

GENERAL AND PARTICULAR ASPECTS OF INFECTIVE RISK IN ORTHODONTICS AND DENTOFACIAL ORTHOPEDICS - PART I

CRISTINA NICOLETA MIHAI¹, DRAGOȘ STANCIU², GABRIEL CIOCHINDĂ³, MIHAI BURLIBAȘA⁴, VIOREL ȘTEFAN PERIEANU⁵, MARIANA PĂCURAR⁶, IRINA ADRIANA BEURAN⁷, IRINA DONCIU⁸, ILEANA IONESCU⁹, MĂDĂLINA VIOLETA PERIEANU¹⁰, LILIANA BURLIBAȘA¹¹, GABRIELA TĂNASE¹², AUGUSTIN MIHAI¹³, LAURA LELIA MIHAI¹⁴

^{1,2,3,4,5,7,8,9,10,12,13} "Carol Davila" University of Medicine of Pharmacy Bucharest, Romania; ⁶ "George Emil Palade" University of Medicine, Pharmacy, Science and Technology of Târgu Mureș, ¹¹ University of Bucharest, ¹² Private practice, Bucharest

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Abstract: The infectious risk in the dental practice, including in the orthodontic practice, represents a real danger for both the medical team (orthodontic specialist, dental nurse and dental technician), but also for the patient. But, dental orthodontics and dentofacial orthopedics is a specialty in the field of dentistry with a special content and a special instruments and, therefore, by conducting this study, even if it is only preliminary, we set out to highlight a succession of concepts, the objective being to familiarize the specialists in orthodontics and dentofacial orthopedics with certain rules of theoretical and practical character, which aim to prevent and combat the infectious risk in orthodontic practice.

INTRODUCTION

In a medical field with such a high morbidity, as dental diseases, it is compulsory for the professionals of this specialty to be concerned about taking concrete and firm prophylaxis measures. By prophylaxis, we mean prevention, and in this material we will refer to the prevention of infectious aggression, which may occur at the level of the dental office, with reference to the office where the specialist in orthodontics and dentofacial orthopedics works.

Orthodontics and dentofacial orthopedics is a specialty of dental medicine, in which the specialist, as well as the specialized office where he/she operates, are often incriminated in the occurrence of infections and/or of infectious and contagious diseases with mass spread. This is evident both by the fact that the orthodontist, as well as the other specialists in the field of dental medicine (general dentistry, periodontology, endodontics, dentoalveolar surgery etc.) performs specific maneuvers, in which almost every act involves direct contact with existing fluids and secretions at the level of the oral cavity (saliva, blood, crevicular fluid etc.) considered to have an infectious potential on the one hand, and on the other hand, because the oral cavity is an ultra-populated area with a fugal flora.(1-5)

AIM

Any person who carries out a professional activity, is permanently or temporarily, from the point of view of his health, under the influence of a complex of toxic substances specific to each job, which can lead either to professional illnesses, medically or legally defined or not, either to physical, chemical or biological occupational incidents or accidents.(6-9)

Due to the specific conditions of the exercise of various procedures in the field of orthodontics and dentofacial orthopedics, as well as of the specific human relations, under the influence of these specific toxic substances are found both the

orthodontic medical team (orthodontic specialist, dental nurse, dental technician), as well as patients. But, in the last 3 decades, the infectious segment has gained a special importance. Both theoretically and practically, every orthodontist or patient brings into the professional environment a multitude of pathogenic or non-pathogenic bacteria and viruses, and the activity of orthodontics and dentofacial orthopedics amplifies the relationships between infectious agents and sensitive hosts.(10-12)

By conducting this study, even if it has only a preliminary character, we wanted to highlight a series of concepts, the aim being to familiarize the specialists in orthodontics and dentofacial orthopedics with certain rules of theoretical and practical nature, which have as a goal to prevent and combat infectious risk in orthodontic practice. But, due to the very small space, we have systematized the information in 2 distinct parts.

