

Certification Exam of the Argentine Society of Pediatrics. The challenge of remote evaluation.

Examen de Certificación de la Sociedad Argentina de Pediatria. El desafío de la evaluación remota.

Carolina Pascual ^{1*}, Ana María Martínez Valenti ³, Mónica N. Pose ⁴, Horacio Yulitta ²

¹ Pediatrician - Former Cep technical secretary. President of the CEP <https://orcid.org/0000-0001-6936-4433>

² Pediatrician. Former president of the CEP <https://orcid.org/0000-0001-6917-5245>

^{3, 4} Pediatric Doctors. CEP Technical Secretaries

Correspondence: carolina.cep@sap.org.ar

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Summary: Introduction. The Argentine Society of Pediatrics (SAP) is a certifying entity for Pediatrics and 21 Pediatric Specialties. The certification exam constitutes a voluntary, independent evaluation devoid of conflict of interest. The tool used for this evaluation involves a development that begins long before executing it, with the development of the instruments to be used, and ends after its execution, with the analysis of the results and the assessment of its operation. Aim. Present the process that the SAP Professional Evaluation Council (CEP) carries out for certification in Pediatrics and Pediatric Specialties and its transformation to a completely remote exam. Method. Description of the strategies implemented by the CEP for the preparation of certification exams and their transformation to remote mode. The processes for preparing multiple-choice questions for the written exam and semi-structured cases for the oral exam are detailed, as well as the implementation of a computerized and remote exam using the Zoom platform and the SEB (Safe Exam Browser) safe browser. Results. The completely remote certification exam was implemented for 1,586 professionals, 752 corresponding to pediatric certification and 834 to pediatric specialties, between 2020 and 2023. Catastrophic events occurred that included the interruption of the internet connection and difficulties in the speed of circulation of the multiple choice exam questions for which strategies were opportunely developed that allowed the aforementioned incidents to be saved. Surveys were taken from applicants and jurors. Conclusion. The reorganization of the exam execution strategy in a remote modality, with the implementation of specific tactics to avoid possible catastrophic situations, made it possible to achieve a safe, stable exam, with adequate fluidity in its development and with high rates of acceptability for both those taking the exam. as well as for those taking Certification exams from the Argentine Society of Pediatrics.

Keywords: remote assessment, stability, certification, medical education

Abstract: The SAP (Argentine Society of Pediatrics) is a certifying entity in Pediatrics and 21 Pediatric Specialties. The certification exam is voluntary, independent and free from conflict of interest. The tool used for this exam involves a development process that begins long before its execution with the preparation of the pertinent instruments and concludes with the analysis of the results and the assessment of its functioning. Goal: To submit the process carried out by the CEP (Professional Assessment Board) for the Certification in Pediatrics and 21 Specialties and its transition to a fully remote examination. Method: Description of the strategies implemented by the CEP to elaborate the certification exams and their transition to an online format. The process involved in the elaboration of the multiple-choice questions for the written exam and semi-structured cases for the oral component as well as the implementation of an online format through Zoom platform and the safe browser (SEB). Results: The certification exam was conducted remotely for 1586 professionals, 752 in Pediatrics and 834 in specialties, between 2020 and 2023. During this period, some negative events took place such us connection interruption and difficulties regarding the circulation speed of the multiple-choice questions . Accordingly, strategies were developed to cope with these negative events enabling the correct execution of the exam. A survey was conducted among candidates and members of the jury. Conclusion: The reorganization of the exam execution strategy into a remote modality, with the implementation of specific tactics to address

potential catastrophic situations, enabled a safe and stable exam, with smooth development and high acceptability rates among both candidates and examiners.

Keywords: online format, stability, certification, medical training.

1. Introduction

The Argentine Society of Pediatrics (SAP) has been a certifying entity for Pediatrics since 1968, when the Pediatric Evaluation Court was created, today the Professional Evaluation Council (CEP), and since 1974 for Pediatric Specialties, the first certified specialty being of neonatology. Professionals who aspire to certification must prove that they have completed and passed a training program in the specialty. The certification process involves the approval of the evaluation prepared by the CEP. In the last 10 years, an approximate number of 400 professionals have been evaluated per year between certifications in pediatrics and pediatric specialties.

