DT09 Reline, rebase, repair and modify removable prostheses

OVERVIEW

This standard focuses on the relining, rebasing, repair and modification of removable prostheses. The worker needs to prepare the working environment, reline and rebase a removable prosthesis when it no longer fits. Relining and rebasing involves adding further polymeric material to the existing prosthesis to achieve the required fit. This means that the worker needs to identify where and how much additional polymeric is required by creating a cast from an impression taken by the clinician using the existing prosthesis as a tray.

Repairing a broken or damaged prosthesis requires the worker to assemble the remaining parts of the prosthesis, evaluate whether an effective repair is possible, and repair the damaged/broken prosthesis when this is possible. A cast will be needed, which may be poured from the re-assembled remaining pieces of the prosthesis (if all are available) or if there are parts missing, by the clinician re-assembling the pieces, placing them in the patients mouth and taking an impression (in-situ impression). Modifying an existing prosthesis involves replacing or adding components (eg teeth, clasps), or extending the existing base and flanges. Again, casts will be required which may be formed as for relining and rebasing, or by the clinician fitting the existing prosthesis in the patients mouth and then taking an impression.

The term client is used to mean the member of the oral health care team who has prescribed the relining, rebasing, repair or modification of the prosthesis. Clients may be external to the organisation (such as other laboratories, dental practitioners, training schools) or internal (eg within a dental hospital). The patient is the individual for whom the custom-made prosthesis has been made.

Users of this standard will need to ensure that practice reflects up to date information and policies.

Version No 1

KNOWLEDGE AND UNDERSTANDING

You will need to know and understand:

1. the skeletal anatomy and physiology of the head and neck
2. the structure, function, and movement of the oro-facial musculature (including the tongue) and temporomandibular joint

3. disorders and diseases affecting the oral cavity (e.g., angular cheilitis and denture stomatitis candidiasis, erosive lichen planus and chronic aphthous ulceration and dry mouth)

4. tooth morphology and the form of the natural anterior and posterior teeth

5. the aetiology and classifications of malocclusions

6. the physiological and pathological changes associated with the ageing process and trauma (e.g., the changes in enamel, dentine and pulp that occur with age and how these affect tooth shape and colour, the effect of tooth loss on the supportive dental tissue, the processes and effect of ridge resorption)

7. the importance of retention of the periodontal ligament and the changes in proprioception due to loss of periodontal ligament

8. the broader factors (sociological, behavioural, environmental and economic) that contribute to oral health and illness

9. the emotional response by the patient to tooth loss

10. the role of removable prostheses in the restoration and maintenance of:
    1. tissue support
    2. aesthetics
    3. phonetics
    4. function of occlusion and the temporomandibular joint

11. the importance of restoring and maintaining the occlusal vertical dimension

12. the benefits and restrictions of immediate tooth replacement in the provision of removable prostheses

13. the benefits and restrictions of retaining root structures in the provision of removable prostheses

14. the use and need for transitional removable prostheses

15. the purpose and use of resilient liners and tissue conditioners

16. the design limitations of large anterior undercuts and pre-existing dental conditions

