



ORIGINAL ARTICLE / ОРИГИНАЛНИ РАД

A standstill of the continuing medical education in Serbia 2011–2017

Ružica Nikolić-Mandić¹, Vesna Bjegović-Mikanović², Helmut Wenzel³, Nebojša Lalić^{2,4}, Ulrich Laaser³, Dejan Nešić⁵

¹University of Belgrade, Faculty of Medicine, Centre for Continuing Medical Education, Belgrade, Serbia;

²University of Belgrade, Faculty of Medicine, School of Public Health and Health Management, Belgrade, Serbia;

³University of Bielefeld, School of Public Health, Bielefeld, Germany;

⁴University Clinical Center of Serbia, Clinic for Endocrinology, Diabetes and Metabolic Diseases, Belgrade, Serbia;

⁵University of Belgrade, Faculty of Medicine, Institute of Medical Physiology, Belgrade, Serbia

SUMMARY

Introduction/Objective Continuing Medical Education (CME) is a crucial element to keep the level of professionalism in the three key fields of medical education: pre-clinical, clinical, and public health. The profile of CME in Serbia has been analyzed for the 2011–2017 period.

Methods Between 2011 and 2017, 11,557 courses of CME have been submitted for accreditation, described by 26 variables. Due to the predominance of nominal data, we employed a principal component analysis (PCA) using the nonlinear iterative partial least squares algorithm (PCA/PLS) to arrange the 16 variables with complete information in such a way that most influential factors could be displayed and ranked. The analysis was done with TIBCO Statistical Software.

Results The Faculty of Medicine of Belgrade takes the top position among the medical faculties in Serbia with 569 courses or 47.9% (n = 1187; 2011–2017), whereas non-educational institutions with 86.2% of all courses (n = 11,514) are the most dominant providers. Clinical topics dominate the thematic spectrum with 59.7%. Between 2012 and 2017, the total number of courses offered diminished by 16.9%. A PCA of 16 potential determinants of CME reveals that the most relevant ones are duration, credit points, price, and number of lecturers.

Conclusion For the last decade, a standstill or even a regression in the development can be observed. Especially the faculties of medicine in Serbia, as well as other major providers, should reconsider the entire structure of their administrative organization and initiate innovative development.

Keywords: continuing medical education; accreditation; evaluation; faculties of medicine; Serbia

INTRODUCTION

Over the last 50 years, Continuing Medical Education (CME) attracts the attention of both professionals and scientists as a tool, which is applied either mandatory or voluntary to maintain and upgrade physicians' competences and hence the quality of health care [1]. In 2015, Cervero and Gaines [2] provided an updated synthesis of systematic reviews to present the significance of CME and its positive impact on physicians' performance and clinical outcomes. Today, CME is one of the essential mechanisms in setting targets for high-quality health care and equipping the health care staff to perform corresponding to quality standards [3]. Accountability and financing arrangements play a role in strengthening CME. Particularly in low- and middle-income countries, CME is a valuable option introduced by governments and professional organizations to improve the quality of health care [4]. Besides the effects of CME at these macro- and meso-levels, it has potential at the micro level to improve health workers' motivation and staff retention by serving as an incentive.

CME is a composite part of health workforce development, and though the needs for a comprehensive system of CME in each country have existed for many years, this topic only recently became the object of scientific analysis. Several studies pointed to the diversity among countries in the system of CME organization [5, 6, 7]. The lessons of good practice are based on the existence of national or regional accreditation of training events for health workers, linkage between CME and licensing/re-licensing procedures in professional organizations, and provision of competency-based education through work and lifetime, which will influence patients' health outcomes [8, 6, 9, 10].

In Serbia, the movement for continuous quality improvement started with the adoption of system laws in 2005 (Health Care Law, Health Insurance Law, and Law on Health Professional Chambers). These laws also boosted the CME as an integral part of health system development and a necessary condition for the re-licensing of five recognized health professions (physicians, nurses, dentists, pharmacists, and biochemists). To secure a CME of high quality, in 2008, the Health Council of

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Correspondence to:

Dejan NEŠIĆ
Faculty of Medicine
Institute of Medical Physiology
Višegradska 26
11000 Belgrade, Serbia
drdejannesic@yahoo.com

Serbia obtained the major role in national accreditation of CME training events [11]. According to the Law on Health Care, the Health Council is a principal advisory body of the Ministry of Health for the long-term planning and development of strategic documents in line with international health policies [12]. Among other activities, Council members perform accreditation of the proposals for continuing education, which is considered an important activity considering the health system development aligned with international and European recommendations. Regarding activities dedicated to CME, the Health Council follows the recommendations and the experience of the European Association of Medical Specialists (UEMS) [13]. The Health Council of Serbia, with the help of chambers, performs reviews of training events following established criteria: evidence-based background of the educational topic, specified target groups, objectives and outcome of training, the existence of before–after knowledge testing and evaluation. Providers of the CME training events come from a broad spectrum of institutions including public and private health organizations, educational institutions, governmental and non-governmental organizations. To keep work license and registration with their chamber, all health professionals are undergoing CME training events every year and must secure the specified number of points per year, which are equal to the duration of several training events.

