Original Research Article

Dental equipment - a factor for competitiveness of dental practice

Abstract:

Introduction: *Maintaining a competitive level in the market of dental services in modern working conditions requires a newapproachandupdatedequipmentinthe dentalpractices.* ***Objective:*** *To analyze the importance of updating the equipment for profitability of the dental practice in the conditions of market mechanisms.* ***MM:*** *Anonymous surveyis conducted among the Doctors of Dental Medicine (DDM) on the territory of the 28 regional Offices of the Bulgarian Dental Association (BgDA) / 2011-2013. Data is processed with SPSS 16.0.* ***Results:*** *Most of the offices show tendency to be supplied with more modern equipment. The modernization of the equipment is going at an uneven pace for the individual groups. 72.62% of the doctors under 30 and 68.48% from 31-40 years old work with units purchased after 2000. 55.1% ofthedental unitsareBulgarian-madein opposition to 24.8% which areimported. The data show: 11.21% of participants areworkinginnewlypurchaseddentaloffices, 22.66% - withnewdentalunits, 4.79% (59 DDM) - withnew X-raymachines, and 54.51% (671) havepurchasedothernewequipment.* ***Conclusion:*** *Gradual planned renewal of modern dental practices. Enrichmentofadditionaltechnicalresources.The tendency for modernization of the equipment in the private dental offices is clear.Modernization should increase competitiveness of the dental practice, which increasing revenues and makes it much more easy for the cabinet to self-finance.*

Key words: dentalequipment, dental practice, dental office, new dental purchases

Introduction

Modern working conditions and maintaining a competitive level in the market of dental services requires a new approach and updated equipment in the practice. The changed socio-economic conditions require maximum attention to every detail of the accoutreatments, the design, the appearance of the practice (1, 2). Financial projects for new equipment, new opportunities and associated risks are important (3). A new challenge is the dilemma of buying or renting an office - how profitable it is to own your own commercial space (4). Significant knowledge of ergonomics and its practical application is vital for the prevention of musculoskeletal disorders. The role of ergonomics in equipment to prevent those work-related diseases is worthy of attention (5).

Aim and Purpose

To analyze the importance of updating the equipment for the competitiveness of dental practice in the conditions of market conditions.

To establish the age of the machinery and its renewal

To establish work with imported and domestically producedunits.

To identifythe usage of additional equipment in the dental practices.

Material and Methods

The monitoring was conducted in the form of a direct anonymous survey as of 2011-2013. A representative sample of the dentists registered with the 28 regional regional offices of the Bulgarian Dental Association was included.

The actual study was preceded by a pilot study. Data were collected as follows: for the pilot study September-December 2011; for the real one - in the period January 2012 - September 2013. The data were processed with SPSS.

Forthepurposeofthestudy, primaryinformationwascollectedthroughtheuseofsociologicalmethod - survey.

Data wasenteredandprocessedwithspecializedstatisticalsoftware SPSS 16.0 for Windows.

The groupingoftheresultswasdoneinaccordancewiththeindependentvariables "distributionbyterritory", "gender", "agegroups", "workexperience", "ownershipofpractices", "contractsconcludedwithNHIF", "specialty", "modeofpractice", "withsupportstaff".

Dependentvariables: “equipment”, “apparatus”, “modeofpractice”,"formoflaborlegalrelationswithotherLDMs", "additionallysupportstafftraining'. One-, two- andareinterpreted

multivariatefrequencydistributionsofthedependentvariables.

1. Sociologicalmethod

As a toolforcollectingprimarydatawasusedquestionnaire.

The surveywasconductedundertheconditionofanonymity. Completingthethesurveycardwasdonedirectlybytherespondents.

The signsofobservationcharacterizingthedentalpracticeand Thedoctorsofdentalmedicinearemeaningfullygroupedaccordingtoseveralmainindicators.

Indicatorsforstudyingthedynamicsofthesocio-professionalstatusbydentaldemographics, qualification, modeofpractice.

The developmentofthedentalpractice - throughtheownershipoftheequipment, developmentoftheteam, numberofspecialistsandimprovementofthedentalcareoffered.

Market development – throughvariousformsoffinancing.

Sampleand questionnaire.