17. retention and stability
    1. the effect of skeletal form and ridge relationships upon the function, design and manufacture of complete and partial removable prostheses
    2. the effect of the residual ridge shape and contour on the retention and stability of removable prostheses
    3. the effect of saliva viscosity on the retention of removable prostheses
    4. the effect of the oro-facial musculature on the retention and stability of removable prostheses
    5. the effects of the use of passive and displacive impression techniques on the retention and stability of removable prostheses
    6. the principles and the clinical criteria for the use of the neutral zone impression technique
    7. the importance of the use of biometric guides during the stages in the manufacture of removable prostheses
    8. the role of the baseplate in the retention and stability of removable prostheses
    9. the role of bucco-lingual positioning of artificial posterior teeth in the stability of removable prostheses
   10. the role of the positioning of artificial anterior teeth on the stability of removable prostheses
   11. the importance of artificial posterior tooth form and mould on the stability of removable prostheses
   12. the role of the polished surfaces in the retention and stability of removable prostheses
13. the importance of occlusal rims in establishing tooth position in the manufacture of removable prostheses
14. the importance of establishing and maintaining the occlusal table on the stability of removable prostheses
15. the role of compensating curves in minimising instability of removable prostheses
18. aesthetics and phonetics
   1. the importance of pre-extraction guides in the development of acceptable aesthetics in the manufacture of removable prostheses
   2. the various methods of determining anterior tooth form for the manufacture of removable prostheses
   3. the importance of posterior tooth form in the development of acceptable aesthetics for the manufacture of removable prostheses
   4. the compromises sometimes necessary between aesthetics and function in the provision of removable prostheses
   5. the role of anatomical contouring in improving the aesthetics of removable prostheses
   6. the importance of base material selection on the appearance of removable prostheses
   7. the challenges presented by overdenture abutments when maintaining acceptable appearance in removable prostheses manufacture
   8. the importance of baseplate design in the development of good phonetics
19. articulation
   1. the selection of a suitable dental articulator for the type of removable prosthesis
   2. the benefits and restrictions of the various types of dental articulator
   3. the various methods of transferring clinical information to the dental articulator
   4. the use and need for kinematic relators (facebows, earbows and pantograph tracings etc.)
   5. the importance of hinge axis for the partially dentate mouth or where paranormal function of the temporomandibular joint exists
   6. the purpose of split mounting and re-articulation procedures
   7. the need to make adjustments to the various components parts of dental articulators based on the type and form of the patients existing or intended anterior tooth arrangement and occlusion
   8. the purpose of centric and eccentric wafers when making adjustments to dental articulators
   9. the indications and contraindications of using eccentric wafers in the development of occlusal stability during the manufacture of removable prostheses
20. the principles of partial removable prosthesis design
   1. the classifications of partially dentate mouths
   2. the classifications based on the nature of support gained by the partial removable prosthesis during the transmission of masticatory forces
   3. the principles of cast surveying and its application to partial removable prosthesis design and manufacture
   4. the need to identify the component parts of partial removable prosthesis
   5. the rationale for the selection of materials to fulfil the design requirements of partial removable prostheses
   6. the factors influencing the design, peripheral outline and basic contours of the base and connectors for partial removable prostheses
7. the principles of direct retention when applied to partial removable prosthesis design
8. the need for reciprocation when direct retainers are used
9. the types and efficacy of reciprocation that may be achieved by appropriate design of partial removable prostheses
10. the importance of guide surfaces in the retention and stability of partial removable prostheses
11. the need for and principles of indirect retention when applied to partial removable prosthesis design
12. the use of the altered cast technique in improving the stability of partial removable prostheses

21. methods of modifying, repairing and maintaining removable prostheses
   1. immediate dentures and additions
   2. principles of complete and partial immediate prostheses
   3. extraction and alveoplasty techniques
   4. modification of models to meet clinical requirements
   5. principles of complete immediate prosthesis construction
   6. the setting of artificial teeth, alteration of teeth to meet clinical requirements
   7. principles of addition of teeth to polymeric prostheses
   8. principles of addition of teeth to metallic prostheses

22. repairing
   1. the reasons for fractures of dentures, accidental damage, design faults, changes in underlying bony and mucosal support, materials degradation
   2. disinfection procedures for polymeric and metallic/polymeric prostheses
   3. identification of fracture plane and mode of fracture
   4. how to reassemble fractured parts and preparation of model
   5. preparation of fractured surfaces in relation to curing method and materials selection
   6. application of material and curing procedures
   7. fractured artificial teeth
   8. identification of tooth material, (polymeric/ceramic), resetting of teeth use of over bites, shade and mould matching
   9. preparation of replacement tooth
   10. application of new polymer and curing procedures
   11. materials selection and techniques of inclusion for strengthening and linking components, effect of fracture mechanics upon component selection
   12. effect of disruption of polymer chains by inclusions

