

# Postgraduate education of dentists in Poland – current state and perspectives

## *Kształcenie podyplomowe lekarzy dentyistów w Polsce – stan obecny i perspektywy*

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### KEYWORDS:

- postgraduate education
- dentists
- Poland

### ABSTRACT

**Introduction:** In the Polish medical education system, dentists, after graduating from university studies, obtain the right to practice their profession with the possibility of continuing their education. One of the forms of postgraduate development is specialist training. In the face of dynamic demographic, economic and social changes taking place in Polish society, the availability of an appropriate number of qualified specialists is a guarantee of health safety. Conducting reliable analyzes allows to set the right directions for the development of specialization education and its adaptation to changing health needs.

**Aim of the article:** The aim of the study was a quantitative analysis and evaluation of changes taking place in the system of specialist education of dentists in treatment specializations in the years 2010-2020.

**Material and methods:** The analysis included the data from the register of doctors undergoing specialization training; register of entities authorized to conduct this training, kept by the Centre of Postgraduate Medical Education of Warsaw (CMKP); data of the Medical Examinations Center on the number of dentists taking the specialization examination and on the number of diplomas issued and the passing rate of the National Specialization Examination. The material analysis was quantitative.

**Results:** The analysis of data register about dentists undergoing postgraduate training shows that in 2010-2020 there was a gradual increase in the number of entities offering dental specializations and the number of training places they provide, including residential places. These changes were accompanied by an increase in the number of dentists receiving specialist training more by 50% (52,3%) in 2020 in comparison to 2010. The situation differed between the seven analyzed specializations: conservative dentistry with endodontics, pediatric dentistry, orthodontics, dental surgery, periodontics, dental prosthetics and maxillofacial surgery.

**Conclusions:** The changes that took place in the system of specialization education of dentists in 2010-2020 included an increase in the number of dentists undergoing training, an increase in the percentage of people undergoing specialization as part of the residency, an increase in the number of entities conducting specialization, and thus increasing the availability of training places.

### SŁOWA KLUCZOWE:

- kształcenie podyplomowe
- lekarze dentyści
- Polska

### STRESZCZENIE

**Wstęp:** W polskim systemie edukacji medycznej lekarze dentyści po ukończeniu studiów wyższych uzyskują prawo wykonywania zawodu z możliwością kontynuowania kształcenia. Jedną z form rozwoju podyplomowego jest szkolenie specjalizacyjne. W obliczu dynamicznych zmian demograficznych, gospodarczych i społecznych zachodzących w polskim społeczeństwie dostępność odpowiedniej liczby wykwalifikowanych specjalistów jest gwarancją bezpieczeństwa zdrowotnego. Prowadzenie rzetelnych analiz pozwala na wytyczenie właściwych kierunków rozwoju kształcenia specjalizacyjnego i jego dostosowanie do zmieniających się potrzeb zdrowotnych.

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Published and financed by Centre of Postgraduate Medical Education; <https://doi.org/10.36553/wm.120>.

**Cel artykułu:** Celem pracy była ilościowa analiza i ocena zmian zachodzących w systemie kształcenia specjalizacyjnego lekarzy dentyistów w specjalnościach leczenia w latach 2010-2020.

**Materiał i metody:** Analizie poddano dane z rejestru lekarzy odbywających szkolenie specjalizacyjne; rejestru podmiotów uprawnionych do prowadzenia tego szkolenia, prowadzonego przez Centrum Medycznego Kształcenia Podyplomowego w Warszawie (CMKP); dane Centrum Egzaminów Lekarskich o liczbie lekarzy stomatologów przystępujących do egzaminu specjalizacyjnego oraz o liczbie wydanych dyplomów i zdawalności Państwowego Egzaminu Specjalistycznego. Analiza materiału miała charakter ilościowy.

**Wyniki:** Analiza rejestru danych o stomatologach odbywających szkolenie podyplomowe wskazuje, że w latach 2010-2020 sukcesywnie rosła liczba podmiotów oferujących specjalizacje stomatologiczne oraz liczba oferowanych przez nie miejsc szkoleniowych, w tym rezydentur. Zmianom tym towarzyszył wzrost liczby lekarzy stomatologów odbywających szkolenia specjalizacyjne o 50% (52,3%) w 2020 roku w porównaniu do 2010 roku. Sytuacja różniła się istotnie w przypadku siedmiu analizowanych specjalizacji: stomatologii zachowawczej z endodontcją, stomatologii dziecięcej, ortodontji, chirurgii stomatologicznej, periodontologii, protetyki stomatologicznej oraz chirurgii szczękowo-twarzowej.

**Wnioski:** W latach 2010-2020 wzrosła liczba szkolących się lekarzy stomatologów, odsetek osób odbywających specjalizację w ramach rezydentury, liczba podmiotów prowadzących szkolenie specjalizacyjne oraz liczba miejsc szkoleniowych.