Evaluation at the different stages of medical education is considered a complex and challenging process and there is no single instrument that allows for a reliable evaluation of all learning. The CEP uses as an evaluation instrument a multiple-choice exam whose approval is essential to access a second complementary evaluation instance, an oral exam based on the resolution of two semi-structured simulated clinical cases. The first was carried out in person and on paper, through the implementation of logistics that allowed the evaluation to be carried out simultaneously in all the country's headquarters, until 2014. In 2015, a in-person computerized Pediatrics exam, whose applicants attended the evaluation locations arranged by the Society throughout the country, taking the exam on their own computers (PC or tablet) and being directly supervised at the respective locations by CEP juries. The advantage of applying the computerized exam was to systematize the simultaneity of the exam, automate and centralize the correction in a coordinating group, also allowing all exams to be saved in a central exam database on the SAP server. The oral exam was always carried out in person, with jury tables at each venue establishing observers in situations of conflict of interest, using support material from the paper cases for the jury and the evaluated professionals. All exams are prepared and agreed upon by the members of the Council, leading experts and authorities of the SAP specialty committees and representatives of the entities and institutions with which certification agreements have been established(1-3).

The COVID-19 pandemic in March 2020 presented the CEP with the challenge of carrying out a transformation of the evaluation to a completely remote modality in order to continue with the certification activity. The objective of this presentation is to describe the process involved in the development of the instruments that the Society's CEP uses to carry out the aforementioned certification and the logistics of the day of the exam.

2. Methods

The preparation of a quality examination involves a series of tasks included in a work plan that the CEP launches 10 to 12 months prior to its execution and which, for practical purposes, is divided into three stages:

1. Preparation of the written and oral exam
2. Exam day logistics
3. Analysis of the results: "the day after"

In this work we will describe the first two stages of preparing professional certification exams.

2.1 Preparation of the multiple choice exam

The first step is to establish the purpose of the instrument and define the population to which it is directed; both elements are relevant and support the validity of the interpretation of the results. After having defined the evaluation objective, the construct that is intended to be measured must be clearly defined, making an exhaustive definition of the contents and skills involved, which will be the reference for the development of the instrument. To construct a multiple-choice exam, the domains of the specialty must be defined, based on all the competencies and scientific advances that are representative of it. To do this, a "specification table" is built which, organized in a matrix where the topics that will be evaluated are specified, determines the evaluation objectives of each one. Finally, the percentage weights of the themes are detailed, in order to distinguish which ones should have a greater or lesser presence in the final instrument (4).

The specifications tables are built and updated periodically, with the consensus of all members of the CEP for the Pediatric examination and of experts and members of the National Committees of the Society for Specialties. The total number of questions for each exam will depend on the number of topics or domains to be explored. The literature recommendation regarding this number is a minimum of 80. The CEP has 200 questions for the pediatrics exam and 100 to 120 for the rest of the specialties (5-6). Once this table has been built and the number of questions to be taken has been defined, the CEP convenes an expanded group of professionals from each specialty who will work on the construction of questions and semi-structured clinical cases for the oral exam. This group of expert specialists includes representatives from all over the country, with more than 5 years of experience in their certification, references of the main training programs of each specialty and members of the aforementioned National Committees of the Society. The CEP permanently works on improving the quality of multiple choice questions and on the training of those who perform them as a necessary action in the circuit of improvement of the exams it uses. In recent years, the technical area has developed internal guides for the construction of questions and clinical cases and has worked on the selection and circulation of bibliography that supports the alignments for the preparation of quality questions among the members of the CEP (1-4).