MATERIALS AND METHODS

Orthodontic office. The space where the orthodontic specialist carries out his daily activity varies considerably depending on the geographical environment, but also on his personality and financial possibilities. Theoretically, we can say that the area available for a medical office of orthodontics and dentofacial orthopedics (similar to any kind of general dentistry and/or dentoalveolar surgery) located in a rural area can have larger surface than a cabinet with the same profile in an urban area, because the price of a useful square meter of useful area in urban areas is much higher than in rural areas. However, it is known that orthodontic practitioners prefer for their offices, spacious premises, some even very generous, which also allow the creation of additional spaces, such as a radiology office and/or a dental laboratory.(1-14) Under these conditions, there is a growing tendency in Romania, as more dentists, with different specialties, to associate with each other, also having common

⁹Corresponding author: Ileana Ionescu, Str. Plevnei, Nr. 19, Sector 1, București, România, E-mail: mburlibasa@gmail.com, Phone: +40723 472632
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CLINICAL ASPECTS

auxiliary staff, thus creating real medical teams. In this context, we can discuss, referring to the profile legislation already existing at the level of 2019 in Romania, about the fact that, in a medical office with a profile of orthodontics and dentofacial orthopedics, similar to any general dentistry office and/or dentoalveolar surgery, we can talk about separate rooms for cleaning (washing and presterilization), sterilization itself, as well as a space for storing materials and instruments. It is very important that in the organizational plan of a medical office with profile of orthodontics and dentofacial orthopedics should exist, besides the rooms previously mentioned, the actual space where clinical activity is performed, but also a changing room for medical and auxiliary personnel, a waiting room for patients and 1-2 toilets.(14-16) The work program must be adapted so that the route of the sterile instruments does not intersect with the patients' route.

The instruments in a medical office with orthodontic and dentofacial orthopedics profile, involves 2 types of instruments, namely:(1-16)

- *The common instruments* for the dental profession: dental unit, suction system, the classic general dentistry toolkit (consultation kits, flat burnisher, cement spatulas, ball burnisher, manual scaling instruments etc.), but also standard impression trays, necessary for impressions, for creating study models and mobile orthodontic appliances;

- *Special instruments for orthodontics and dentofacial orthopedics* for cresting special devices, in particular multi-attachment systems.

Thus, the specialized instruments used in orthodontics and dentofacial orthopedics should be briefly described, also in terms of the infectious risk and its prevention, as follows:

1. Dental pliers:

- *Pliers for making orthodontic archwires.* These pliers are not inserted into the oral cavity. But, during the reactivation of the bows and clasps of the removable appliances, these pliers can be microbially contaminated, through the biological fluids existing at the level of the oral cavity (saliva, blood, crevicular fluid etc.). Even making new arches, requires multiple checks at the level of the oral cavity of patients, during which the pliers can be microbially contaminated.

- *Pliers for insertion and/or removal of the archwires* in the oral cavity. These pliers are always microbially contaminated, through biological fluids existing in the oral cavity (saliva, blood, crevicular fluid etc.).

- *Pliers for removing orthodontic rings and/or brackets.* Removing the orthodontic rings from the oral cavity is almost always a bloody task. In this way, microbial contamination of the jaws of this type of pliers occurs. The same microbial contamination also occurs during removal of the brackets from the teeth.

- *Ligature archwires cutter pliers.* By introducing the pliers into the oral cavity of the patients, microbial contamination immediately occurs, through biological fluids existing in the oral cavity (saliva, blood, crevicular fluid etc.).

- *Pliers for making ligatures.* A professional and highly specialized instruments, namely: Steiner pliers, Coon pliers, Mathieu pliers used to make metal ligatures, but also Mosquito pens used to make ligatures from elastomeric materials. All this instruments used to make ligatures can be contaminated by the same biological fluids existing in the oral cavity (saliva, blood, crevicular fluid etc.).

2. Kits (boxes) for rings:

These contain new orthodontic rings and/or orthodontic rings which have been tested and did not match. Tested rings were decontaminated, cleaned and sterilized [with moist heat (autoclave) or dry heat (as far as Romanian legislation is concerned, the use of dry sterilization leaves room

for interpretation)]. There are many discussions about cold sterilization, but according to the existing legislation in our country, it is not accepted in this formula, but it has been called as high level disinfection. At the same time, the specialized legislation in Romania, does not accept sterilizing devices with quartz balls). During a test session of the orthodontic rings, their manipulation is done with the help of sterile dental tweezer. At the same time, the contact of these rings with the "wet fingers" of the orthodontic specialist or of the dental nurse should be avoided, when they work without gloves.

3. Brackets or other attachments for soldering:

These are usually stored in special kits. Even if the kit contains only new materials, they should be handled with a service tweeze. The extremely small dimensions of the attachments impose this type of behaviour.

