Learning Aims – Replacement of Teeth

- Factors that affect our decision-making
- Need for replacement of missing teeth
- Patient opinion on the things that we do for them
- RBBs
- Removable Dentures
- OI
- Difficult teeth to replace
High lip line UL1

- Symptoms from previously RCT
- Past apical surgery UL1
- No sinus, mildly TTP no deep pocketing
- Past history of trauma – when 12 years
- Very high lip line
- Unhappy aesthetically – previous post core – recurrent de-cementation – patient has the restoration in a tissue
- All else is fine
If you needed to replace it - what would you use and why?

Or would you re-restore it?

**HIGH LIP LINE**

- Symptoms from previously RCT
- Past apical surgery UL1
- No sinus, mildly TTP no deep pocketing
- Past history of trauma
- Very high lip line
The things will feed into such decision-making?

- **Wishes of the patient** – but cannot these easily be affected by us – what they are good at is saying they do or do not want to wear a denture?
- **Knowledge** – how much do we know about the thing we are making a decision on? How did we learn it – (superficial or deep)?
- **Experience** – how many times have I dealt with something similar and how did it go?
PROMs and PREMs

Patient Reported Outcome Measures (PROMs)

Patient Reported Outcome Measures (PROMs) assess the quality of care from the patient’s perspective. Currently covering four clinical procedures, PROMs are used to assess surgical treatment using pre- and post-operative surveys.

The four procedures are:
- hip replacements
- knee replacements
- groin hernia
- varicose veins

PROMs have been collected by all providers of NHS-funded care since 2016.

PROMs measure a patient’s health status or health-related quality of life, collected through short, self-completed questionnaires. This health status is measured after a procedure and provides an indication of the outcomes or quality of care.

Data

PROMs national-level headline data are published every month with more detailed data made available each quarter (typically in February, May, August, and November each year). Data are provisional until a final annual publication is released each year.

PROMs data are available at: http://www.hscic.gov.uk/proms
Quality of Life of Endodontically Treated versus Implant Treated Patients: A University-based Qualitative Research Study
Gatten, DL et al, J Endod 2011;37:903-909

Results of single tooth implant – v - endo and tooth restoration:
• The results obtained from this study show similar overall Oral Health Impact Profile (OHIP) scores and show a high rate of satisfaction with both treatment modalities (saving tooth with endo and post versus extraction and replacement with SC implant). No advantage from a patient perspective of an implant crown over a restored and post restored RCT’d tooth.
Never underestimate the drive of the patient to have something fixed? – OI bridge 21/12 and OI SC /4

**So** – A patient will be equally happy (or unhappy) with a restored natural tooth or a fixed form of replacement restoration. They will be less happy with a RPD.

Patient experience

however it is delivered
QoL findings with Implants and natural teeth

- **OI -v- Natural Retained Tooth Over-denture:** no QoL difference (Dostalova et al 2009) - **Learning point** - we do not need to help ourselves to potential over-denture roots – they are equal value to patients as implants

Patient-Centred Outcomes
QoL findings OI v Removable

• OI retained complete denture -v- conventional complete denture: Implant retained over-denture improved QoL+++ (Awad et al 2003, Heydecke et al 2003)

• Kennedy class 2 - Unilateral OI retained denture -v- RPD: Better QoL+++ in patients with implant-supported denture Vs RDP in unilateral mandibular free end saddles (Kuboki et al 1999)
RPD - conclusions
Ozhayat & Gotfredsen (2012)

- **QoL** of patients with *any removable prosthesis* is likely to be less good than those with natural teeth
- Change in QoL influenced by age, gender and zone of replacement
- Prostheses reduce frequency of common problems reported before treatment, but **new problems arise**
- Replacing **anterior** teeth with a partial denture is a **difficult task** – pts have high expectations or can be ‘negatively surprised’ by aesthetic result
RDPs - Results & Findings
Ozhayat & Gotfredsen (2012)