Building on our first analysis of CME in Serbia in 2015, covering the years 2011 and 2012, we are now in the position to analyze the entire period of seven years from 2011 to 2017 [14]. During this period, the responsible institutions in Serbia (Ministry of Health, Health Council of Serbia, and chambers of regulated health professions) invested much effort to stabilize the system of CME. They followed the Bologna process, the Law on Health Care, the Law on Higher Education in Serbia, and the Strategy for Development of Education in Serbia by 2020 [12, 15, 16]. Furthermore, the Law on Chambers of Health Workforce requests obligatory re-licensing every seven years based on a pre-defined number of CME credits [17]. In 2015, we concluded that medical faculties are best suited to set the standards for CME as far as it is obligatory for medical professionals. The present paper attempts to investigate whether improvements in the organization and practice of CME for physicians can be identified, especially concerning the standards set by the four medical faculties in Serbia.

METHODS

The Health Council of Serbia must approve the continuing education of all health professions and therefore keeps a comprehensive database. For this study, the Health Council provided the data of 11,557 courses for CME of physicians, submitted between 2011 and 2017. In 2017 alone, reviewers of the Serbian Health Council analyzed 2928 submissions for continuing education of physicians and 2157 for other health professions. (Appendix 1: CME, all health professions, 2017). The number of proposals submitted is almost

identical across four cycles, e.g., in 2016 and 2017, with minor variations in the type of proposal. The database for Serbian physicians comprised 26 variables (Appendix 4), thereof six variables are interval-scaled, and 20 are nominal-scaled. We did not further consider the type and number of participants (nine nominal variables) as the latter was not available and the status of accreditation was a nominal process variable of no relevance for this analysis. This leaves us with 16 variables for the analyses.

For the description, we applied the median and interquartile range because of the heterogeneity of the datasets. As many lecturers are repeatedly reading, we count the number of lecturers per course but sum-up across all courses as “lectorates.” Due to the predominance of nominal data, we used a principal component analysis (PCA) using a nonlinear iterative partial least squares (NIPALS) algorithm to arrange 16 variables with complete information in such a way that the most influential factors could be displayed and ranked increasing interpretability, but at the same time minimizing information loss. The NIPALS algorithm allows to include nominal data as well. Our findings are underpinned by the in-depth delineation of the outcomes of price patterns and attraction (e.g., hours per credit point). Analyses were done with TIBCO Software [18]. As of January 1, 2011, the national currency of dinar is traded against the euro at a rate of around 118 dinars per euro.

RESULTS

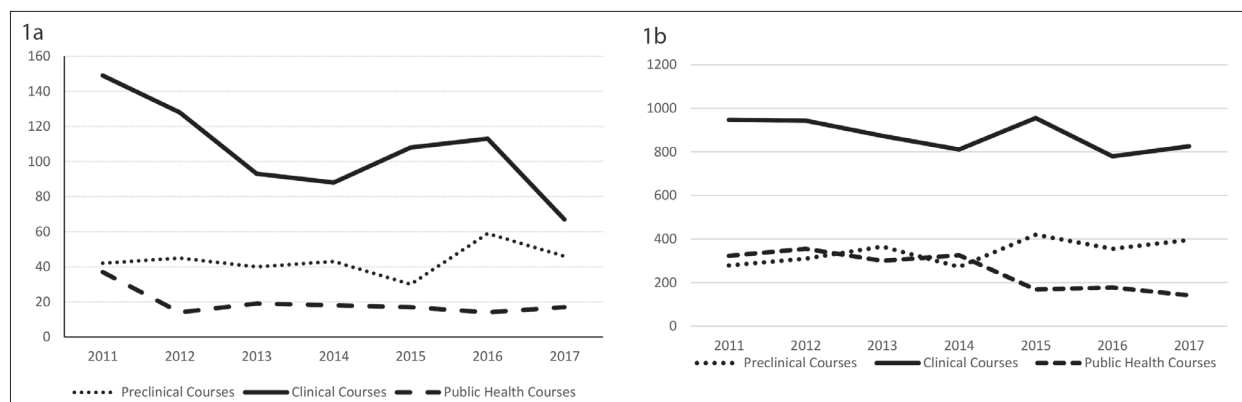
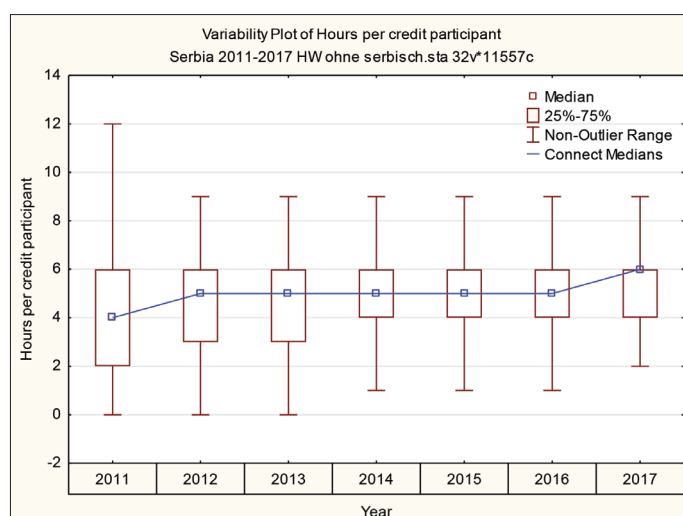
The organizers traditionally submit the most significant number of proposals through the Medical Chamber (2928 proposals in total in 2017), followed by the Nursing and Health Technicians Chamber (1630 in total), the Pharmacy Chamber (226), the Dental Chamber (156), the Chamber of Biochemists (49), and the Health Council – for combined education which includes health professionals of different occupation (96), see Appendix 2: continuing medical education in Serbia, specified by field of education and year. There are four cycles for submissions of proposals per year. The average number of proposals accredited per cycle is 1178 out of the total submitted for accreditation – an average of 1271. Of the total of 5085 proposals for CME accreditation in 2017, after the submission of comments and additions, 92.68% were positively resolved within the observed period of one year. Share of accredited proposals out of the total submitted by chambers is the following: physicians – 96.2%, nurses – 91%, biochemists – 85.7%, pharmacists – 85.4%, dentists – 78.9%, health professionals of other occupation – 55.2%.