23. relining and rebasing
   1. selection of method and materials, preparation of prostheses prior to procedures
   2. clinical re-line impression techniques and impression material identification
   3. compatibility of impression materials with denture base plate material
   4. disinfection procedures for polymeric and metallic/polymeric prostheses, and re-line impression material
   5. complex preparation techniques, casting model and articulating, over bites
   6. preparation of existing prosthesis baseplate, waxing, effect of palatal thickness on tongue space and physical performance of prosthesis
   7. flassing packing, auto cure techniques
   8. processing and finishing procedures

24. the classification and sub-classification of materials on the basis of chemical composition and internal structure

25. the mechanical, physical, thermal, chemical and biological properties of materials
1. the importance of the evaluation of materials prior to use in the oral cavity
2. the ideal properties of materials used in the manufacture of removable prostheses
3. comparison of the materials currently used in dentistry to the ideal properties
4. the effects of storage on the properties of materials used in the manufacture of removable prostheses
5. the properties of materials during manipulation
6. the properties of materials during setting
7. the effects of processing on the properties of the materials used in the manufacture of removable prostheses

26. products for cast and mould manufacture
   1. the requirements of products used in the manufacture of casts and moulds for removable prostheses
   2. the composition of cast and mould products used in dentistry
   3. the manipulation and setting characteristics of cast and mould products
   4. the properties of the set materials used in the manufacture of casts and moulds

27. waxes used in the manufacture of removable prostheses
   1. the requirements of wax pattern and base materials
   2. the composition of dental waxes used in the manufacture of removable prostheses
   3. the properties of dental waxes used in the manufacture of removable prostheses
   4. the importance of solid/solid transitions in the manipulation of waxes
   5. the essential differences between baseplate waxes and casting pattern waxes
   6. the relevance of the coefficient of thermal expansion (CTE) in the use of baseplate and pattern waxes
   7. the importance of pattern strain relief in the manufacture of indirect patterns
   8. the importance of maintaining the physical, mechanical and aesthetic properties of baseplate waxes

28. dental polymers
   1. the term polymerisation
   2. the activation mechanisms that can be used in the polymerisation of polymers
   3. the initiation processes that can be used in the polymerisation of polymers
   4. the processes by which termination occurs in dental polymers
   5. the terms step and chain polymerisation and how these may be equated to the terms condensation and addition curing
   6. the terms thermoplastic and thermoset

29. structural features of polymer chains:
   1. the term copolymerisation
   2. the terms branching and cross-linking and how these relate to:
      1. the thermosetting of denture base polymers
      2. the setting of reversible and irreversible hydrocolloid impression materials
      3. the setting of rubber based and silicone impression materials
   3. transition temperatures of polymers (tm and tg) and their effects on the physical and mechanical properties of polymers
   4. the term tacticity and the various forms that this may take in the structure of polymers
   5. the rotation of polymer segments
   6. the effect of the degree of polymerisation on properties of polymers

