity of randomised controlled clinical trial data with large enough numbers and suitably controlled variables to make many meaningful conclusions applicable to real-life dental practice. Indeed, one of the few SRs on MI dentistry aptly concluded that

as existing data was heterogeneous, limited practical conclusions could be derived apart from the need for further research![6] There has been some work published using business modelling systems to extrapolate data and predict the outcomes of the clinical and financial benefits of MI dentistry but there is no doubt that further practice-based research is required to provide the evidence of the benefits of minimum intervention dentistry.[6-9] As mentioned earlier, there is a need for practice-based research networks populated by dentists and teams trained in delivering MI oral care to allow this valuable information to be collected where it matters.

SUMMARY

In an era where the use of dental amalgam as a restorative material is being hotly debated internationally at a professional and political level it must be stressed that the minimum intervention philosophy of oral healthcare sits somewhat above and detached from this discussion. The rationale of MI oral care is absolutely not dependent upon which materials or techniques are used, but on a philosophy of effective patient-centred disease prevention and tooth preservation, as well as when and how any required operative interventions are implemented and by the qualities of the operator and patient.

The views expressed in this paper pertain directly to the current situation in the UK. However, the points raised are applicable in numerous countries worldwide as many of the issues are by no means unique to the UK system. Indeed, international collaboration and directives are needed to drive home the global MI message under the broad topics discussed above. An example of such an endeavour is the development of the European core curriculum in cariology, from consensus discussions originating within the European Organisation for Caries Research (ORCA) and the Association for Dental Education in Europe (ADEE), also including contributions from North and South America.[10,11]

The relevant stakeholders (the dental profession – service providers/educators/researchers, the government healthcare regulators, the public and the dental industry) must work in close partnership to move MI care forwards as the desirable goal for dentistry now and in the future. Its careful implementation into the mainstream will bring long lasting rewards for both patients and all dental care professionals and will lay down a secure foundation for optimising the dental health of future generations.

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Erratum

Research article (*BDJ* 2012; **213:** E20) and Research summary (*BDJ* 2012; **213:** 564-565)

'The psychosocial impacts of implantation on the dental aesthetics of missing anterior teeth patients'

In the above Research article and its associated summary, the author affiliations should have read as follows:

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We apologise for any confusion caused.