- RDP more improvement than bridges (but OHIPs start off in a much worse place)
- Participants with RDP in masticatory zone only showed no improvement with OHIPs (fits in with previous studies)
- This study identified a deteriorated QoL group despite RPD Rx:
  1. Significantly older
  2. Significantly more women
  3. More teeth in aesthetic zone
  4. Fewer teeth needed replacing in both aesthetic and masticatory zones!
6 classes

N = number of teeth
C = number of posterior premolar units
(molar occluding unit counts as two premolars)
Relationship between oral function and shortened dental arches

We could argue that the biggest drop off in oral function is in fact between from 2 to 0 posterior occluding units 65% - 38%.
Conclusion (Solution)

- Sufficient (85%) patient adaptive capacity in SDAs where 4 occlusal units are left, preferably in a symmetrical position
- not a disaster if down to 2 occlusal units (65% function) and none (38% function)

Caveats: No perio, no anterior Gaps and Class I incisor contact
So we rarely need to fill / replace in all gaps for function – it is more about what is shown – how wide is the lip / smile line?
• **Wisdom** - the quality of having experience, knowledge, and good judgement; the quality of being wise – what will happen if we do nothing? How will it fail and what will be the implications to the patient then? Will my intervention help in the long-term (risk to reward)?

• **Thinking of the bigger picture – long game** - not short term gains or wins
Wisdom

What should we have done 20 years ago if we could turn back the clock?

89 year old in residential home unhappy with #’d OI mandibular fixed bridge and food-packing beneath substructure referred to NHS Signif Peri-implantitis & on IV Bisphosphonate infusions - dementia

To me it is about maintaining quality of life for as long as they are on the planet – often accepting and watching pathology
There's enough risk and unintended consequences of new techniques – Segway

Jimi Heselden
OBE

Born
James William Heselden
27 March 1948
Hatton Moor, Leeds,
United Kingdom

Died
26 September 2010 (aged 62)
Thorp Arch, West Yorkshire,
United Kingdom

Cause of death
Accidental fall off a cliff while riding a segway

Residence
Leeds, England

Nationality
British

Occupation
Entrepreneur

Years active
c.1985-2010

Known for
Chairman of Hesco Bastion Ltd

Net worth
£340m [1]

Awards
Officer of the Order of the British Empire
Wisdom – sensible interpretation of evidence and implication of failure

Survival of Fixed Space Fillers

Table 1. Summary of annual failure rates, relative failure rates and 5-year survival estimates

<table>
<thead>
<tr>
<th>Type of reconstructions</th>
<th>Total number of reconstructions</th>
<th>Total exposure time</th>
<th>Mean follow-up time</th>
<th>Estimated annual failure rate</th>
<th>5-year survival summary estimate, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional FDP</td>
<td>2088</td>
<td>11998</td>
<td>5.7</td>
<td>1.28* (0.64–2.59)</td>
<td>93.8 (87.9–96.9)</td>
</tr>
<tr>
<td>Cantilever FDP</td>
<td>432</td>
<td>2112</td>
<td>5.2</td>
<td>1.80* (1.15–2.82)</td>
<td>91.4 (86.9–94.4)</td>
</tr>
<tr>
<td>Implant supported FDP</td>
<td>1384</td>
<td>6880</td>
<td>5</td>
<td>0.99 (0.64–1.52)</td>
<td>91.2 (92.7–96.8)</td>
</tr>
<tr>
<td>Tooth-implant supported FDP</td>
<td>199</td>
<td>976</td>
<td>5</td>
<td>0.92* (0.50–1.70)</td>
<td>95.5 (91.9–97.5)</td>
</tr>
<tr>
<td>Implant supported SC</td>
<td>465</td>
<td>2280</td>
<td>5</td>
<td>1.14* (0.76–1.70)</td>
<td>94.5 (91.8–96.3)</td>
</tr>
<tr>
<td>Resin bonded bridges</td>
<td>1374</td>
<td>8241</td>
<td>6</td>
<td>2.61* (1.68–4.06)</td>
<td>87.7 (81.6–91.9)</td>
</tr>
</tbody>
</table>

*Based on standard Poisson regression.
†Based on random-effects Poisson regression.

