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ORIGINAL ARTICLE

The positive and negative impacts of the COVID-19 pandemic on the European Council on Chiropractic Education accredited programs: A mixed methods audit and thematic analysis

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ABSTRACT

Objective: The objectives of this study were to: (1) determine the impact of COVID-19 on the operations within the 9 sections of the European Council on Chiropractic Education (ECCE) 'Standards'; (2) identify specific rapid changes to the programs; and (3) identify positive changes that will continue post-pandemic.

Methods: This was a mixed methods audit and thematic analysis of data from interviews conducted via a cloud-based video conferencing tool with program leaders of the ECCE accredited institutions. A validated questionnaire designed around ECCE's "Standards" was used, consisting of 3 sections: (1) Severity of the COVID-19 impact on each ECCE Standard section; (2) Description of program changes made for each section; (3) Identification of positive changes continuing post-pandemic. Descriptive statistics were calculated for Part 1 and compared for significant differences via the Kruskal-Wallis test. Verbal responses to Parts 2 and 3 were evaluated independently by 3 researchers using a modified "thematic analysis" approach. Final thematic categories and themes were agreed upon by the researchers.

Results: There was a 100% response rate. *Outpatient teaching clinics* were most severely affected, followed by *teaching chiropractic technique courses*. *Curricular structure and duration* and *program management* were least affected ($p = .033$). Four thematic categories were identified: *Extreme Stress*, *Courses Most Severely Affected*, *Integrity of Examinations and Assessments,* and *Positive Changes That Will Continue*.

Conclusion: Final-year students were most negatively impacted due to restricted opportunities in outpatient clinics. Integrity of examinations was also a problem. Positive, innovative teaching materials and methods were quickly developed and should continue.

Key Indexing Terms: Chiropractic; Education; Curriculum; COVID-19 Pandemic; Healthcare Quality Assurance

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INTRODUCTION

Educators, administrators, and students globally had to rapidly adapt their teaching and learning methods as a result of the threats and restrictions caused by the COVID-19 pandemic during the 2020 and 2021 academic years.[1–6] This included the 10 chiropractic programs accredited by the European Council of Chiropractic Education (ECCE) throughout Europe and South Africa.[7] In-person, face-to-face teaching in lecture, tutorial, and laboratory classes was abruptly curtailed with only a few days' notice in early 2020, requiring faculty to quickly adapt their courses to be delivered online or postponed indefinitely.[1,4–6] The challenges were particularly difficult for courses that required students to perform physical examination procedures and courses and clinical rotations requiring the application of manual treatments, such as chiropractic techniques, due to the requirements of "social distancing" during the pandemic.[3,6] Additionally, some basic science courses had to adapt their laboratory teaching methods because they traditionally require in-person teaching using individual microscopes for students, cadaver dissection, or human anatomical specimen study, etc.[6]

These sudden and drastic changes to the teaching and learning methods for chiropractic students need to be carefully evaluated to determine whether the adaptations that the accredited programs were required to make fulfill the academic requirements to graduate safe and competent practitioners. Additionally, the ECCE was required to

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adapt its own accreditation procedures during this pandemic to comply with the relevant nonpharmaceutical requirements to limit the spread of COVID-19. Thus, on-site accreditation evaluation visits were not allowed.[7] Recognizing the importance of careful monitoring of how the accredited programs have adapted to various challenges resulting from the COVID-19 pandemic, in the absence of in-person accreditation evaluations, this mixed methods thematic analysis study was conducted.

The purposes of this study were to:

1. determine the severity of the impact of COVID-19 on the operations of the accredited programs within each of the 9 sections of the ECCE "Standards" (as reported by the various program leaders);
2. identify specific changes that had to be quickly made to the delivery of teaching;
3. identify positive and innovative changes that will continue post-pandemic.