30. dental base polymers
   1. the specific requirements of denture base polymers
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Subsections</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>the constituents and properties of denture base polymers</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>the constituents and properties of hard reline materials</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>the constituents and properties of tissue conditioners and temporary soft lining materials</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>the constituents and properties of permanent soft lining materials</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>the microbial, physical and technical implications of the metallo-polymeric junction</td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>artificial tooth materials</td>
<td>1. properties of the artificial tooth materials available for use in the manufacture of removable prostheses 2. the mechanisms of attaching artificial tooth materials to denture bases 3. the benefits and restrictions of combining different materials in the manufacture of removable prostheses</td>
</tr>
<tr>
<td>32.</td>
<td>impression, duplicating and disinfection materials</td>
<td>1. the constituents and uses of different impression materials 2. the compatibility of impression materials with disinfection procedures 3. the term viscoelasticity and its relevance to the handling of certain types of impression materials 4. the term elastomeric and the essential characteristics of the materials in this category</td>
</tr>
<tr>
<td>33.</td>
<td>dental alloys</td>
<td>1. the structure and properties of metals and the methods of crystallisation in the cooling of metals 2. the benefits of combining metals to produce alloys 3. the types of binary alloys that can form and the relevance of these structures in the use of dental alloys 4. the importance of dislocations in the structure of metals and alloys 5. the construction of thermal equilibrium diagrams from the cooling curves of different binary alloy compositions 6. the important features of thermal equilibrium diagrams for alloys that form solid solutions and 7. the relevance of the eutectic mixture on the composition of dental alloys and solders 8. the importance of phase precipitation in alloys that exhibit partial solid miscibility on the hardening mechanisms and corrosion resistance 9. the relevance of non equilibrium cooling conditions on the structure of alloys 10. the importance of homogenisation heat treatments on cast alloys 11. the relevance of refining elements on the castability and eventual crystal structure of alloys 12. the importance of cooling cycles on the physical and mechanical properties of dental alloys 13. the importance of primary, secondary and tertiary creep 14. the effects of cold working on dental alloys and its relevance to anisotropic properties 15. the terms stress relief anneal, recrystallisation and grain growth and their relevance to the use of dental alloys 16. the importance of maintaining the crystal structure of wrought dental alloys 17. the important principles in the soldering, brazing and welding processes used in modern dentistry 18. the relevance of electrolytic corrosion in the use of dental alloys 19. the importance of the use of electro-brightening of certain dental alloys 20. the rationale for the selective plating of dental alloys</td>
</tr>
</tbody>
</table>
34. dental refractory materials
   1. the need for the use of refractory materials
   2. the rationale for the selection of refractory materials
   3. the use of phosphate bonded and gypsum bonded refractory materials
   4. the setting characteristics of the two main types of investment used in dentistry
   5. the importance of thermal expansion of investment materials used in casting and soldering processes
   6. the role of the allotropes of silica in the expansion process
   7. the role of colloidal silica on the setting and thermal characteristics of phosphate bonded refractory materials
   8. the important physical and chemical changes that take place during the heating of dental investments
   9. the importance of mould temperature on the crystal structure of cast alloys
35. methods of protection against contamination and cross-infection when handling received impressions and other items which may have been in the mouth, or which are intended to be placed in the mouth; why it is important to do so
36. the purpose of personal protective equipment
37. the range of equipment used in the design and manufacture of simple complete removable prostheses; methods of using equipment and materials safely (including the use of chemicals and other hazardous substances); methods of storing different equipment and materials safely and securely; methods of cleaning and maintaining different types of equipment and the workers role in this
38. the reasons for maintaining records throughout the process and of clearly identifying the products during the manufacturing process
39. organisational procedures and requirements for the recording of information about incoming work, work in progress and work delivered to clients, and the purpose of this
40. quality audit systems: their purpose, nature and procedures; impact of the Medical Devices Directive on the recording of incoming work, the detailed design and manufacturing specification and the recording of materials and processes
41. principles of quality assurance (including effective recording and sampling); processes and procedures for quality assurance in the workers workplace
42. methods of setting and calibrating equipment and of testing that this is correct
43. the effects of modifying manufacturers products to meet laboratory requirements on the physical properties of products, on quality assured products and the legal implications (eg of inaccurate mixing, inadequate processing)
44. the requirements of the Medical Devices Directive in monitoring the progress of devices through the production process
45. legal requirements of the contract of employment, confidentiality and employers regulations
46. health and safety at work legislation and related procedures and liability; principles of, and how to apply, legislation and regulations (eg COSHH regulations, the Health and Safety at Work Act, Environmental Protection Act)
47. legal requirements relating to third party insurance
48. the competency range of other members of the oral healthcare team (and the wider health and social care team)
49. the regulatory functions of the General Dental Council
50. legal and ethical obligations of regulated members of the oral healthcare team
51. the need for lifelong learning and professional development and responsibilities in relation to this for regulated members of the oral healthcare team
52. the oral healthcare teams wider responsibility to the community as a whole
PERFORMANCE CRITERIA