## Introduction

In the current legal situation in Poland, a title of the dentist and a limited license to practice the profession are obtained after completing five-year studies in the field of medicine and dentistry at one of the medical universities (1). Graduates who completed their medical studies before 2002 were retained the right to use the professional title of the dentist. The full right to practice a profession is obtained after successfully passing the Final Medical and Dental Examination (LDEK), which before 2013, while maintaining the same form, was called the Medical and Dental State Examination (2). A prerequisite for obtaining full professional qualifications is also completing a one-year postgraduate internship. According to the legal regulations (1), the dentist is authorized to treat diseases of the teeth, oral cavity, and craniofacial area and adjacent areas. At the same time, due to the constant increase in the complexity of dental procedures, technological progress and the increase in knowledge and skills necessary for the proper treatment of patients, there is a far-reaching specialization in dentistry (3). The applicable legal regulations impose on dentists the necessity of continuous professional development. The fulfillment of this obligation may take various forms and is aimed at updating medical knowledge and improving practical skills. One of the basic forms of professional development is postgraduate specialist training in one of the nine medical and dental specializations. Two of them are non-surgical specializations in the field of epidemiology and public health. The specialization training system is based on uniform training modules lasting from 3 to 6 years (4). The condition for commencing the specialization is graduating from the Faculty of Medicine and Dentistry, completing a postgraduate internship and obtaining a positive result of the Final Medical and Dental Examination. The framework program of the specialization defines the scope of theoretical requirements and activities necessary to implement in the course of education in the form of internships (practical element) and improvement courses (theoretical element). The scope of clinical requirements included in the program of a given specialization is carried out by the dentist under the supervision of the head of specialization, holding the title of specialist in this field. A dentist may undergo specialization training

as part of a residency status founded by the government or in non-residency as a volunteer (4). When applying for residency, the result of the final exam is crucial and only candidates with the best results are admitted to this form of postgraduate education. On the other hand, when applying a non-resident status, additional activities are also decisive e.g. an academic title, points for publications in scientific journals, and a full-time employment period of at least three years in accordance with the field of specialization (4). The number of training places is announced by the Ministry of Health, based on the opinions issued by national consultants about the real need for specialists in the given fields. As part of the residency, the dentist concludes an employment contract for a period specified in the framework program of specialization. This form of specialist training is available only to doctors who do not yet have the title of specialist. Recruitment for medical and dental specialization in the qualification procedure is carried out twice a year. In a given session, you can apply for specialization in one field only, only in one voivodeship (4). Specialization may be conducted in a unit authorized to conduct training. The Minister of Health specifies the requirements for organizational units that provide specialist training for dentists. The condition for obtaining accreditation is meeting the criteria enabling the implementation of all elements of the specialization program within a specified period of its duration. The remuneration of the resident physician, as well as the educational process, are financed from public funds. In the non-resident system, a dentist runs a training cycle financed by the unit with which he signs an appropriate agreement, e.g., a civil law one. The implementation of the scope of the requirements specified in the program of a given specialization is tantamount to completing the specialization training. It is an essential condition for a dentist to be admitted to the specialization examination. A positive final result of the National Specialization Examination (PES) finalizes the process of training and obtaining the title of a specialist. In the last decade, the Polish system of specialization education has undergone modifications aimed at adapting it to the changing health needs of society. An element of these changes was, inter alia, the identification of priority specializations, in which the deficits of specialists were the most noticeable (5, 6). These changes also included specialist training of dentists.

## Objective of the article

The aim of the study was to determine the quantitative changes in the system of postgraduation education of dentists in general and in relation to individual specializations, taking place in 2010-2020.

## Material and methods

The material for the analysis consisted of data from the register of doctors undergoing postgraduate specialization training conducted by the Centre of Postgraduate Medical Education of Warsaw (CMKP). The analyzed data covered the period from 2010 to 2020 and concerned seven clinical fields in which dentists received specialization training, i.e., pediatric dentistry, periodontics, dental surgery, orthodontics, dental prosthetics, conservative dentistry with endodontics and maxillofacial surgery. A specialization in maxillofacial surgery was included even though it is a specialization available for both physicians and dentists. However, in the analyzed period, in 2010-2020, only dentists did it. Two non-surgical specializations were excluded from the scope of the analysis: public health and epidemiology.

Data on the number of dentists specializing in specific fields were analyzed, including the number of women and men, the age of specializing doctors, and the number of dentists specializing in residency. Moreover, the number of training places and the number of entities conducting specialization were analyzed. The results of the study will provide the basis for assessing the direction of changes in dentist education in recent years and will allow for the formulation of conclusions for the future. Statistical analysis was performed with the use of the Statistica 12.0 PL software.