The generalpopulationatthetimeofthestudyis 8242 DDM.The sampledeterminedonthebasisofthegeneralpopulationincludesminimum 1350 people. Forthereliabilityoftheresults, thesufficientnumberparticipantsis 70% of 1350 (945 people). The samplesizetocomplywithreliabilityiscalculatedaccordingtotheformula:

$$\boxed{n = \frac{\dfrac{P[1-P]}{\dfrac{A^2}{Z^2} + \dfrac{P[1-P]}{N}}}{R} = \frac{\dfrac{50[1-50]}{\dfrac{3^2}{1.96^2} + \dfrac{50[1-50]}{8242}}}{70} = 1350}$$

Where: n – volumeofthesample;

P – Variabilityofresults (50%);

A – Randomerror (3%);

Z – ConfidenceMultiplier (1. 96 at 95% confidencelevel);

R – Responserate (70%).

Results

Ofthe 1,900 questionnairesdistributed, proportionallyinalldistrictsofthecountry, 1,331 (including 175 pilots) attendedthepostgraduateseminarsofthe ROofthe BgDA[1], whichis 16.15% ofthetotalnumberofDDM[2], with 95% confidenceinterval (15.40% ÷ 17.00%), with a responserateof 70.10%.

The available dental unitswere divided into two groups. The continuous improvements of the dental technology are leading to development of the market. Parallel to that, modernization of the dental equipment is observed. At the moment, the use of Bulgarian units isstillprevailing. In order to specify, without defining the brands, the used equipment is conditionally included in two groups. Each group is divided into two subgroups. The first group isincludingmachinesplaced in cervicebefore 1990, andsubgroups- beforeandafter 1980. The second group includes machines purchased and installed in offices from 1991 to 2011. In this group the subgroups are: 1991-2000 and after 2000 (Table1).

Table1*Distribution of DDM depending on the year of production of the dental unit*

The year of production of the dental units, used in dental office			
Before 1990 г.		After 1991 г.	
Before 1980 г. n (%)	1981-1990 г. n (%)	1991-2000 г. n (%)	After 2001 г. n (%)
64 (6, 17%)	150 (14, 46%)	295 (28, 45%)	528 (50, 92%)
TOTAL I-stgroup: 214 (20,63%)		TOTAL II group: 823 (79,37%)	
TOTAL: 1037 (100%)			

Most of the offices show tendency to be supplied with more modern equipment (823 machines purchased after 1991, compared to 214 purchased before 1990). This is an indicator that would lead to more rational, efficient and modern dental care for patients.

The data show that the modernization of the equipment is going at an uneven pace for the individual groups. The largest number of units made between 1991 and 2000 are purchased fromdentits with age 41 and plus years old, while those made after 2000 are purchased from the dentits with age until 40.

A statisticallysignificantrelationshipisestablishedbetweentherenewaloftheunitsandtheage group ofthedentists who have workedinthosedental practices. Sixty-one (72.62%) of the doctors in the first age group and 126 in the second group (68.48%) work with units purchased after 2000. This is related to the desire to improve the quality of dental care among young colleagues

[1] Regional offices of the Bulgarian Dental Association (RO BgDA)
[2] Doctors of Dental Medicine (DDM)

and at the same time only 28.43% (29 doctors) of over 60 years old renew their machinery with units after 2000. The trend is reversed with the old machinery: with machines made before 1980 work 1.19% of DDM from the age group under 30 and 15.69% of those over 60 (Table2).

Table 2Distribution of DDM depending on the year of production of the dental unit and the age group

Age group **Which year is the dental unit, you're working with?**	**≤ 30** **n (%)**	**31 ÷ 40** **n (%)**	**41 ÷ 50** **n (%)**	**51 ÷ 60** **n (%)**	**> 60** **n (%)**	**Total** **n (%)**
< 1980	1 (1,19)	8 (4,35)	9 (2,95)	30 (8,45)	16 (15,69)	64 (6,21)
1981-1990	14 (16,67)	13 (7,07)	41 (13,44)	65 (18,31)	17 (16,67)	150 (14,56)
1991-2000	8 (9,52)	37 (20,11)	80 (26,23)	127 (35,77)	40 (39,22)	292 (28,35)
> 2001	61 (72,62)	126 (68,48)	175 (57,38)	133 (37,46)	29 (28,43)	524 (50,87)
Total	84 (100,00)	184 (100,00)	305 (100,00)	355 (100,00)	102 (100,00)	1030 (100,00)

The data presents that 747 (55,10%) of the participants are working with Bulgarian made units, 337 (24,80)%) –with importedones and 273 (20,10%) give a vague answer "Other". Important fact is that 669of the machines, made in Bulgaria, are older models (Media, US-5, US-7) and 78 are more contemporary - "Micromotor", "Anvita". The biggest part of the imported machines areHirana– 91, and second and third are respectively Siemens - 65 and KAVO - 42.