METHODS

This was a mixed methods audit and thematic analysis of data obtained from live interviews conducted via Zoom (Zoom Video Communications, San Jose, CA, USA) by the first 2 authors of this paper with the program leaders of each of the 10 ECCE accredited chiropractic programs.[7] Audits are considered appropriate data collection tools, as they focus on evaluating and analyzing existing tasks and procedures systematically to determine whether changes are needed.[7] The interviews used a questionnaire strictly designed around ECCE's Accreditation Standards (Appendix 1 available online).[8] This questionnaire was tested for face and content validity by the authors and the ECCE executive committee prior to use. The live interviews first obtained categorical responses to how significantly the COVID-19 pandemic affected each of the 9 sections of the ECCE Standards.[8] This was followed by semistructured interviews addressing each of these 9 sections of the ECCE Standards, to obtain detailed descriptions of how the program modified/adapted their teaching and learning methods to the restrictions that the pandemic placed on the program's functions.

The questionnaire consisted of 3 sections (Appendix 1 available online). Section 1 requested that the program leader provide a rating of between 1 and 5 using the Likert response regarding how severely the pandemic affected the teaching methods and resources for each of the 9 sections of the ECCE Standards.[6] A rating of 1 = *severely affected* and a value of 5 = *not at all affected*. Participants were allowed to select a numerical value halfway between 2 of the whole numbers (ie, 3.5) if they so desired.

Section 2 of the questionnaire asked the program leaders to specifically list and describe those changes/modifications that the faculty and managers in their programs had made due to the COVID-19 pandemic, for each of the 9 sections of the ECCE Standards. Section 3 of the questionnaire asked the participants to then identify positive changes made that were facilitated by the pandemic, which would continue post-pandemic. The questionnaire was sent by email to each program leader prior to the scheduled interview to allow sufficient time for them to consider each item, solicit input from faculty members if required, and formulate their responses.

The ECCE vice president conducted the interviews while the ECCE consultant for quality assurance transcribed the responses from the program leaders. Live interviews were conducted, rather than just relying on written responses to the questionnaire, to allow the interviewers to probe more deeply into topics as they arose.

After each interview, the consultant for quality assurance typed the verbal responses for each of the 3 sections of the questionnaire into their relevant sections of the document prior to sending it to the appropriate program leader for correction, elaboration, and confirmation. Returned questionnaires provided the approved/valid data from which the audit and thematic analysis portion of the study was conducted, which were then anonymized by assigning a number to each program. Participation in the interviews and returning the completed post-interview questionnaire was considered informed consent to take part in this study. This process assured the participants of the trustworthiness of the data.

Descriptive statistics (means and standard deviations [SD]) were calculated for each of the 9 sections of the ECCE Standards from Section 1 of the questionnaire, based on the responses from the 10 accredited programs. Comparisons of the numerical ratings for the 9 sections of the ECCE Standards were then analyzed using the Kruskal-Wallis test (Free Statistics Calculators version 4.0, Daniel Soper, Fullerton, CA, USA) to determine whether there were significant differences between the various sections of the ECCE Standards.

All written responses from Section 2 of the questionnaire, once approved by each of the program heads, were copied verbatim and placed into their appropriate section of the ECCE Standards (after being anonymized), and separated by a row of symbols from adjacent program comments for the same ECCE section (Appendix 2 available online). Similarly, all responses for section 3 of the questionnaire (ie, positive changes that would continue post-pandemic) were also copied verbatim and inserted into a single document, with the comments from each program separated from adjacent comments by a row of symbols (Appendix 2 available online). Three researchers independently assessed the written responses to sections 2 and 3 of the data collection questionnaire, using an inductive modified thematic analysis approach, to identify recurring themes and thematic categories, as was performed in previous thematic analysis publications by the ECCE.[9,10] This inductive approach to the thematic analysis started with observations that are specific and limited in scope and proceeded to generalized conclusions that were likely but not certain. Once this was completed, the 3 researchers met together via Zoom to discuss, explain their rationales, and agree upon the thematic categories and individual theme identifications.[9,10]