At the CEP Conference held in March 2020, before the quarantine was declared in Argentina, the application for remotely uploading questions to the CEP site was presented, designed by the council's technical team and the IT support team of the CEP. SAP. This allows a work system in which each author uploads the questions to the system and initiates feedback with the technical secretariat of the CEP to optimize the technical quality of each question, establishing a Galofré index 4 (7) as the basis for acceptance of a question.). When the question is finally accepted, it must be entered into the question database for each specialty. The remote upload application allows the authors and reviewers of the questions to be registered and the questions to circulate in a specific correction circuit, without access to the general question base of the specialty, optimizing confidentiality and security. Once the circuit of loading and correcting questions is completed, these are stored in the database of each specialty. Once the questions for the Pediatric Certification exam have been uploaded, they are reviewed by a group of specialists convened for this purpose, "peer review", remotely working on another application designed ad hoc and added to the exam software. Through a zoom meeting, groups of 2 or 3 jurors from different fields and training centers in the country are formed, with a coordinator giving access to a specific group of questions. After being reviewed, with corrections and/or comments and initial categorization by degree of difficulty, the selected questions are sent to the CEP technical team and entered into the corresponding "pre-exam."

2.2 Oral exam, how and why?

There is evidence that an oral exam provides added value to the evaluation process, expanding the measurement carried out with a written test, through the assessment of other fundamental domains for professional practice (8-9). It allows the evaluation of essential competencies for professional performance, difficult to evaluate through an exam of multiple-choice response questions, such as communication skills, ability to contextualize the clinical situation, prioritization of interdisciplinary teamwork, consideration of ethical, legal, quality and safety aspects in patient care. The tools to be used in the oral test must respond to the objectives of this type of evaluation, for which semi-structured simulated clinical cases are built that have:

- real and possible contextualization
- high levels of uncertainty
- insufficient initial diagnostic elements
- ability to evaluate: paths of inquiry, formulation of diagnostic hypotheses and their instances of confirmation and refutation, proposal of complementary studies, therapeutic decisions, prognosis of evolution and follow-up.

For the construction of clinical cases, professionals from all over the country are summoned, who work with the guidance and technical supervision of the CEP, based on a model structured in two instruments: one for the applicant as a visual tool necessary for the execution of a remote evaluation, and another for the evaluation juries. Each member of the jury, 48 hours before the exam, receives via email:

- Computerized material to share the screen with the applicant through the zoom application (designed in 4 to 6 Power Point windows).
- Material for jurors: evaluation guide with the expected answers for each question of the case, with specification of "critical points" that define the minimum standard for the approval of the evaluation, and also contains an updated bibliographic review of the topic.

Passing the oral exam implies the correct resolution of two simulated clinical cases before a jury made up of at least two professionals. Failure in both clinical cases determines failure of the exam and the need to retake both times of the evaluation at a later date. The approval of just one of the evaluated cases gives the right to the possibility of a second opportunity with a new clinical case and panel of judges, the result of which is determining the final result of the evaluation.

2.3 Exam day logistics

- Written exam.

Since 2015, the CEP implemented an in-person computerized written exam, for which applicants were summoned at different locations throughout the country with a PC or Tablet, being supervised during the exam to avoid the use of search browsers. exam answers and screenshots. The professional certification activity was not immune to the global impact of the 2019 Covid pandemic. In the month of September 2020, it was decided to generate a remote evaluation strategy for the 2020 Certification exams within the framework of the preventive social isolation in force in the Argentine Republic. The applicants took an exam with multiple choice questions and, after passing it, the oral exam from their homes. The change in modality was communicated to the entities with an agreement and to the registered applicants, who, through a sworn declaration, agreed to perform under the new conditions. At this point, the CEP faced a great challenge: the security of the exam with applicants taking it from their homes and the need to anticipate the possibility of "catastrophic events." This property or condition of an evaluation has been described in the literature as "the stability of an exam" (10). It was decided to replicate the in-person scenario. The applicant would use two devices: a computer on which the secure browser (SEB) would be installed (see later) and a second device

connected to the zoom application that would allow observing the environment where the applicant took the test, with a camera and microphone. permanently open in order to ensure, to the extent possible, that the applicant took the exam without “external help.” The examinees were distributed in small rooms with no more than 9 applicants, with the camera of the device connected to the zoom focusing on the head, hands on the keyboard and the screen of the personal computer (PC), supervised (zoom screen and audio). by a jury in each classroom. The access of each evaluated professional to the written exam program would be done from the SAP website through their DNI number, personal SAP password or user and a final and common password, “examiner password” informed by the technical team in the time to start the exam. The program is prepared to admit a single open exam session per DNI number, which prevents another person from accessing the exam simultaneously. Each open exam is followed by the technical area through the system.