## Results

In 2020, a total of 1,264 dentists (in the seven analyzed surgical and clinical specialties) completed their specialization (Annex: Table 1). Compared to 2010, it was 52.3% more. The largest number of people in 2020 specialized in the following areas: dental surgery (272 people, i.e., 21.5% of all specialization), dental prosthetics (248 people, i.e., 19.6%), conservative dentistry with endodontics (231 people, i.e., 18.3%), maxillofacial surgery (152 people, i.e., 12%), orthodontics (133 people, i.e., 10.5%), pediatric dentistry (130 people, i.e., 10.3%), periodontics (98 people, i.e., 7.8%). Among the seven analyzed specializations in 2010-2020, the largest increase in the number of specialized dentists was recorded in maxillofacial surgery (72.7%), dental surgery (67.9%), conservative dentistry with endodontics (54%), orthodontics (49.4%). The smallest increase was in periodontics (28.9%).

The average age of a dentist in 2020 was 30.4 years. Compared to 2010, the average age has slightly decreased (2020 – 30.4 years, 2010 – 30.8 years). Among the seven analyzed areas, the lowest average age of specialized dentists was recorded in orthodontics and periodontics – 30 years. In turn, the highest average age of dentists was found in the field of maxillofacial surgery – 30.6 years and dental prosthetics – 30.5 years (Appendix: Table 1).

The dentists specializing in 2020 in Poland are mostly women (73.3%). In the seven analyzed specializations, the highest percentage of women in 2020 was in the fields

of: pediatric dentistry (93.1%), conservative dentistry with endodontics (86.6%) and dental prosthetics (82.3%). The lowest percentage of women was present in the following specializations: maxillofacial surgery (40.8%), dental surgery (58.8%) and periodontics (74.5%). In the period from 2010 to 2020, the percentage of women increased in five of the seven analyzed medical and dental fields: maxillofacial surgery (15.8 pp), dental surgery (13.1 pp), dental prosthetics (10.4 pp), dentistry conservative with endodontics (6.6 pp), pediatric dentistry (1.6 pp). On the other hand, a decline was recorded in the other two areas, i.e., orthodontics (-1.4 pp) and periodontics (2.3 pp).

In 2020, most dentists (77.9%) completed specialization training as residency. It was 41.2 percentage points more than in 2010. Among the seven analyzed medical and dental fields in 2020, the largest share of residents was in the following specializations: pediatric dentistry (86.9%), conservative dentistry with endodontics (82.7%), maxillofacial surgery (80.3%), periodontics (79.6%) and dental prosthetics (75.4%). The lowest percentage of residents was recorded in dental surgery (72.8%) and orthodontics (72.2%). In the analyzed period of 2010-2020, the percentage of dentists specializing in residency increased in all analyzed areas. The largest increase in the percentage of specializing in residency was recorded in such areas as: dental prosthetics (56.2 pp), periodontics (49.3 pp), pediatric dentistry (42.2 pp) and conservative dentistry with endodontics (44 pp).

In 2020, the number of training places was 1,507, and the number of entities conducting the specialization was 358. In the period 2010-2020, the total number of training places and the number of entities conducting specialization increased. Compared to 2010, in 2020 there were 19.2% more training places and 24.9% more entities conducting specialization. The increase in the number of training places occurred in all analyzed areas. The largest increase in the number of places was recorded in such areas as: maxillofacial surgery (+52.6%), dental surgery (+49.5%), children's dentistry (+23.1%) and orthodontics (+19%). The number of entities specializing in specialization increased in all 7 analyzed areas, with the largest increase in dental prosthetics (+45.7%), orthodontics (+44.1%) and dental surgery (+37.3%).

In the analyzed period, the use of training places, expressed as the ratio of the number of doctors attending a specialization, in relation to the number of available training places, showed an average value for all specializations from 0.68 (minimum) in 2010 to 0.84 in 2020, with a maximum of 0.91 in 2017 (Appendix: Table 2).

Among the seven analyzed medical and dental specializations, the highest use of training places in 2020 was observed in dental surgery (0.88), maxillofacial surgery (0.86), periodontics (0.86) and dental prosthetics (0.82). On the other hand, less use of training places was noted in conservative dentistry with endodontics, pediatric dentistry and orthodontics (0.81).

### *Obtaining the title of a specialist (State Specialization Examination)*

The specialization training course completed in accordance with the program of a given specialization, enables the dentist to proceed to the exam – the National Specialization Examination (PES). Confirmation of the training and completion of the necessary formalities is admission to the PES. The exam takes place twice a year, in spring and autumn sessions.

The exam consists of a test and an oral part. Obtaining positive results of the exam confirms the qualifications of a specialist in a given field.