In the present study the data about the distribution of additional equipment in dental offices shows that one thousand three hundred and four of the participants answered with more than one answer. One thousand one hundred and eighty one DDM are using photopolymer lamp (90.57%), 1086 DDM are using autoclaves(83.28%), 918 DDM are using ultrasound machine (70.40%),339 DDM are using laser devices (26%) (also includes doctors who use a laser located in a foreign office). Two hundred and forty-nine of the respondents (19.10%) indicate that the office in which they work also has an X-ray for segment graphics(Fig.1).

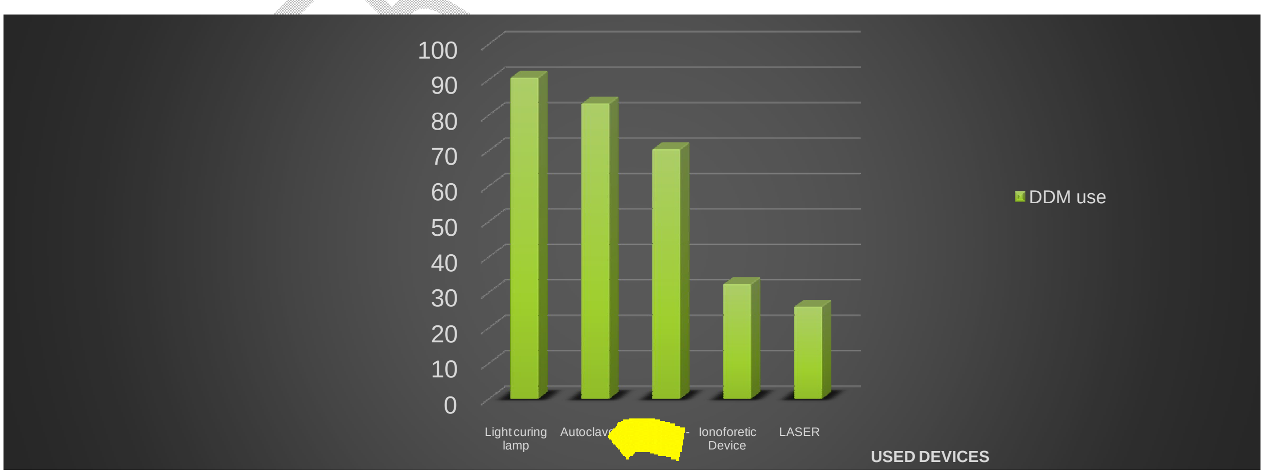

FIG. 1 Distribution of additional equipment in dental offices

In the last three years, 692 computers were purchased, which represents 56.21% of the responding dentists.

All participants (excludingthose,working only inthefieldof oralsurgery) are using the services of dental technician.Thenumberofdental clinics with theirowndentaltechinicianlaboratoriesisinsignificantly small (Fig.2).