RBBs drop down to 65% at 10 years (compared to 89.2% for FDP)
Peri-implantitis affects 1:5 patients and 2:5 fixtures (Alani 2014). How do conventional bridges usually fail?
What things feed into such decision-making?

• Training and Learning – what does this look like in 2017 – everyone is cashing in on the demand - ‘Self-taught’, ‘E or Distance-learning’ ‘Didactic / Skills-lab based’ ‘taught with patients by benchmarked clinician(s) with more experienced and skilled clinician(s) – where does the QA fit in?

• Fee and funding mechanism – often a perverse incentive
Three types of Hong Kong dentists were questioned:

- GDPs placing implants without formal validated training.
- MDS / MSc graduate student undergoing validated 'taught' training on patients.
- MDS / MSc graduate dentists.
What would the three groups of dentists do?

Conclusions

• GDP MDS ‘taught’ Graduates and post-graduate Students more frequently opted **not** to re-habilitate lost molars compared to GDPs

• Findings from the regression analyses identified that GDP MDS ‘taught’ Graduates and Students were **three** times more likely to retain compromised maxillary molars with or without pain

• GDPs (who place implants in practice without formal training) prescribed **more** implants (less of other options) to restore a space than GDP MDS Graduates and Students

• GDPs were **less likely to RCT** and **more likely** to suggest Rx options where outcome not robustly supported by evidence

Developed by repetitive practice – taking in own reflection of performance (to include mistakes and suboptimal outcomes) and the use and transfer of ‘deeper’ knowledge to own clinical application (within the workplace)

• ‘Craft’ Operative Skills

DAVID DUNNING and JUSTIN KRUGER
Their work published in 1999 demonstrated that less skilled and less competent people tend to overestimate their level of competence and expertise, while those who are truly expert sometimes underestimate their true level of expertise
Restorable or Not? – Need to Replace Missing Teeth?

I am not going to spend time on this today but I think a huge issue in 2017 – particularly amongst our younger dental workforce – I feel sorry for them

Dear Dr Briggs,

I am emailing you on behalf of the Foundation Dentist group who had set out to carry out an audit on the topic of restorability. Having reevaluated, we have planned a service evaluation on restorability and we ask if you would kindly complete our questionnaire. Please follow the steps below;

1. Your **DENTIST ID**: IKV

2. Please fill out your dentist details on the dentist registration form: https://goo.gl/forms/oeXwAEr56lh8i4eE3 with your unique dentist ID which is anonymous

3. Once you’ve filled the dentist registration form in, you do not need to do it again

4. Please open up the presentation with the case descriptions which can be found here: https://www.dropbox.com/s/ou03bhcjlo88wgu/Restorability%20Service%20Evaluation.pptx?dl=0

5. For each case, please fill out and submit an individual restorability questionnaire that can be found here: https://goo.gl/forms/Kxfmti48PrMtdDzS72 NB: PLEASE INCLUDE YOUR DENTIST ID FOUND AT THE TOP OF THIS EMAIL AS WELL AS THE TOOTH ID FOUND AT THE START OF EACH CASE

There are 10 cases for now as we are presenting the preliminary data first and will collect more cases at a later stage. We would ideally like your responses by Sunday Evening (19/2/17).
Generation Y – working in the riskiest dental workplace in the world

- 1 Endodontics
- 2 Crown & Bridge
- 3 Periodontics
- 4 Nerve Damage
- 5 Implants
- 6 Orthodontics
- 7 Veneers
- 8 Oral Surgery
Restorative Replacement Skills – are they changing?

- Do you need to have done a lot, seen a lot, failed a lot and succeeded a lot to gain any resemblance of competence with any repetitive skill?

- Is it reasonable to aim to achieve desired objectives 80-90% of the time?

- Reflective practice

**Figure 2. Quality of the impressions of prepared teeth (NHS/Private/All Contracts)**

(The 4 cases that did not specify contract type are included in the All Cases category)

*Storey and Coward (2012)*
Restorative Replacement Skills – are they changing?