The statistical data available on the Medical Exams Center website regarding the number of dentists taking the specialization examination, the number of diplomas issued and the PES pass rate in 2010-2019 (data for 2020 was not available) shows that:

- the number of diplomas issued to specialists in clinical fields of medicine and dentistry in 2010-2019 totaled 1,918,
- the number of dentists joining the PES in 2010-2019 was 2,096,
- during this period, the greatest number of diplomas were issued to specialists in conservative dentistry with endodontics, which also corresponds to the largest number of dentists joining PES in this field,
- the fewest diplomas were awarded to periodontology specialists,
- the highest PES pass rate was achieved by specialists in conservative dentistry with endodontics,
- specialists in maxillofacial surgery showed the lowest PES pass rate.

Detailed statistics for medical and dental specializations in particular years are presented in the tables below, together with an analysis and description.

#### Children's dentistry

**Table 1. Descriptive statistics of State Specialization Examination for the specialization of pediatric dentistry in 2010-2020 (20).**

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2010	25	23	92%
2011	23	21	91.3%
2012	18	16	88.9%
2013	18	17	94.4%
2014	29	29	100%
2015	36	32	88.9%
2016	18	18	100%
2017	21	20	95.2%
2018	23	23	100%
2019	28	27	96.4%
<b>Total:</b>	<b>239</b>	<b>226</b>	<b>94.6%</b>

The data in Table 1. show that in 2010-2019, a total of 239 dentists took the State Specialization Examination in the field of pediatric dentistry. The number of diplomas issued at that time was 226. The average PES pass rate was 94.7%, with

the highest 100% pass rate in 2014 and 2018. The lowest pass rate was recorded in 2019 – 32 dentists were admitted to PES in pediatric dentistry, but 28 authorized doctors took the exam.

#### Periodontology

**Table 2. Descriptive statistics of State Specialization Examination for the periodontology specialization in 2010-2020 (20).**

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2010	14	14	100%
2011	9	8	88.9%
2012	18	18	100%
2013	17	16	94.1%
2014	22	20	90.9%
2015	23	21	91.3%
2016	11	11	100%
2017	14	13	92.9%
2018	20	19	95%
2019	27	21	77.8%
<b>Total:</b>	<b>175</b>	<b>161</b>	<b>92%</b>

The data in Table 2. show that in the years 2010-2019 a total of 175 dentists took the State Specialization Examination in the field of periodontology. The number of diplomas issued at that time was 161. The average PES pass rate was 93.1%. The highest pass rate was achieved in 2010, 2012 and 2016. The lowest pass rate was recorded in 2019, 31 dentists were admitted to PES in periodontology, but 27 authorized doctors took the exam.

#### Dental surgery

**Table 3. Descriptive statistics of State Specialization Examination for the dental surgery specialization in 2010-2020 (20).**

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2010	19	18	94.7%
2011	26	23	88.5%
2012	47	45	95.7%
2013	35	30	85.7%

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2014	38	36	94.7%
2015	32	27	84.4%
2016	28	25	89.3%
2017	25	20	80%
2018	36	29	80.6%
2019	61	50	82 %
<b>Total:</b>	<b>347</b>	<b>303</b>	<b>87.3%</b>

The data in Table 3. show that in 2010-2019, a total of 347 dentists took the State Specialization Examination in the field of dental surgery. The number of diplomas issued at that time was 303. The average PES pass rate was 87.55%. The highest pass rate was achieved in 2012, the lowest in 2017. In 2019, 79 dentists were admitted to PES in dental surgery, but 61 authorized doctors took the exam.

#### Orthodontics

**Table 4. Descriptive statistics of State Specialization Examination for the orthodontics specialization in 2010-2020 (20).**

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2010	20	18	90%
2011	15	15	100%
2012	21	20	95.2%
2013	27	26	96.3%
2014	35	34	97.1%
2015	22	20	90.9%
2016	27	26	96.3%
2017	25	23	92%
2018	47	43	91.5%
2019	51	43	84.3%
<b>Total:</b>	<b>290</b>	<b>268</b>	<b>92.4%</b>

The data in Table 4. show that in 2010-2018, a total of 290 dentists took the State Specialization Examination in the field of orthodontics. The number of diplomas issued at that time was 268. The average PES pass rate was 93.37%. The highest pass rate was achieved in 2011, the lowest

in 2019 – 55 dentists were admitted to PES in orthodontics, but 51 authorized doctors took the exam.