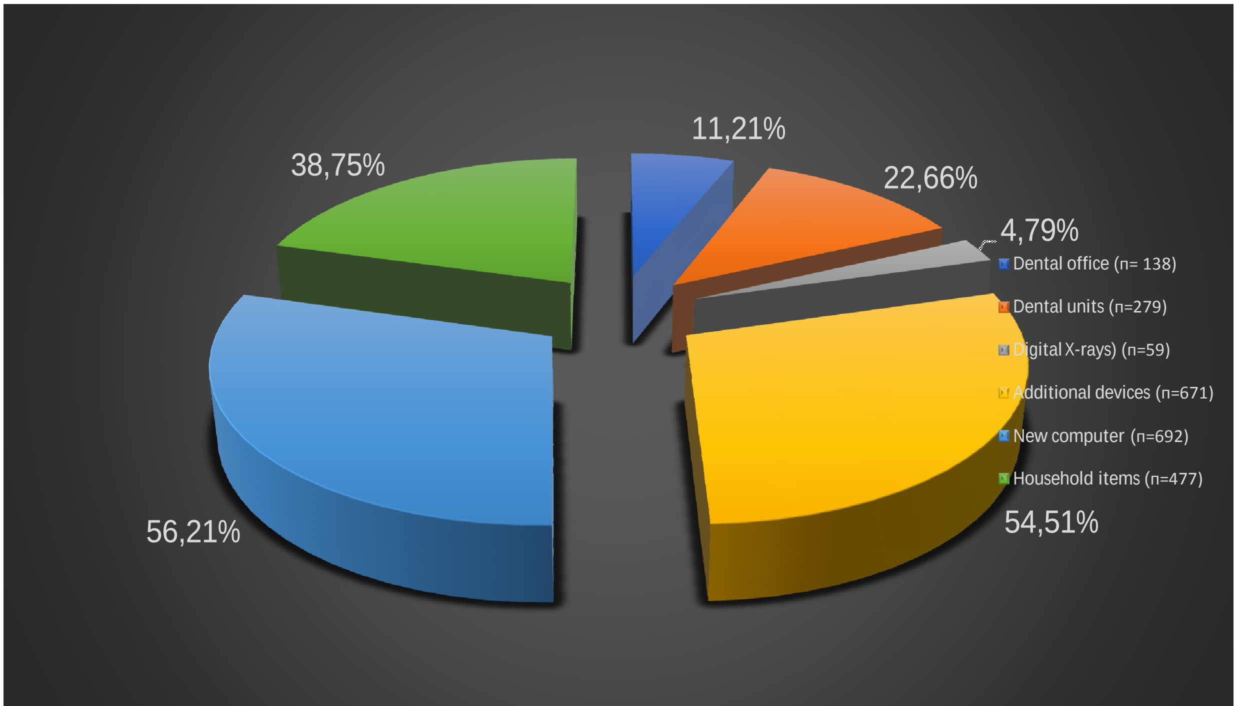

FIG. 2 Distribution of DDM by newly purchased equipment for the practice during the last three years

There is a clear tendency to buy computer equipment and accessories in all age groups. There is a steady trend for the purchase of household items (cleaning and disinfecting agents, towels and other aids). The big interest in buying of new dental units among the dentists of age of 60 years old and over is most likely in anticipation of a futuredentist in the family. Desire to buy a new dental office, among dentists above 41 years decreases, reaching almost zero in at the age over 60 years (Fig.3).