You must be able to do the following:

1. correctly prepare cast material in a manner which is appropriate for the process
2. effectively clean and disinfect the received impression and pour the cast material correctly into the impression and produce a cast that:
   1. provides an accurate positive image of the impression
   2. is dense
   3. is free from voids or other visible defects
3. produce an index that:
   1. provides an accurate reciprocal location to hold the teeth in place
   2. is in the correct occlusal vertical dimension
4. remove the impression in a manner that maintains the integrity of the cast and minimises disturbance to the teeth
5. remove an appropriate thickness of material from the fitting surface of the prosthesis and shape the prosthesis suitably to produce sufficient bonding for the new material
6. select and prepare materials appropriate to the nature and construction of the removable prosthesis and in the correct quantities for re-shaping the prosthesis
7. evaluate the occlusal vertical dimension of the cast against the index and make any necessary adjustments
8. apply releasing agent to mating surfaces to facilitate effective separation and boil out any traces of wax prior to packing
9. mix resin and monomer in the correct manner and quantities to allow the necessary reaction to take place and fill the moulds completely with polymeric material whilst minimising material wastage
10. process the polymeric material for the correct length of time at the correct temperature
11. release the removable prosthesis from the moulds without damaging it following curing and trim any excess material
12. effectively clean and disinfect the prosthesis fragments and clearly identify the patient for whom it was made
13. handle fragments in a manner which minimises the likelihood of losing or mixing any of them with fragments from other prostheses
14. form into the correct relationship those fragments of the removable prosthesis which it is possible to reassemble and fix them together
15. assess the reassembled fragments and make a justifiable decision as to whether:
   1. to request an impression with the reassembled prosthesis in place
   2. a new impression is needed to enable the prosthesis to be repaired
   3. the damaged prosthesis is beyond repair
16. effectively clean and disinfect the received impression and pour the cast material correctly into the impression and produce a cast that:
   1. provides an accurate positive image
   2. is dense
   3. is free from voids or other visible defects
17. separate the cast from the impression and any reassembled fragments of the
damaged prosthesis in a manner which minimises damage and prepare the cast appropriately for use.

18. remove an appropriate thickness of polymeric from the damaged site and shape the prosthesis suitably to produce sufficient bonding for the new material.

19. apply releasing agent to mating surfaces to facilitate effective separation and boil out any traces of wax prior to packing.

20. prepare polymeric resin:
   1. appropriate to the nature and construction of the removable prosthesis
   2. in the correct quantities for repairing the prosthesis

21. apply polymeric resin using the correct technique to the required shape and thickness and repeatedly place the prosthesis on the cast and make any adjustments:
   1. for fit
   2. to minimise any damage to surrounding tissues in the mouth which are obvious from the cast.

22. apply additional strengthening and linking material appropriately when this is required.

23. process the material for the correct length of time at the correct temperature.

24. release the repaired prosthesis from the moulds without damaging it following processing and trim any excess material.

25. effectively clean and disinfect the prosthesis fragments and clearly identify the patient for whom it was made.

26. handle fragments in a manner which minimises the likelihood of losing any or of mixing them with fragments from other prostheses.

27. form into the correct relationship those fragments of the removable prosthesis which it is possible to reassemble and fix them together.

28. promptly contact the client to obtain a new impression of the fitting surface inside the prosthesis when it is not possible to reassemble the fragments.

29. effectively clean and disinfect the received impression and pour the cast material correctly into the reassembled prosthesis or impression and produce a cast that:
   1. provides an accurate positive image
   2. is dense
   3. is free from voids or other visible defects.

30. remake any ceramic or metallic components that are not capable of being reused from the damaged prosthesis.

31. assemble the components on the cast, fix them securely together, remove the assembled prosthesis from the cast and embed it in a suitable investment.