In Table 1, a total of 11,557 courses targeted physicians during the period 2011–2017 including 43 courses with incomplete data. They have been classified according to the three main categories of preclinical, clinical, and public health continuing education programs. The Faculty of Medicine of Belgrade takes the top position among the medical faculties in Serbia – which should set the standards – with 569 courses or more than 80 on average per year.

Table 1. Continuing medical education in Serbia, summarized overview of all courses submitted 2011–2017

| Field of education | FM Belgrade | FM Novi Sad | FM Kragujevac | FM Nis | Other faculties / educational institutions | Non-educational institutions | Missing Data | Totals including missing data |
|--------------------|-------------|-------------|---------------|------------|--|------------------------------|--------------|-------------------------------|
| Pre-clinical | 169 | 28 | 76 | 32 | 107 | 2290 | 2 | 2704 |
| Clinical | 315 | 195 | 179 | 57 | 169 | 5969 | 20 | 6904 |
| Public health | 85 | 19 | 12 | 20 | 109 | 1683 | 3 | 1931 |
| Missing | 0 | 1 | 0 | 0 | 0 | 17 | 0 | 18 |
| Totals | 569 | 243 | 267 | 109 | 385 | 9959 | 25 | 11,557 |

FM – faculty of medicine

**Figure 1a.** Continuing medical education offered by the medical faculties of Serbia**Figure 1b.** Continuing medical education offered by other providers**Figure 2.** Hours per credit attended 2011–2017

However, far more courses are organized by non-educational institutions like health insurances or non-governmental organizations, with 86.2% of all courses offered (other state health institutions, professional organizations, non-governmental organizations, industry, etc.). Clinical topics dominate the thematic spectrum with 59.7%, followed by pre-clinical topics with 21%, and public health with 19.3%.

Figures 1a and 1b show the development over the years (more details in Appendix 2: continuing medical education in Serbia, specified by field of education and year). There is a negative trend of submitted courses, e.g., for clinical courses offered by the medical faculties (Figure 1a) and similarly for all other providers (Figure 1b). Together, the

course portfolio shrinks over the years from the maximum of 1796 in 2012 to 1494 in 2017, i.e., by 16.8%. This trend is the highest for public health with a reduction of 56.9% since the maximum in 2012. The intermediary rise in preclinical courses in 2016 may be due to courses submitted in 2015 and accredited later.

Figure 2 shows the hours attended per rewarded credit point, which demonstrates a remarkable stability of the system in that between 2012 and 2016 the median of required hours per credit remains stable at five hours and the range of hours for 50% of all courses (interquartile range) remains stable between four to six hours for the period between 2014 and 2017.

Regarding the prices per course participant, Figure 3, in general, shows the highest prices for Belgrade. The differences between Belgrade and Central Serbia as well as between Central Serbia and Vojvodina across the fields of education are significant (ANOVA based on means: $p < 0.001$).

To understand data better, Figure 4 shows a breakdown by the responsible four medical faculties and the remaining groups of other educational and non-educational institutions. Between 2011 and 2017, the medical faculties ask for the highest prices, especially the Faculty of Medicine in Niš, in the field of public health. Also, Novi Sad and Belgrade stand out for the clinical field of education.

To determine the relevance of the 16 variables with complete and relevant information available, we performed a PCA. The PCA identified eight variables as important,

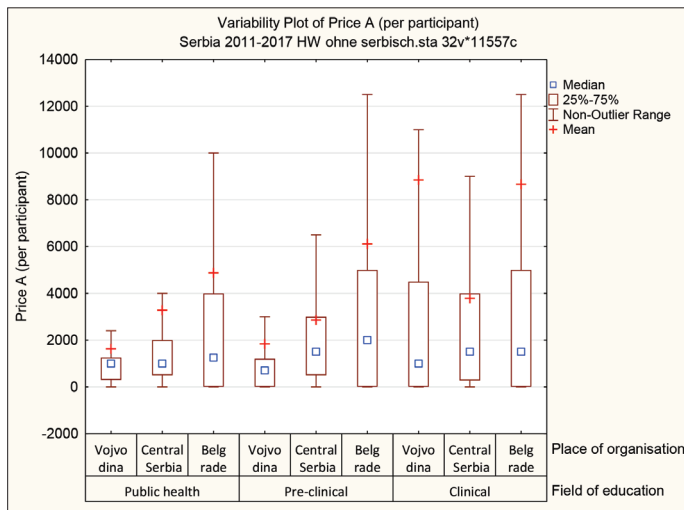


Figure 3. Comparison of prices per hour by field of education and province of Serbia 2011–2017

