DT13 Design and manufacture single tooth coloured restorations

OVERVIEW

This standard describes the role of the worker in designing and manufacturing single tooth coloured restorations from ceramic, polymeric, composite and emerging materials acceptable for bio-compatibility (such as castable and pressable glass). These restorations include inlays, onlays, veneers, facings, temporary restorations and crowns. The worker needs to manufacture the single tooth coloured restorations which have been prescribed, and finish them ready for fitting in the patients mouth.

The term client is used to mean the member of the oral health care team who has prescribed the custom-made dental device. 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 restoration is being made. A cast is a dimensionally accurate positive form of areas of the oral cavity produced from a negative impression. A die is a section of a cast of an individual tooth.

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 (eg 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 (eg 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 proprioreception due to loss of periodontal ligament
8. the broader factors (sociological, behavioural, environmental and economic) that contribute to oral health and illness.
9. articulation
   1. the selection of a suitable dental articulator for the type of restoration
   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
10. aesthetics and phonetics
   1. the relevance of the existing natural dentition in the creation of restorations
   2. the various methods of determining anterior tooth form for the manufacture of restorations
   3. the importance of developing patient confidence in the process of artificial teeth selection
   4. the importance of posterior tooth form in the development of acceptable aesthetics for the manufacture of restorations
   5. the importance of tooth material selection on the maintenance of aesthetics of restorations
   6. aesthetic and phonetic considerations in the anteroposterior positioning of upper and lower artificial anterior teeth
   7. the compromises sometimes necessary between aesthetics and function in the provision of restorations
   8. the role of anatomical contouring in improving the aesthetics of restorations
   9. the importance of base material selection on the appearance of restorations
  10. the effect of staining on the aesthetics of restorations
  11. the challenges presented by overdenture abutments when maintaining acceptable appearance in restorations manufacture
11. the principles of restoration design
   1. the classifications of partially dentate mouths
   2. the principles of cast surveying and its application to restoration design and manufacture
   3. the need to identify the component parts of restoration
   4. the rationale for the selection of materials to fulfil the design requirements of restoration
   5. the principles of direct retention when applied to restoration design
12. the constituents of restorations (onlays, crowns, post and cores, inlays) and how they are made
   1. the management of materials and process selection to meet client requirements and functional requirements of restorations
   2. the constituents and physical properties of the different alloys used for restoration construction
3. the selection of construction processes to ensure the accuracy of fit of restorations
4. the function and operation of computer aided manufacturing systems
13. the classification and sub-classification of materials on the basis of chemical composition and internal structure
14. 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 restorations
   3. comparison of the materials currently used in dentistry to the ideal properties
   4. the effects of storage on the properties of the materials used in the manufacture of restorations
   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 restorations
15. products for cast and mould manufacture
   1. the requirements of products used in the manufacture of casts and moulds for restorations
   2. the composition of products used in the manufacture of casts and moulds
   3. the manipulation and setting characteristics of products
   4. the properties of the set materials used in the manufacture of casts and moulds
16. waxes used in the manufacture of restorations
   1. the requirements of wax pattern and base materials
   2. the composition of dental waxes used in the manufacture of restorations
   3. the properties of dental waxes used in the manufacture of restorations
   4. the importance of solid/solid transitions in the manipulation of waxes
   5. the relevance of the coefficient of thermal expansion (CTE) in the use of waxes
   6. the importance of pattern strain relief in the manufacture of indirect patterns
   7. the importance of maintaining the physical, mechanical and aesthetic properties of waxes
17. aesthetic restorative materials
   1. the constituents, physical properties, function and performance of polymeric and ceramic materials used in the manufacture of restorations; processing methods used
   2. the structure of a ceramic material, the general properties of alumina and how these are imported to dental porcelains
   3. the structure of glasses
   4. constituents, physical properties, function and performance of composite materials, the manipulation of composite materials
   5. processes of polymerisation: heat, chemical, pressure and photopolymerisation; the effect of inadequate polymerisation on the physical properties of dental restorations; the effect of inadequate polymerisation on the toxicity of the restoration.
   6. principles and methods used in the bonding of the range of different materials used in the manufacture of tooth coloured restorations
   7. the effect of materials selection and surface finish upon microbial colonisation of restorations.
   8. the management of materials selection of artificial tooth materials in relation to the required clinical performance and mechanical properties
18. the relationship between chemical bonds and the properties of solid materials
19. impression, duplicating and disinfection materials
   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
20. 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
21. the purpose of personal protective equipment.
22. the reasons for maintaining records throughout the process and of clearly identifying the products during the manufacturing process
23. 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
24. 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
25. principles of quality assurance (including effective recording and sampling); processes and procedures for quality assurance in the workers workplace
26. methods of setting and calibrating equipment and of testing that this is correct
27. 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).
28. the requirements of the Medical Devices Directive in monitoring the progress of devices through the production process
29. legal requirements of the contract of employment, confidentiality and employers regulations
30. 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)
31. legal requirements relating to third party insurance.
32. the competency range of other members of the oral healthcare team (and the wider health and social care team)
33. the regulatory functions of the General Dental Council
34. legal and ethical obligations of regulated members of the oral healthcare team
35. the need for lifelong learning and professional development and responsibilities in relation to this for regulated members of the oral healthcare team
36. the oral healthcare teams wider responsibility to the community as a whole

PERFORMANCE CRITERIA

You must be able to do the following:

1. assess the occlusion to determine the necessary information for making the incisal and occlusal form
2. prepare any required foil and matrices in a manner appropriate to their intended use prior to starting the manufacturing process
3. apply and shape the appropriate tooth coloured materials to create appropriate:
   1. shade and internal colouration
   2. tooth morphology
   3. characterisation and surface texture
   4. effects in relation to adjacent gingiva, natural teeth and restorations
   5. simulated gingival tissue
   6. root simulation
   7. creative illusions and inclusions
4. process tooth coloured materials appropriately for their type and form to maintain aesthetic harmony and appropriate occlusion
5. check the processed restoration on the cast throughout the process and make any necessary adjustments to:
   1. fit around the entire marginal edge
   2. occlusion with opposing teeth so that premature contacts are avoided
   3. required proximal contact areas
   4. its compliance with the prescription
   5. the risk of the restoration damaging surrounding tissues in the mouth
6. check the item for faults and reprocess the material if this is required at different stages in the process.
7. check the restoration:
   1. for faults
   2. general fit (and undertake any necessary rework)
8. create appropriate fitting surfaces consistent with:
   1. the restoration material
   2. the items design
   3. the requirements of the prescription
9. finish the item so that:
   1. it is capable of maintaining accuracy of fit
   2. it is of the appropriate shape
   3. its shade matches the prescription requirements
10. check the restoration against the cast and prescription requirements and confirm:
    1. there is an acceptable overall fit of the restoration to die margins and cast parameters
    2. the restoration provides the correct occlusion and articulation
    3. the proximal contact areas are in contact with the adjacent teeth at the appropriate points
    4. the tooth coloured material creates the required anatomical form, shade and surface finish, particularly at the mesial proximal contact area
    5. the finished restoration is smooth, appropriately finished and free from faults
    6. there is adequate retention and fixing to retain the restoration in the correct position within the mouth
    7. the restoration will not cause damage to the patients soft or hard tissues and will not adversely affect their oral hygiene
11. correctly identify the restoration with the patients unique reference and date of production
12. effectively clean and disinfect the finished restoration, prepare and package it safely for despatch together with instructions for the patient and client
13. make complete, accurate and up-to-date records relating to the identification, components and manufacture of the restoration 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