32. position the components in the correct place and prepare them for joining so that:
   1. an optimum join can be made
   2. they are appropriate to the joining method to be used
   3. any polymeric components which could be damaged during the process are protected.

33. accurately join components at the correct points to form secure, strong and viable joints.

34. evaluate each finished join for its:
   1. location
   2. strength
   3. integrity
   4. function
   5. fitness for purpose (and discard and remake any which give cause for concern).

35. effectively clean and disinfect the received impression and check it against the
case data and confirm their identity
36. appropriately prepare the impression to receive the cast material and select appropriate material for making the cast that meet the technical requirements
37. correctly prepare cast material that is appropriate for:
   1. the process which will be used to manufacture the final prosthesis
   2. the nature of the impression material
38. pour the cast material correctly into the impression and produce a cast that:
   1. provides an accurate positive image of the impression
   2. includes the detail and area that is required to modify the prosthesis
   3. is dense
   4. is free from voids or other visible defects
39. survey the cast to identify the position and size of undercuts, determine an appropriate path of insertion for the planned prosthesis and block out any unsuitable undercuts
40. add extra mechanical retention to the prosthesis if this is required and prepare the surfaces appropriately for the modification that is to be made
41. select and prepare the components for modifying the prosthesis that are appropriate to:
   1. the nature and construction of the removable prosthesis
   2. the modification which is required
   3. the shade, size, type and cuspal forms of the patients natural dentition
42. select and position in wax any artificial teeth that need to be added to the prosthesis and adjust to the baseplate in a manner that produces:
   1. an occlusion appropriate to the prescription and natural dentition
   2. the required aesthetic appearance
43. shape and contour the supportive wax for additional artificial teeth so that it is consistent with:
   1. the patients musculature
   2. the lost tissues
   3. the addition of any retentive components
44. place additional or replacement metallic components in the correct place on the prosthesis and fix them securely with an appropriate amount of fixing material
45. select and use appropriate equipment and materials to attach additional or replacement metallic components to the prosthesis at the correct points to form secure, strong and viable joins
46. select and prepare polymeric materials for reshaping the prosthesis which are:
   1. appropriate to the nature and construction of the removable prosthesis
   2. in the correct quantities (and apply them in an appropriate manner to achieve the required shape and thickness)
47. repeatedly place the developing prosthesis on the cast during the modification process and make any necessary adjustments to:
   1. confirm its fit
   2. minimise any likelihood of damage to surrounding tissues in the patients mouth which are obvious from the cast
48. trim the prosthesis to the required dimension consistent with:
   1. relevant anatomical features
   2. the required extension of the base
49. examine the fit surface and remove any processing anomalies and sharp surfaces that could cause discomfort to the wearer
50. fit the prosthesis to the working cast maintaining the required path of insertion
51. polish the prosthesis to create smooth and polished non-fitting surfaces and rolled borders
52. fit the trimmed and polished prosthesis to the cast and reposition the casts on an appropriate articulator
53. assess the articulated prosthesis, confirm that the occlusion is appropriate to the prescription and the patients natural dentition, make any necessary adjustments to maintain the original vertical dimension of the occlusion
54. evaluate the finished prosthesis for:
   1. its quality and freedom from defects
   2. functional effectiveness to the design
   3. fit to the cast
   4. compliance with the prescription
55. correctly identify the finished prosthesis with the patients unique reference and date of production
56. effectively clean and disinfect the finished prosthesis, prepare and package it safely for despatch together with instructions for the patient and client
57. make complete, accurate and up-to-date records relating to identification components and materials used in the repair and modification of the prosthesis, and store the records in the correct location consistent with relevant legislation

**ADDITIONAL INFORMATION**

This National Occupational Standard was developed by Skills for Health.

This standard links with the following dimension within the NHS Knowledge and Skills Framework (October 2004):

Dimension: HWB9 Equipment and devices to meet health and wellbeing needs