#### Dental prosthetics

**Table 5. Descriptive statistics of State Specialization Examination for the dental prosthetics specialization in 2010-2020 (20).**

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2010	32	29	90.6%
2011	34	30	88.2%
2012	53	49	92.5%
2013	38	35	92.1%
2014	25	24	96%
2015	35	32	91.4%
2016	49	44	89.8%
2017	34	33	97%
2018	61	59	96.7%
2019	49	39	79.6%
<b>Total:</b>	<b>410</b>	<b>374</b>	<b>91.2%</b>

The data in Table 5. show that in 2010-2019, a total of 410 dentists took the National Specialization Examination in the field of dental prosthetics. The number of diplomas issued at that time was 374. The average PES pass rate was 91.39%. The highest pass rate was achieved in 2017, the lowest in 2019. In 2019, 57 dentists were admitted to PES in dental prosthetics, but 49 authorized doctors took the exam.

#### Conservative dentistry with endodontics

**Table 6. Descriptive statistics of State Specialization Examination for the conservative dentistry specialization in 2010-2020 (20).**

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2010	50	50	100%
2011	55	55	100%
2012	37	33	89.2%
2013	46	45	97.8%
2014	57	53	92%

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2015	48	46	95.8%
2016	48	44	91.7%
2017	44	43	97.7%
2018	34	33	97.1%
2019	51	46	90.2%
<b>Total:</b>	<b>470</b>	<b>448</b>	<b>95.3%</b>

The data in Table 6 show that in 2010-2019, 470 dentists took the National Specialization Examination in the field of conservative dentistry with endodontics. The number of diplomas issued at that time was 448. The average PES pass rate was 95.24%. The highest pass rate was achieved in 2010 and 2011, the lowest in 2012. In 2019, 57 dentists were admitted to PES in conservative dentistry with endodontics, but 51 authorized doctors took the exam.

#### Maxillofacial surgery

**Table 7. Descriptive statistics of State Specialization Examination for the maxillofacial surgery specialization in 2010-2020 (20).**

Year	Number of doctors who reported to PES	Number of diplomas issued	Pass rate
2010	13	13	100%
2011	12	12	100%
2012	16	15	93.8%
2013	16	16	100%
2014	14	13	92.9%
2015	16	16	100%
2016	18	14	77.8%
2017	13	10	76.9%
2018	16	13	81.3%
2019	31	16	51.6%
<b>Total:</b>	<b>165</b>	<b>138</b>	<b>83.6%</b>

The data in Table 7. show that in 2010-2019, 165 dentists took the National Specialization Examination in the field of maxillofacial surgery. The number of diplomas issued at that time was 138. The average PES pass rate was 87.42%. The highest pass rate was achieved in 2010,

2011, 2013 and 2015. However, the lowest in 2019. In 2019, 33 dentists were admitted to PES in maxillofacial surgery, but 31 authorized doctors took the exam.

#### Discussion

In 2010-2020 there was an increase (370 people, +49.9%) in the number of dentists undergoing specialization from 830 (minimum) in 2010 to 1264 in 2020, from a maximum of 1,323 in 2018. This change resulted mainly from a significant increase in the availability of specialization in residency. In the analyzed period, the number of places of residence almost tripled from 305 in 2010 to 985 in 2020. The fundamental role of this factor in shaping the overall number of specialized dentists is confirmed by changes in the number of doctors with particular specializations. In the period 2010-2020, the percentage of dentists specializing in residency increased in all medical and dental fields. In the overwhelming majority of cases, the increase in the number of available residential places was accompanied by an increase in the number of specialized doctors, and the decrease in the number of residencies resulted in a decrease in the number of doctors joining a given specialization. In absolute terms, the changes in the number of specialists were usually higher than the increase or decrease in the number of available residential places. The above observation coincides with the findings of other studies indicating the economic nature of barriers to access to specialization training (9, 10). However, the increase in the number of available specialization places and residencies is not in line with the constantly increasing number of practicing dentists. From the research analyzing the demographic structure of dentists in Poland (7) and the data of the Central Register of Physicians (CRL) (8), in 2012-2017 the number of dentists practicing in Poland increased from 34 188 to 37 100 (an increase by 8.5%), which is a result of 0.3 pp higher than the population of physicians. According to data from 2017, the percentage of specialists among dentists was as much as 49.2 pp. smaller than among other doctors, and only every sixth dentist had a specialization (7). In the analyzed period, the total number of available specialization places increased to 1,507 in 2020. With the constantly growing population of dentists, the number of which, measured by the number of people with the right to practice, exceeded 42,000 in 2020, this means a deterioration in the availability of specialist training. Obtaining residency in the field of medical and dental specializations is more difficult than in the field of other medical specializations, and this trend has been observed for several years (21). As a result, dentists more and more often decide to take commercial training in the form of various types of courses that they finance themselves. According to the data of the Central Register of Physicians and the study "Doctors stomatologists 2016" (8), conducted by the Center for Studies and Analyses of the Supreme Medical Chamber, it appears that only 17% of professionally active dentists currently have a specialization, most of them in conservative dentistry, dental surgery and dental prosthetics. Then there are specializations in pediatric dentistry and orthodontics, periodontics and maxillofacial surgery. In the last decade, dentists in Poland most often specialized in the following fields: dental surgery, conservative dentistry with endodontics, pediatric dentistry and orthodontics. In other European countries, the most common areas of specialist education include: orthodontics, dental surgery, pedodontics, periodontics, prosthetics and

maxillofacial surgery (18). Occasionally, in individual countries, education is provided in the fields of public health, oral pathology or dental radiology (18). The titles of orthodontist and dental surgeon are equivalent in all EU Member States, in line with the principle of automatic recognition of professional qualifications (19). Other specializations are verified by meeting additional recognition criteria through the recognition procedure (19).