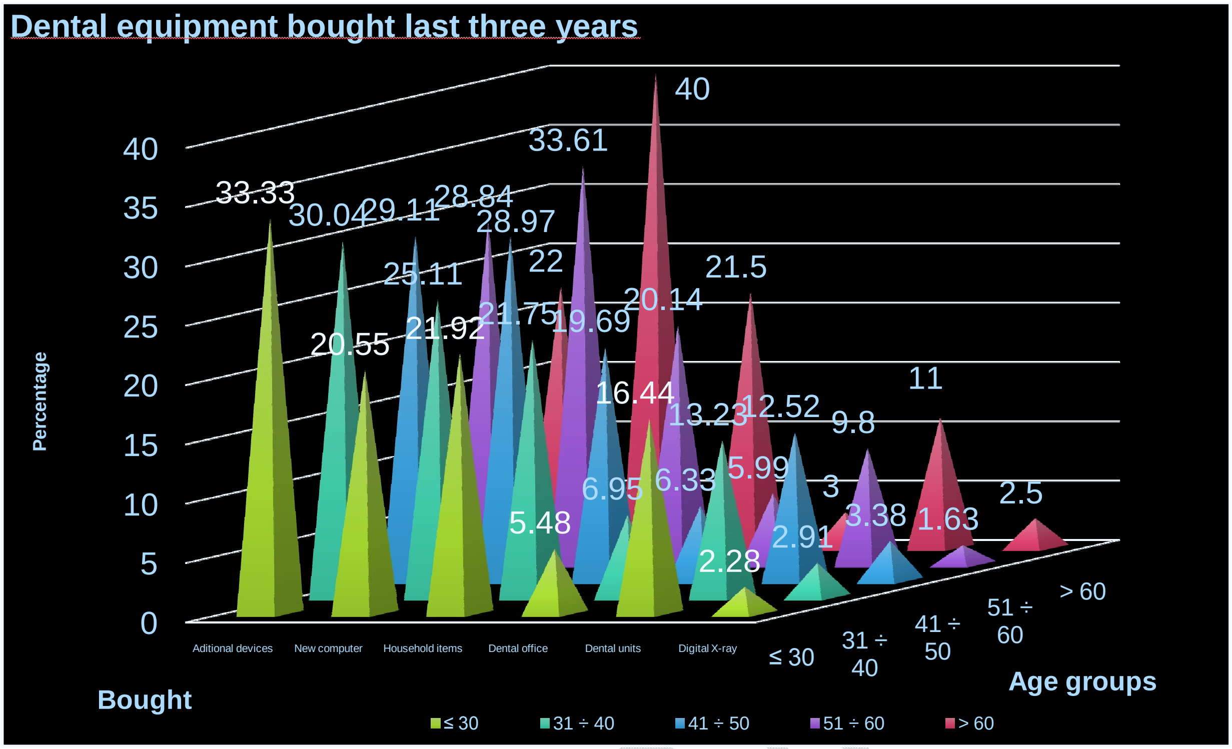

FIG. 3 Distribution of DDM by new equipment purchased in the last 3 years and age group

The owners usually buy purchase fixed assets such as dental office, dental unit, digital X-ray respectively 5,7%, 11,8%, 2,9% vs nonowners respectively: 2,6%, 7,8%, 0,00% . At the same time non-owners buy equipment for current use: additional devices (34,30%), household items (25,70%) vs 28,70% and 20,30% for owners. Almost equal parts of owners and non-owners buy computers, respectively: 30,60% : 29,50% (Fig.4).

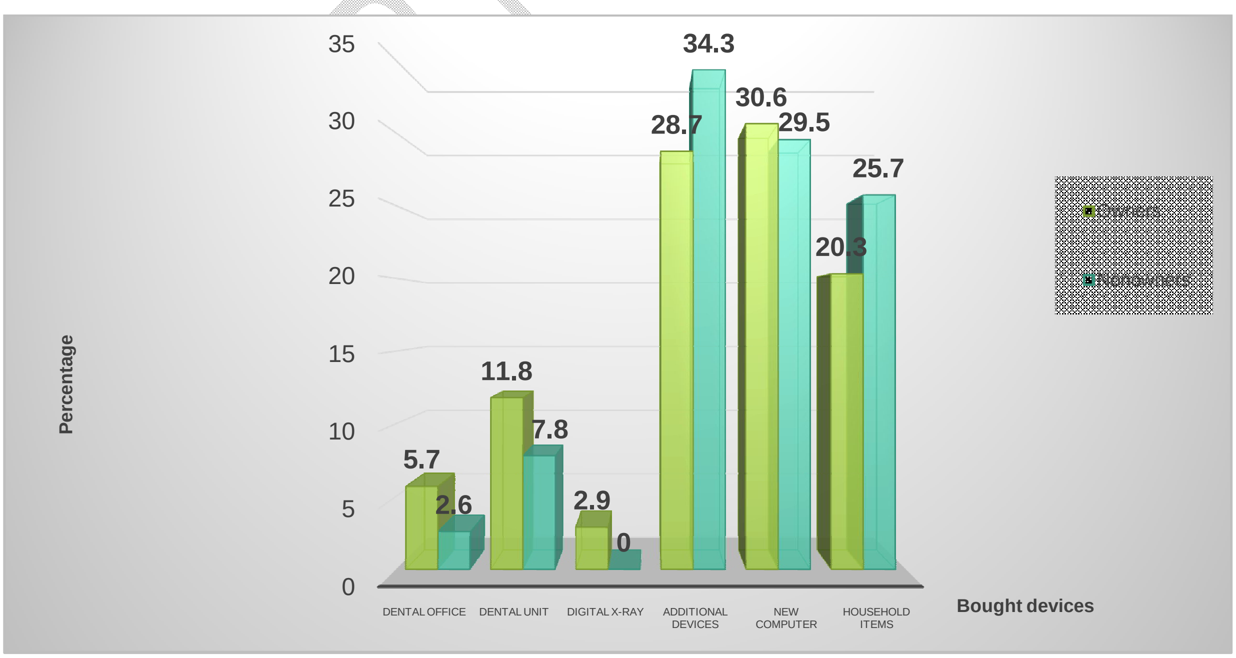

FIG. 4 Distribution of the renewed dental property according to ownership

Discussion and conclusion

X-ray machines in offices are becoming more and more common, despite the complicated procedure for their legalization

The complexity of the reports and the requirement of the NHIF[3], the use of newer technologies and communications have led to widespread use of computer technology

Outof 1261 respondents, whogavemorethanoneanswer, itisclearthatnoteveryemployeehas a computer, butunder a contractwiththe NHIF heisobligedtousethistechniqueandprobablyreliesonhiscolleague. The numberofthosedoctorswhouseadditionalmedicalequipmentoutsidetheofficeswheretheyworkissignificantlyhigher. Allrespondentsusevariousradiographs, adequatetotherequirementsforaccuratediagnosisofthedisease.