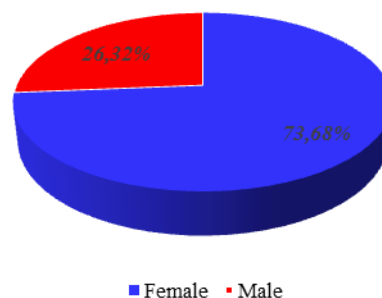
4. Molar band seater:

They are made of plastics or metals. In general, they are heat-resistant and can be sterilized by means of moist heat or they can undergo high-level disinfection processes, by immersion in chemicals with a disinfectant potential: peracetic acid, quaternary ammonium salts, etc.

Unfortunately, the reduced space that we enjoy, did not allow us to include all the information (the part related to the instruments had to be splitted), so, as we mentioned in the first part, we structured this material into 2 distinct parts, the second part will be presented in another issue of the journal.

Starting from these notions regarding the infectious risk and its prevention in orthodontics and dentofacial orthopedics, we developed a questionnaire consisting of 9 items, which we sent to a number of 19 orthodontist from Romania. The gender distribution of the subjects included in the study was as follows: 14 practitioners (representing 73.68%) were female, while 5 practitioners (representing 26.32%) were male (figure. no. 1).

Figure no. 1. Gender distribution of the group



In the following, we will present the applied questionnaire:

1. *The space (the place) where the orthodontic specialist carries out his daily activity, varies as the surface in a considerable way, depending on:* a. *The personality of the orthodontic specialist;* b. *The financial possibilities of the orthodontic specialist;* c. *The geographical environment.* d. *The degree of involvement of the orthodontic specialist?* **Correct answers: a, b, c.**

2. *A medical office with orthodontic and dentofacial orthopedics profile:* a. *Must include a space where the clinical activity is carried out, a room for radiology, a room for the dental laboratory and a single room for cleaning (washing and pre-sterilization)) and sterilization itself;* b. *Must include the space where the clinical activity is carried out, separate rooms for cleaning (washing and pre-sterilization), proper sterilization and a space for storing the materials and instruments, a changing room for doctors and auxiliary staff, a waiting room*

CLINICAL ASPECTS

for patients, 1-2 toilets; c. The work schedule should be adapted so that the sterile instrument path does not intersect with the patient route? **Correct answers: b, c.**

3. The instruments within a medical practice with orthodontic and dentofacial orthopedics profile, necessarily involves the following: a. Common instruments for the dental profession: dental unit, suction system, the classic general dentistry instruments (consultation kits, flat brunisher, cement spatulas, ball brunishers, manual scaling instruments etc.), standard impression trays, etc.; b. Special orthodontic and dentofacial orthopedics instruments for manufacturing special devices, especially multi-attachment systems; c. Endodontic instruments (Kerr needles, tire-nerfs, etc.) and periodontology. d. Instruments for insertion of dental implants? **Correct answers: a, b.**

4. The pliers used in orthodontic practice can be: a. Pliers for making orthodontic arches; b. Pliers for insertion and / or removal of arches in the oral cavity; c. Pliers for removing orthodontic rings and / or brackets; d. Ligature arch wires cutter orthodontic pliers; e. Pliers for making ligatures; f. Dental extraction forceps? **Correct answers: a, b, c, d, e.**

5. Pliers for making of orthodontic archwires: a. Are mandatory inserted in the oral cavity of the patient; b. Microbial contamination cannot occur under any circumstances; c. Microbial contamination can occur through the biological fluids existing in the oral cavity, following the reactivation of the orthodontic arches and the clasps of the removable appliances? **Correct answer: c.**

6. Pliers for removing orthodontic rings and/or brackets: a. It ensures the removal of orthodontic rings from the oral cavity, a maneuver almost always bleeding; b. There is microbial contamination of the jaws of these types of pliers, through the biological fluids existing in the oral cavity (saliva, blood, crevicular fluid); c. During the removal of the brackets from the teeth, does not the microbial contamination of these orthodontic pliers occur? **Correct answers: a, b.**

7. Pliers for making ligatures: a. They are not inserted in the oral cavity; b. They cannot be microbial contaminated, due to the materials with antimicrobial potential from which they are made; c. Can be microbial contaminated through biological fluids existing in the oral cavity (saliva, blood, crevicular fluid, etc.)? **Correct answer: c.**