A significant problem of the health care system in Poland is the aging of the workforce (11), which also applies to dentists. The average age of a dentist in 2017 was 46.9 years and it was about 3.5 years lower than the average age of other doctors, but this value is constantly increasing (12). The table below presents a comparison of the average age of a dentist who begins his specialization training.

The results of the analysis of the collected data indicate that the average age of dentists obtaining the first specialization, amounting to 33.1 in 2017, was significantly lower than the average age of specialist doctors, 54.4 years (7).

At the same time, the average age of a specialist dentist has slightly decreased over the last decade and amounted to 30.4 years in 2020. The lowest average age of specialist doctors was recorded in orthodontics and periodontics (30 years), while the highest in the field of maxillofacial surgery (30.6 years) and dental prosthetics (30.5 years). A similar trend of increasing the age of practicing dentists was also noticed in Great Britain. A survey conducted among specialists (SpR-specialty registrar) in Great Britain (14) shows that 40% of the respondents were in the 31-35 age group, and as much as 7.4% over 40 years old. Taking into account the age of the dentist undergoing postgraduate specialization training and the duration of the training cycle (minimum 3-6 years) (17), in some areas of dentistry this problem is even more noticeable than in Poland.

The profession of dentist in Poland is clearly feminized. Women constitute over 75% of all dentists. They are also prevalent among dentists receiving specialist training. In 2020, women accounted for 73.3% of all specialist dentists. According to the data of the Council of European Dentists (CED) (14), a similar situation occurs in Estonia, Lithuania, Latvia and Denmark. In these countries, the feminization rate of the dentist profession is as high as 80%. However, in many countries the statistics differ, for example in Switzerland, Iceland and Italy, the share of women in the dental profession is up to 34%. In nearly half of the countries included in the CED report, the majority of practicing dentists are male. Over the analyzed period, the percentage of women

undergoing specialization showed an upward trend. According to the data from the CMKP register, the largest number of dentists in 2020 decided to undergo pediatric dentistry (93.1%). Women least frequently chose maxillofacial surgery (40.8%) and dental surgery as their specialties, although in the latter field, due to the high feminization rate of the profession, they accounted for 58.8%. The choice of pedodontics by women is also noticed in other countries. A survey conducted in 2002 in Great Britain (15) among specialists (SPR) shows that women accounted for 41% of respondents, and the main fields of their postgraduate education (postgraduate training) were pediatric dentistry (78%) and orthodontics (53%). The authors of the article (15) note that the process of educating future specialists is longer, especially in the fields preferred by women. This is due to the involvement of doctors in family life and the limited working time.

In the analyzed period (2010-2020), there was an increase in the number of entities conducting specialization training. This change was significant for the increase in the overall number of specialization places. In the analyzed period, in the case of most specializations, the increase in the number of entities conducting specialization training was clearly higher than the accompanying increase in the number of places. The exception was maxillofacial surgery (an increase in the number of places in the period 2010-2020 by 52.6% with an increase in the number of training entities by 22.7%) and dental surgery (an increase in the number of places in the period 2010-2020 by 49.5% with an increasing number of training entities by 37.3%).

Throughout the analyzed period, the use of specialization places remained at a high or very high level. The greatest use of training places in 2020 was observed in dental surgery, maxillofacial surgery and periodontics.

The analysis of the CMKP register data concerning all specialists in 2010-2020 shows that the main form of specialization training was residency (77.90% of all specialists), guaranteeing the dentist a salary financed from public funds. In the British system (15) as much as over 75% (3/4 of the SpR) of specialists were employed in units of the National Health Service (NHS) or academic centers (20%). Few dentists participated in the costs of the specialization or financed it completely (15).