The exam application includes the “Appeal” function in each question, a free text field in which the applicant can request a review of the question from the CEP. At the end of the exam, members of the CEP technical secretariat analyze the appeals (review of the evidence that supports the question and/or consultation with experts in the specialty) and determine whether or not the appeal results in the cancellation of the question. Once the evaluation is completed, the program saves each exam by DNI number in an exam database for each specialty. Another important aspect in the transition to a remote exam was the need to optimize security on the device with which applicants would access the exam. For this purpose, a user license was activated for the SEB (Safe Exam Browser), a secure browser that avoids screenshots, emergency notifications and only allows you to “browse” the exam. Once the exam is finished and the appeals have been defined, the software automatically corrects it. Finally, a central element in the preparation and logistics of applying certification exams is the establishment of standards or cut-off points (self standard), which support decision-making, in this case whether or not to grant certification. The cut-off modality to decide the approval of the written test is defined according to the number of professionals evaluated (11).

In Pediatrics and Pediatric Intensive Care, given that on each exam date more than 100 tests are administered throughout the country, the passing cut-off point is determined with 80% of the average of the 5% of the highest grades achieved in that evaluation or with 70% of the total questions, choosing between both the value that favors the approval of a greater number of applicants. In the case of the rest of the Pediatric Specialties, the writing has 100 to 120 questions and is approved with 70% correct answers. On some occasions it was modified, but it was never less than 65% correct questions. The cut-off point, a Once calculated, it is manually entered into the system for each exam taken and it returns the list of approved and failed students. Each applicant receives an automatic email informing them whether or not they passed the written exam. Next, those approved receive an email with the schedule and the zoom link to connect to the oral exam.

- Oral exam.

It was carried out in person at the different locations in the country until 2019. Currently, remote examination tables are formed, made up of pairs of jurors belonging to different geographical and institutional areas of the country who, connected remotely through the zoom application, are distributed in small rooms. The allocation of applicants to each examination table is done at random, but avoiding conflicts of interest that could arise when the jury and the applicant belong to the same training center. The technical and administrative secretariat coordinates the flow of applicants to the examination tables arranged in the small Zoom classrooms, provides advice to the juries when required,

arranges the times of use of each “clinical case package” and organizes the third case instances. definition in cases where necessary. These functions are carried out through the zoom application, with the implementation of meetings between members of the technical secretariat and juries in different small classrooms, isolated from the certification applicants, through simultaneous WhatsApp groups in which the juries are coordinated. by one of the members of the technical secretariat and, sometimes by telephone, which allows consensus on problem-solving or decision-making strategies.

Applicants must pass two cases to pass the oral. If they only approve one case, they go to a second evaluation instance, with a different case and juries, and if they do not approve either of them, they disapprove the evaluation instance. At the end of all the exams, a survey is sent to applicants and jurors, designed ad hoc for each group, which explores the degree of satisfaction with different aspects of the written and oral exam, and its application in a remote environment, including a free field to propose improvement strategies.

3. Results

Since September 2020, the completely remote certification exam was implemented for 1,582 professionals, 750 corresponding to pediatric certification and 832 to pediatric specialties. The passing percentages are shown in Table 1. The psychometrics of the multiple-choice exams and the validity analysis are not a matter of discussion in this article.

Especialidad	Año 2020-2023	Presentes	Aprobados	Desaprobados
Pediatria	2020	166	100	66
	2021	197	108	89
	2022	213	106	107
	2023	174	99	75
Terapia Intensiva	2020	85	44	41
	2021	86	60	26
	2022	70	42	28
	2023	92	48	44
Neonatología	2020	28	15	13
	2021	43	25	18
	2022	28	9	19
	2023	21	10	11
Otras Especialidades	2020	113	86	27
	2021	97	77	20
	2022	83	63	20
	2023	86	58	28
Totales		1582	950	632

Table 1. Results of the 2020-2023 Certification exams.