• Constant improvement by reflective practice – do not get stuck in the past - evolve and innovate

• In my view the skills needed to preserve / save teeth are more difficult than for modern tooth replacement

• As a result many are tempted to go for the simpler option – first – particularly if not competent / non-confident or risk-adverse in restoring difficult teeth
Replacement with Resin-Bonded Bridges in 2017

RBBs are not just something for use within the ‘Ivory Towers’ & they are not intermediate or temporary if done well (King et al 2015)
86 year old – a great option

Wisdom – sensible interpretation of evidence

Failure characteristics

• 20% failed by 5 years
• Few failed thereafter even though more than two thirds were assessed for more than 10 years
• Result 5 and 10 year survival probability was 80% (as shown by survival curve)
Metal wing grey-out a thing of the past

Poyser et al 2006; King et al 2015
Cementation protocol – retained retraction cord and if helpful ‘open’ rubber dam

- Place retained retraction cord – palatal / lingual
- Rubber Dam – if useful
- A/E / Prime / Bond / Lute Cement / Oxyguard
- Remove excess cement / polish & review

Remove excess cement / polish & review
RBBs will always struggle to restore molar sized pontics. Should we be doing conventional bridges where abutment teeth are relatively intact? RBBs are reliable for premolars, lateral incisors and central max incisors. Less good for molars, canines and lower central incisors.

Annual RBB de-bond risk anterior 3% and posteriorly 5% - avoid risky posterior CRRBs – Hussey & Linden, 1994
Damage and loss of conventional abutment teeth at failure Scurria & Badia, 1998
Restoring Missing Teeth

Removable Partial Dentures (RPD)

For many circumstances the very best way to replace missing teeth in 2017 (ultimate aesthetic flexibility).

2009 Adult Dental Health Survey found nearly one in five adults (20%) wore removable dentures of some description (partial or complete).

In addition to the 6% edentulous patients, 13% of the sample group relied on a combination of dentures and natural teeth – many were extensive with few remaining natural teeth.
Survival rate of metal frame RPDs:
75% at 5 years dropping to 50% at 10 years

Ten-year evaluation of removable partial dentures: Survival rates based on retreatment, not wearing and replacement

A. H. B. M. Vermeulen, DDS, PhD,* H. M. A. M. Keltjens, DDS, PhD,* M. A. van't Hof, PhD,* and A. F. Kayser, DDS, PhD*
Trikon, Institute for Dental Clinical Research, School of Dentistry, University of Nijmegen, Nijmegen, The Netherlands

From a group of 1460 patients, 1036 were treated with metal frame removable partial dentures (RPDs) at least 5 years before this analysis. Of those, 748 patients who wore 886 RPDs were followed up between 5 and 10 years; 288 patients dropped out. The 748 patients in the study groups were wearing 703 conventionally designed metal frame RPDs and 183 RPDs with attachments. When dropout patients and patients who remained in the study were compared, no differences were shown in the variables analyzed, which indicated that the dropouts did not bias the results. Survival rates of the RPDs were calculated by different failure criteria. Taking abutment retreatment as failure criterion, 40% of the conventional RPDs survived 5 years and more than 20% survived 10 years. In RPDs with attachments crowning abutments seemed to retard abutment retreatment. Fracture of the metal frame was found in 10% to 20% of the RPDs after 5 years and in 27% to 44% after 10 years. Extension base RPDs needed more adjustments of the denture base than did tooth-supported base RPDs. Taking replacement or not wearing the RPD as failure criteria, the survival rate was 75% after 5 years and 50% after 10 years (half-life time). The treatment approach in this study was characterized by a simple design of the RPD and regular surveillance of the patient in a recall system. (J Prosthet Dent 1996;76:367-72.)
Ozhayat & Gotfredsen (2012)

• If patients have SDA, unlikely to improve QoL by providing RDP, unless the anterior tooth / teeth is / are involved with the tooth replacement

• Aesthetic improvement will be the biggest compliance drive
A series of retrospective cohort studies also reported that increase of abutment teeth mobility and fracture of denture base were observed more frequently in acrylic resin-based RPD than metal based RPD.