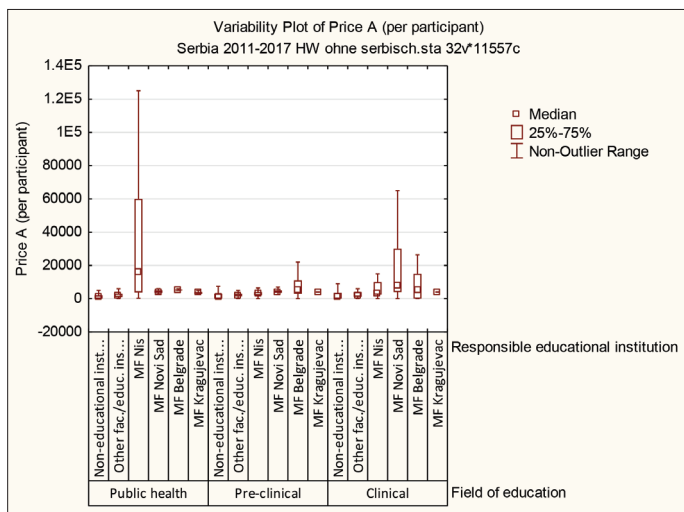


Figure 4. Breakdown of prices by the responsible institution

scaled according to what is usually known as ‘Power,’ a quantity ranging 0–1.

Variables with high power (≥ 0.99):

1. Duration of education (hours)
2. Credit points for lecturers
3. Hours per credit lecturer
4. Price per participant
5. Number of domestic lecturers
6. Number of international lecturers
7. Hours per credit participant
8. Credit points for participants.

The eight variables out of 16 available that are not well represented (i.e., have low values of power) are more likely to be unimportant (for details see Appendix 3 – principal component analysis).

DISCUSSION

Despite their minor quantitative contribution to CME in Serbia, medical faculties should be the ones to initiate urgently required improvements of the entire system, due

to their societal lead role in education and science, whereas e.g., Maisonneuve et al. [19] found that pharmaceutical industry accounts for more than 50% of CME in five European countries, financing and stabilizing the existing system. This may also explain the relative stability of public health related courses offered by medical faculties, whereas those offered by other providers show a clear downward trend (Figures 1a and 1b). On the other hand, clinical topics offered by academic providers trend downwards whereas the number of courses offered by non-academic providers is rather stable, at least over the last years. In this regard, it is regrettable that the numbers of course participants (course attendance) are not available. This would allow to analyze whether increased participation per course compensates for the lesser number of courses offered, although this may be considered rather unlikely.

As demonstrated in Figures 1a and 1b, the system is stable, but at a standstill or even a slightly downward trend it is visible in the number of courses. The PCA identified duration, credit points, price, and number of lecturers, and thereby determined the variation presented in Figures 1–4. Modifying these parameters has the potential to adapt the profile better to needs. These critical issues have to be discussed between the providers and the accrediting Health Council of Serbia to analyze the areas of possible improvement. The steep downward trend for CME in public health may also be due to the deficit in up-to-date teaching material, which since the end of the European Stability Pact and the 2nd edition of the Programmes for Training and Research in Public Health in 2013 [20] has not been updated in spite of the positive experience summarized by Zaletel-Kragelj et al. [21].

Recent publications on CME are rare; at the end of 2009, Garattini et al. [22] published an analysis of six European countries, which revealed different models regarding compliance, financial incentives for some categories of physicians, formal accreditation of providers, and private sponsorship. Regulatory bodies exist in some countries (e.g., Germany and the United Kingdom – UK), whereas self-regulation is considered sufficient to secure high quality care in, e.g., Austria and Spain [23].

A model for progressive change is provided by recent developments in the UK initiated by the report on “Unfinished Business” published in 2002 [24, 25]. A so-called ‘gold guide’ was first published in 2010 (sixth edition 2016), providing a reference to postgraduate training in the UK [26]. The following improvements are also especially relevant for Serbia:

- Provision of a more standardized national program also for the entry into CME in which all trainees must achieve a standardized list of generic competencies (not yet available in Serbia);
- Promotion of the concept of work-based and competency-based assessment and feedback.

Since 2010, only one organization, the General Medical Council (GMC), oversees an integrated under- and postgraduate education in the UK [27, 28], which is the same as in Serbia, as only the Serbian Health Council supervises the process; however, the precise criteria for supervision are still not endorsed. An example of good practice in the UK is the “framework for the Professional Development of Postgraduate Medical Supervisors,” established as early as 2009 [29]. Analogous concepts are promoted in the United States [30]. In the Netherlands, VanNieuwenborg et al. [31] argue that “CME should go beyond the sheer acquisition of knowledge, and also seek changes in practice, attitudes and behaviors of physicians.” With the same intention, Whitehurst [32] asks for a “continuing medical education partnership.” A related model to involve practice experience as an essential element in CME has been proposed by Wiese et al. [33].