Table 1 - Severity of the Effect of the COVID-19 Pandemic Impact on Teaching, Learning and Functioning, as Reported by Each of the 10 Accredited Programs, Regarding the 9 Sections of the ECCE Standards. 1 = Severely Affected; 5 = Not At All Affected

Program (Identification Blinded)	1	2	3	4	5	6	7	8	9	10	Mean/SD
Biomedical sciences	2	3	4	4	4	2	5	1	2	3	3.0 SD = 1.25
Behavioural & social sciences	3	4	5	2	4	3	5	2	2	5	3.5 SD = 1.27
Clinical sciences & skills	1	2	4	3	4	3	1	3	1	3	2.5 SD = 1.39
Chiropractic sciences & skills	1	2	4	3	3	3	1	1	2	3	2.30 SD = 1.06
Outpatient teaching clinic opportunities	2	2	3	1	3.5	2	1	4	1	2	2.15[a] SD = 1.06
Curricular structure, composition & duration	4	3	4	4	4	3.5	5	5	3	4	3.95[a] SD = 0.69
Program management	2	3	5	4	4	1	1	2	2	5	2.9 SD = 1.52
Linkage with subsequent stages of education & training	4	5	4	1	5	1.5	5	Not given	4	4	3.72 SD = 1.48
Assessment of students	1	3	3	2	4	3	4	2	2	2	2.6 SD = 0.97

[a] Mean scores and standard deviations for the sections least affected and most affected by the COVID-19 pandemic.

Ethical approval was not needed for this audit study, similar to other recent thematic analysis publications reporting on the ECCE's functions and operations.[7,9,10]

RESULTS

There was a 100% response rate from the 10 accredited chiropractic programs. A statistically significant difference was found when comparing the 9 sections of the ECCE Standards in terms of how severely they were affected by the COVID-19 pandemic (p =.033). The most severely affected section of the ECCE Standards due to the pandemic was "Outpatient Teaching Clinic Opportunities" with a mean score of 2.13 (SD = 1.06) (Table 1). This was followed by the teaching and learning of "Chiropractic Sciences and Skills," which had a mean score of 2.30 (SD = 1.06), and "Assessment of Students," mean = 2.60 (SD = 0.97) (Table 1).

The sections of the ECCE Standards that were least affected by the pandemic were "Curricular Structure, Composition, and Duration," which had a mean score of 3.95 (SD = 0.69), followed by "Linkage with Subsequent Stages of Education and Training" with a mean of 3.72 (SD = 1.48) (Table 1).

Four major thematic categories were identified and agreed to by the researchers and are presented in Table 2. These included "Extreme Stress," "Courses Most Severely Affected," "Integrity & Validity of the Exams/Assessments," and "Positive Changes Which Will Continue."

Specific themes arising under the category of "Extreme Stress" were those related to faculty and management having to: (1) very quickly reorganize resources; (2) find and/or create good online teaching and learning platforms and course content; (3) the many unknowns early in the pandemic requiring quick changes; (4) the requirement to work within limited student number "bubbles," which lead to increased faculty contact time; and (5) the unknowns about whether the academic year would be extended, including a delayed graduation.

The category of those "Courses Most Severely Affected" highlighted the "Outpatient Teaching Clinic" opportunities as most severely impacted, as clinics were closed for varying time periods ranging from 2 weeks to 5 months (country dependent) and when reopened, had reduced capacity (Table 2). Program leaders reported that it was necessary to decrease the number of patients that students were required to examine and treat and create virtual clinical experiences for the students. However, it was noted by the interviewers that the 2 chiropractic programs integrated within university medical programs reported the least disruption to the clinical experiences of their students.

The "chiropractic technique" courses were also impacted severely, as reduced or no person-to-person contact was allowed for varying time periods early in the pandemic. The practical laboratory components of the "physical diagnosis" and "basic science" courses were also severely impacted due to social distancing requirements and small size student "bubble" requirements.

Below is a quote from 1 of the program leaders when discussing teaching chiropractic technique courses, which the authors feel is representative of the overall experience of the ECCE accredited programs.