Acrylic resin-base had a 5 times greater risk of patients not wearing the denture.

The main reason for ‘not wearing’ was problem with abutment teeth in the acrylic resin-based RPD; whereas it was replacement in the Co-Cr-base group.
A follow-up study on removable partial dentures in undergraduate program: Part I. Participants and denture use by telephone...

Table V. Reasons for nonuse of acrylic resin-base or Co-Cr-based RPDs.

<table>
<thead>
<tr>
<th>Reason</th>
<th>n</th>
<th>(acrylic resin/Co-Cr)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPD fracture</td>
<td>5</td>
<td>(5 / 0)</td>
<td>11</td>
</tr>
<tr>
<td>Pain</td>
<td>4</td>
<td>(4 / 0)</td>
<td>9</td>
</tr>
<tr>
<td>Functional problem</td>
<td>5</td>
<td>(5 / 0)</td>
<td>11</td>
</tr>
<tr>
<td>Discomfort</td>
<td>2</td>
<td>(2 / 0)</td>
<td>4</td>
</tr>
<tr>
<td>Problem with abutment teeth</td>
<td>17</td>
<td>(16 / 1)</td>
<td>36</td>
</tr>
<tr>
<td>Aesthetic problem</td>
<td>1</td>
<td>(1 / 0)</td>
<td>2</td>
</tr>
<tr>
<td>Problem with pronunciation</td>
<td>1</td>
<td>(1 / 0)</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>(1 / 0)</td>
<td>2</td>
</tr>
<tr>
<td>Replacement</td>
<td>11</td>
<td>(6 / 5)</td>
<td>23</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>(41 / 6)</td>
<td>100</td>
</tr>
</tbody>
</table>
Biological issues (plaque and perio risk factors) are more important than mechanical issues (rotation and overload of the abutment teeth)
Fixed Implants v OI Overdenture v RPD?

How much dento-facial support has been lost?
What do things look like without a flange?
The more complex the Rx (i.e. large grafts) - then there will be more complications and long-term problems.

Complications in 17.4% of implants up to 11.8 years of service (mean 5 years).

Implants are the best fixed method in 2017 for replacing a missing canine space (if funding allows).

If significant hard and soft tissue problems in the canine space or the patient happy with a denture then RPD only sensible predictable replacement option.
Fixed OI – less maintenance complications than removable OI (particularly in maxilla) - but long-term maintenance is reliant on patient’s biological ability to maintain

By 2025 20% population in England will be 65 or over
Implant supported dentures – can be a ‘game changer’
The problem of maintenance

Prosthodontic Complications with Implant Overdentures: A Systematic Literature Review

Marina Andreatelli, DDS, Dr Med Dent/ Wael Att, DDS, Dr Med Dent/
Jürg-Rudolf Strub, DDS, Dr Med Dent, PhD, Prof Dr Dr hc

Purpose: Problems associated with a complete denture, such as lack of stability and retention, can be solved with the use of implant-retained or implant-supported overdentures. However, controversy exists as to the anchorage system used and indications for both the maxilla and mandible. The purpose of this review was to identify the prosthetic complications associated with the different attachment mechanisms used for implant-supported or implant-retained overdentures. Materials and Methods: A search of the MEDLINE and PubMed databases was conducted to find articles in English and German peer-reviewed journals published between 1980 and 2008. The search focused on randomized controlled clinical trials and prospective studies with follow-up periods of at least 5 years that contained clinical data regarding success, failure, and prosthetic complications. Results: The search yielded a limited number of randomized controlled clinical trials referring to implant-supported or implant-retained overdentures. Very few studies have prospectively compared prosthetic complications for a period longer than 5 years after delivery of the prosthesis. Conclusions: Implant-supported or implant-retained overdentures in the mandible provide predictable results with improved stability, retention, and patient satisfaction. Scientific evidence shows a lower rate of implant survival and a higher frequency of prosthetic complications for maxillary implant-retained or implant-supported overdentures. Although the literature presents considerable information on complications of implant prostheses, variations in study design preclude proper analysis of certain complications. Well-designed longitudinal studies are required to establish evidence-based treatment planning principles. Int J Prosthodont 2010;23:195-203.