The analysis of the period 2011–2017 and the published literature during the last five years confirm the recommendations published in 2015 [14, 22, 23, 24, 26, 28–33]:

Administrative organization

1) Improve the database quality of the national registration especially to include data on final delivery; 2) Providers should rigorously follow their obligation to produce evaluation reports after completion of educational events, to the appropriate chamber and to the Health Council; 3) Limit the course fee rates per hour; 4) Reduce the percentage of obligatory payments to the administration and arrange for a cheaper production of certificates in order to save money for remuneration; 5) Request lecturing in CME programs of the faculties of medicine as obligatory for academic

promotion together with an increase of remuneration. The Faculty of Medicine in Belgrade has adopted these standards already.

Innovative development

1) Going online towards blended learning; 2) Adopt best practice from a competitive market; 3) Increase attractiveness for participants from South-Eastern Europe (especially from the former Yugoslavia) and from abroad in general (if English speaking); 4) Invest in bilateral agreements with big organizations; 5) Organize focused publicity.

CONCLUSION

Integrated education including practice experience is a key element to improve CME in Serbia. To follow-up on this process there should certainly be more rigid control of submitted courses by the Health Council of Serbia regarding the timeliness of submissions, the completeness of data, and the reporting of delivered CME. The key determinants of change should be adapted accordingly as there are duration, credit points, price, and number/variety of lecturers.

The Faculty of Medicine of Belgrade has invested considerable effort to stabilize and further develop the system of CME between 2013 and 2017, and these standards should be enforced nation-wide for all providers. Reorganization and adaptation to a changing environment become mandatory if stagnation and outclassing of CME should be avoided.

Conflict of interest: None declared.

REFERENCES

- Bucklin BA, Asdigian NL, Hawkins JL, Klein U. Making it stick: use of active learning strategies in continuing medical education. *BMC Med Educ.* 2021;21(1):44.
- Cervero RM, Gaines JK. The impact of CME on physician performance and patient health outcomes: an updated synthesis of systematic reviews. *J Contin Educ Health Prof.* 2015;35(2):131–8.
- Tello JE, Barbazza E, Waddell K. Review of 128 quality of care mechanisms: A framework and mapping for health system stewards. *Health Policy.* 2020;124(1):12–24.
- Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era: time for a revolution. *Lancet Glob Health.* 2018;6(11):e1196–e1252.
- O'Brien Pott M, Blanshan AS, Huneke KM, Baasch Thomas BL, Cook DA. Barriers to identifying and obtaining CME: a national survey of physicians, nurse practitioners and physician assistants. *BMC Med Educ.* 2021;21(1):168.
- Cook DA, Price DW, Wittich CM, West CP, Blachmann MJ. Factors influencing physician's selection of continuous professional development activities: A cross-specialty national survey. *J Contin Educ Health Prof.* 2017;37(3):154–60.
- Younes NA, AbuAlRub R, Alshraideh H, Abu-Helalah MA, Alhamss S, Qanno' O. Engagement of Jordanian Physicians in Continuous Professional Development: Current Practices, Motivation, and Barriers. *Int J Gen Med.* 2019;12:475–83.
- Agha S. Aligning continuing professional development (CPD) with quality assurance (QA): a perspective of healthcare leadership. *Qual Quant.* 2021;1–15.
- Hearle D, Lawson S. Continuing Professional Development Engagement – A UK-based Concept Analysis. *J Contin Educ Health Prof.* 2019;39(4):251–9.
- Koepsen J. Demands-based and employer-driven curricula: defining knowledge in higher vocational education and training. *Studies in Continuing Education.* Accessed February 12, 2020 at: <https://www.tandfonline.com/doi/full/10.1080/0158037X.2019.1661238>.
- Health Council of Serbia. Belgrade. 2020. Accessed February 12, 2019 at: <http://zdravstvenisavetsrbije.gov.rs/>
- Official Gazette. Law on Health Care. Belgrade. Official Gazette RS, 25/2019.
- UEMS. Continuing medical education & Professional development. Brussels: European Union of Medical Specialists (UEMS) 2018. Accessed February 12, 2020 at: <https://www.uems.eu/areas-of-expertise/cme-cpd>.
- Bjegovic-Mikanovic V, Lalic N, Wenzel H, Nikolic-Mandic R, Laaser U. Continuing medical education in Serbia with particular reference to the Faculty of Medicine, Belgrade. *Vojnosanit Pregl.* 2015;72(2):160–8.
- Official Gazette. Law on Higher Education. Official Gazette RS 88/2017.
- Republic of Serbia: Strategy for Development of Education in Serbia by 2020. Official Gazette 55/05 and 71/05.
- Official Gazette. Law on Chambers of Health Workforce. Belgrade. Official Gazette 70/2017.
- TIBCO Software. Statistica (data analysis software system). Version 13: TIBCO Software. Online at: <https://www.tibco.com/>.