> *"This was the most severely impacted initially. In the beginning (March–summer 2020) everything was shut down and they were locked out of the University (ie, the university was closed). All teaching was cancelled for this area for about 8 weeks.*
>
> *A summer school was created to then cover the material, but this was not as good as there was not enough time for the students to practice. Summer school ran from 8 am–10 pm.*
>
> *During the summer and autumn of 2020, a complete plan was made as to how to run the skills classes since it is not possible to have 2 meters between students for these classes. They obtained an exception from the university and all skills classes ran more or less normally in the autumn 2020 and spring 2021.*
>
> *Faculty are worried about student competency in this area for the affected students."*

Examinations and Assessments was another difficult

Table 2 - Four Thematic Categories and the Specific Themes Identified Within Each Category From Program Head Interviews

Extreme Stress	Courses Most Severely Affected	Integrity & Validity of Exams/Assessments	Positive Changes Which Will Continue
Management had to quickly organize faculty and resources to teach remotely	**Outpatient Clinic Rotations** (Closed for varying time periods and limited patients when reopened). Reduced clinical patient encounters for final-year students.	Exam formats changed to online or continuous assessments and were mainly formative rather than summative.	The hybrid/blended learning formats will remain.
Creating valid, online teaching materials quickly was required.	Chiropractic technique courses (no person-to-person contact for varying time periods),	Cheating was a big problem with exams given remotely.	Excellent new educational materials were created.
Could only work within limited student bubbles, which resulted in "increased faculty contact time."	physical diagnosis laboratory/ practical classes	Practical exams for chiropractic technique courses, physical diagnosis courses, and basic science laboratory courses were delayed.	Students will have increased and flexible access to more online teaching and learning materials.
Finding good online teaching and learning platforms quickly was necessary but challenging.	Biomedical (ie, basic science) laboratory courses	OSCE exams were delayed or cancelled.	Increased opportunity to employ and engage international faculty and researchers without transportation and housing costs.
Many unknowns and uncertainties that changed quickly			Faculty meetings will remain on Zoom/online platforms rather than in-person (better attendance).
Unknown if final year students would graduate on time.			Distance/hybrid teaching reduces transportation costs and reduces the number of offices needed.
Extended academic year for many programs			More flexible pathways to reach learning competencies
			Increased opportunities for educational research projects

area for the programs to find suitable, valid, and reliable adaptations to adequately evaluate student knowledge, abilities, and progress (Table 2). This was particularly challenging for practical assessments such as objective structured clinical examinations (OSCEs), chiropractic technique, and manual therapy assessments, and physical examination assessments. Several programs reported that the assessment integrity was a potential concern, as cheating by students when assessments were offered remotely is difficult to manage. Below is a direct quote from 1 of the program leaders, which nicely reflected the majority of comments.

> *"All exams were required to be on-line—even practical exams. Thus, the practical assessments were postponed in the spring of 2020. Dispensations were obtained for the autumn of 2020 and spring of 2021, where a plan describing a 'modified' OSCE exam procedure which were 'corona-safe' was made.*
>
> *Written exams: The University hired a company to see/ monitor how the students were doing while sitting at home taking exams. The company proctored this to look for cheating. However, students were able to get around this and cheating was certainly occurring.*
>
> *For the MCQ exams, questions were randomized in different orders for students as well as the answer options in order to try to reduce cheating. The students were also not able to return to previously answered questions (prohibited backtracking).*
>
> *Faculty are worried about how valid these assessments are as the proctoring system did not work well and it was well known that cheating occurred. The last of these types of assessments should be this summer (2021)."*

A surprising thematic category was identified during the interviews with the program leaders, which is called "Positive Changes Which Will Continue Post Pandemic." This category had the most themes identified (Table 2).

