

## **Significance of the “Ergonomic requirements for dental equipment”.**

### **Introduction.**

In May 2006 the document “Ergonomic requirements for dental equipment. Guidelines and recommendations for designing, constructing and selecting dental equipment” is published within the scope of the European Society of Dental Ergonomics. It is sent to manufacturers of dental equipment for Europe with an appeal to use these requirements for developing equipment with which dentists are able to work in a healthy way. In this document a number of reasons are mentioned why it is important to draw up ergonomic requirements for dental equipment. It contains a full explanation of an ergonomic method of working of dentists and in relation with this ergonomic requirements regarding dental equipment are worked out. Below are drawn up the significant aspects of the “Ergonomic requirements for dental equipment”.

### **What is new?**

1. Working posture and ergonomic method of working of the dentist – physically and visually – are defined in a coherent survey starting from the functioning of the human being, using the now available knowledge.
2. The description of this forms the foundation for the ergonomic criteria for the parts of dental equipment, also using the now available knowledge.
3. The working out is based on a system approach of the man-machine system of the dentist so comprising his working system using dental equipment.
4. The requirements represent a survey of the present state of the art.
5. In this way a documented basis came available for designing, constructing and selecting dental equipment with which can be worked in a healthy way, by as well tall and small dentists, except the very small (< P5=1.56 m) and very tall (> P95=1.96 m) dentists. For the group of dental operators < P5 and > P95 special adaptations - in relation with their body dimensions - have to be provided

### **What are the targets?**

1. Complying with the general guideline of the Directive of the EU concerning Medical Devices to use equipment with which it is possible to work in a healthy way. By this also a basis comes available for using the CE marking.
2. Complying as well with the European Directive concerning health and safety at work:
  - \* taking care of the protection of health and safety of employees as to protect them against and prevent occupational risks;
  - \* basing the choice of work equipment on the specific working conditions and hazards existing;
  - \* providing workers with adequate information about a good use of it.
3. Making available a basis for ISO and CEN to define ergonomic criteria for Standards to be developed regarding dental equipment.
4. Providing dental manufacturers with the documentation for designing and constructing ergonomic equipment according to the state of the art.
5. Providing dentists, dental hygienists etc. with equipment for a healthy way of working, next to criteria for assessing ergonomic aspects of equipment.
6. Making possible in this way an adequate prevention of musculoskeletal or physical complaints and disorders of dentists, dental hygienists etc.
7. Offering dental schools equipment for a proper ergonomic training of students.
8. Offering criteria to the management of larger dental practices and organisations etc, for selection of dental equipment (for other people than themselves to work with it).
9. Providing professional organisations with information for supplying dentists etc with ergonomic advices.

10. Prevent liability cases against dentists/employers leading to lawsuits when they do not use equipment for their employees that meets legal criteria. Or liability cases against dental depots if they do not provide dentists with relevant information regarding possibilities and limitations of equipment.

#### **What is the problem of the present construction of dental equipment.**

- The problem of the present construction of dental equipment is that this is performed by engineers i.e. technicians primary on the basis of a technical approach of solutions to be reached. Without starting from a functional analysis of the tasks of the dentist which he has to perform based on his human possibilities and limitations. It means a target oriented analysis of functions to be performed and the proper conditions for this. Nowadays design (lay out, shape and colour) has still priority.

#### **What is the challenge?**

- The great challenge is to develop now ergonomic equipment starting from functional principles and giving it a design and ergonomically adapted colours by which a refreshing ergonomic line next to existing equipment comes available. Directed at helping dentists to prevent physical complaints.

#### **What are the priorities?**

Five coherent priorities are presented for working out the “Requirements”.

1. A well supporting working stool.
2. An optimal lighting of the mouth of the patient.
3. An adequate support of head and neck of the patient together with the shoulders.
4. A comfortable chair for the patient to lie relaxed on the chair
5. Finally sitting upright with upper body and head by using spectacles with prism segments and/or a loupe.

The necessity of taking care of other requirements remains unimpeded.

#### **What are the parts of the 5 priorities?**

##### *Ad 1. Working stool.*

A working stool of the dental operator with the right support of the top of the pelvis (without contact with muscles above and below this place) further of the tuberosities ischii (sitting bones) at the underside of the pelvis and finally of the obliquely downwards running upper legs to make possible a stable and active posture upright.

##### *Ad 2. Operating light.*

A light beam of the operating light parallel with the viewing direction of the dental operator providing a shadow free lighting in the mouth, with a sufficient great surface for a good overall lighting of the mouth and without an uncomfortable positioning of the lighting rectangle over the face of the patient. For this purpose 3 turning axes are needed.

##### *Ad 3. Support of head and neck.*

- A support of head and neck that facilitates easily and without hindrance the 3 turnings of the head of the patient. So that the in different directions oriented working fields/surfaces in the mouth can be oriented towards the viewing direction of the upright sitting dentists. Providing the back of the head of the patient and the lower part of the cervical column with support, while the upper part of this is left free for movements of the head. Also an adjustment of the neck support is possible to the individual height of the neck, ranging normally from 4-8 cm.
- A complete support of the shoulders of the patient, directly connected with the support of the lower part of the cervical column, so without an interruption of the support of shoulders and lower part of the neck. To prevent strain of the muscles of shoulders, neck and mouth. By which the patient is relaxed, the opening of the mouth can be

maximally and the turnings of the head are not hampered by muscle strain.

*Ad 4. Comfortable chair for the patient.*

- An adjustment of the length of back and headrest of the patient chair together so that always a joined together support of shoulders and neck can take place.
- A flat back of the patient chair that is not pressing uncomfortably against the sides of the shoulders and fits different widths of backs of patients; making it also possible for the patient to move sideward with the upper body to follow the lateroflexion, i.e. the sideward bending of the head.
- An equable transition of back and seat, without differences in height because the lowest 15 cm of the back of the patient lies on the seat, by which height differences work out uncomfortable causing an overstretching of the back.
- An angle between seat and support of the lower legs being not more than 15° to be able to position the patient without damming up of the blood circulation horizontally.
- Taking care that the lower legs are not hanging downwards, in relation with the circulation (specially patients with thrombosis legs).
- Functional supports of the elbows at the sides of the chair, in relation with differences in position of the elbows depending on differences in length. These can be moved away when working standing.
- For treating patients with differences of length of 50-60 cm, together with all the differences in anatomy, i.e. the individual roundings and curves it is not possible to use a patient chair with a number of curves to accommodate these patients. Older patients complain increasingly about the uncomfortable patient chairs. They are undergoing not only short treatments but increasingly more longer lasting treatments, for cosmetic treatments, implants etc. So a flat chair will be necessary that makes it possibly to position patients of all sizes on it comfortably.
- A width of the back of the chair that makes it possible to work in a correct standing position, in relation with necessary movements of the head of the patient.
- Sufficient room below the back of the chair for the legs of long dentists together with the foot control and also for four handed dentistry.

*Ad 5. Spectacles with prism segments and or loupe.*

The use of a pair of spectacles with prism segments and/or loupe, through with upper body and head can be kept upright sufficiently by which also breathing becomes improved.

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