From the present study the trend to update equipmentinprivatedentalofficesis clear. Thisisdefinitelydictatedbytheconditionssetbythemarketeconomy. Withouttheseconditions, competitivenessdecreases, whichreducesrevenuesandmakesitmuchmoredifficultforthecabinettoself-finance

The difference in the attitude of those who are owners and those who work as employees, at a percentage or rent is impressive.Owners are more likely to invest in a dental office, dental unit, computer equipment and X-ray equipment.This is the basis of their development and work in modern conditions and maintaining good dental practice.At the same time, non-owners are more inclined to buy other equipment and household items – just to maintain their work.

The equipment is also the basis for improving productivity, especially in the conditions of market-economic relations. Its renewal and improvement are part of the world's technological progress in every era (6). On the Bulgarian market there is a gradual renewal of machinery most of which is imported equipment (7, 8). With the increasing use of social networks and computer technology, it leads to an increasing saturation of dental practices with computers of the latest generation. At the same time, communication between doctors and patients is improving, as well as between doctors themselves and them and commercial companies and other institutions. This determines at the same time the standard of good dental practice (9,10).

It is important to take into account the differences between the modern market and the previous - planning environment. With the change of the role of DDM, from employed by the state on a salary to being the responsible and interested in the development of his practice. In the condition of planned economy, complex and expensive equipment is purchased and maintained by the state. The government has also been paying for other consumables - electricity, water, heating, materials. And in these conditions, a better equipped office together with a more qualified doctor lead to a better quality of treatment. However, in those conditions the possibility of a discrepancy between the limited state resources and the initiative of the doctor is great. We have a contradiction between what the dental specialist wants as equipment and what the state provides.

In the conditions of 100% private practice, modernization depends on the financial capabilities of the doctor himself. From his initiative and entrepreneurship. Of course, here again we can see a discrepancy between what he wants and the possibilities for providing it. The costs in this case are solely at the expense of the practitioner. Therefore, the existence and development

[3] National healthcare Insurance Fund - NHIF

of dental practice depends primarily on profit, or income and expenditure balance (11). The private practitioner is required to know the legal requirements in the field of funding (12).

Seema Sharma states that for good modern dental practice, "business acumen is as important as clinical experience." According to her, dental practice has two goals: to provide excellent patient care and to generate income for the people who work in it. For the owner of the practice there is an additional goal: to invest in the sustainable development of the business, which may be sold at some point in the future. Modern dental practice needs:

- Increase in its capacity and production at all times to maintain and raising revenue;
- Reducing possible losses and maintaining and increasing profits;
- The dentist as a team leader to have an active approach to continuous training and improvement of their own andthe staff'sskills (13,14).

From the above, the tendency for modernization of the equipment in the private dental offices is clear. This is definitely dictated by the conditions set by the market economy. Without these conditions, competitiveness decreases, which reduces revenues and makes it much more difficult for the cabinet to self-finance.

The gradual increase in the number of owners of dental offices logically leads to the renewal of equipment and improvement of the material base - large private offices, new units, X-ray machines, etc. are been purchased. Modern dental practice is equipped with a growing range of equipment: ultrasound machine, autoclave, photopolymer lamp, iontophoresis machine, laser machine and others. The trendfortechnologicalinnovation, staffinganddevelopmentofthedentalteamisconfirmedbyotherstudies (15,16). In newly purchased dental offices have been working 11.21% (138 respondents).Withnewdentalunits are working22.66% (279 oftheanswers), 4.79% (59 DDM) are usingnew X-raymachinesand 54.51% 671) havepurchasednewotherequipment. The number of practices relying on computer data processing and webtransfer is increasing sharply. Withnewcomputershave been working671 (56.21%). This trend is also observed in other European countries (M. Nasser) (15, 17).

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