Most program leaders identified the "hybrid/blended" teaching and learning materials that had to be quickly created as effective and, with some modifications, will continue post-pandemic. Program leaders commented that these newly created online materials can also provide more flexibility for future teaching and learning, while providing students the opportunity to access the relevant course content at any time. Additionally, new learning platforms and materials provide more flexible pathways to achieving the needed learning competencies.

Several program leaders stated that faculty meetings in the post-pandemic era will remain on videoconference platforms as they have better attendance without faculty having to commute. The pandemic changes have also made the program leaders more aware that remote teaching and learning facilitates and hiring of foreign faculty members and researchers, may facilitate a reduced need for offices, transportation, and housing costs. The following is the feedback from 1 of the programs, which summarizes the feedback from most of the other ECCE accredited programs.

"Some faculty love working and teaching from home, others hate it.

There are many benefits for online teaching if used correctly. They now have the skills and soft-ware to do this well.

Online or hybrid teaching is here to stay for some courses but must be used wisely.

There are serious concerns about how much students actually learn in on-line teaching environments. How much can they/do they interact with the faculty and each other?

Surveys need to be sent out to students concerning how and if they can motivate themselves for online teaching.

An advantage is also that international faculty and researchers can be brought into classrooms remotely.

Hybrid meetings, teaching and learning also reduce transportation time and costs.

However, interaction with students is needed."

DISCUSSION

The high level of stress suffered by program leaders, faculty, and students at the ECCE accredited chiropractic programs, was 1 of the primary thematic categories identified early in the pandemic. This was due to the pressure to rapidly adapt their courses and delivery methods to virtual or hybrid platforms, as well as cancelling or delaying clinics and classes requiring hands-on activities.[1,3–6] Faculty were required to find and evaluate appropriate online teaching and learning platforms, as well as create valid online teaching and learning materials on a short period of time. However, it was impressive to learn of the rapid and innovative actions taken to address the learning outcomes and competencies required, similar to other chiropractic and medical programs internationally.[1–6,11] Unfortunately, the disruptions, particularly in the early phase of the pandemic, required many of the programs to extend their academic year.

The effect of the COVID-19 pandemic on the operations of the outpatient teaching clinics, where final year students diagnose and treat patients, was another challenging and difficult "theme" mentioned by all accredited programs. However, the severity of the impact on clinical teaching and student clinic experiences varied depending upon the country where the program takes place, and the relevant regulations stipulated. It was somewhat surprising to learn that the length of the outpatient clinics' closures ranged from 2 weeks to 5 months based on the program's country. The severity of the reduction in the number of patient clinical encounters per student in their final year of study also varied greatly from country to country more than anticipated. For the 2 programs that are integrated with medical faculties, this impact was much less than for the other accredited programs, with 1 of these 2 programs reporting that their students were still able to evaluate, diagnose, and treat over 700 patients per student in a 6-month period during this pandemic.

As with other chiropractic and medical programs around the world, telemedicine took on a much greater role in patient care for final-year students.[1,2,5,11] However, the ECCE accredited programs reported that there are serious limitations for telemedicine platforms in treating patients manually. Patient history taking, limited physical examination procedures (ie, observations, active movements, etc.) and offering advice on treatments or activities that the patients could do at home were the main components of these virtual visits. Thus, final-year students in most of the programs had fewer opportunities to perform many of the physical examination procedures, and apply, the necessary manual treatments. Students in countries with mandatory postgraduate programs (ie, residencies) will likely be less impacted by these deficiencies long term, compared to students who graduate and then go into practice without mentorship or supervision.[12,13] Follow-up studies on these graduates should be conducted to determine their confidence in being ready to practice, and their initial success or difficulties experienced in practice.

All courses that normally required in-person, practical applications of knowledge and skills were severely affected during the pandemic, as reported by other medical and chiropractic programs internationally.[1–6] This was especially true in the early phases of the pandemic, when good on-line substitute teaching materials were being sought or created in a short period of time. The chiropractic technique courses were most impacted compared to the basic science laboratory and physical diagnosis laboratory classes as there were limited valid and reliable substitute mechanisms to create and assess the various manual adjustments and therapies. Thus, the chiropractic programs in many cases had to extend their academic year and

lengthen the daily class schedules to achieve the necessary competencies required. Post-pandemic studies are needed to evaluate the effectiveness of these strategies.