19. Maisonneuve H, Matillon Y, Negri A, Pallarés L, Vigneri R, Young HL. Continuing medical education and professional revalidation in Europe: five case examples. *J Contin Educ Health Prof.* 2009;29(1):58–62.
20. Burazeri G, Zaletel-Kragelj L, editors. 'Health: Systems – Lifestyle – Policies' and 'Health Investigation: Analysis – Planning – Evaluation'. Forum for Public Health in Southeastern Europe Vol. I & II, South Eastern European Journal of Public Health (SEEJPH).
21. Zaletel-Kragelj L, Kovacic L, Bjugovic V, Bozikov J, Burazeri G, Donev D, et al. Utilization of teaching modules published in a series of handbooks for teachers, researchers and health professionals in the frame of "Forum for Public Health in South Eastern Europe – Programmes for training and research in public health" network. *SJPH.* 2012;51(4):237–50.
22. Garattini L, Gritti S, De Compardi P, Casadei G. Continuing Medical Education in six European countries: a comparative analysis. *Health Policy.* 2010;94(3):246–54.
23. Sole M, Panteli D, Riso-Gill I, Doering N, Busse R, McKee M, et al. How do medical doctors in the European Union demonstrate that they continue to meet criteria for registration and licencing? *Clin Med (London).* 2014;14(6):633–9.
24. Patel M. Changes to postgraduate medical education in the 21st century. *Clinical medicine (London, England).* 2016;16(4):311–4.
25. Donaldson L. Unfinished business: proposals for the reform of the senior house officer grade. London: Department of Health, 2002.
26. Academy of Medical Royal Colleges. Conference of Postgraduate Medical Deans A reference guide for postgraduate specialty training in the UK ('gold guide'). 6th ed. London; 2016.
27. General Medical Council (GMC). Quality improvement framework. London: GMC; 2010.
28. General Medical Council (GMC). Standards for curricula and assessment systems – merger with PMETB. London: GMC. Accessed February 12, 2020 at: www.gmc-uk.org/education/postgraduate/26724.asp.
29. Academy of Medical Educators A Framework for the Professional Development of Postgraduate Medical Supervisors (AoME). Cardiff: AoME; 2009. Accessed February 12, 2020 at: http://www.medicaleducators.org/write/MediaManager/A_framework_for_the_professional_development_of_postgraduate_medical_supervisors.pdf.
30. McMahon GT, Skochelak SE. Evolution of Continuing Medical Education: Promoting Innovation Through Regulatory Alignment. *JAMA.* 2018;319(6):545–6.
31. VanNieuwenborg L, Goossens M, De Lepelaeire J, Schoemakers B. Continuing medical education for general practitioners: a practice format. *Postgrad Med J.* 2016;92(1086):217–22.
32. Whitehurst KE. Making the Learning Continuum a Reality. The Critical Role of a Graduate Medical Education – Continuing Medical Education Partnership. *J Contin Educ Health Prof.* 2019;39(4):270–5.
33. Wiese A, Kilty C, Bergin C, Flood P, Fu N, Horgan M, et al. Protocol for a realist review of workplace learning in postgraduate medical education and training. *Syst Rev.* 2017;6(1):10.

Стагнација континуиране медицинске едукације у Србији у периоду 2011–2017. године

Ружица Николић-Мандић¹, Весна Бјеговић-Микановић², Хелмут Венцел³, Небојша Лалић^{2,4}, Улрих Ласер³, Дејан Нешић⁵

¹Универзитет у Београду, Медицински факултет, Центар за континуирану медицинску едукацију, Београд, Србија;

²Универзитет у Београду, Медицински факултет, Школа јавног здравља и здравственог менаџмента, Београд, Србија;

³Универзитет у Билефелду, Школа јавног здравља, Билефелд, Немачка;

⁴Универзитетски клинички центар Србије, Клиника за ендокринологију, дијабетес и болести метаболизма, Београд, Србија;

⁵Универзитет у Београду, Медицински факултет, Институт за медицинску физиологију, Београд, Србија

САЖЕТАК

Увод/Циљ Континуирана медицинска едукација (КМЕ) пресудан је елемент за одржавање нивоа професионалности у три кључне области медицинског образовања: претклиничком, клиничком и јавном здрављу. Профил КМЕ у Србији анализиран је у периоду 2011–2017. године.

Методе У периоду 2011–2017. године предато је на акредитацију 11.557 едукација КМЕ, које су описане са 26 променљивих. Због превладавања номиналних података користили смо анализу главних компонената помоћу алгоритма *NIPALS* да бисмо 16 променљивих (варијабла) поређали са потпуним информацијама на такав начин да се најутицајнији фактори могу приказати и рангирати. Анализа је урађена са статистичким софтвером *TIBCO*.

Резултати Медицински факултет у Београду заузима водеће место међу медицинским факултетима у Србији са 569 кур-

сева или 47,9% ($n = 1187$; 2011–2017), док су необразовне установе са 86,2% ($n = 11.514$) најдоминантније у организацији КМЕ курсева (као пружаоци услуга КМЕ). Клиничке области доминирају са 59,7%. Између 2012. и 2017. године укупан број курсева се смањио за 16,9%. Од 16 могућих детерминанти КМЕ, према анализи главних компонената, најрелевантније су трајање, број добијених бодова, цена и број предавача.