Facial support and lip line – low risk - acrylic will replace everything cosmetically
So are these the answer?

- Angulation of fixtures
- Position of implants – essential to avoid ‘AP rock’
- Length of locator abutments
- Patient need to buy the Locator tool and learn to replace the plastic inserts – add parafunction then +++++return visits
- What happens when physical or mental decline sets in?
Attitudes of general dental practitioners to the maintenance of Locator retained implants

J. W. Vere, S. Elyas

VERIFIABLE CPD PAPER

Introduction: Locator retained implants have been the standard of care in edentulous mandibles for over 30 years. These prostheses have been advocated as the standard of care in the edentulous mandible. The 2001 Adult Dental Health Survey revealed that 6% of the adult population in England, Wales and Northern Ireland was edentulous. There would therefore be a need for dental practitioners to have an understanding of the maintenance of such devices.

IN BRIEF

- Investigates the attitudes of GDPs to the maintenance of Locator retained implant overdenture.

Bar constructed in 1995 in 2017

Bar constructed in 1995 in 2017

2014
So we will need to up-skill people with these skills and kit
Replacing Missing Teeth with Complete Dentures in 2017

6% of patients are edentulous
Dear Sir/Madam,

Please see this exceptionally lovely patient. She has a set of dentures that were made 25 years ago and which are still a good fit. The only problem is that the teeth on her denture have completely worn down flat and she is unable to bite. I have attempted to locate a bite however found it impossible. I would be very grateful for your help in making a suitable set of dentures for this patient.
We all know that technically correct dentures will better satisfy patients than poor quality ones


So - should this be part of the skill-set of a young dentist or should resources be directed to CDT training in 2017?

Personally I do not care who does the work – but someone needs to be able to do it to a satisfactory standard with adequate funding - with flexibility of where it is provided
How difficult is this?

- Establish VD – reversible changes to lower denture - **Trim easy to mould, shape and remove – trial modification**
- Improve fit of existing C/C – with temp reline / soft-lining material
- Use originals C/C diagnostically – do no irreversible damage – **Never damage what the patient is wearing!**
- 3D printing
Good technical support, adequate funding and time, clinical skill and experience & skilled patient

Training:
- Diagnosis
- Impressions
- Jaw relationship
- Tooth position
- Aesthetics
- Occlusal plane
- Articulation
- Facial support
- Fit and review

Walton & MacEntee (2005) – 1:3 patients will choose not have free OI care when offered
Replacement of missing teeth

• Just because there is a space – it does not mean that we should replace and fill it in 2017
• Patients worry much more about aesthetic impact than function – they always have and always will
• Some operative and replacement clinical and laboratory skills are being lost
Replacement of missing teeth

• Fixed implants, Conventional and Resin bonded Bridges are predictable and preferred by patients (and probably dentists) to removable alternatives – all options have a downside

• UK leads the world with development of additive prosthodontics & optimising performance of CRBB – however there are big differences in performance between centres that we need to address (e.g. King et al (2015) / Garnett et al (2006))

• If teeth in good condition then I feel it is difficult to defend conventional tooth preparation to allow prescription of a conventional bridge in 2017
Replacement of missing teeth

- Canines, mandibular central incisors and molars are all difficult to restore with conventional & RBBs
- Implants probably are a best alternative for canines and molars in 2017 – although the less native bone present the more complications one can expect – we are still early days in knowing what happens to grafting materials
- There is still a place for dentures; particularly where spaces are big and tissue-loss significant. Funds will always tip the balance
- The digital revolution will help us: (intra-oral) scanning, 3D printing, CAD-CAM, move away from casting alloys to milling zirconium, titanium, alloys etc. – reduce turn around and costs
- Digital memory – remake / refurbish & copying
Replacement of Missing Teeth

Expect further Revolution over the next 150 years

Peter Briggs – Thank you for your attention