Among the difficulties that had to be faced include, as has also been reported in the bibliography, those inherent to accessing the online system from the applicants' locations, through different Internet providers with wide variability in terms of bandwidth, speed and stability in service provision (9, 12). The most important “catastrophic events” in our remote exam experience occurred in 2020, the first year of its implementation, and were the interruption in the supply of internet by a third-party provider and the delay in the circulation time of the questions and answers on the own server on which the exam program is running. The catastrophic events recorded, as can be seen in Table 2, can be grouped into two general categories: those related to the SAP (server and internet provision) and those that refer to difficulties inherent to each applicant.

The “SAP Difficulties” included two types of events, firstly, difficulties with the SAP server dependent on the high number of professionals running the exam application simultaneously, the consequence of which was a slowdown in the circulation of the exam questions . The solution to this problem was achieved by modifying, in the application on which the remote exam is developed, the frequency of the automatic backup of each exam, which significantly impacted the fluidity of circulation of questions and answers without registering a negative impact on the security of the exam. data storage. The second type of

events, linked to the SAP, were limitations in bandwidth and interruption of internet provision. The solution strategies for these events were, initially, the reorganization of the applicants who took the exam into subgroups that entered it in a staggered manner, which allowed greater speed in the development of the test, the temporary hiring of a second internet provider that could correct a possible interruption of the service and, finally, the implementation of a second server in the cloud, which acts as a backup of the physical server and is activated according to the performance of the application in each exam, also allowing the location of the coordinating and supervisory group to be easily and quickly moved. These solution strategies determined that no difficulties inherent to SAP were recorded since November 2021.

Table 2 . Catastrophic events during remote exam implementation

YEAR	Exam Written	Presents	SAP difficulties		Applicant Difficulties	
			Server	Internet	With the provision of internet	With technological equipment and/or technical assistance
2020	Specialties	226	Yes	Yes	2	3
2020	Pediatrics	166	Yes	Yes	No	0
2021	Specialties	226	Yes	Yes	No	5
2021	Pediatrics	199	No	No	0	5
2022	Specialties	181	No	No	0	0
2022	Pediatrics	213	No	No	0	5
2023	Specialties	199	No	No	0	0
2023	Pediatrics	174	No	No	2	3

With reference to the events linked to the examinees, one group is secondary to difficulties in the provision of the Internet, in a country that is geographically extensive and heterogeneous in terms of the quality of service provision. The remediation strategies included anticipating the possibility of these events to the applicants, recommendations about looking for “safe or efficient” supply locations with fewer simultaneous connections to the same service, and trials or tests that allowed them to some extent predict the operation. for the actual exam. The events linked to the technical equipment were related in some cases to the operating system on which the SEB was executed, having observed greater difficulties when it was developed on Mac IOS than on Windows, a consideration that was anticipated at the time of registration for the exam and allowed circumvent this difficulty. There were also difficulties related to errors in the installation of the SEB, the implementation of mandatory participation in rehearsals or exam tests is the strategy that allows minimizing this type of difficulties as the installation and testing of the application has necessarily been completed in advance. to the real exam.

Table 3. Survey of jurors participating in the Specialties and Pediatrics exams. Likert scale: 1 strongly disagree, 5 strongly agree. The percentages are based on having responded between 4 and 5 (agree and strongly agree).

	YEAR 2020		YEAR 2023	
	Specialties	Pediatrics	Specialties	Pediatrics
Number of jurors who responded	70/155 (45.1%)	94/120 (78%)	58/151 (38.4%)	58/85 (68.2%)
The exam was well organized: agree	94%	89%	93.2%	94%
Support during the exam was adequate: agree	95.7%	96%	90%	93%
Zoom for orals easy to implement: agree	82.9%	85%	86.2%	95%