The integrity and validity of the various examinations and assessments was problematic, as reported by many of the ECCE accredited programs. Although some of the programs used established platforms to limit and evaluate potential cheating, it was reported that there are limitations to their effectiveness. Additionally, the format of some written assessments had to be changed to continuous assessment or formative assessment as opposed to the previous summative assessment, to adapt to the inability to have proctored, in-person examinations. The question often arose from program leaders as to whether these adaptations were appropriate in terms of promoting deep-level learning. Certainly, the practical examinations such as the OSCE and the laboratory component assessments in the basic science courses and physical diagnosis courses were severely impacted by the pandemic, as a few programs indicated they were cancelled initially and postponed by others. The practical assessments of students' manual skills in the various chiropractic technique courses were also delayed as there are currently no valid and reliable substitutes.

Despite all of the stress imposed in the rapid adaptation of chiropractic education to an unprecedented global calamity, 1 of the surprising outcomes of this study was the large number of positive and innovative changes identified and created by the various programs that will potentially continue in the post-pandemic environment. This thematic category had the largest number of identified themes as shown in Table 2. It is clear that many components of chiropractic education and program operations in the 10 ECCE accredited programs will not return to their prepandemic status quo. Many of the online educational materials and tools created or discovered during the pandemic are excellent, and will continue to be used post-pandemic, often in a hybrid format together with in-person teaching. This will allow students access to these learning materials, and prerecorded presentations as often as desired, and as appropriate to their schedules. Follow-up research studies assessing the effectiveness of these new resources and methods in promoting deeper levels of student learning will be needed.

It was also noted by several programs that the changes required to the teaching and learning during this pandemic had additional positive consequences, with the reduced need for faculty offices if much of the teaching is done remotely, increasing faculty attendance at meetings when they can attend via online platforms, and providing more flexible pathways for students to reach the required learning competencies. Some program leaders also recognized that using online interactive platforms increases their opportunities to employ and engage international faculty and researchers to a much greater degree without the additional costs of transportation, accommodation, and stipends. The consequences and outcomes of these opportunities will be interesting to follow in the future. It is conceivable that several programs may compete for the same high-profile faculty and research colleagues or that these academics could work for more than 1 institution. This may result in reduce opportunities for younger, up-and-coming faculty members and researchers or strengthen and improve the education of chiropractors in parts of the world with fewer experienced clinicians and faculty members. Both scenarios are possible, and may provide additional areas for future research.

As the data for this study were collected using live interviews with members of the ECCE itself, a limitation in this methodology could be that the program leaders may have been reluctant to fully acknowledge or disclose weaknesses in their programs arising due to the COVID-19 pandemic. A follow-up study post-pandemic exploring permanent changes to the programs, which were facilitated by COVID-19 and the impacts of these permanent changes on students, faculty, and resources would be important.

CONCLUSION

The unprecedented levels of stress caused by the COVID-19 pandemic for program leaders, faculty, and students, especially early in the pandemic, was a major theme identified in this study. The areas of the curriculum that were most impacted were the outpatient teaching clinics and the chiropractic technique courses as well as the laboratory components of physical examination and basic science courses. The integrity of the examinations was also a thematic category with cheating identified as a concern, as well as not being able to use the most appropriate examination formats such as the OSCE examinations. The largest thematic category to arise from this study is the number of positive changes facilitated by the pandemic that may continue into the future. Hybrid teaching and learning using the new, innovative teaching materials should continue, and may facilitate more flexibility in students' access to learning options and more flexible pathways to reaching learning competencies. Additionally, the development of online interactive formats to teaching and new teaching materials should facilitate the employment and increased engagement of international faculty and researchers without additional travel and accommodation costs.

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The authors have no conflicts of interest to declare relevant to this work.

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