8. Orthodontic rings that have been tested and did not fit, can be sterilized, according to the Romanian legislation in force: a. With the help of moist heat (autoclaving); b. By cold sterilization; c. Using quartz ball devices; d. With the help of the dry heat appliances dry heat - depends on the interpretation of the legislation? **Correct answers: a, d.**

9. Molar band seater: a. They are made of plastics or metals; b. They are not heat-resistant; c. They can be sterilized using moist heat (autoclaving). **Correct answers: a, c.**

RESULTS AND DISCUSSIONS

To the first question related to the factors that influence the surface of the orthodontic office, 15 practitioners (representing 78.95%) answered correctly the personality, the financial possibilities and the geographical environment. Only 4 practitioners (representing 21.05%) considered as factors of influence only the personality and the financial possibilities (figure no. 2).

Regarding the way of organizing the orthodontic office, most of the respondents (14 representing 73.68%) answered correctly with reference to the legal provisions related to the minimum organization and sterilization rules. The remaining 5 respondents (representing 26.32%) focused more on the practical aspect, for these more important was the existence of the dental laboratory as part of the office (figure no. 3).

Figure no. 2. Factors that influence the surface of the orthodontic office

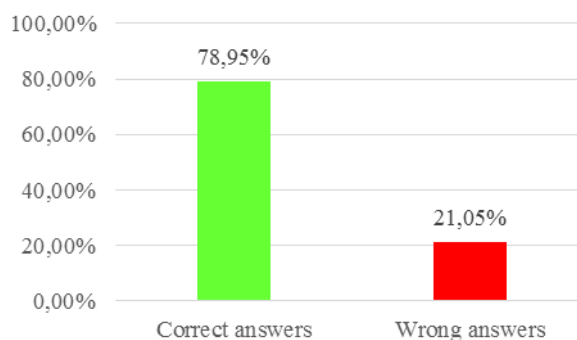
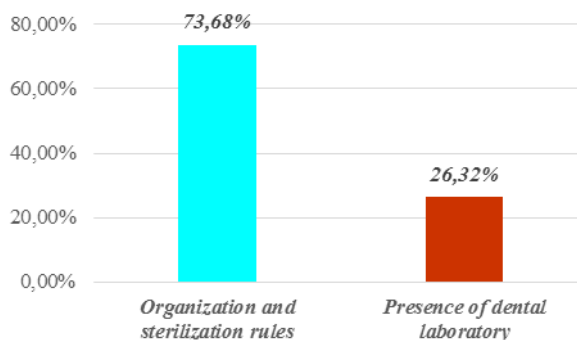


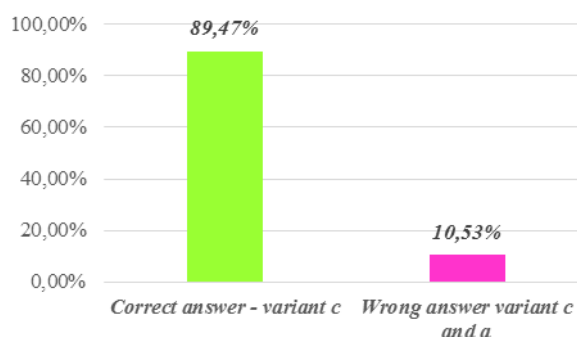
Figure no. 3. Organization of the orthodontic office



Concerning the endowment and the necessary instruments for an orthodontic office, all the specialists included in the study answered correctly both regarding the general elements (question 3) and the specific instruments (question 4).

About the use and the possibility of contamination of the pliers for making orthodontic archwires most of the respondents (17 representing 89.47%) answered correctly - variant c, while only 2 respondents (representing 10.53%) they were wrong including, in addition to the correct answer, the answer a (figure no. 4).

Figure no. 4. Use and contamination of the pliers for making of orthodontic archwires



Regarding the pliers for removing orthodontic rings and/or brackets most practitioners (18 representing 94.74%) answered correctly - variants a and b, while only 1 practitioner chose as answer variants a and c, considering that it cannot be produced bacterial contamination of the pliers while removing the brackets from the teeth (figure no. 5).

Related to the pliers for making the ligatures all the respondents answered correctly - variant c.

Concerning the sterilization of orthodontic rings that were tested but did not match, 16 practitioners (representing

CLINICAL ASPECTS

84.21%) answered correctly - variants a and d, using moist or dry heat devices. Only 3 practitioners (representing 15.79%) mistakenly considered that all the methods listed are correct (figure no. 6).