An important element of planning recruitment for individual medical and dental specializations is the analysis of the demand for specialists throughout the country. Due to the current tendency to concentrate dentists specializing in large urban areas with academic centers, the phenomenon

An average age of the person undergoing specialization training	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Children's dentistry	30.6	29.6	29.7	29.9	30.0	29.6	30.2	31.2	31.9	32.0	31.0
Periodontology	30.2	30.3	31.2	31.4	32.3	31.3	31.2	31.9	30.9	31.0	30.0
Dental surgery	31.1	31.0	30.9	30.4	30.7	30.4	30.4	31.1	31.0	30.7	30.2
Orthodontics	30.9	31.6	32.5	32.1	31.6	31.1	31.1	31.7	31.1	30.5	30.0
Dental prosthetics	30.8	30.5	30.1	30.1	30.6	30.2	30.1	30.9	31.3	31.5	30.5
Conservative dentistry with endodontics	30.5	30.2	30.7	30.7	30.2	30.2	30.2	30.8	30.8	31.2	30.3
Maxillofacial surgery	31.8	31.7	31.4	30.7	31.3	30.7	30.6	31.5	31.3	31.4	30.6

of unequal access to highly specialized dental care, especially in the public services sector, is growing.

The study is limited by the lack of data about the number of dentists eligible to start postgraduate training every year. Further research should answer whether the discussed directions of changes in postgraduate training are adequate and appropriate.

## Conclusions

The implementation of analyzes in planning the education of dentists is one of the essential elements of the state's health policy (13). In the last decade, the system of specialist education of dentists has undergone qualitative and quantitative changes. In most specializations, the duration of training was shortened, changes were made to the framework programs and priority specializations were distinguished (pediatric dentistry and orthodontics). The limits of places for specialization training, mainly as part of the residency, have been increased.

In the analyzed period (2010-2020):

- the number of dentists undergoing specialist training increased, the increase being only nominal, and the percentage of specialist dentists remained at a similar level, while being lower than in the case of medical specializations;
- the percentage of people undergoing specialization as a residency increased, and the increase in the availability of residential places positively correlated with changes in the use of the pool of available training places;
- the number of entities specializing in specialization was gradually increasing;
- the number of available specialization places increased, and this increase was slower than the change in the number of entities offering them.

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## ANNEX

**Table 1. Data from the CMKP register concerning dentists specializing in specific fields in 2010-2020.**

Children's dentistry	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Number of people holding special in total</b>	94	116	120	122	133	123	140	143	137	128	130
<b>Including the number of residents</b>	42	66	74	77	82	100	119	123	119	109	113

<b>Children's dentistry</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
% of residents	44.7	56.9	61.7	63.1	61.7	81.3	85.0	86.0	86.9	85.2	86.9
Including the number of women	86	106	108	110	120	117	135	137	129	121	121
% of women	91.5	91.4	90.0	90.2	90.2	95.1	96.4	95.8	94.2	94.5	93.1
Average age of the person undergoing the specialization	30.6	29.6	29.7	29.9	30.0	29.6	30.2	31.2	31.9	32.0	31.0
Number of training places	130	130	138	143	149	141	158	151	157	153	160
Number of entities conducting specializations	25	25	24	24	25	27	32	30	33	31	34
Number of people undergoing specialization to the number of training places	0.7	0.89	0.93	0.85	0.89	0.87	0.89	0.95	0.87	0.84	0.81
<b>Periodontology</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Number of people holding special in total	76	95	91	97	85	86	91	99	104	97	98
Including the number of residents	23	39	40	47	43	55	57	54	61	65	78
% of residents	30.3	41.1	44.0	48.5	50.6	64.0	62.6	54.5	58.7	67.0	79.6
Including the number of women	59	74	72	76	67	65	67	69	76	68	73
% of women	77.6	77.9	79.1	78.4	78.8	75.6	73.6	69.7	73.1	70.1	74.49
Average age of the person undergoing the specialization	30.2	30.3	31.2	31.4	32.3	31.3	31.2	31.9	30.9	31.0	30.0
Number of training places	101	103	103	107	103	100	107	111	116	115	112
Number of entities conducting specializations	30	31	29	32	30	29	31	32	34	35	34
Number of people undergoing specialization to the number of training places	0.75	0.92	0.88	0.91	0.83	0.86	0.85	0.89	0.90	0.84	0.86
<b>Dental surgery</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Number of people holding special in total	162	181	184	193	204	234	249	268	274	248	272
Including the number of residents	56	82	111	123	134	161	175	178	184	171	198
% of residents	34.6	45.3	60.3	63.7	65.7	68.8	70.3	66.4	67.2	69.0	72.8
Including the number of women	74	86	87	91	99	122	125	128	144	142	160
% of women	45.7	47.5	47.3	47.2	48.5	52.1	50.2	47.8	52.6	57.3	58.8
Average age of the person undergoing the specialization	31.1	31.0	30.9	30.4	30.7	30.4	30.4	31.1	31.0	30.7	30.2
Number of training places	206	209	216	222	231	256	284	279	309	302	308
Number of entities conducting specializations	59	59	61	63	68	72	76	79	86	82	81
Number of people undergoing specialization to the number of training places	0.79	0.87	0.85	0.87	0.88	0.91	0.88	0.98	0.89	0.82	0.88