The degree of acceptance of the completely remote exam by the applicants who took it as well as those who participated as jurors, both in the supervision of the written exam and the oral exam, was measured through surveys sent at the end of the exam day of each anus. They consisted of different statements and the degree of agreement or disagreement was recorded on a 5-point Likert scale with 1 being “strongly disagree” and 5 being “strongly agree.” The summary of the results is shown in tables 3 and 4. More than 90% of those who participated as judges considered that the exam was well organized, the problem resolution and support during difficulties was adequate, and the oral exam via zoom It was easy to implement. These percentages have been sustained throughout these 4 years. Regarding the opinions of the certification candidates, more than 80% considered that the SEB installation instructions and the mock exam were useful. 72% or more considered that the support provided in the face of difficulties during the development of the exam was adequate, 73% or more rated the remote exam experience between 4 and 5 overall. In relation to the time granted, in 2020 half considered it insufficient, and in 2023 more than 70% considered it adequate. Today the exam flows without delays and allows each block of 100 questions to be completed in an average time of two hours.

Table 4. Survey of applicants participating in the Specialties and Pediatrics exams. Likert scale: 1 strongly disagree, 5 strongly agree. The percentages are based on having answered between 4 and 5 (agree and strongly agree).

	YEAR 2020		YEAR 2023	
	Specialties	Pediatrics	Specialties	Pediatrics
Number of applicants who responded	130/226 (57.5%)	131/166 (79%)	96/129 (74.4%)	92/174 (52.9%)
The instructions were clear	80.2%	78.6%	93.2%	85.8%
Pre-exam test was helpful	88.5%	87.8%	82.7%	85.9%
Adequate computer and technology support	72.3%	82.5%	71.9%	72.8%
The time was enough	54.6%	52.2%	70%	70.7%
Overall Rating of the Remote Exam Experience	73.%	79.5%	76.1%	76.1%

4. Discussion

The covid 19 pandemic represented a global challenge for educational and health institutions to adequately continue with evaluation activities, both training and certification of professionals. This forced the use of electronic proctoring technology as the possibility of fraud during testing could have been increased. These supervision tools generated, in our experience and that of other reports (13), different inconveniences for both those taking the exams and those taking the exams (14).

Remote supervision instruments vary according to different experiences and range from the use of web cameras (like ours and the one reported by Kharbat & Ajayeb (13)) to none, appealing to the honesty of the performer and emphasizing the time spent. offers to carry out the exam and in the random sending of questions to each examinee (15). Another experience in our country is the one reported by Silberman (16) in which technical difficulties and situations of fraud are also mentioned.

The problems that our group faced that had to do with the connectivity of those who performed were also reported by other authors (14). Over the years, the number of events compared to the number of applicants who took the exam is negligible and does not alter the normal development of the exam. As we said previously, there were no events that depended on SAP since 2021. The experience gained and paying special attention to the observations that the applicants and the juries made in the surveys made us adjust the logistics and have a more preventive attitude towards possible events.

Although the first experiences of 2020 had a high number of difficulties related to malfunctions of our server or our internet connection over the years, depending on the implementation of improvements such as the staggered entry of applicants to the remote exam , security and efficiency considerations of internet providers and the implementation of a virtual server in the cloud, were decreasing until a completely stable exam was achieved in 2023. Events related to the individual connectivity of those taking the exam are not feasible forecast or improvement by SAP. The degree of acceptability of those who participate as jurors increased as they became more trained in the dynamics of the exam. For applicants, we also achieved high rates of acceptability and compliance by optimizing the SEB installation instructions and training tests, as well as the general logistics of the exam. The supervision of the applicants while they performed through the cameras and open microphones of the zoom application provided the peace of mind for the applicant to have a SAP representative to consult in the event of difficulties, and for the jurors to directly observe any situation suspected of fraud. . The oral exam taken via Zoom allows jurors from anywhere in the country to participate without leaving their home or workplace, saves travel costs, allows exchange between colleagues and avoids conflicts of interest. The percentage of passes in certification exams has remained stable over the last 10 years, a fact that contributes to the security of the remote exam strategy implemented.

5. Conclusion

- The reorganization of the exam execution strategy in a remote modality, with the implementation of specific tactics to avoid possible catastrophic situations, made it possible to achieve a safe, stable exam, with adequate fluidity in its development and with high rates of acceptability for both those who They perform as well as those who take the Certification exam of the Argentine Society of Pediatrics.

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