Figure no. 5. Use and contamination of the pliers for the removal of orthodontic rings

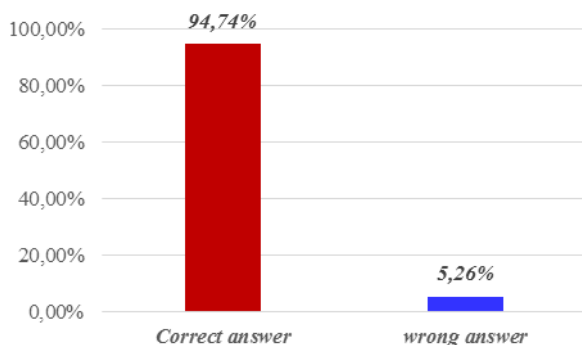
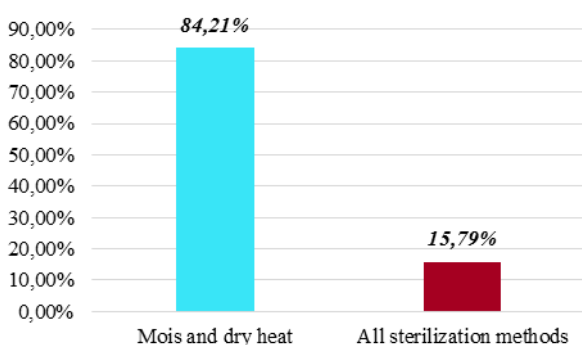
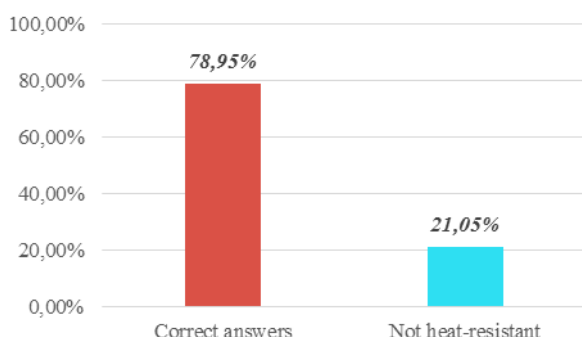


Figure no. 6. Methods of sterilization of the tested orthodontic rings



To the last question regarding the molar band seater most specialists (15 representing 78.95%) answered correctly - variants a and c, and only 4 specialists (representing 21.05%) answered incorrectly a and b, considering that they are not heat-resistant (figure no. 7).

Figure no. 7. Use of molar band seater



CONCLUSIONS

Several aspects, some very interesting, resulted from studying the answers to the 9 questions, as follows:

Approximately $\frac{3}{4}$ of the orthodontic practitioners participating in the study, are aware of the mandatory rooms that a medical office with a profile of orthodontics and dentofacial orthopedics (similar to the general dentistry and dentoalveolar surgery) must have, which denotes the fact that not all subjects are employers or administrators of medical units, but many of

them are only employees of these offices (and had only employees status until then), not being interested at all in this legislative aspect of the functioning of dental offices, related to space, surface, location, etc.

All the specialists in orthodontics and dentofacial orthopedics included in the study, have a strong theoretical and practical knowledge, regarding both the common dental instruments and the specialized instruments described in this first part of the report [pliers, kits (boxes) for rings, brackets or other attachments for soldering, molar band seater].

Most of the specialists in orthodontics and dentofacial orthopedics (about 85%) involved in the study, are aware of the rules of hygiene, asepsis, antiseptics, in compliance with the Romanian legislation, good aspect for this seemingly ignored specialty of "dentistry".

Over 85% of these orthodontic specialists included in the study know very exactly how the instruments we discussed in this first part of the report referred to [pliers, kits (boxes) for rings, brackets or other attachments for soldering, molar band seater] must be decontaminated, disinfected and / or sterilized, depending on the particularities of each instrument piece.

The implementation of hygiene rules, asepsis and antiseptics, according to the current Romanian legislation, requires not only additional efforts, but also special and consistent efforts, from the staff working in the medical offices with the profile of orthodontics and dentofacial orthopedics.

The orthodontic practitioners have the task of analysing all the therapeutic and non-therapeutic acts of a working day and also the task of finding an effective system, which will allow to meet these demands, without jeopardizing the balance of his own activity.