Закључак Током последње деценије може се уочити застој или чак назадовање у развоју. Посебно би медицински факултети у Србији, као и други значајни организатори (пужаоци услуга), требало да преиспитају целокупну структуру своје административне организације и покрену иновативни развој.

Кључне речи: континуирана медицинска едукација; акредитација; евалуација; медицински факултети; Србија

Appendix 1. Continuing medical education, all health professions, 2017

Total continuing medical education accreditation results for four cycles
(January 2017, April 2017, Jul 2017, October 2017)

| Chamber | Professional meetings | | Courses and seminars | | Congresses/symposiums | | On-line testing | | Total proposals submitted | Total complains submitted | Complains positively solved | Total accredited |
|--|-----------------------|------------|----------------------|------------|-----------------------|-----------|-----------------|------------|---------------------------|---------------------------|-----------------------------|------------------|
| | S | R | S | R | S | R | S | R | | | | |
| Physicians | 1493 | 72 | 683 | 77 | 239 | 10 | 305 | 49 | 2928 | 147 | 98 | 2818 |
| Nurses | 910 | 115 | 232 | 37 | 51 | 4 | 249 | 32 | 1630 | 88 | 42 | 1484 |
| Pharmacists | 105 | 19 | 44 | 3 | 3 | / | 29 | 23 | 226 | 13 | 12 | 193 |
| Dentists | 25 | 9 | 27 | 11 | 35 | 2 | 32 | 15 | 156 | 4 | 4 | 123 |
| Biochemists | 33 | 2 | 5 | / | 2 | / | / | 7 | 49 | 2 | 2 | 42 |
| Health professionals of other occupation | 15 | 32 | 19 | 11 | 10 | 4 | / | 5 | 96 | 14 | 9 | 53 |
| Total | 2581 | 249 | 1010 | 139 | 340 | 20 | 615 | 131 | 5085 | 268 | 167 | 4713 |

S – submitted; R – refused as not appropriate;

Note: Success of accreditation – share of accredited proposals in total submitted

Appendix 2. Continuing medical education (CME) in Serbia, specified by field of education and year

| Field of CME | Faculty of Medicine, Belgrade (FMB) | All 4 medical faculties (incl. FMB) | All other organizers | TOTALS (%) |
|------------------|-------------------------------------|-------------------------------------|----------------------|--------------|
| 2011 | | | | |
| Preclinical | 19 | 42 | 279 | 321 (18.06) |
| Clinical | 61 | 149 | 947 | 1096 (61.68) |
| Public Health | 14 | 37 | 323 | 360 (20.26) |
| TOTAL 2011 | 94 | 228 | 1549 | 1777 |
| 2012 | | | | |
| Preclinical | 24 | 45 | 310 | 355 (19.77) |
| Clinical | 45 | 128 | 944 | 1072 (59.69) |
| Public Health | 8 | 14 | 355 | 369 (20.55) |
| TOTAL 2012 | 77 | 187 | 1609 | 1796 |
| 2013 | | | | |
| Preclinical | 23 | 40 | 365 | 405 (23.95) |
| Clinical | 39 | 93 | 874 | 967 (57.19) |
| Public Health | 12 | 19 | 300 | 319 (18.86) |
| TOTAL 2013 | 74 | 152 | 1539 | 1691 |
| 2014 | | | | |
| Preclinical | 27 | 43 | 272 | 315 (20.22) |
| Clinical | 41 | 88 | 811 | 899 (57.70) |
| Public Health | 11 | 18 | 326 | 344 (22.08) |
| TOTAL 2014 | 79 | 149 | 1409 | 1558 |
| 2015 | | | | |
| Preclinical | 19 | 30 | 420 | 450 (26.49) |
| Clinical | 49 | 108 | 956 | 1064 (62.63) |
| Public Health | 17 | 17 | 168 | 185 (10.89) |
| TOTAL 2015 | 82 | 155 | 1544 | 1699 |
| 2016 | | | | |
| Preclinical | 27 | 59 | 355 | 414 (27.62) |
| Clinical | 40 | 113 | 780 | 893 (59.57) |
| Public Health | 11 | 14 | 178 | 192 (12.81) |
| TOTAL 2016 | 78 | 186 | 1313 | 1499 |
| 2017 | | | | |
| Preclinical | 30 | 46 | 396 | 442 (29.59) |
| Clinical | 40 | 67 | 826 | 893 (59.77) |
| Public Health | 15 | 17 | 142 | 159 (10.64) |
| TOTAL 2017 | 85 | 130 | 1364 | 1494 |
| 2011-2017 | | | | |
| Preclinical | 169 | 305 | 2397 | 2702 (23.47) |
| Clinical | 315 | 746 | 6138 | 6884 (59.79) |
| Public Health | 85 | 136 | 1792 | 1928 (16.74) |
| TOTAL 2011-2017 | 569 | 1187 | 10,327 | 11,514 |

Note: Courses with incomplete data are excluded (n = 43)