<b>Orthodontics</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Number of people holding special in total</b>	89	116	122	126	141	147	151	132	145	124	133
<b>Including the number of residents</b>	30	60	62	70	75	91	92	79	94	85	96
<b>% of residents</b>	33.7	51.7	50.8	55.6	53.2	61.9	60.9	59.8	64.8	68.5	72.2
<b>Including the number of women</b>	73	100	105	113	126	134	133	116	123	100	106
<b>% of women</b>	82.0	86.2	86.1	89.7	89.4	91.2	88.1	87.9	84.8	80.6	79.7
<b>Average age of the person undergoing the specialization</b>	30.9	31.6	32.5	32.1	31.6	31.1	31.1	31.7	31.1	30.5	30.0
<b>Number of training places</b>	137	151	152	142	149	146	146	145	154	150	163
<b>Number of entities conducting specializations</b>	34	40	40	41	43	44	43	43	50	46	49
<b>Number of people undergoing specialization to the number of training places</b>	0.64	0.76	0.80	0.89	0.95	1.01	1.03	0.91	0.94	0.82	0.81
<b>Dental prosthetics</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Number of people holding special in total</b>	171	195	199	229	256	237	255	261	255	220	248
<b>Including the number of residents</b>	50	76	101	117	118	132	163	159	162	154	187
<b>% of residents</b>	29.2	39.0	50.8	51.1	46.1	55.7	63.9	60.9	63.5	70.0	75.4
<b>Including the number of women</b>	123	145	155	168	188	171	191	194	201	181	204
<b>% of women</b>	71.9	74.4	77.9	73.4	73.4	72.2	74.9	74.3	78.8	82.3	82.3
<b>Average age of the person undergoing the specialization</b>	30.8	30.5	30.1	30.1	30.6	30.2	30.1	30.9	31.3	31.5	30.5
<b>Number of training places</b>	266	267	276	283	281	297	292	291	304	294	303
<b>Number of entities conducting specializations</b>	46	47	49	51	52	56	58	60	68	63	67
<b>Number of people undergoing specialization to the number of training places</b>	0.64	0.73	0.72	0.81	0.91	0.80	0.87	0.89	0.84	0.75	0.82
<b>Conservative dentistry with endodontics</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Number of people holding special in total</b>	150	184	192	202	202	205	236	239	252	217	231
<b>Including the number of residents</b>	58	87	90	100	89	125	167	164	183	167	191
<b>% of residents</b>	38.7	47.3	46.9	49.5	44.1	61.0	70.8	68.6	72.6	77.0	82.7
<b>Including the number of women</b>	120	151	162	176	170	175	199	200	211	187	200
<b>% of women</b>	80.0	82.1	84.4	87.1	84.2	85.4	84.3	83.7	83.7	86.2	86.6
<b>Average age of the person undergoing the specialization</b>	30.5	30.2	30.7	30.7	30.2	30.2	30.2	30.8	30.8	31.2	30.3

<b>Conservative dentistry with endodontics</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Number of training places	261	268	265	254	252	245	268	271	287	274	284
Number of entities conducting specializations	53	56	58	57	57	58	62	65	70	64	66
Number of people undergoing specialization to the number of training places	0.57	0.68	0.72	0.79	0.80	0.83	0.88	0.88	0.88	0.79	0.81
<b>Maxillofacial surgery</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Number of people holding special in total	88	104	104	118	131	133	145	148	156	154	152
Including the number of residents	46	65	64	80	85	88	111	109	114	120	122
% of residents	52.3	62.5	61.5	67.8	64.9	66.2	76.6	73.6	73.1	77.9	80.3
Including the number of women	22	27	31	37	42	46	51	48	54	59	62
% of women	25.0	26.0	29.8	31.4	32.1	34.6	35.2	32.4	34.6	38.3	40.8
Average age of the person undergoing the specialization	31.8	31.7	31.4	30.7	31.3	30.7	30.6	31.5	31.3	31.4	30.6
Number of training places	116	120	128	134	139	145	162	166	168	171	177
Number of entities conducting specializations	22	22	23	22	24	25	26	27	27	27	27
Number of people undergoing specialization to the number of training places	0.76	0.87	0.81	0.88	0.94	0.92	0.90	0.89	0.93	0.90	0.86

Table 2. Number of specialization places and their use in particular years – data of the CMKP register.

	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
Number of training places	1217	1248	1278	1258	1304	1330	1417	1414	1495	1459	1507
Total number of people completing their specialization	830	991	1012	1087	1152	1165	1267	1290	1323	1188	1264
Resident share for all specializations	305	475	542	614	626	752	884	866	917	871	985
Degree of use of specialization places	0.68	0.79	0.79	0.86	0.88	0.88	0.89	0.91	0.88	0.81	0.84