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REFERENCES

1. Burlibaşa M, Ionescu I, Bodnar D, Burlibaşa L, Sfeatu R, Mihai A. Aspecte teoretice şi practice ale formării, dezvoltării şi combaterii biofilmelor microbiene în medicina dentară. *Medicina Modernă*. 2008; XV(10):544-547.
2. Ordinul nr. 961/2016 pentru aprobarea Normelor tehnice privind curăţarea, dezinfectia şi sterilizarea în unităţile sanitare publice şi private, tehnicile de lucru şi interpretare pentru testele de evaluare a eficienţei procedurii de curăţenie şi dezinfectie, procedurile recomandate pentru dezinfectia mâinilor, în funcţie de nivelul de risc, metodelor de aplicare a dezinfectantelor chimice în funcţie de suportul care urmează să fie tratat şi a metodelor de evaluare a derulării şi eficienţei procesului de sterilizare
3. Burlibaşa L., Burlibaşa M., Ionescu I. Microflora cavităţii bucale – posibil factor de risc infecţios în practica stomatologică. *Sibiul Medical*. January-March 2003;XIV(1):43-45.
4. Council on dental materials, instruments and equipment, Council on dental practice, Council on dental therapeutics. Infection control recommendation for the dental office and the dental laboratory. *J Am Dent Assoc*. 1996;116:241-248.
5. Council on scientific affairs and council on dental practice. Infection control recommendation for the dental office and the dental laboratory. *J Am Dent Assoc*. 1996;127:672-680.
6. Missika P, Drouhet G, et colaboratorii. Hygiene, Asespsie, Ergonomie. Un défi permanent. Editions CdP, Paris; 2001.
7. Burlibaşa M, Dumitru SG, Tănase G, Sfarghiu L. Flora cavităţii bucale – element de contaminare directă şi indirectă în reabilitarea implanto-protetică. În: *Progrese în medicina dentară*, Vol. III, coordonatori: Trăistaru T, Burlibaşa M, Ionescu I. Editura Ars Docendi, Bucureşti;

2012. p. 48-63.
8. Burlibaşa M, Muntianu L, Tănase G, Bucur MB, Comes CA, Ionescu CA. Study on microbial contamination of biomaterials in medical practice. *Metalurgia International*. 2010; XV, Spec. Issue No. 2, p. 163-166.
 9. Tănase G, Burlibaşa M, Muntianu L, Simion I, Bucur MB, Ionescu C.A. Testing the antibacterial potential of biomaterials in medical practice. *Metalurgia International*. 2010; Vol. XV, Spec. Issue No. 2, p. 160-162.
 10. Burlibaşa M, Tănase G, Muntianu L, Murgu AI, Teodorescu E, Maliţa C. Quality of life, a multidisciplinary concept with economic and social impacts in medical practice. *Metalurgia International*. 2010; Vol. XV, Spec. Issue No. 4, p. 88-90.
 11. Ispas DC, Eftene OA, Burlibaşa M, Bucur MB, Tănase G, Cristache CM. Implications of titanium in orthodontics and dental facial orthopedics. *Metalurgia International*. 2011; Vol. XVI, No. 10, p. 72-74.
 12. Burlibaşa M, Cernuşcă-Miţariu M, Burcea CC, Miţariu M, Ferechide D. Halogen compounds – theoretical, physiological and practical aspects regarding the decontamination, disinfection and sterilisation of instruments and biomaterials in dental medicine practice. *Metalurgia International*. 2012; Vol. XVIII, Spec. Issue No. 3, p. 54-57.
 13. Burlibaşa M, Cernuşcă-Miţariu M, Cernuşcă-Miţariu S, Miţariu M, Maliţa M. Theoretical and practical aspects related to biomaterials decontamination in dental medicine (with reference to dental prosthetics). *Metalurgia International*. 2013; Vol. XVIII, No. 4, p. 261-267.
 14. Burlibaşa L, Domnariu C. Epigenetic landscape of human diseases. *Acta Medica Transilvanica*. 2018;23(2):33-37.
 15. Bodnar DC, Burlibaşa L, Vârlan C, Marcov N, Georgescu SR, Marcov CE. Mercury, biocompatibility and its impact on environment. *Metalurgia International*. 2009;14:95-100.
 16. Cristache CM, Burlibaşa M, Cristache G, Drafta S, Popovici IA, Iliescu AA, Zisi S, Burlibaşa L. Zirconia and its biomedical applications. *Metalurgia International*. 2011; Vol. XVI, No. 7, p. 18-23.