Appendix 3. Principal component analysis (variables with a power ≥ 0.99 are in bold)

| Variable | Variable importance (Serbia 2011–2017) Number of components is 7 | | | Variable group | |
|---|--|----------------|-----------------|----------------|----------|
| | Variable number | Category value | Power | Importance | |
| Type of education {international conference} | 1 | 3 | 0.319052 | 15 | 1 |
| Type of education {national courses} | 1 | 2 | 0.270487 | 16 | |
| Type of education {national conference} | 1 | 4 | 0.198262 | 19 | |
| Type of education {international courses} | 1 | 1 | 0.067256 | 25 | |
| Field of education {public health} | 2 | 3 | 0.017893 | 38 | |
| Field of education {clinical} | 2 | 2 | 0.016812 | 39 | |
| Field of education {pre-clinical} | 2 | 1 | 0.012881 | 41 | |
| Organizational level of organizing institution {health care system / broader system / educational system} | 3 | 5 | 0.655928 | 12 | 1 |
| Organizational level of organizing institution {tertiary health care} | 3 | 3 | 0.254120 | 17 | |
| Organizational level of organizing institution {primary health care} | 3 | 1 | 0.115224 | 21 | |
| Organizational level of organizing institution {several levels combined} | 3 | 4 | 0.090667 | 24 | |
| Organizational level of organizing institution {secondary health care} | 3 | 2 | 0.044299 | 29 | |
| Organizer of education {NGO} | 4 | 6 | 0.948278 | 10 | 1 |
| Organizer of education {health institute} | 4 | 4 | 0.220569 | 18 | |
| Organizer of education {clinical center} | 4 | 2 | 0.144493 | 20 | |
| Organizer of education {faculty or other educ. institution} | 4 | 1 | 0.095727 | 22 | |
| Organizer of education {PHC} | 4 | 5 | 0.064331 | 26 | |
| Organizer of education {other inst. of nat. interest} | 4 | 7 | 0.042038 | 30 | |
| Organizer of education {gen. hospital / spec. hospital} | 4 | 3 | 0.040430 | 31 | |
| Responsible educational institution {non-educational institution} | 5 | 6 | 0.095597 | 23 | 1 |
| Responsible educational institution {FM Belgrade} | 5 | 1 | 0.036176 | 32 | |
| Responsible educational institution {FM Novi Sad} | 5 | 2 | 0.026819 | 34 | |
| Responsible educational institution {FM Kragujevac} | 5 | 3 | 0.020710 | 37 | |
| Responsible educational institution {other fac./educ. institution} | 5 | 5 | 0.014485 | 40 | |
| Responsible educational institution {FM Niš} | 5 | 4 | 0.009202 | 43 | |
| Status of course organizer {NGO} | 6 | 4 | 0.949097 | 9 | 1 |
| Status of course organizer {state inst.} | 6 | 1 | 0.811897 | 11 | |
| Status of course organizer {private inst.} | 6 | 3 | 0.029601 | 33 | |
| Status of course organizer {military inst.} | 6 | 2 | 0.007268 | 44 | |
| Organization of course {In cooperation with others} | 7 | 2 | 0.026309 | 35 | |
| Organization of course {one organizer} | 7 | 1 | 0.026010 | 36 | |
| Organization of course {11} | 7 | 11 | 0.000304 | 46 | |
| Place of organization {Central Serbia} | 8 | 3 | 0.054656 | 27 | 1 |
| Place of organization {Belgrade} | 8 | 2 | 0.050961 | 28 | |
| Place of organization {Vojvodina} | 8 | 1 | 0.010875 | 42 | |
| Number of domestic lecturers | 9 | | 0.999981 | 5 | 1 |
| Number of international lecturers | 10 | | 0.999749 | 6 | 1 |
| Credit points for lecturers | 20 | | 1.000000 | 3 | 1 |
| Credit points for participants | 21 | | 0.991099 | 8 | 1 |
| Duration of education (hours) | 22 | | 1.000000 | 1 | 1 |
| Status of accreditation {reapplication} | 23 | 2 | 0.625976 | 13 | 1 |
| Status of accreditation {accepted with remark} | 23 | 3 | 0.582916 | 14 | 1 |
| Price per participant | 24 | | 1.000000 | 2 | 1 |
| Hours per credit lecturer | 30 | | 1.000000 | 4 | 1 |
| Hours per credit participant | 31 | | 0.991428 | 7 | 1 |
| Number of variable groups included | | | | | 16 |

NGO – non-governmental organization; PHC – primary health care; FM – faculty of medicine

Appendix 4. List of variables provided

| No. | Name of variable |
|-----|--|
| 1 | Type of education |
| 2 | Field of education |
| 3 | Organizational level of organizing institution |
| 4 | Organizer of education |
| 5 | Responsible educational institution |
| 6 | Status of course organizer |
| 7 | Organization of course |
| 8 | Place of organization |
| 9 | Number of domestic lecturers |
| 10 | Number of international lecturers |
| 11 | Type of participants |
| 12 | Physicians |
| 13 | Dentists |
| 14 | Pharmacists |
| 15 | Biochemists |
| 16 | Nurses |
| 17 | Technicians |
| 18 | Others |
| 19 | Number of participants |
| 20 | Credit points for lecturers |
| 21 | Credit points for participants |
| 22 | Duration of education (hours) |
| 23 | Status of accreditation |
| 24 | Price A (per participant) |
| 25 | Price B |
| 26 | Year |